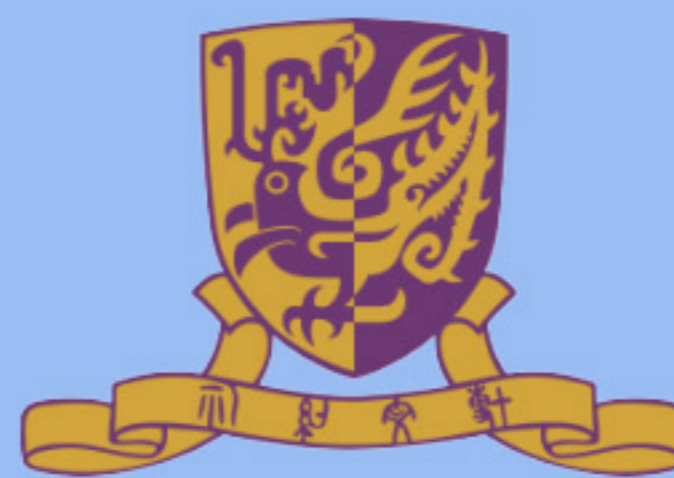


The Chinese University of Hong Kong  
12 - 14 December 2007

# Proceedings of the International Conference on Siting of Locally Unwanted Facilities: Challenges and Issues



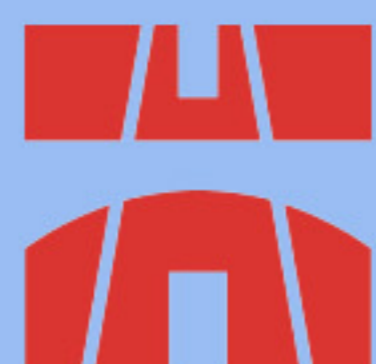
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Proceedings of the

## **International Conference on The Siting of Locally Unwanted Facilities: Challenges and Issues**

12 – 14 December 2007

The Chinese University of Hong Kong  
Hong Kong S.A.R.

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# Keynote Speeches

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***Visions of the Future for Facility Siting***  
*Daigee Shaw*



# **FACILITY SITING: THE THEORY-PRACTICE NEXUS**

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## **Abstract**

The paper focuses on the relationship between the production and utilisation of knowledge in the siting of facilities. It suggests that the siting literature has evolved over time and has moved away from seeing siting as a technological problem to seeing siting as social and political problem facing all nations. It has developed into a fully-fledged literature which uses a full range of theoretical and methodological approaches to explore siting conflicts and their management and has produced a variety of middle-range theories to explain the management of siting conflicts. The literature is highly policy relevant and can provide not only important conceptual insights to siting practitioners in terms of basic perspectives and orientations, but can also offer important instrumental insights in strategic and functional terms. The challenge for the literature in the future will be to build on these achievements and address several theoretical and empirical shortcomings in ways which are seek to fulfill the needs of siting practitioners.

## **1. INTRODUCTION**

Being a siting practitioner is not an easy task.

The siting and development of a range of projects, such as waste repositories, prisons, energy facilities, airports, and industrial projects, has and continues to be a lightning rod for social and political conflict in all nations alike. States and firms may need to develop such projects to provide a range of social and economic benefits for the national community. Yet, while local community interests may agree with the broader social need for these projects, they often oppose them vigorously as they perceive them imposing significant costs, such as environmental degradation, unacceptable levels of risk and disruptions to social relationships, on their communities. These responses often create considerable conflict and can delay or even cause abandonment of facility plans.

Siting is clear a case of contentious politics which can impose significant costs on stakeholders. Siting is a significant policy issue, which impacts on the achievement of state, corporate and community objectives. Disputes have been costly for states particularly where projects are needed for national technological, economic and security objectives. Conflicts have often been costly for developers and include increased uncertainty over capital cost escalations due to inflation and interest repayment burdens. They have also be costly for local communities as they have, for example, altered existing social and political relationships and levels of social capital within those communities. Such outcomes might be beneficial, since the grounds for opposition might be well-based, but they may be, in other cases, socially undesirable since failure to site such facilities might carry opportunity costs which are felt by other communities.

Practitioners confront a complex range of information, much of which is incomplete and ambiguous when contemplating the siting of facilities. They may have incomplete information about the about the magnitude of changing societal needs for projects they are planning. They may not be clear about the character of the stakeholders with whom they will need to negotiate in

order to win agreement for the siting of projects. They are more than likely to be uncertain about the preferences and underlying motivations of these stakeholders and how they will respond to siting processes. They may have conflicting information about which strategies and policy tools might work and which ones might not work. Furthermore, in many cases, as the stakes involved in these conflicts are large, such as capital expenditures, getting any of these things wrong can be extremely costly for stakeholders.

Reflecting the increasing importance attached to siting as a social and policy problem, there has been a growing literature on the *production of knowledge* about the origins and management of conflict in the development of unwanted projects. Over the last thirty years or so, social scientists, including economists, geographers, historians, political scientists, sociologists and psychologists, have developed a range of theoretical explanations which seek to account for recurring patterns of behaviour and discourse in siting controversies over time and across space. They have offered diverse explanations of siting processes, issues and outcomes using a wide range of political, economic, demographic and technological variables. They have used a various competing theoretical and methodological approaches in seeking to explain and interpret siting controversies. While the field is relatively new, it has developed into a rich multi-disciplinary field of inquiry.

Contemporaneously, there has been a growing literature on the *utilisation of knowledge* by a range of social scientists in a variety of policy fields, both domestic and international. This literature has sought to explain the relationship between knowledge production and utilisation in policy processes. It has sought to a range of develop models to investigate the use and impact of research on practical politics and policy and the processes through which knowledge production finds its way into knowledge utilization (Stone et al., 2001). One recurring theme in this literature relates to understanding and analysing the factors, such as the cultural gap between scholars and practitioners, the validity and reliability of research and the ways in which research is useful for practitioners involved in practical political processes.

How is it possible to make sense of this diverse scholarly siting literature and its possible usefulness to siting practitioners? What have been the major developments in the siting literature and what does the evolution of literature tell us cumulatively about siting? Have siting scholars developed theoretical explanations which are robust? To what extent have scholars of siting left their ivory towers and have produced explanations of siting processes and outcomes which are of practical relevance to stakeholders? If so, what does the knowledge utilization literature say about the potential utility of scholarly literature for practitioners? How can we understand the ways in which the production of knowledge can be utilised by siting practitioners? This paper brings together these two literatures and investigates the relationship between theory and practice in siting.

## **2. KNOWLEDGE PRODUCTION**

The social science literature on siting represents an effort by social scientists in knowledge production by seeking to account for issues, processes and outcomes involved in the siting of a wide range of facilities. Social scientists are not unified in positions and approaches to the production of knowledge. They have differing ontological views (whether there is a real world out there or whether that world is socially constructed), epistemological orientations (how do we know what we know about the real world), theoretical views (what are appropriate theories and what variables should be included), and methodological views (what are the most useful methods for understanding the social world). These differences produce varying, yet, important explanations of siting controversies and their management.

## 2.1 Subject Matter

The facility siting literature covers a wide range of projects, both domestic and international. Of particular importance has been coverage of controversial, high-risk projects such as nuclear power plants, waste repositories, and large-scale industrial projects such as chemical facilities. It also has analyzed other a host of other projects which might appear at first site to be less controversial, but can actually generate significant community conflict. These include libraries, wind farms, hospitals and other medical facilities, museums, movie production facilities, and bridges. While domestic projects constitute the bulk of the literature, it has also covered projects that cross borders of sovereign states or whose impacts are perceived to cross those borders. These include nuclear facilities that are located close to other states (Loefstedt, 1996) and oil and gas pipelines which transit two or more states (Hansen, 2003).

Developing projects generally requires a planning stage (site selection) and an implementation stage (public acceptance, licensing, construction, operation and decommissioning). While it is often not possible to separate out these stages analytically because of overlap, it is possible to highlight the key features of them. Site selection typically involves the use of technical criteria, such as the existence of suitable terrain, and the availability of resources such as land, to establish a pools of least-cost candidate sites from which a site would be eventually selected. Public acceptance generally involves political processes aimed at securing community acceptance of projects at selected sites. Licensing involves a regulatory process of government seeking to balance the expected social and economic benefits and risks of facilities. The subsequent stages of project implementation typically involve optimisation processes, whereby developers seek to minimise construction, operation and decommissioning costs (Lesbirel, 1998).

The earliest comprehensive review of the siting literature focused on planning and site selection, particularly the use of numerical methods to select least-cost sites on which to develop projects (Jopling, 1974). It surveyed the site selection literature focusing on the use of technical criteria in site selection such as the existence of flat and stable terrain, the availability of cooling water, a relatively low population density (particularly for nuclear plants), accessibility to transportation routes, and proximity to major load centres. It also investigated the use of different numerical methods (attaching numerical scores to site selection criteria) in establishing pools of least-cost candidate sites from which a site would be eventually selected.

Since that time, the siting literature has grown significantly and is still growing. Several books have been written about siting and articles on siting can be found in many journals. The bulk of this growth in the literature has focussed on the social and political aspects of siting particularly during the public acceptance stage. This has reflected the increased political difficulties of siting and an attempt by social scientists to explore the origins and management of siting conflicts. Examinations of the other stages of implementation have tended to take a back seat in the literature. This is perhaps not surprising given that the regulatory and economic optimisation processes involved in implementation (including decommissioning) only become relevant once public acceptance has been achieved, in whatever form. It is timely to review the literature in the context of social science.

## 2.2 Theoretical Approaches

We can understand this growing literature by reference to the ontological and epistemological approaches to the production of knowledge (Hay, 2002). Ontology is a theory of being. The key question is whether there is a real siting world out there that is independent of our knowledge of it. For instance, are there *fundamental* differences between the risks of nuclear projects and wind farms? Foundationalists might agree and argue that these differences persist across space and time and that these differences provide a critical foundation upon which to explore siting

disputes. In contrast, anti-foundationalists would most likely argue that these differences are not *fundamental*, but are particular to different times, cultures and circumstances. They would argue that there are not objective differences between the risks of different projects but that any differences are socially constructed and that these social constructions have a significant bearing on siting processes.

The ontological positions that social scientists adopt influence their epistemological positions on scientific claims or what we can know about the siting world and how we can know it. For example, are there real or objective relationships between risks and the degree of difficulty in siting different projects, and can we observe these relationships directly. There are three general positions. Positivists would argue that it is possible to understand this relationship through theory and to test that relationship by direct observation (Halfpenny, 1982). Interpretivists would argue that the world is discursively or socially constructed (Foucault, 1977), it is not possible to observe siting phenomena directly, and that it is crucial to identify the subjective interpretations or meanings attached to the risk-siting difficulty relationship. Realists sit between positivists and interpretivist (Sayer, 1992). They would argue that there is a real and objective risk-siting difficulty relationship, but that there are also deep but unobservable, social, economic and ideological structures which would account for differences in siting phenomena.

These competing ontological and epistemological positions underpin a diverse range of theoretical and methodological approaches used in analysis of siting conflicts. I use a framework contained in (Marsh & Stoker, 2002) to review briefly the siting literature in terms of these competing positions and approaches in the social sciences. It treats institutional, behavioural and rational choice theory as the dominated foundational approaches contained in the siting literature. It categorises feminist theory as a foundationalist approach, but recognized the increasingly strong tendencies towards anti-foundational approaches. Interpretive theory is classified as the anti-foundational approach. Finally, it considers normative theory from the perspective of both ontological approaches.

Institutional approaches to siting are concerned with exploring the institutions, rules, procedures of the political system and the impact on siting politics through organized knowledge which is theoretically informed. They cover organisational structures and relationships between different arms of government as well as the impact of policy networks on politics and policy outcomes. An important perspective is that they treat government, not in organizational terms, but as an association of heterogeneous political actors in their own right with their own political interests. Weingart (2001) shows that the nature and structure of state institutions influenced the inability to site low level radioactive waste sites in New Jersey in the second half of the 1990s. While the state government was creative and flexible, and while there was some organized resistance, there were significant bureaucratic constraints resulting from different policy goals and overlapping jurisdictions which ultimately prevented the state from managing siting conflicts. McAvoy (1994) highlights how the siting of waste facilities in Minnesota was problematic even when strong elite policy networks comprising government, industry and environmental groups (led by the Sierra Club) agreed that solutions were acceptable. While local citizens' groups did not impact on state autonomy, they were able to derail siting processes and influence significantly the capacity of the state to achieve its siting objectives.

Behavioural approaches seek to explain political behaviour of different stakeholders involved in siting conflicts through the development of falsifiable statements which are then tested against the evidence. They emphasise the question of why people at the individual and aggregate levels behave politically the way they do and how do we account for their behavior in siting conflicts. They focus on observable behaviour and use of theory and explanation to develop a casual account of the relationships between behaviour and siting, using systematically all the relevant evidence. Lober (1995) discovers that behavioural opposition declines more quickly with distance than attitudinal resistance, suggesting that self interest rather than attitudes

are crucial in explaining varying behavioural responses to siting facilities. Dear (1992) and Hunter and Leyden (1995) provide some evidence to show that more educated, younger residents with higher income are more likely to oppose facilities. This provides some explanation to explain why some observers have suggested that project developers seek to locate unwanted projects in poorer areas which are characterized by less educated and non-white residents (Bullard, 1990; Been, 1994; Kruize et al., 2007).

Rational choice theory focuses on political choices made by rational, self-interested individuals and seeks to develop general laws regarding these choices. It argues that political actions by stakeholders involved in siting can be understood in these terms. It assumes a rational capacity by stakeholders to choose among alternative course of action the one that they believe is likely to have best overall outcome. It therefore seeks to explain political choices that stakeholders make and the resultant outcomes in terms of courses of action or strategies given preferences over goals and beliefs about what influences the preferences of other actors. Frey and Oberholzer-Gee (1997) use rational choice theory to explain the crowding-out effect of monetary compensation. They found that in a Swiss case that the level of acceptance to facilities drops when compensation is offered because intrinsic motivation is partially destroyed (reducing the option of indulging in altruistic behaviour) when price motivations are introduced. (Hamilton, 1993, 2005) uses a discrimination model to explore locational features of projects. He argues that profit-maximising firms are likely to select sites where there are low income and education levels as there is a relatively low willingness to pay for the environment. As firms care about political opposition, they prefer to locate in minority areas as a lack of or weak collective action requires relatively less internalization of negative spill over effects.

Feminist theory stresses the impact of and challenge to the structure of patriarchy (rule by males) as a form of power in political processes. It argues that there has been a gender blindness in foundationalist approaches and explores the nature and importance of gender in understanding siting conflicts. The theory expands the political debate from the *public* to the *private* sphere. Given evidence that women tend to attribute higher risks to siting-related activities than males Slovic (2000), it provides insights into the relationship between gender, power and the management of siting conflicts. Brown and Ferguson (1995) argue that women constitute the majority of both the leadership and the membership of local toxic waste activist organizations, and show how women activists transcend private pain, fear, and disempowerment and become powerful forces for change by organizing against toxic waste. Bantjes and Trussler (1999) agree, arguing that the fit between the community health focus and women's traditional role (the motherhood effect) enables women to play a central organizational role in anti-waste movements. They conclude that women have greater structural availability than men do in fighting toxic waste projects as they are less likely to be in the labour force and that housewife activists can form stronger local female networks, based on ties of kinship and domestic labour, to provide powerful opposition.

Interpretivist theory represents the anti-foundationalist approach and generally rejects foundationalist approaches to social science. Dismissing the notion that a real world exists, it focuses on the structuring of social meaning as central act in siting controversies and argue that the system of meaning (discourses) shape way people understand political activity involved in siting. It sees political actors, institutions and practices as only making sense within particular discourse in terms of the use of language, symbols, and the structuring of siting debates. Siting conflicts are viewed in terms of the production, functioning and changing of discourses relating to key aspects of siting processes, such as equity and identity. These conflicts are conflicts between different forces trying to impose ideas (structures of meaning) on each other. Hubbard (2005) applies discourse theory to the siting of an asylum facility in England. He clearly demonstrates how opposition could create a dominant discourse between self (local citizens) and others (asylum seekers) by emphasizing a social construction of the "other" as a burden on the

community and a potential security risk, thereby threatening the identity of the English countryside. Haggart and Toke (2006) show how opponents to wind farms in Wales were able to dispel claims of NIMBYism by developing a discourse which challenged wind farms as clean technology by appeals to the notion of intrusion into unspoiled areas and the use of the language such as wind energy power station (image of large factories with smoke) as opposed to wind farm (images of being part of the countryside).

Normative theory concerns the discovery and application of moral notions to siting practice. It explores the goals, values and processes of society that should be pursued such as equity (equal distribution of benefits and burdens), liberty (rights of government to interfere with choices by local communities) and efficiency (maximizing siting outcomes with least costs). In short, it addresses a central question of what ought to or should be and examines alternatives open to society by elaborating a “best blueprint for society.” Foundationalist and anti-foundationalist approaches all have range normative perspectives. Institutional, behavioural and rational choice approaches generally stress the need for approaches to siting which are fair, workable, just, transparent and legitimate and the importance of institutions in achieving these normative goals. The feminist literature has stresses gender and other inequalities in terms of the siting of projects. Interpretivists stresses the discursive aspects of siting and view siting conflicts as importantly being a contest of competing ideas and discourses, all of which have normative foundations.

It is important to note that these competing theoretical perspectives are not mutually exclusive. The literature contains a variety of examples of multi-theoretic approaches to examining siting conflicts which attempt to provide more theoretically integrated approaches to understanding this issue. (Hecht, 1998) uses both institutional and behavioural analysis to explore the interactions between fragmented institutional decision making and the behaviour of stakeholders in managing siting conflicts in rural France. (Sakai, 2005) combines social choice and normative theory to develop a formal model of siting which posits site selection in a way which maximizes social welfare and to share the value equally through monetary compensation and that such a approach would be robust to strategic manipulations. Haggart and Toke (2006) explore wind farm siting conflicts in England and Wales and show how siting discourses related to the behaviour of key stakeholders.

### **2.3 Methodological Approaches**

The literature also employs competing methodological approaches to the analysis of siting conflicts and their management. The literature is replete with the use of qualitative analyses which have generally used case-studies and narratives (often based on interviews and focus groups) to explore siting conflicts. These have been particularly useful in examining siting decision processes and outcomes, policy tools that states use in managing siting processes, motivations and strategies supporters and opponents in siting disputes, understanding the experiences of stakeholders in siting conflicts and the meanings they attach to these experiences, and in drawing attention to the broader social, political and historical contexts in which siting conflicts are played out.

The use of quantitative approaches is also abundant in the siting literature. These methods include univariate, bivariate and multivariate techniques to provide statistical insights into siting conflicts. They seek to explore statistically relationships between a dependent and explanatory variable and assess the strength of those relationships, using both experimental and observational data. They have been useful for analysing the socio-economic locational characteristics of projects in terms of environmental justice (Been & Gupta, 1997) and levels of social capital (Aldrich, 2007), the relationship between compensation offers and the crowding out of civic duty in siting facilities (Frey & Oberholzer-Gee, 1997), the relationship between auctioning strategies



and compensation costs in siting (Quah & Tan, 2002), and the relationship between public acceptance times and the structure of the bargaining environment (Lesbirel, 1998).

Finally, the siting literature has also used comparative methods to further enhance our understanding of siting processes and outcomes. These methods aim to explore explicitly and systematically differences and similarities between siting processes and outcomes and can involve intra- or inter-country comparisons, both across space and over time. Much of the earlier siting literature focussed on North American cases, although over time the country coverage has expanded to include a wider variety of settings in Europe, Asia-Pacific and elsewhere. Many of these studies are comparative in the sense that they compare different siting outcomes within these nations. An important development has been the increase of inter-country comparative analyses, include alternative siting strategies in the US, Canada and other advanced nations (Rabe, 1994; Munton, 1996), failure and success in siting (Vari et al., 1994), transaction costs and institutions in industrialised nations (Lesbirel & Shaw, 2005), state management of civil society in advanced nations (Aldrich, 2007).

## **2.4 Explanatory Utility**

The range of theories used in the siting literature represent attempts by social scientists to account for recurring processes, issues and outcomes involved in facility siting. The extent to which these theories are useful in explaining the real world of siting will be importantly determined by the empirical validity of causal relationships between the variables contained in those theories, and the extent to which the theories explain siting phenomena in general terms.

The literature has identified a wide range of variables to understand the origins and management of siting conflicts. These include: risk, trust, distribution of burdens, demand for environmental quality, compensation and mitigation, legitimacy, public participation, power, political party structure, social capital, strategy and the like and has explored the empirical relationships between these variables and siting difficulties. For instance, Jenkins-Smith and Kunreuther (2005) explore the relationship between the use of compensation and changing degrees of opposition for projects of differing perceived risk levels in the US. They find that there is likely to be less resistance to the use of compensation for projects which are perceived to be less risky. Kraft (2000) stresses the importance of policy design in siting nuclear waste repositories in the US and Canada. He concludes that Canada had adopted a more deliberate pace of policy development (including extensive public participation) while the US had adopted a more rushed pace with respect to its policy development.

While uni-causal explanations in the social sciences might provide useful, partial understandings of siting processes and outcomes, the literature has developed sophisticated multi-causal models which highlight interactions between different independent variables. Such models generate better explanations of siting conflicts. Rabe et al., (2000) shows explores the relationship between voluntary siting strategies and trust, legitimacy and risk and shows how siting became derailed when authority shifted from a public to private implementing agency. Aldrich (2007) explores the relationship between demographic, political and civil society variables and probable siting outcomes in Japan, demonstrating the state-planned projects are more likely to be located and implemented in communities where civil society is less concentrated and relatively weak.

An important feature of the siting literature is that there is no general theory of siting, but rather a variety of middle-range theories. General theories are wide in the scope of their general applicability and are characterized by little conditionality in their conclusions. They explain broader patterns of behaviour and discourses that persist, both across space and over time, with the use of a relatively small number of explanatory variables. The siting literature has not yet produced general theories such as positivist or interpretivist theories of siting. In contrast, the

siting literature is replete with a variety of middle-range theories which are which narrower in scope and have more conditionality in terms of their conclusions. Such theories tend to be more problem-oriented and focus on specific set of issues, strategies, policy instruments and the like in specific social and historical contexts. While they are related to more general social science theories and provide important insights, they are often based on a limited number of observations or cases and tend to produce contingent generalisations (Lane, 1990; Wilson, 2000; Jentleson, 2002).

Cumulatively, the siting literature has explored the origins and management of conflict in the siting of a wide range of facilities. It covers a full range of theoretical and methodological perspectives, although the literature is dominated by foundationalist approaches. It identifies a key set of variables and, importantly, demonstrates reasonably well how the inter-relationships between these variables influences siting processes and their outcomes in complex ways. These analyses have enhanced our theoretical knowledge of different aspects of siting in a host of different social, political and historical contexts. While the literature has not developed general theories of siting, it has developed a range of middle-range theories which are important in understanding issues, strategies and policy instruments.

### 3. KNOWLEDGE UTILISATION

A continuing theme in the knowledge utilization literature relates to the nature and extent of a cultural gap between academia and policy practitioners (Stone et al., 2001). This is often referred to as a *two communities* model (Caplan et al., 1975). One view is that this gap is due to the different ways that both camps produce knowledge. Scholars generally see knowledge as deriving from theory. Policy practitioners generally view knowledge as stemming from experience and commonsense based on their involvement in real-world social and political processes. One observer has gone so far as to say that academics are from Mars while policy makers are from Venus (Birnbaum, 2000). This model posits that that academic and policy communities are distinct, that there is very little interaction between the two, and that there is limited use scholarly knowledge by policy practitioners (Caplan et al., 1975; Booth, 1988; Eriksson & Sundelius, 2005).

Policy practitioners, just like academics, also have theories of their own relating to the management of siting controversies. Practitioners have theories which guide them in identifying goals in siting processes and considering, evaluating and choosing alternatives courses of action to develop projects. In doing this, they have to decide, amongst other things, which information to use, which stakeholders matter, which events need priority, which strategies they will employ and in what order, and which policy instruments and in which combination they will use to achieve their goals, whatever they may be. These theories might derive from insights contained the scholarly literature, previous experience in the siting of facilities by them or others, rules of thumb or some combination of these.

Indeed, Hamilton (2005) notes that siting policy debates amongst practitioners in the United States can be understood in terms of competing theories to which policy practitioners subscribe. He observes that some decision makers expressed a preference for an approach which generally left siting in the hands of private developers but specified a process of explicit negotiation between developers and communities, buttressed with compensation mechanisms that sought to offset negative expected social and environmental costs to local communities. He notes that others advocated an approach which involved centralised decision making power where the state had the authority to initiate siting processes and would have preemptive powers whereby it could override the zoning powers of local governments. Hamilton argues that these policy debates centered on whether states approached the management of siting conflicts through a market model or a firm's decision making model.

How can we evaluate the potential utility of scholarly research for siting practitioners? The knowledge utilization literature provides a useful entry point. It identifies two major uses of research. The first is *conceptual* use of knowledge and the ways in which it can assist practitioners in the basic orientations and broader perspectives to resolving social and political problems. The second is *instrumental* use of knowledge and concerns the ways in which the literature can assist practitioners in more strategic and functional ways (Caplan et al., 1975; Weiss, 1977; Jentleson, 1990; Walt, 2005). I apply these notions to evaluate the ways in which the siting literature can be helpful to siting practitioners.

### 3.1 Conceptual Utility

The history of the siting literature reflects a major paradigm shift during the 1980s and 1990s. As a result of the emergence of siting difficulties in the 1970s and 1980s in democratic nations, there was a basic change in awareness and a theoretical reorientation from one which stressed coercive approaches to siting to one which emphasized more participatory democratic approaches. The use of numerical least-cost approaches to site selection was closely associated with DAD (decide-announce-defend) approaches to managing siting conflicts. Developers, after selecting least-cost sites, would either sought to ride out community opposition or attempt to override community interests. Typically, secret discussions would occur between developers and political and other commercial elites in local communities with no public consultation. Developers would obtain relevant preliminary construction and other licensing permits. Once siting proposal became public (either by accident or by intentional leaks), developers would either seek to ride out any community opposition that emerged. Where this opposition was perceived to be strong or likely to become more intense, local governments would also seek to override that resistance through the use of zoning and other laws such as eminent domain (Kunreuther, 1995; Munton, 1996).

As the literature demonstrates, such coercive approaches to siting have generally not worked for some time (Kasperson, 2005), although Aldrich (2007) provides some qualification, suggesting that states do use coercive methods in siting some facilities. In democratic countries, communities are generally powerful enough to delay or stop the development of projects that they perceive to be risky. Many states still have the legal and constitutional authority to impose environmental burdens on community interests (through the use, for example, of eminent domain). Yet, increased demands for more voluntary and democratic processes, power sharing, and transparency, coupled with more awareness of environmental risks, equity issues and mistrust in public institutions, have effectively meant that communities have veto power over project placement decisions. As Morell and Magorian (1982) conclude, governments can strip away a the legal power of communities, but they cannot strip away their political power.

An important feature of the literature is that it is highly policy relevant and has provided overarching perspectives which seek to assist practitioners in the management of siting conflicts. The most seminal in this regard is the *Facility Siting Credo* (Kunreuther et al., 1993). The fundamental theoretical orientation of the Credo is that the key features of siting conflicts are disagreement over values and goals, a tendency to wish to maintain the status quo and a lack of trust. Based on this, the Credo suggests a range of guidelines with the aim of achieving a more deliberative, workable and fairer siting process for all stakeholders. The Credo has formed the basis for subsequent policy-relevant research on siting. Many analyses of siting have tested the validity of the Credo or have used it as a basis, either implicitly or explicitly, for developing further analysis and practical recommendations.

Particularly noteworthy is the development of a stepwise approach for nuclear waste facility siting which draws heavily on the Credo (OECD, 2004; Pescatore & Vári, 2006). This approach stresses the reversibility of decisions after reconsideration of one or a series of steps at

various stages in the siting process. The key theoretical perspective relates to participatory democracy and new forms of risk governance and in particular that decision making should be open and provide the flexibility to adapt to contextual change, that social learning should be facilitated, and that there should be public involvement in siting processes. Importantly, the study argues that siting decisions are already being made in a stepwise and participatory way and that there has been a significant move to increased participation in siting processes in Europe and elsewhere.

These guidelines highlight the importance of interactions between scholars and siting practitioners in providing broader conceptual perspectives and insights into the management of siting processes. The Credo was generated from a workshop which included scholars principally from MIT, Harvard and Pennsylvania universities and practitioners from the public and private sectors in the US and Canada. The development of the stepwise siting approach involved contributions from several scholars in Europe and policy makers associated with the NEA. The Report itself stressed the importance of the scholarly literature in the development of this approach by a major international organisation. This suggests that the literature is providing important insights and finding its way onto the desks of some siting practitioners.

### **3.2 Instrumental Utility**

This discussion supports a contention in the knowledge utilization literature which suggests that a major role of scholarly research is an enlightening one whereby knowledge production can provide useful conceptual insights which can and does, over time, have an impact on the broader orientations and perspective of practitioners (Weiss, 1977; Booth, 1988). Yet, an examination of the siting literature also reveals that it can provide useful instrumental insights in strategic and functional ways. Walt (2005) and Jentleson (1990; 2002) suggest a useful way for examining the usefulness of theory to policy practitioners by reference to its diagnostic, predictive, prescriptive and evaluative utility. I apply that approach to evaluating the instrumental utility of the siting literature.

Siting theories can assist practitioners in *diagnosis* or attempting to understand what phenomenon they are facing. For instance, theory can help policy makers understand if the motivations of those opposing projects is based simply on emotional concerns about projects, green ideology or, indeed, simply to extract more benefits out of project developers (Welcomer et al., 2000). While there may be some element of truth in these assertions, siting theories suggest that resistance to projects is based on motivation which are much more complex and nuanced (Wolsink, 2007). It also has a lot to do with real and legitimate concerns with the possible and often negative aspects of projects on local communities (including both physical and non-physical harms), the nature of participatory decision processes involved in siting those projects, and a lack of trust in institutions governing siting processes. Such diagnosis has significant implications for devising an approach to siting and the management of conflict.

Theory can help in an understanding and interpreting historical siting experience and guide practitioners in their responses to the future. It provides a broad set of useful diagnostic options for decision makers. International experience reveals that most industrialised nations generally have generally abandoned DAD approaches in favour of more democratic approaches to locating unwanted facilities. While there is no single model of siting that has emerged, the literature highlights various participatory and deliberative responses to siting in democratic nations such as Austria (where strong hierarchical traditions persist), France (where the state has tried to embed itself in local communities), Japan (where the state uses an array of compensatory and other policy tools), and Germany (where cooperative discourse approaches have been attempted) (Lesbirel & Shaw, 2005). While there are variations in the effectiveness of these approaches

(they have worked in some cases, but not in others), they do provide practitioners with a useful set of potential diagnostic possibilities.

Such diagnosis, based on siting theories, can also point practitioners in the direction of additional information that is likely to be important in the management of siting conflicts. For instance, competing views of procedural fairness will be an important determinant of siting outcomes. As Linnerooth-Bayer (2005) points out, fairness can be understood in the context of major forms of social organisation (hierarchy, market and egalitarian). Hierarchical approaches stress authority and procedural rationality, where fairness is settled by administrative determination. Market approaches are distinguished by an emphasis on personal rights, freedoms and economic rationality where distributive issues are settled by market interactions. Egalitarians reject the unequal social relations contained in both hierarchical and market views of fairness and abhor morally any procedures that perpetuate social inequalities such as sited facilities in poor and minority communities on environmental justice grounds. While there is no precise and unambiguous way of measuring fairness and equity in siting processes, her conclusions provide a way of helping siting practitioners in their search for additional relevant diagnostic information in terms of approaching siting processes.

Theory can also assist siting practitioners in *prediction* or anticipating conditions, events and trends which influence the broad environment in which siting occurs. Hunold and Young (1998) highlight the importance of changed levels of cynicism towards the capacity of democracies to promote justice in terms of communicative participation as a key contextual variable influencing facility siting. Kasperson (2005) highlights the importance of a changed social and political context where changed perceptions of risk (including the amplification of risk), trust and confidence in siting institutions, and equity and environmental justice concerns have created a different context in which siting processes now occur in democratic nations. Aldrich (2007) stresses the level of social capital in communities as an overall determinant of the locational characteristics of a range of projects in industrialised nations. While siting practitioners might not be able to influence the broader environment in which siting occurs, being able to provide some reasonable predictions will assist them to anticipate how historical, social and political contexts in which they operate might influence siting processes and strategies.

Such predictions also help stakeholders to prevent or manage unwanted, or reinforce wanted, developments in siting processes. Barthe and Mays (2005) provide an excellent analysis to highlight unintended consequences of legislative changes which required more communicative process in facility siting. It shows how such communicative processes, if perceived as not only providing information *to* the public, but also *on* the public, can open up a forum for opposing voices or interests that can derail siting attempts. The siting of the Bayer chemical project in Taiwan during the 1990s shows the importance of anticipating electoral outcomes in siting processes. While the company had made significant efforts to increase local community support for a factory, it was not able to prevent the key leader of the resistance from continuing to politicise the dispute and win a seat in elections, thereby changing power structures which ultimately forced the company to abandon the project (Personal Communication, 2002).

Siting processes are not static, and the relationship between predictive theories and real world developments is highly dynamic, making predictions highly problematic. For instance, O'Hare (1977; 1983) highlights the strategic importance of compensation in reducing resistance to projects. Yet, as several scholars have subsequently observed, such predictions can be inaccurate as compensation can inject instabilities in siting processes. It can do this by changing levels of altruism (Frey & Oberholzer-Gee, 1997), increasing concerns that the risks of projects are high and that developers are paying "blood money," especially if mitigation measures have not been employed (Gerrard, 1994; Kasperson, 2005), and changing power relationships and the scope of conflict in siting disputes (Lesbirel, 1998). They may help to understand why many

observers argue that economic inducement strategies are ineffective or only effective under limited conditions in managing siting conflicts. While perfect predictions in the social sciences are not possible because of relationship between those predictions and behaviour, the theory can sensitise practitioners to anticipate the likely consequences from their actions and to account for those in fashioning their approaches to siting.

Siting theories can also facilitate practitioners by providing useful *prescription* or policy approaches to achieve desired results. The literature offers a range of examples of siting guidelines which have been based on theory. As discussed earlier, perhaps the best known is the Credo. While it provides conceptual insights, it also provides important instrumental insights which are grouped into three areas. The first relates to goals and objectives such as instituting a wide participatory process and working to develop trust. The second set concerns appropriate outcomes such as guaranteeing stringent safety standards will be met, addressing negative aspects of the facility and making the community better. The third relates to steps in the process such as using a volunteer process, seeking to achieve geographical fairness, and keeping a range of options open at all times (Kunreuther et al., 1993).

Other approaches have suggested siting in stages or steps and have highlighted different aspects of the Credo. Sequential multi-stage siting processes provide an illustration of a comprehensive stage-based approach. It includes such site selection, environmental impact assessment, benefit-cost analysis, mitigation, public hearings, negotiations, and an auctioning process to determine relative compensation requirements (Quah & Tan, 1998; 2002). Stepwise siting involves the development of steps in the siting process that are reversible. The guidelines specify a set of goals, such as having open debate, developing an understanding that the status quo is unacceptable, identifying one more acceptable sites, negotiating tailor-made compensation packages and fully respecting agreements, as crucial in implementing siting solutions that are regarded as legitimate (OECD, 2004). Cooperative discourse approaches entail the three major consecutive steps: identification and selection of concerns and evaluative criteria by relevant interests, identification and measurement of impacts and consequences related to different policy options and establishing expert consensus on these consequences and options, and conducting a rational discourse with randomly selected citizens as jurors on citizen and representation of interest groups as witnesses, with citizen panels ultimately deciding on the various options (Schneider et al., 2005).

These various siting prescriptions provide useful strategic insights for siting practitioners. First, they help identify goals and objectives of siting processes, such as equity, efficiency and liberty, and trade-offs between those goals. Second, they assist in exploring the different problems involved in siting conflicts such as assessing the costs and benefits of projects and dealing with different interests which become involved in siting processes. Third, they help in identifying policy instruments, such as inducements, rights and persuasion, for managing siting conflicts. While there is no strategic approach which is unambiguously favoured among scholars, these prescriptions provide important starting points for practitioners in the strategic crafting of approaches to siting projects.

A final way that siting theories can assist practitioners is in *evaluation* or specifying benchmarks for assessing the success or otherwise in accomplishing siting objectives. While the concepts of success and failure have often been used very loosely by siting scholars, perhaps reflecting their slipperiness as concepts and their normative connotations (Smith, 1989), the literature suggests at least four important factors are important when making judgements about success or failure in siting. The first is that siting policies can be judged in terms of design and how they were formulated with success or failure assessed on values and interests. This would entail judging siting policies in terms of whether they were based on appropriate and acceptable values, such as equity, justice and participation (Linnerooth-Bayer, 2005). The second is that siting policies can also be judged in terms of their execution. For instance, success or failure

could be assessed on the efficiency (including social efficiency) and the degree to which siting approaches yielded siting outcomes consistent with their design (Kraft, 2000). The third is that siting policies can be evaluated by the extent to which they were effective in achieving goals and leading to solutions to a societal problem (Kunreuther et al., 1993). For instance, success or failure could be assessed on the extent to which siting policy meet societal needs for those projects without leading to other societal problems, both foreseen and unforeseen. Finally, siting policies can be judged on the overall normative positions of the stakeholders involved. As Lindblom (1959) notes, the only test of a good policy outcome is a consensus that it is good.

#### **4. CONCLUDING REMARKS**

This paper started out with the observation that being a siting practitioner is not an easy task. Scholars rarely do siting, but they do produce knowledge about siting processes and outcomes. It is hoped that this paper has clarified the nature of the knowledge that they produce and how that knowledge can be utilised by practitioners in conceptual and instrumental ways. It is through the production of ideas and knowledge that scholars can contribute to helping practitioners in their desire and mission to make siting a more manageable task.

The analysis suggests two principal conclusions. The first is that the siting literature has evolved into a substantive one. It has used a full range of theoretical and methodological perspectives to explore siting processes and outcomes for a wide range of facilities. It has generated a variety of middle-range explanations which have enhanced our understanding of siting processes and outcomes in quite rigorous and sophisticated ways. The second is that the knowledge that siting scholars have produced is policy relevant. It offers a range of conceptual and instrumental insights which can assist practitioners in the management of siting processes. Importantly, there is some evidence that these insights have been based on two-way interactions between scholars and practitioners and that they have found expression in observed approaches to siting in many democratic nations.

While the siting literature can offer and has provided useful insights, the challenge will be to build on these achievements by addressing several theoretical and empirical shortcomings in ways which seek to enhance its utility to practitioners.

The first issue relates to the practical utility of contestable theories in the literature. A key feature of the literature is contestability. Indeed, it is the contestable nature of the literature that has allowed it to develop and enhance its explanatory power. Yet, ironically, this process, while extending our knowledge of siting conflicts, might actually act to reduce the practical utility of the literature. Practitioners will be confronted by competing analyses by scholars who are recognised in the field and whose work will be quite compelling from the perspective that they are taking. However, they may very well be reluctant to use these theories because they may not know how and when to emphasise one theory over another or to how to combine these different theoretical perspectives into one. For instance, practitioners will need to know when to emphasise institutional approaches (which focus on rules) over interpretivist approaches (which focus on the structure of meaning). An important area for future research would be to explore how the siting literature can provide policy practitioners with more guidance on the utilisation of contestable explanations of siting conflicts and their management.

The second issue concerns the effectiveness of existing participatory approaches to siting. There are contending positions in the literature. Some authors suggest that existing approaches have not been effective and there is a need to change institutional structures (Shaw, 2005); others argue that it is too early to really test their effectiveness (Kasperson, 2005); still others have argued that there is some evidence of such democratic approaches can work effectively to resolve siting conflicts (Rabe et al., 2000). Reconciling these debates will require addressing biases in the literature. With some notable exceptions, it is still heavily biased towards exploring the

difficult cases. While these are important, it is equally critical to explore the easier cases. For example, while there continues to be studies which analyse why nuclear projects are abandoned, there are few studies which explore why others have been developed. Currently, there are 33 reactors under construction in a variety of nations such as Canada, China, Finland, France, India, Russia, South Korea, and Japan (IAEA, 2007). Yet, there appears to have been no extensive siting studies which explain these cases collectively. Practitioners will not only want to know about the difficult cases; they will also want to know why other cases were resolved. An important issue for future research will be rectifying these selection biases in the literature and testing such outcomes against the approaches proposed in the literature.

The third issue concerns the contingent nature of middle-range theories and their relative strategic and tactical utility. Siting scholars will often be happy with middle-range theories which produce contingent explanations of the form that a X percent increase in trust will lead to a Y percent increase in the probability of reaching agreement. While such conclusions will be acceptable to scholars and might provide useful strategic insights, practitioners will also wish to know how to address more immediate tactical needs. They will need to know how to overcome the problem of trust. But they will also need to know whether the relationship between trust and probability of acceptance fits the particular circumstances they are confronting and whether that circumstance is an outlier. While some research has pointed to the importance of tactical needs in the development of policy guidelines (Kasperson, 2005), there is considerable scope for future research on making the siting literature more useful to policy makers in terms of their day-to-day tactical needs.

The final issue relates to the utility of conceptual and instrumental insights to the management of siting conflicts more generally. The dominant insights found in the literature relate to North America and Western European experience. Yet, there is very little analysis of whether such insights will be useful to practitioners in Asia, a region characterized by nations of differing political systems and levels of economic development. While there is some evidence that existing insights are likely to be relevant to nations such as Japan, South Korea and Taiwan, practitioners in Asia will wish to they are applicable to other nations. For instance, an interesting article on siting in China suggests that local governments and host communities can block the establishment of waste facilities as a result of increasing decentralisation of decision making power as local governments are granted more autonomy in decision making (Chung et al., 2002). There is also some evidence that siting is becoming an important issue in Vietnam, especially with increased citizen concerns after construction (Cuong, 2003). A critical area of future research relates to the extent to which Western-based siting insights are likely to have any applicability in Asia and the extent to which practitioners in different nations can learn from other siting experience and encourage the transfer of knowledge.

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# **LULUs, NIMBYs AND ENVIRONMENTAL JUSTICE**

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## **Abstract**

Attention is directed to the relationship among LULUs, NIMBYs and the concept of environmental justice. Particular consideration is given to principles (trust, participation, equity) and procedures (reverse Dutch auction) which can be used to help in siting LULUs. The way in which governments in North America have interpreted and used environmental justice as a means to address LULUs and NIMBYs is explored. How governments may use environmental justice is then related to different kinds of policies (such as whether they are based on 'issue areas' or incidence and distribution of benefits and costs), as well as to the politics of policy adoption. Finally, experience in Canada is reviewed with reference to locating sites for disposal of waste, with the strengths and weaknesses examined regarding 'traditional' and 'voluntary' approaches.

## **1. INTRODUCTION**

The background information for the International Conference on Siting of Locally Unwanted Facilities highlights that "siting locally unwanted land uses (LULUs) is a major policy problem throughout the industrialized world" and that the focus is "to examine the underlying causes for facility siting impasse in Asia and other countries and to suggest ways and strategies to help resolve siting conflicts." In that context, key themes are identified: public participation; consideration of options and alternatives; mistrust and trust building; risk perception; communication and management; incentives and compensation; conflict resolution: approach and strategy; and, sharing of experiences - successful and not so successful cases.

The intent here is to (1) examine the relationship between LULUs and NIMBYs and the concept of environmental justice, (2) explore the way in which governments in North America have interpreted and used environmental justice as one means to address issues related to LULUs and NIMBYs, and (3) provide selected examples from Canada to illustrate different approaches to siting LULUs in that country.

## **2. LULUS, NIMBYs ND ENVIRONMENTAL JUSTICE**

### **2.1 LULUs and NIMBYs**

'Locally unwanted land uses' (LULUs) and 'Not in my back yard' (NIMBYs) are interchangeable concepts used to characterize facilities or services that society collectively requires, but usually does not view as desirable to have in close proximity to where people live, work or play. Examples include landfill sites, incinerators, hazardous waste disposal sites, sewage treatment plants, and airports, all of which are normally viewed as 'noxious'. Such phenomena have been well recognized and studied for over 30 years in North America (Wolpert, 1976; Popper, 1983; Matheny and Williams, 1985; Ballard and Kuhn, 1996; Lawrence, 1996; Elliott et al., 1997; Elliott, 1998; Ali, 1999; Baxter, Eyles and Elliott, 1999a and 1999b;

Gunderson and Rable, 2000; Raby, Baker and Levine, 2000; Wakefield and Elliott, 2000; Hostovsky, 2006; Schively, 2007). Another term sometimes been used is TOADs, standing for 'Temporarily obsolete abandoned derelict sites' (Greenberg, et. al, 1990; 2000).

In the following subsections, attention turns to two aspects addressed by researchers: principles and procedures.

### 2.1.1 Principles

In addition to addressing technical matters, investigators have examined principles on which decision makers should base decisions. To illustrate, Baxter, Eyles and Elliott (1999a) identified three principles to guide decisions related to LULUs or NIMBYs: trust, equity and public participation. In their view, *trust* is a key element for relationships among stakeholders, especially government regulatory agencies, siting agencies (public or private), and the host community. Conflict and opposition often emerge because people in a proposed host community do not trust one or both of the regulatory agency or facility proponent, or the proposed technology. There is a close connection between (lack of) trust and *public participation*: trust is an end to be achieved, and public participation is one means to achieve that end. Both should contribute to achievement of *equity*, or a fair sharing of risks associated with a LULU.

Public participation is likely to be ineffective when regulatory agencies and siting proponents interpret it to mean only or primarily providing information to the host community about the siting process and possible risks, rather than systematically including the public into the decision-making process. In that context, Lawrence (1996) argued that various degrees of participation can lead to different degrees of control by the public, ranging from: (1) *procedural control* (influence related to the structure and implementation of the general decision-making process), (2) *locational control* (authority to decide whether or not to accept a site for a LULU), and (3) *facility control* (opportunity to accept the need for, and scale and operating characteristics of, a facility). For many regulatory officials, allocating the above types of control to the host community or general public frequently represents a significant change in power and authority relationships, and some officials can be expected to be unwilling to make such changes. However, a desire or determination by regulatory officials to retain all authority usually is a barrier to building stronger trust and achieving equity. On the other hand, the host community or general public normally is not homogeneous. As a result, when there are basic disagreements between different community groups, the turning over of substantial power to the host community can lead to difficulty in being able to take decisions.

The third principle, *equity*, focuses attention on *fairness* in terms of the social and spatial distribution of environmental risks. A significant challenge, given different needs and interests associated with decisions for NIMBYs or LULUs, is that various kinds of equity are involved. For example, *distributive equity* relates to the distribution of benefits and costs upon and among different groups in a host community. With regard to costs imposed by a LULU, the normal way to deal with distributive equity is to compensate host communities, usually through financial incentives (tax relief, new or enhanced community facilities). However, by itself, distributive equity usually is not sufficient to meet concerns of host communities. As a result, *procedural equity* initiatives are often used in parallel. These involve modifying processes used for risk prevention, control and mitigation.

The work by Baxter, Eyles and Elliott is instructive by highlighting the desirability for decision makers to develop and publicize the basic principles guiding decisions related to LULUs or NIMBYs. Given that such decisions are normally surrounded by emotion and conflict, it is highly desirable, before the decisions are taken, to have agreement on transparent principles upon which analysis, discussion and decisions will be based. It is almost inevitable

that not every stakeholder will get everything wanted or expected related to a decision for a LULU or NIMBY. Nevertheless, experience indicates that if those not getting everything they wanted believe that the process was open and transparent, they were heard, and decisions include action to mitigate or compensate for risk, the likelihood becomes much higher that a site will be found.

### *2.1.2 Procedures*

Attention also has been given to creating processes or mechanisms to find sites for noxious materials or facilities. For example, Barbalace (2001) has reviewed a concept proposed by Michael Girrard, a lawyer in New York State, for choosing sites for new hazardous waste facilities. The following discussion is based on her report.

Communities usually oppose a hazardous waste facility within or adjacent to their community for two main reasons: risk to health, and devaluation of property values. On the other hand, a positive view may emerge if communities believe a waste facility will be a trigger to improve both the local economy and quality of life. In some cases, when the second, positive perspective has dominated, communities have volunteered to be the host for a waste facility only later to have the state or provincial government refuse permission on the grounds that the state or province would end up receiving a disproportionate proportion of waste generated in the region or nation.

Girrard proposed that a 'reverse Dutch Auction' process, as developed by Herbert Inhaler, could be an appropriate tool to help find a site for hazardous waste facilities. Under the reverse Dutch auction process, an auctioneer would propose a minimum amount of compensation for a community which accepted a hazardous waste facility. Barbalace suggested that the minimum bid for such compensation might start at \$10 million, and that amount would be advertised for a set period of time (e.g., a month). If no bids were received from a community based on the \$10 million compensation, the bid would be raised, say to \$20 million, for another set period. Then, if no bid were received, the amount would be raised again, to \$30 million, and so on.

Each community would obviously want to receive maximum compensation. If a community were interested but waited too long in order for the bid to go higher, however, another community might submit a bid and become the host for the site. Hence, there is pressure on potential host communities, as at any auction, to be prepared to make a decision before another community becomes the successful bidder. An important part of the overall process also is for the state to provide a bidding community with sufficient funds to hire an expert to provide advice.

Girrard recognized that not only the community which becomes the host for a LULU could bear negative impacts from a hazardous waste facility. Other neighbouring communities could be exposed to risk if the hazardous waste were to be transported through them by rail or by truck. The other communities might also be vulnerable from air-borne contaminants from the facility, or to pollution of aquifers or soils if contaminants were to escape from the site and migrate through subsurface processes. Recognizing these possible problems, Girrard proposed a two-step referendum process, following the reverse auction procedure. The first step would involve a referendum for all residents living within a specified radius of the facility site. The second step would be a referendum for all residents of the appropriate local government area in which the facility site would be located. If the proposal for a site passed both referenda, a final stage would be an assessment of needs in the community, geological conditions at the site, and any other relevant considerations. Such technical considerations and criteria would have to be satisfied before a final decision.

Barbalace commented that the attraction of the reverse Dutch Auction process is that it provides a way to ensure a facility is 'wanted' by those living in or near to its site. As with all

procedures, however, the process is not without limitations. In that regard, as Barbalace (2001: 2) observed, “The only question would be whether Girrard’s plan would achieve environmental justice or entice an impoverished community to accept something that they didn’t really want in order to achieve certain economic advantages.”

Barbalace (2001:2) concluded her analysis by stating that “the problem of environmental justice will not be solved overnight ....” Nevertheless, by examining creative processes to ensure potential sites meet technical criteria and acceptance by residents of a host community and larger region, she hopes that greater sensitization of industries, communities and societies will lead to ways to identify and establish such sites. In that context, in the next Section, attention turns to the concept of environmental justice, in order to explore whether it is a cause of, or possible solution for, LULUs and NIMBYs.

## 2.2 Environmental Justice

The US Environmental Protection Agency (EPA) defines environmental justice as “... the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations and policies.” ([www.epa.gov/compliance/basics/ej.html](http://www.epa.gov/compliance/basics/ej.html)). The EPA indicates that ‘fair treatment’ means that no group of people should bear a disproportionate share of negative environmental consequences from industrial, commercial or municipal operations, or from the implementation of federal state, local or tribal policies or programs (EPA, 1997). The Office of Environmental Justice in the state of New York uses the same definition as the EPA, and elaborates that “Environmental justice efforts focus on improving the environment in communities, specifically minority and low-income communities, and addressing disproportionate adverse environmental impacts that may exist in those communities.” ([www.dec.state.ny.us/website/ej/index/html](http://www.dec.state.ny.us/website/ej/index/html)).

In contrast, the Friends of the Earth (FOE) takes a broader perspective, stating that “Environmental justice means: quality of life for all – everyone should have a safe and healthy place to live, work and play; enough for us and the future – we need to make sure there are enough resources for all of us and future generations.” ([www.foe.co.uk/resource/faqs/questions/environmental\\_justice/html](http://www.foe.co.uk/resource/faqs/questions/environmental_justice/html)). The FOE continues, observing that “unfortunately, there are many examples of environmental injustice” and that “it is usually the poorer communities that suffer the most from more pollution ..., habitat loss ....., health problems ....., climate change .....”

Bullard ([www.ourplanet.com/imgversn/122/bullard.html](http://www.ourplanet.com/imgversn/122/bullard.html)) comments that “The environmental justice movement emerged in response to environmental and social inequities, threats to public health, unequal protection, differential enforcement and disparate treatment received by the poor and people of color. It redefined environmental protection as a basic right.” Continuing, he observed that since the mid 1980s environmental justice spread around the world, and “embraces the principle that all communities are entitled to equal protection and enforcement of environmental, health, employment, housing, transportation, and civil rights laws and regulations that have an impact on the quality of life.”

It is generally agreed that the concept of environmental justice emerged from a protest in 1982 regarding a hazardous waste landfill site in Warren County, North Carolina, USA, which resulted in arrest of 500 protesters. The protest was against a decision to establish a landfill site for PCB-contaminated soil to be removed from 14 different places in the state. The location of the landfill site was adjacent to a small, low income community whose residents were predominantly African-American people. For the protesters, the siting decision highlighted that such hazardous facilities were frequently being located in areas in which the dominant inhabitants were minorities and/or low-income people.

One outcome of the Warren County protest was a study by the US General Accounting Office. It focused on eight southern states, with the goal to determine if there were an association between the location of LULUs or NIMBYs and the racial and economic status of nearby communities. The General Accounting Office reported that three of every four such landfills were sited in or close to minority communities. Subsequent studies confirmed this pattern, and from them emerged the concepts of environmental justice, equity, racism and classism.

Later, in 1991, the First National People of Color Environmental Leadership Summit was held in Washington, DC. This summit attracted over 1,000 delegates from across the world and from 50 US states. On 27 October 1991, the Summit adopted and released 17 Principles of Environmental Justice (Table 1). The following year (1992), these principles were introduced at the Earth Summit in Rio de Janeiro.

During February 1994, President Clinton released Executive Order 12898, entitled *Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations* (Clinton, 1994). This executive order required that “each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions.”

Responsibility for coordinating inter-agency initiatives related to environmental justice was given to the Environmental Protection Agency, and in this way the concept was institutionalized within US federal governance structures. Furthermore, Ringquist and Clark (2002; 354) noted that at least four states (California (2002), Florida, Texas, Washington) have created environmental justice commissions whose purpose is “to evaluate the degree of environmental inequity in their states and propose changes in environmental policy to reduce any observed inequity.” Similar initiatives also have emerged at the local or municipal level. They explained that New York City’s ‘fair share’ policy represented best practice, and that its purpose is to ensure that “each borough and neighbourhood bears a fair share of undesirable land use burdens and receives a fair share of beneficial public services and amenities” (Ringquist and Clark, 2002: 354).

The Office of the Inspector General of the Environmental Protection Agency (EPA, 2004) published an evaluation of the effectiveness of the EPA in implementing the intent of the 1994 Executive Order. It concluded that the EPA “has not identified minority and low-income, nor identified populations addressed in the Executive Order, and has neither defined nor developed criteria for determining disproportionately impacted” [‘disproportionately impacted’ is a term used to characterize adverse effects of environmental actions that burden minority and/or low-income populations at a higher rate than the general population] EPA, 2004: i). Furthermore, the Office of the Inspector General concluded that the EPA “had not developed a clear vision or a comprehensive strategic plan, and has not established values, goals, expectations, and performance measurements.” More positively, however, it was found that the EPA had prepared an environmental justice toolkit, endorsed environmental justice training, and required all regional and program offices to submit ‘action plans’ in order to create accountability for environmental justice integration.

The Office of the Inspector General (2004: ii) also noted that in a response to its draft report, the EPA stated that it “disagreed with the central premise that Executive Order 12898 requires the Agency to identify and address the environmental effects of its programs on minority and low-income populations.” Instead, EPA believed the Executive Order “instructs the Agency [EPA] to identify and address the disproportionately high and adverse human health or environmental effects of it (sic) programs, policies and activities”, and that, in the words of the Office of the Inspector General, “The Agency does not take into account the inclusion of the minority and low-income populations, and indicated it is attempting to provide environmental



justice for everyone.” (EPA, 2004: ii). The report from the Office of the Inspector General is a good reminder that it is one thing to create a law, policy or regulation. It is quite another to achieve consistent interpretation or implementation related to the stated intent, especially when ideologies shift as a result of different governments taking office. This outcome deserves consideration by any jurisdiction considering development of policies or regulations related to environmental justice to deal with LULUs or NIMBYs.

Environmental justice is not confined to ‘local issues’. As Bryant (2007a: 1) has noted, due to increased restrictions on disposal of toxic wastes in developed countries, combined with growing opposition to toxic waste sites, governments and private waste management companies have been seeking alternative sites in other countries. In Bryant’s view, the target countries have been “the politically and economically less powerful nations of the world”. The attraction for governments in such nations is substantial payments to receive toxic wastes, and opportunity to create employment opportunities in building and operating the waste sites. However, Bryant also observed that governments and peoples in developing countries are increasingly showing less interest in being ‘dumped on’.

Bryant (2007a) has highlighted various examples of toxic wastes from developed countries being sent for disposal to developing countries:

- During April 1987, Jamaica refused to accept a shipment of 20,000 bags of milk powder because of unacceptable high levels of radioactivity. The European Economic Community (EEC), the supplier of the milk powder, argued that the bags of milk were safe, and, after Jamaica refused to accept them, the EEC terminated all its food aid to Jamaica. Later, the EEC removed most of the milk powder from Jamaica.
- From August 1987 to May 1988, nearly 4,000 tons of toxic wastes were sent to Koto, Nigeria. Subsequently, there was a significant increase in premature births and incidence of cholera. The leaking barrels holding the toxic wastes were later removed, but they had been buried for over 10 months, resulting in toxic wastes having leaked into the soil.
- In October 1987, the government of Haiti approved an import permit for fertilizer to be dumped into the Khian Sea. However, it was learned that the ‘approved’ cargo on the freighter included over 13,000 tons of toxic municipal ash from Philadelphia.

Given such examples, and others in Clapp (1994a, 1994b, 2001), advocates of environmental justice have argued that it is not an acceptable solution to deal with national or domestic LULU or NIMBY problems in developed countries by moving the contentious material or facility to a developing country. The examples also emphasize that LULU or NIMBY situations can involve transjurisdictional complications, up to and including relationships between two or more nations.

In the past 10 to 15 years, considerable research has focused on environmental justice (Bryant and Maliai, 1992; Been, 1993; Higgins, 1993; Bullard, 1994, 2000 and 2005; Bryant, 1995 and 2007b; Cutter, Holm and Clark, 1996; Foreman, 1998; Simon, 2000; Taylor, 2000; Cole and Foster, 2001; Draper and Mitchell, 2001; Mitchell, 2001 and 2004; Warner, 2001; Rechtschaffen and Gauana, 2002; Lerna, 2005; Vig and Kraft, 2005). In the following section, attention turns to the implications of institutionalizing environmental justice within government in the US, and what the lessons might be for other countries.

### **3. GOVERNMENT APPROACHES TO ENVIRONMENTAL JUSTICE**

Ringquist and Clark (2002) have analyzed what they termed the ‘politics of State environmental justice policy adoption’. They provide deep insight into the opportunities and challenges for

governments which have decided to use environmental justice to deal with LULUs and NIMBYs. In this section, the observations, findings, insights and recommendations from Ringquist and Clark are reported.

Ringquist and Clark (2002: 351) observed that, in the late 1990s and early 2000s, there was ‘an explosion of research regarding environmental justice.’ In their view, however, virtually all the research emphasized the exposure of poor and minority communities to environmental risks created by siting of noxious land fills. They argued that there had been “... neither a comprehensive survey of state environmental justice policy nor a systematic investigation of the forces that prompt state policy activity in this area.” Their purpose was to address both of these aspects.

Governments, whether national, state or local, have shown great variation in responding to environmental justice problems. Part of the reason for such variability is due to divisions within the environmental communities related to what is considered to be the fundamental nature of environmental justice problems, and, therefore, what are the most appropriate responses.

In that context, Ringquist and Clark (2002: 354) observed that “environmentalists appear divided between small, grassroots groups and large, mainstream environmental advocates.” As a result, different goals and methods can create a divide between grassroots and mainstream environmentalists. For example, grassroots activists in the US frequently seek remediation through civil rights litigation whereas the mainstream environmental organizations normally seek ‘regulatory stringency’ or punitive action against polluters. As Ringquist and Clark (2002: 355) have observed, “The tradeoff seems to be efficiency and compensation for the principles of liability and punishment.”

### **3.1 Policy Types and Choices**

In order to understand how different groups may perceive, or react to, different policy choices, it is helpful to recognize different categories of policies. Several typologies exist. One divides policies relative to ‘particular issue areas’, such as national security, education and environment. Another typology differentiates among policies based on who pays for and benefits from them, and on the distribution of benefits and costs. Based on the second approach, domestic policies are characterized as being distributive, redistributive, protective regulatory, or competitive regulatory.

Policies created to facilitate environmental justice are situated at the intersection of different policy types. As Ringquist and Clark (2002: 356) explain, environmental justice policies normally concentrate on allowable levels of pollution, or on the location of polluting facilities, and also on the enforcement of ‘command and control’ regulations. In such circumstances, environmental justice policy can be defined as a kind of ‘environmental policy’. And, environmental policy is usually considered to be the ultimate example of a *protective regulatory policy* because its associated programs are created to protect the public by specifying conditions to govern different private actions.

However, environmental justice also can be interpreted as a ‘social issue’. When this view is taken, then it becomes a type of *redistributive policy* because such policy and associated programs are designed to manipulate the distribution of wealth, political or civil rights, or some other aspect valued by social classes or racial groups. Such policy is redistributive because it creates winners and losers; some value is allocated to one group at the expense of one or more other groups.

Most advocates of environmental justice do not seek to redistribute environmental risk from poor and minority populations to wealthy and white people. Instead, their goal normally is to reduce environmental risk to all communities. Furthermore, their view is that reduction of pollution is the only viable long-term solution to the inequitable distribution of environmental

risk. Nevertheless, given the compelling evidence that more environmental risk associated with LULUs and NIMBYs has fallen on minority populations (defined by race or income), resolving the problem does require some redistribution of the risks. Such redistribution may be of two kinds: (1) absolute, assuming overall pollution is not reduced, and (2) relative, assuming some reduction of pollution.

Given the above, it is possible to analyze the implications of a popular redistributive policy used to deal with LULUs: resolve environmental injustice by having municipalities or private companies pay compensation to individuals living adjacent to or near facilities which pose an environmental risk to them. Compensation can take various forms, such as cash payment, increased community facilities (better parks or schools), or even relocation of residents. Each kind of compensation involves a redistribution of wealth. In addition, evidence is strong that communities with relatively low levels of political power are more likely to receive LULUs or NIMBYs. As a result, action to alter either the criteria or processes used to find sites for such facilities represents a redistribution of political power from those who gained from the previous system to those who will benefit from the new arrangements. Whatever redistributive arrangements are used, different winners and losers emerge, highlighting the defining feature of redistributive policies.

### **3.2 Implications of Policy Types**

The discussion above indicated that environmental justice can be seen as an example of either environmental or social policy. The implications of viewing environmental justice as one or the other are profound, because, as Ringquist and Clark (2002: 357-358) comment,

How an issue is defined (e.g. whether environmental justice is seen as environmental policy or social justice policy) determines the policy  
Subsystem within which policy decisions are made. The policy  
Subsystem in turn helps to determine which participants have access  
to policy decisions, and the relative power of these participants.  
Moreover, redefining an existing policy issue can radically alter or  
even demolish policy subsystems, instigate significant changes in  
the magnitude and distribution of budgetary resources devoted to the  
policy, and precipitate substantial changes in legislation.

They use the example of nuclear energy policy to illustrate how policy definition and redefinition contribute to determining the politics of policy choice. In their view, atomic energy in the USA was initially viewed to be a component of economic development policy, with a connection to national security policy. The outcome was that nuclear power policy was made “by supportive government personnel in a very closed policy environment” (Ringquist and Clark, 2002: 358).

During the 1970s, however, nuclear power was redefined in terms of the kind of policy it represented due to at least four factors: poor performance of nuclear power plants; high cost of electricity produced by the plants; increased appreciation of the risks associated with disposal of nuclear wastes; and, the Three Mile Island reactor accident in 1979. As a result of the combined effects of the four factors, “public perception of atomic energy changed from a safe, clean, and cheap source of power to a serious environmental threat that inflicted huge costs on consumers” (Ringquist and Clark, 2002: 358). Consequently, in a very short time period, “nuclear power policy was redefined as environmental/consumer protection policy, and this redefinition opened the policy subsystem to environmental organizations and groups of anti-nuclear scientists” (Ringquist and Clark, 2002: 358). In less than 5 years, the Atomic Energy

Commission and the Joint Committee on Atomic Energy were abolished. They were replaced by various competing administrative agencies and congressional committees, and access to the policy-making process became much more open and accessible. Subsequently, federal nuclear policy was significantly altered.

The lesson from the above experience is to highlight that, depending upon how a policy is defined, various stakeholders have different access to policy makers and to policy-making processes. This insight suggests that when governments consider adopting environmental justice to address LULUs and NIMBYs, there should be careful assessment regarding how environmental justice policy is defined and framed. As Ringquist and Clark (2002: 362) concluded,

Whether environmental justice is defined as a protective regulatory/ environmental policy issue or a redistributive/social justice policy issue condition our expectations about the locus of important policy decisions, the subsystem within which policy decisions are made, the relative power of advocacy coalitions within the subsystem, and several other theoretically important factors.

### **3.3 Politics of Policy Adoption related to Environmental Justice**

As attention is given to whether environmental justice might be adopted as policy, Ringquist and Clark (2002: 363-368) suggest attention should be given to three factors important for policy change at a state level: (1) external political factors, (2) internal political factors, and (3) policy specific factors. Each is discussed below.

#### *3.3.1 External Political Factors*

Decision makers operate in a complicated policy environment, in which external (international or national) events often are influential. For example, the SARS epidemic and 9/11 both have affected policies regarding national security, and have led to changes in protocols for screening at airports and issuing of passports. Another example is the growing awareness of the implications of climate change, and the resulting moves by many governments to be, or appear to be, more “green” in their policies.

With reference to environmental justice, Ringquist and Clark (2002: 365) concluded that external political factors are of little significance for policy makers because, in their view, “there have been no significant changes in general ‘policy mood’ . . . ., nor has there been any significant movement of public opinion with respect to environmental justice.”

#### *3.3.2 Internal Political Factors*

It is generally accepted by policy analysts that levels of wealth, economic development, and general political ideology are all important in establishing the boundaries for what will be considered by a government. In addition, the characteristics (number of interest groups, diversity of interests represented, relative strength of groups) of the interest group system are important, as interest groups communicate policy expectations and demands to policy makers. Finally, the professionalism and capacity of governance institutions are critical influences.

Internal political factors usually “should be critical determinants of state policy activity in environmental justice” (Ringquist and Clark, 2002: 366). In particular, state political institutions are important because redistributive and protective regulatory policies usually trigger sharp conflict, requiring decisions to be taken at the highest levels within government.

Government institutions which are both professional and capable are most likely to be able to take decisions under such conflict-laden situations. As a consequence, highly professional and capable institutions should be able to craft environmental justice policies and implement programs, whether the policy is viewed as protective regulatory or redistributive. At the same time, however, success is likely to be greater if both the elected government and professional public servants share an ideology supportive of environmental justice. Without such support, the challenge will be much greater. A final contextual aspect can be important. As Ringquist and Clark, (2002: 367) noted, “Since environmental justice policies will benefit disproportionately members of minority groups, state racial diversity is likely to be especially influential in this policy area.”

### *3.3.3 Policy Specific Factors*

Several factors have implications for the success of a particular policy. These include the accumulated policy-relevant understanding related to the nature and severity of the problem, and the likelihood of developing effective solutions. States are less likely to address a problem if it is not judged to be severe or if policy makers are unsure how to resolve it. However, accumulated knowledge often gives policy makers confidence that they can deal with a problem.

Ringquist and Clark (2002: 367) concluded that, for the US, there had been no ‘defining focusing events’ related to environmental justice at the state level. As a result, they advise that the key factor for governments contemplating use of environmental justice is the level of accumulated knowledge about related issues, and possible solutions.

Furthermore, they argue that the perceived degree of environmental problem severity will have a major impact on how the policy is conceived and defined (environmental/protective regulatory or social justice/redistributive). In other words, in regard to environmental policy, the severity of an environmental problem is very important. Control regulations are more likely to be introduced in situations of severe air or water pollution, or severe hazardous waste treatment or storage issues. In contrast, if environmental justice is conceived as a redistributive policy, then severity of the environmental problem is less critical because there is little or no association between redistributive policy and problem severity. Indeed, there is considerable evidence to suggest that there is an inverse relationship between need and policy generosity when a policy is viewed as redistributive. That is, a state experiencing more severe problems, such as many citizens in need, often introduces less expansive redistributive policies and programs compared to states with smaller populations with needs.

## **3.4 Significance for Environmental Justice**

Ringquist and Clark (2002: 380-382) offer the following conclusions, which should have significant implications for government policy makers or private sector initiators of a LULU or NIMBY.

- (1) Environmental justice has attributes of both redistributive and protective regulatory policy, indicating that it “... has not been defined by policy makers in any convincing fashion.”
- (2) As a result of the first point above, it is possible that environmental policy has not been defined in a specific enough way to lead to identifiable patterns of policy making. The outcome? “An undefined issue seems likely to evoke mixed and perhaps ineffective policy responses (where it evokes response at all).” Such a situation could help to explain why state environmental justice policies “have not been aggressive, nor have then been especially high in profile. Environmental justice exists in the policy making arena as a shadow rather than as an issue of substance and immediacy.”

- (3) Another aspect is lack of agreement within the environmental community regarding the nature of basic environmental justice issues, such as what are true environmental justice issues and problems, their extent, and possible remedies. If such differences exist, it is hardly surprising that government policy makers do not hold a unified view about goals and approaches to address environmental justice concerns.

This detailed review of the study by Ringquist and Clark (2004) has been provided because it offers deep insights which should be considered by government decision makers. Environmental justice is a possible concept on which a foundation can be constructed to address LULUs and NIMBYs. When doing so, however, policy makers need to be very clear what kind of generic policy it will reflect, what contextual conditions exist to improve the likelihood of it being effective, and how to engage with environmental non-government organizations (ENGOS) which very likely will be heterogeneous rather than homogeneous, and highly variable in their interpretations of environmental justice and their preference for solutions. Without careful attention to such aspects, the likelihood of being able to develop and implement effective environmental justice policies and programs will be low.

#### **4. CANADIAN APPROACHES TO LULUs AND NIMBYs**

As with other nations, in Canada there has been an evolution of approaches to find locations for LULUs or NIMBYs. Maclaren (2004) has explained that approaches have moved from 'traditional' to what are termed as either 'voluntary', 'open' or 'willing host'. In her words, this change has occurred because,

Siting waste management facilities has become a conflict-ridden process characterized by massive public opposition, disagreement over the environmental impacts of the facilities, and a general lack of faith in the traditional regulatory or 'closed' approach to facility siting. Dissatisfaction with traditional methods has led to the emergence of a new approach that emphasises co-operation over conflict. (Maclaren, 2004: 391)

Maclaren explains there is one key difference between traditional and voluntary approaches. In the traditional approach, a wide-ranging search is conducted across a region with the goal to identify a site that best satisfies technical criteria, without regard to whether the relevant local community has indicated willingness to be the host. In the voluntary approach, in contrast, emphasis is placed upon identifying a willing host community which contains at least one site satisfying technical criteria.

Traditional or voluntary approaches share a common initial stage. A general region or area is identified within which the search for a site is to be conducted. Key factors in determining the extent of the area include where waste is generated, limits on how far the waste can be transported, and whether there are any political boundaries (municipal, provincial, national) across which the waste could not be moved. Once this task is completed, the two approaches diverge in terms of what happens.

##### **4.1 Traditional Approach**

The second step involves 'constraint mapping'. Using environmental protection criteria (e.g., hydrological, soils, land use), planners map the entire region to eliminate areas not satisfying minimum thresholds related to the criteria. To illustrate, an area underlain primarily by sandy soils normally would be viewed as unacceptable because sandy soils do not allow for natural

containment related to controlling leachates. The areas satisfying the environmental protection criteria become candidates for subsequent investigation.

Step three focuses on detailed analysis of data for those areas which passed the constraint mapping. Another set of screening criteria is used to identify specific potential sites. Examples could be a minimum area of land, and avoidance of areas designated as environmentally sensitive. The fourth step is a comparative assessment of possible sites, with a goal to identify the site which is best relative to biophysical, economic and social criteria. Prior to this stage, decisions are taken regarding whether all criteria have the same value, or whether they are allocated different weights.

The traditional approach has limitations. First, identification of possible sites and choice of the best site are influenced to a large extent by scientific and technical criteria and considerations, with social and psychological aspects often ignored because of difficulties in measuring them on a quantitative basis. Second, professionals with technical expertise, such as engineers and scientists, normally make most of the decisions throughout the siting process regarding which criteria to use and what their weights will be. This characteristic often alienates the general public, leaving it feeling powerless and not engaged in a meaningful way. A common outcome is that a site which meets all the technical criteria is identified but then is rejected by local communities (often as much due to dissatisfaction over the process rather than due to possible negative environmental risks).

#### **4.2 Voluntary, Open, Willing-host Approach**

Sometimes, the voluntary approach is the same as the traditional approach in that area screening is used to narrow the number of possible host communities. The voluntary approach may not use constraint mapping at all, however, or only apply it after a willing host community has emerged. Once this aspect has been determined, the voluntary and traditional approaches are notably different.

The principal feature of the voluntary approach is a deliberate choice to seek co-operation with the general public, as well as to find a site in or adjacent to a willing community. Another fundamental characteristic is that a community can withdraw from the siting process at any stage.

Normally, step one involves regional meetings at which local communities have an opportunity to learn about the proposed facility as well as about the siting process itself. After these regional information meetings, communities have the option of expressing initial interest in being included as a possible host. For those communities expressing interest, more detailed information meetings are arranged. If, after the second round of meetings, elected officials in a community are still interested, then detailed investigations begin to see if there is a suitable site within the community. If no suitable sites are found, a community must drop out of the process. If one or more acceptable sites is found, then community approval must be obtained, such as by a referendum or by public meetings. If a community does give approval, then it becomes a candidate to receive the LULU or NIMBY facility. If more than one community is a possible host, then the appropriate level of government with jurisdiction for finding a site decides which site is the best overall.

Conceptually, a process that results in a LULU being sited in a willing community is superior to one that results in one being imposed in a community. However, as with all processes, there are weaknesses. As Maclaren (2004: 393) highlights, "First, and probably most importantly, there is no guarantee that any community will volunteer to host the facility. If there is no willing host, then the siting process must start again, after considerable time and money have been spent." A second limitation is that, although the dominant principle is that the process will find a socially acceptable site, it may do so at the expense of not protecting the

environment. Third, some residents in the host community will be exposed to or suffer more from the environmental risks than others due to their close proximity to it. That is, the facility truly is ‘in their backyard.’ Those most negatively affected may be out voted by the larger number of people who perceive benefits to the community through promised jobs or enhancement of community amenities. In such situations, fairness requires that the needs and concerns of those most at risk be given attention. Fourth, residents of adjacent communities may be concerned that their community will not receive any direct benefits but could be exposed to risks. Fifth, Maclaren (2004: 393) identified an ‘ethical issue’. In her words, “Only communities that have the greatest need for the economic benefits of these facilities are likely to consider volunteering. Ultimately, therefore, the poorest communities may be asked to bear the greatest burden for the consequences of activities that take place elsewhere, such as nuclear power generation and industrial production.”

#### **4.3 Canadian Experience with the Voluntary Approach**

Hazardous waste facilities have been successfully sited using this approach in both the provinces of Alberta and Manitoba (Rabe, et al, 2000). However, failures also have occurred. Kuhn and Ballard (1998) document the unsuccessful attempt in British Columbia to find a site for a province-wide hazardous waste facility. Based on their analysis, they suggest the voluntary approach failed because of faults in the public consultation process which led to loss of trust in the overall process by residents of two communities which had offered themselves as possible hosts. Ontario also has had some unsuccessful outcomes (Kuhn, 1998; Gunderson and Rabe, 2000; Mitchell, 2004: 564-566; Maclaren, 2004: 393-394). The implication is that while the voluntary approach overcomes limitations of the traditional approach, it also has weaknesses that continue to provide challenges.

### **5. CONCLUSIONS AND IMPLICATIONS**

Decisions to locate LULU or NIMBY facilities usually are characterized by conflict and controversy. Ironically, such facilities are needed because of the collective demand generated by societies, yet individuals rarely are keen to have them located adjacent to where they live, work or recreate.

Research suggests that it is important to identify transparent principles upon which siting decisions will be based, and, to engage local communities from the outset in the decision process. Furthermore, innovative procedures, such as the inverse Dutch Auction, offer opportunities to overcome mistrust about regulatory agencies, facility proponents, and technologies.

Environmental justice has emerged due to concerns that LULU and NIMBY facilities too often were being located within or adjacent to minority communities. In countries such as the USA, environmental justice has been institutionalized into federal governance arrangements through a Presidential executive order. However, recent evaluations have shown significant divergence in interpretation about what the executive order had mandated federal agencies to do, emphasizing the generic challenge of moving from intent to action.

If environmental justice is to be used as a foundation, governments must be aware that it can be defined or interpreted as either a protective regulatory or redistributive policy. Each type of policy leads to different values being emphasized and makes the related decision-making processes accessible to different types of stakeholders. A further complication is the heterogeneity of environmental non-government organizations, leading to different goals and methods being pursued or advocated by various environmental groups.

Environmental justice is not a ‘magic wand’ or ‘silver bullet’ to resolve the conflict and controversy normally associated with LULUs and NIMBYs. Nevertheless, it is a powerful



concept to sensitize regulatory agencies and proponents that too often such facilities are sited in or beside communities that are marginalized due to lack of wealth, political influence or power, or minority status. The ideas that have emerged from the environmental justice movement, such as the Environmental Justice Principles prepared at the First National People of Color Environmental Leadership Summit in 1991, provide an excellent basis from which to develop principles to guide policy and decisions.

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Table 1: Principles of Environmental Justice, from the 1991 First National People of Color Environmental Leadership Summit

Delegates to the First National People of Color Environmental Leadership Summit held on October 24-27, 1991, in Washington DC, drafted and adopted 17 principles of Environmental Justice. Below, 13 of the principles are provided.

### PREAMBLE

**WE, THE PEOPLE OF COLOR**, gathered together at this multinational People of Color Environmental Leadership Summit, . . . ., do affirm and adopt these Principles of Environmental Justice:

- 1) **Environmental Justice** affirms the sacredness of Mother Earth, ecological unity and the interdependence of all species, and the right to be free from ecological destruction.
- 2) **Environmental Justice** demands that public policy be based on mutual respect and justice for all peoples, free from any form of discrimination or bias.
- 3) **Environmental Justice** mandates the right to ethical, balanced and responsible uses of land and renewable resources in the interest of a sustainable planet for humans and other living things.
- 4) **Environmental Justice** calls for universal protection from nuclear testing, extraction, production and disposal of toxic/hazardous wastes and poisons and nuclear testing that threaten the fundamental right to clean air, land, water, and food.
- 5) **Environmental Justice** affirms the fundamental right to political, economic, cultural and environmental self-determination of all peoples.
- 6) **Environmental Justice** demands the cessation of the production of all toxins, hazardous wastes, and radioactive materials, and that all past and current producers be held strictly accountable to the people for detoxification and the containment at the point of production.
- 7) **Environmental Justice** demands the right to participate as equal partners at every level of decision-making, including needs assessment, planning, implementation, enforcement and evaluation.
- 8) **Environmental Justice** affirms the right of all workers to a safe and healthy work environment without being forced to choose between an unsafe livelihood and unemployment. It also affirms the right of those who work at home to be free from environmental hazards.
- 9) **Environmental Justice** protects the right of victims of environmental injustice to receive full compensation and reparations for damages as well as quality health care.
- 10) **Environmental Justice** considers governmental acts of environmental injustice a violation of international law, the Universal Declaration on Human Rights, and the United Nations Convention on Genocide.
- 12) **Environmental Justice** affirms the need for urban and rural ecological policies to clean up and rebuild our cities and rural areas in balance with nature, honoring the cultural integrity of all our communities, and provided fair access for all to the full range of resources.
- 16) **Environmental Justice** calls for the education of present and future generations which emphasizes social and environmental issues, based on our experience and an appreciation of our diverse cultural perspectives.
- 17) **Environmental Justice** requires that we, as individuals, make personal and consumer choices to consume as little of Mother Earth's resources and to produce as little waste as possible; and make the conscious decision to challenge and reprioritize our lifestyles to insure the health of the natural world for present and future generations.

The Proceedings related to the First National People of Color Environmental Leadership Summit are available from the **United Church of Christ Commission for Racial Justice**, 475 Riverside Dr. Suite 1950, New York, NY 10115.

Source: <http://www.ejnet.org/ej/principles.html>, accessed on 11 June 2007.

# SITING LULU FACILITIES: AN EXPERIENCE OF TAIWAN

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## Abstract

This study was conducted through a survey of LULU cases, 9 electric power stations and 15 solid waste incinerators, in Taiwan. Unlike past literature paid much attention on the effect of 'economic' factor such as compensation or auction approach on the decision of LULU site, this study calls for site planners should be more sensitive to the influence of 'noneconomic' factors in the siting selection process. Economic factors include health and property safety concerns, compensation for environmental effects, and living standard risk. Noneconomic factors contain lack of public participation, credibility deficiency, and local politics. 30 people of the community adjacent power stations and 60 people of solid waste incinerators are interviewed. All the interviews were recorded. The interviewing questions were based primarily on the two types of contributing factors to successful sites of LULUs. The author spent about 30 minutes to an hour to partake in an in-depth interview with all the participants. Structured telephone interviews were also conducted with 260 residents for electric power stations at the confidence level of 95%, having a sampling error of  $\pm 6.07\%$ . 765 for solid waste incinerators at the confidence level of 95%, having a sampling error of  $\pm 3.54\%$ . The study concluded that LULU syndrome indeed existed in the field of Taiwan's site selection and construction of electric power stations and solid waste incinerators. In order to settle the NIMBY syndrome and convert it to a YIMBY (Yes in My Backyard), official planners have to take into consideration all the noneconomic factors in the public facility construction procedures. Two different approaches are suggested by urban planning researchers to cope with the confrontation of LULU facilities. One is to adopt a government-centered and regulatory approach. Another is utilizing market-based and voluntary approach, especially in the compensation for the effects on the environment. This paper suggests the third way, community governance approach to resolve the dilemma of siting LULU facilities through the use of noneconomic factors.

**Keywords:** LULU, NIMBY, YIMBY, Conflict management, Risk communication

## 1. INTRODUCTION

LULU (locally-unwanted-land-uses) syndrome has become one of society's controversial issues. No matter where it occurs – in a developed country or in an underdeveloped one, proposed construction of new facilities are often met with intense public opposition. Related examples are landfills or solid waste incinerators, airports, prisons, low-income housing projects, electric power stations, transportation facilities; recreational facilities; water supply facilities; social service facilities, etc. The siting of LULU facilities are subject to criticism by community residents, concerned grassroots' groups, and local LULU politicians. Siting protests have

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become frequent, and some have even turned violent. The NIMBY (not in my backyard) syndrome has grown as project opponents have attempted to alter, delay, or stop public construction projects. Site planner invariably faces some form of paralysis in site selection of public facilities. Thus, how to break through the predicament of LULU syndrome in the siting process becomes one of the most exigent tasks for site planners and urban planners.

Indeed, the siting of a public infrastructure decision and the NIMBY syndrome situation that arises is a common scenario of industrialized nations' worldwide (Lake 1987; Popper 1987). NIMBYism research has always been the focus of urban planners and site practitioners. How a LULU, NIMBY or NIMTOO (not in my term of office) site be built without setting off riots or endless litigation? Are there any possibilities to resolve the tension caused by annoying NIMBY constituencies effectively? Related studies are many, but answers are inconclusive. This aim of this research is to examine NIMBYism in Taiwan and trying to offer our experiences for siting LULU facilities successfully.

This article will focus on the LULU syndrome in Taiwan, specifically the location selection and execution of facility construction. I chose to focus on Taiwan as an example because it is not only one of the most active members of the four Asia "dragons"<sup>1</sup> but it is a miracle of an economically developing country. As a small island with a highly dense population, Taiwanese is not only well-educated but are apt to pay particular attention to improving their environment and living standards. Anti-pollution movements are quite frequent in this transitional society. Therefore the protest and opposing movement derived from NIMBY syndrome in Taiwan is more passionate than most other developing countries.

This study has accomplished through a survey of LULU cases, electric power stations and solid waste incinerators, in Taiwan during past ten years. Unlike past literature are concerned with the effect of 'economic' factor such as compensation or auction approach on the decision of LULU site, the author calls for local government decision-makers should be more sensitive to the power and influence of 'noneconomic' factors, including public participation, social trust and local politics in the siting selection process.

It is our hopes that Taiwan experience will give the reader some useful hints on how to promote a successful plant location siting and plan for its smooth execution. Most importantly, we hope to recommend ways of resolving NIMBY confrontations, so that policy planners can carry out their public infrastructure projects successfully and thereby reduce the cost burden on society.

## 2. REDEFINING "LULU SYNDROME"

There are many different terms, regarding LULU, as Build-Absolutely-Nothing-Anywhere-Near-Anything (BANANA), Not-In-My-Bottom-Line (NIMBL), For-Not-On-Our-Street (NOOS), etc. According to NIMBY researchers, the LULU syndrome began 30 years ago in the United States. At that time the focus on environmental pollution facilities, such as a waste processing plant (Halstead, Luloff and Myers, 1993), toxic treatment facilities (Bryant and Mohai, 1992), airport (Hall, 1980), etc. But recently many cases have occurred that have nothing to do with pollution, such as human service facilities (Takahashi & Dear, 1997), cellular phone transmission stations (Barthold, 2000), prison sitings in Rural North Carolina (Hoyman & Weinberg, 2006; Sechrest, 1992). The building of Iowa's meat processing factory, even though this created 1,100 jobs and brought annual revenues of \$80

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<sup>1</sup> Traditionally, "Yazhou szhi Ziaolong" (four Asia Dragons) include Taiwan, Hong Kong, South Korea, and Singapore. Since Shanghai becomes one of the most prosperous areas in the world, "Yazhou wuzhi Xiaohu" (five Asia "Tigers") are much more appropriate for today's situation than "Yazhou szhi Ziaolong."

million for the state, both of which were blocked by the people of the neighborhood (Kreidler, 2000).

What is NIMBY? The definition of NIMBY is quite confusing. Inhaber (1998) pointed out that NIMBY syndrome actually is a kind of hatred or dislike of the public infrastructure's repeal consciousness. He describes such a phenomenon as a "dragon" and the process of resolution as "slaying the NIMBY dragon."

As Richman & Boerner (2006: 37) indicated that LULU is defined as socially desirable land use that broadly distributes benefits, yet is difficult or impossible to implement because of local opposition. Two important characteristics make LULU facilities. The first is the project will generate an overall increase to social surplus. Second, the nature of the costs and benefits associated with these facilities virtually assures local opposition. Lake (1993) observed that LULU occurs because of two factors: (1) the public facility itself is required in some manner and provides important social benefits. (2) Local parochialism is an obstacle to a practical, social good. Therefore, the LULU syndrome actually is a tough bottleneck for environmental planners to break through during the planning and execution of public facilities. Such gridlock cannot be settled by any rational or technical means.

Dear (1992: 288) defines NIMBY as, "the motivation of residents who want to protect their turf. More formally, NIMBY refers to the protectionist attitudes of land oppositional tactics adopted by the community groups facing an unwelcome development in their neighborhoods. Such controversial developments encompass a wide range of land use proposals."

Vittes, Pollock, III, & Lilie (1993) recognized NIMBY as: (1) a passive attitude towards and/or denial of the public infrastructure that is considered harmful to the community's right to living and environmental well being. (2) The syndrome basically is environmentalism in that it places emphasis on the value of the environmental effect of the standard of living of those living near the public infrastructure. (3) NIMBY syndrome actually sometimes is not even based on any technical, economical or administrative knowledge or discussion; rather it is a rejection phenomenon.

Although LULU attitudes are sometimes regarded as "rights" of the individuals, many studies have shown that LULU is a selfish, egocentric and political trait (Hunter and Leyden, 1995). Common elements of LULU protesters, who subverted a well-conceived and essential disposal facility, include fear, meetings, emotions, and politics. It is always hard to dissuade them through rational discussion. Many developed countries look at it as an obstacle of public infrastructure construction. In the U.S., for example, from 1980 to 1987 it planned to build 81 plants to treat toxic waste. Only 8 facilities were completed. Their main obstacle was with LULU syndrome. Irrational arguments were made to block the construction (Lake 1987; O'Hare and Sanderson,<sup>2</sup> 1988).

Based on the above description, the author found that the LULU syndrome has the following four distinct characteristics: (1) the benefits of the public infrastructure are shared by the whole society at the expense of those local residents affected. (2) It was determined that the degree of acceptance by local residents varied with the distance between the public facility and their homes. (3) The LULU syndrome is an irrational response. Most carry it out through passive but willful resistance – or simply put, for the sake of opposition alone. (4) Initially, LULUs sometimes arose between the technical experts and government officials and the community at-large over the value and purpose of the construction.

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<sup>2</sup> Through their research, Lake, O'Hare and Sanderson (1988) found out that in this instance of NIMBY, only 2.4% really cared about the environmental effect and property value; 45.7% were apathetic or did not care and 25.5% were concerned about their health and safety. Therefore the content leading up to the NIMBY syndrome consisted of many irrational factors.

### 3. ECONOMIC VS. NONECONOMIC FACTORS CONTRIBUTING TO SITE LULU FACILITIES

How to site LULU facilities without neighborhood opposition or resident protest? What kinds of factors contributing to a successful decision of LULU site? Past literature has paid much attention on the importance of site location and the effect of economic incentives. Economic instruments, such as auction or compensation strategy, must be implemented for the victims adjacent in the selected LULU site. Site proximity should cause irrational neighborhood opposition. Compensation or public auction is the only effective and peaceful way to solve the gridlock of LULU syndrome. Accordingly, the study of LULU phenomenon has focused on the economic incentive instruments and neighborhood demographic characteristics as predictors of hostility, with housing in low-income, transient, heterogeneous neighborhoods expected to generate the least resistance (Zippay, 2007).

For example, Lehr & Inhaber (2003: 402) suggests a creative “reverse Dutch auction” approach to well end the stalemate caused by LULU syndrome that so greatly retards progress of public construction facilities. The guidelines behind the use of reverse Dutch auction to site LULU such as waste disposal site or electric power station are: (1) the site has to be volunteered. (2) Environmental standards should not be reduced. Basically, there is no “best site.” Although the reverse Dutch auction strategy has many advantages, Neuzil (2003) argues that a LULU will have different effects on different members of the population. Landowners adjacent to a proffered site without any benefits from the auction must oppose this proposal. The underlying assumption of reverse Dutch auction will be failed because it is hardly to have a siting area that is overwhelmingly volunteered. How do we expect every citizen in the LULU area will accept the auction proposal without any opposition? How do we build the consensus of residents for the decision of LULU site? If through referendum, ‘the tyranny of majority’ is another problem---the public interest of minority might be sacrificed under the result of referendum. Thus it would not avoid litigation, political battles, and facility delays.

The market approach by Inhaber (1992) also illustrates that those who cry "NIMBY" are telling us that the cost, real or perceived, of a LULU in their vicinity is high to them. Thus, public auction is suggested to deal with LULUs, money has to be paid to the community making a bid. Richman & Boerner (2006) develop a transaction cost economic model for regulation and applies this model to environmental siting regulations designed to overcome NIMBY political opposition. However, how fair is fair enough? Many LULU cases have clearly confirmed that money is not always enough to be equally distributed to every resident in LULU area. In any society, equal distribution is hardly achieved by resources distributors. According to Dorshimer (1996), economic developers and others have had great difficulty in the past siting high impact projects because they: (1) failed to recognize and avoid the technical rational vs. culture rational root cause of the NIMBY phenomenon; (2) have not been successfully presenting and defining the benefits and costs to all affected parties, and lastly; (3) have failed to reach equitable and fair agreements on the redistribution of these benefits and costs.

In *Controlling Technocracy*, McAvoy (1999) applies the concept of NIMBY to hazardous waste facility siting in the Minnesota. He found that public participation, which is a noneconomic factor, has positive impact upon solving the predicament of LULU facility. Residents are not always irrational, self-interested, and ill-formed. After participating public hearings and intensive communication, local people are highly knowledgeable about the LULU site facilities. McAvoy (1999) concludes that democratic decision-making may be cumbersome and slow, it can change the NIMBY syndrome into YIMBY (Yes in My Backyard). Thus, Waugh, Jr. (2002) values public participation in siting policy making. In fact, more and more site practitioners and urban planners are preferred to adopt ‘community governance approach’ instead of ‘market approach.’



In this model the goal is to reach collaborative, consensus-based decisions; government, business, community groups and citizens work together; and leaders share power, working to enable others to decide issues. In short, the new model would redefine politics away from the capital 'P' politics of elections and campaigns and voting and contributions to the small 'p' politics of self-government. The challenge of the coming decade is for America's leaders and citizens to adapt themselves and their communities to this New World (Gates, 1999). For example, the solution envisioned by most siting agencies now is education. To carry public education out, public meetings are held in which the potential host communities are lectured by scientists and administrators. The experts usually explain that the risks are very small and that the chances of environmental damages from a well-engineered facility are almost negligible. Then they sit back and wait for nods of agreement from the locals.

The community governance mode implies the importance of democratization of environmental policy. Residents not only have the right to know how the LULU siting facilities have been established around neighborhood, but also have the right to access information regarding siting decision-making. As Gould (2002) and Korten (1995) pointed out that only direct democracy in LULU siting facilities can prevent developmental and economic interests from subverting environmental protection efforts.

Sénécal & Reyburn(2006), using Montreal as an example, has constructed an integrated conceptual framework that includes encouraging citizens participation, negotiating solutions and considering planning practices, to deal with the dilemma of NIMBY. The central concern of conceptual framework obviously is noneconomic dimension of LULUs.

Curic & Bunting (2006: 219) urge site planners need to achieve balance between public participation in the planning process and the renewed debate about what constitutes 'good' urban form; and planning policies. Kurland (1992) believes risk communication is a crucial component of any successful venture involving public perceptions of high risk.

McAvoy (1999) challenges the stereotype of NIMBY forces as overly excited, parochial, selfish and ill informed. He finds that local residents may well have considerable knowledge about technical issues. For that reason, Minnesota officials expected that local interests would oppose the experts' preferences and encouraged efforts to limit public input in the site selection process.

The effect of location/economic approach to finding sites for LULUs is clearly limited. Everyone is in favor of finding a place for a LULU, as long as it is at least a hundred miles away from them. In a densely populated country such as Taiwan<sup>3</sup>, official planners do have very limited choice for site selection. Therefore, they have to concern with the significance of "noneconomic" instead of "economic" factors. Although money can reconcile the tension between the vendors and residents, it can not get to the bottom of the LULU problem. By focusing upon biomedical incinerator in a small city, Dunn, North Carolina, Sellers (1993: 460-461) calls for that "for waste incinerators, fear of risk to health and safety is probably the most significant one." Others, for instances, "the concern over possible mismanagement of such facilities, falling property values, and the unfair burdening of one community with waste created statewide or by neighboring states."

As McAvoy (1999) mentioned, lack of participation by the local community in the facility siting process is a key factor of NIMBY syndrome<sup>4</sup>. In fact if we could involve and educate the

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<sup>3</sup> Population Density approximately reaches 634 persons per square kilometer, in Sep. 2007. National Statistics, R.O.C. <http://eng.stat.gov.tw/point.asp?index=4>. 2007/10/28.

<sup>4</sup> McAvoy (1999) indicated that NIMBY syndrome originally began in American society. The increasing democratic involvement of local residents clashed with the advancement of technology in the public facility construction policy arena. Government policy relied heavily on the scientific and technical expertise of planners, while the local community was viewed as too emotional or irrational to involve in policy decisions. This led to the NIMBY syndrome, a movement that has ceaselessly developed and grown as a major obstacle to public facility

local community in the understanding of the technical aspects and the societal value, this would help bring all points of view to a compromise, allowing the construction of the public facility to proceed more smoothly.

As indicated above, LULU syndrome arises from economic factors but is much more complex than a conglomeration of economic, social, psychological, or political responses by residents to local controversies (Takahashi, 1997). A systematic study of NIMBY phenomenon in Taiwan, this research concluded that the NIMBY syndrome arises from the following factors:

1. **Economic factors:** including: (1) health and property safety concerns. To the community residents, the most controversial cases of LULU syndrome occur when there is a profound effect on the emotional and psychological level and when there is damage to personal property. In the siting of power plant and waste incinerators, this article focuses on how the following four specific risks affected the local community: health, safety, property value, and farmer and fishermen yield. (2) Compensation for environmental effects. No matter what rationale is given, there is no avoiding a confrontation between the facility owners and the local community residents, which creates a LULU syndrome. Therefore, a monetary settlement of some kind is unavoidable. The community will usually request compensation either for the local construction itself or will request a monetary or non-monetary compensation for the health, property and psychological losses of community residents. In Taiwan the environmental compensation has been recognized as the key means of settling the NIMBY syndrome. This article will examine the following three items for analysis: Did the power plants or waste incinerators siting improve the economic development? Did the power plants or waste incinerators siting create jobs? What is the most compensation that would be asked of the power plants or waste incinerators? (3) Living standard risk. The public facility construction, of course, affects the local residents' quality of life. Lee (1997) indicated that the living environment includes the natural environment and man-made environment. The latter includes real and unreal environment. Based on his definition, the environmental living standard includes land uses, environmental hygiene, traffic impact, landscape, air pollution, water contamination, noise disturbances, etc. This article will also discuss the following questions. How will this siting affect total living quality? What did residents consider to be the most detestable impact?
2. **Noneconomic factors:** including: (1) lack of public participation. LULU Syndrome appears when expert opinion is relied on solely for government public policy, neglecting public opinion and civic engagement altogether. Therefore, in order to smoothly settle LULU syndrome it is very important for local residents to participate in the public facility siting selection and planning process. This article will discuss the following three questions: Did this facility siting ever have a public hearing? Did the facility site owner ever provide the detailed information to the local community? Was this case suitable to provide a local referendum? (2) Credibility deficiency. Most public agencies and private firms responsible for waste management and facility siting in Canada and the United States suffer from low credibility. Their traditional approach to facility siting has only exacerbated earlier distrust (Rabe, 1994: 163). The LULU syndrome is a transparent example of a serious credibility crisis between local groups and civic officials; specifically citing a general distrust of the government's fairness and the entrepreneur's willingness to deal with and collect the environmental pollution arising from the situation. This creates distrust among the groups. Chiou (2002) indicate that the credibility gap is one of the key issues to

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construction. Therefore, lack of participation in the facility siting process becomes a key factor of NIMBY syndrome.

study. Therefore in this article, we tried to address the following two items: Did local residents believe that the power plants or waste incinerators owner has the sincerity to bring in favors for the community? Did the local residents trust that the owner intends to resolve any environmental pollution created and settle the safety issues? (3) Local politics. To the local Taiwanese politician, the logical resolution to LULU is to seek the vote of support from the local community concerned for the facility construction. Since the motivation to get involved is to skew by a desire to win support for an incumbent election, the local politician tends to support the residents no matter how irrational the case is. In the ballot consideration, the local representatives or civic leaders must approach the public for its opinion no matter how obscure the situation is. Therefore, voting is the political process's main axis in Taiwan's present political situation. In the political arena, this article will mainly focus on whether any underground or local factions were involved.

#### 4. RESEARCH METHODS

The LULU facilities in this study are solid waste incinerators and electric power stations island wide (Table1). The research methods depended on two parts. One, the in-depth interview: The author had to interview the representatives of the solid waste incinerators and electric power stations and the neighborhood of the sites. We interviewed nine solid waste incinerators and fifteen power plants, covering the entire island from south to north. Chang-sen power station and Tsin-Tow station in the north Taiwan; Hai-Du station in Central Taiwan; Mai-Lou station and Chia-Fai station in southern Taiwan and Hoc-Ping station in eastern Taiwan. Solid waste incinerators in Taipei, Tauyuan, HsinChu, Taichung, and Kaishung are intensively investigated. The author interviewed the station manager or the public affairs representative of the solid waste incinerators and electric power stations. For the local people we interviewed the community leader or the self-appointed group representative of the community. In total, we interviewed 30 people for power plants and 60 people for waste incinerators. All the interviews were recorded. The interviewing questions were based primarily on the two types of contributing factors mentioned above. We spent about 30 minutes to an hour to partake in an in-depth interview with all the participants.

Structured telephone interviews were also conducted with 260 residents for electric power stations and 765 for solid waste incinerators. The former sample is fairly representative at the confidence level of 95%, having a sampling error of  $\pm 6.07\%$ . The latter sample is satisfactorily representative at the confidence level of 95%, having a sampling error of  $\pm 3.54\%$ .

Table 1. Type of LULU Facilities and Samples of Interviews

Types of LULU	Numbers	Sample of telephone interview	Sample of in-depth interview
solid waste incinerators	9	765	60
electric power stations	15	260	30

The research protocols were conducted by the National Taipei University's Research Center for Public Opinion and Election Studies. The Center employed the CATI (Computer Assisted Telephone Interview) system to survey the residents nearby the power plant sites and solid waste incinerators. We used the phone directories of each local community to conduct phone interviews.

The demographics of the interviewed sample were indicated as Table 2. This method of research was the first of its kind in LULU research in Taiwan, and we believe the strength of this sampling methodology lies in its random selection process. The results were not only representative of the community but were also very meaningful to the study.

Table 2. Demographics of the interviewed sample

Variable	Classification	electric power stations %(n)	solid waste incinerators % (n)
Sex	Male	55(169)	49.2(376)
	female	35(91)	50.8(389)
Age	20-29	12.7(33)	14.6(112)
	30-39	18.1(47)	23.4(179)
	40-49	35.8(93)	26.8(205)
	50-59	20.0(52)	21.8(167)
	60 or over	13.1(34)	12.8(98)
Education	Illiteracy	3.8(10)	4.4(34)
	Elementary	12.3(32)	13.5(103)
	Junior high	18.1(47)	10.8(83)
	High school	36.9(96)	35.6(272)
	College/university	26.5(69)	31.8(243)
	Master or Doctor	1.2(3)	2.5(19)
Occupation	Farmer, Fisherman	9.2(24)	3.8(29)
	Blue-collar worker	25(65)	16.6(127)
	Retail/vendor	12.3(32)	13.7(105)
	Service	11.5(30)	11.9(91)
	Civil/military	9.6(25)	9.0(69)
	Housewife	14.6(38)	5.1(39)
	Retirees	5.4(14)	19.6(150)
	Unemployed	4.6(12)	7.7(59)
	Others	7.7(20)	3.0(61)

## 5. EMPIRICAL RESULTS

The following are the results and analysis of our research:

### 5.1 The existence of NIMBY syndrome

First, we will discuss how we determine if NIMBY syndrome actually exists. As indicated above, this research analyzed the existence and seriousness of NIMBY syndrome in the construction of Taiwan's electric power stations and solid waste incinerators in the north, central and south of the island. We examined three indicators. (1) The "welcome" indicator: This describes the local reaction of the LULU facilities being sited in the community. (2) The "favor" indicator: This describes whether the local community favored or disfavored the site decision. (3) The "fairness" indicator: This describes whether the decision to site the LULU facilities in the local community was made in a fair way. NIMBY syndrome is likely to exist if the three questions above are answered in the negative. If all of the above answers are positive, then NIMBY syndrome is likely not to exist.

Based on the results of the interviews with factories representatives, we concluded that NIMBY syndrome did exist in all cases. This was determined by two factors. (1) A total of 24 vendors applied for the construction of power plants and solid waste incinerators, and only ten were constructed. Of course, the cause of abandonment cannot be totally blamed on the confrontation from the local community; however, the NIMBY syndrome was the main reason.

(2) In all power plants and solid waste incinerators, each located in different areas; the local community formed self-relief organizations to conduct the confrontation against the power plant and converted the pervasive NIMBY sentiment into active confrontation.

According to the survey results, in the “welcome” indicator category, 51.9% and 48.1% of the participants bore either an “unwelcome” attitude or a “very unwelcome” attitude with respect to the power stations waste incinerators being set in their neighborhood. In the “favor” indicator category, 58.1% and 57% of the residents either “did not favor” or “strongly opposed” the siting of the power stations and waste incinerators in their neighborhood. In the “fairness” indicator category, negative attitudes were lower than the above two indicators but still 38.8% and 40.6% of the residents described the action as “very unfair” or “unfair.” This figure is still higher than the “fair” or “very fair” categories, which was 29.6% and 28.4%, respectively (Table 3). Therefore, all three indicators -- “welcome,” “favor,” and “fairness” – showed a negative trend, thereby confirming that LULU syndrome existed.

Table 3. Survey results on the existence of LULU Syndrome

1. The “welcome” indicator: <i>Did you welcome the site here or not?</i>					
	Very Unwelcome	Unwelcome	Welcome	Very Welcome	Unknown
Power station	21.9%(57)	30%(78)	28.1%(73)	2.7%(7)	17.3%(45)
Incinerators	17.9%(137)	30.2%(231)	30.6%(234)	2.2%(17)	19.1%(146)
2. The “favor” indicator: <i>Did you favor the power plant here or not?</i>					
	Very Unwelcome	Unwelcome	Welcome	Very Welcome	Unknown
Power	25.4%(66)	32.7%(85)	19.6%(51)	3.1%(8)	19.2%(50)
Incinerators	22.2%(170)	34.8%(266)	24.3%(186)	1.3%(10)	17.4%(133)
3 The “fairness” indicator: <i>Did you feel that it is fair or unfair for the power plant to be here?</i>					
	Very unfair	Unfair	Fair	Very Fair	Unknown
Power station	13.8%(36)	25%(65)	26.5%(69)	3.1%(8)	31.5%(82)
Incinerators	16.2%(124)	24.4%(187)	26.8%(205)	1.6%(12)	31%(237)

## 5.2 Economic Factors Contributing to LULUs

### 5.2.1 Health and Property Concerns

According to in-depth interviews with the residents concerned, it was found that the power plant’s siting affected the community by the health and property concerns as follows: (a) the people worried that the electromagnetic field would affect their health, especially in increasing the risk of cancer. (b) People also worried that they would die by electric shock. They were concerned especially for their children’s safety. (c) They believed that the presence of a high voltage electric tower in the surrounding area would result in property value depreciation. (d) They worried that the magnetic field would damage their agricultural produce. With regard to the solid waste incinerators, the residents of the community are mainly concerned with the problems of air pollution (especially Dioxin), water, and solid water pollution.

According to the survey results, 41.9% and 44.7% responded that the power plants and solid waste incinerators would have a negative effect on their health; 46.9% and 47.3% of the residents in power stations and solid waste incinerators said it would have no effect; 51.9% and 47.2% of the participants in the sites of power plants and solid waste incinerators said it would have a negative effect to the property and 38.8% and 37.4% thought there would be no effect, respectively. 47.3% of residents in the power stations and 33% residents of the site of solid waste incinerators said it would impact agricultural produce and production; and 31.2% and 26.9% thought there would be no effect (Table 4).

From the above results, we found the opinions were quite varied. Regarding the health and safety risks, the residents acknowledged that the establishment of an electric power plant would carry low risk. However, they felt that there was a great risk to real estate values and agricultural production. Therefore, we could conclude that the residents' antagonistic attitude towards the power plant chieflier concerned their property than their life.

Table 4. Survey results on health and property concerns

<i>1. The power stations (incinerators) set here, would it affect your health or not?</i>					
	Many ill effects	Some ill effects	A bit of ill effect	Totally no ill effect	Unknown
Power station	14.2%(37)	27.7%(72)	36.5%(95)	10.4%(27)	11.2%(29)
Incinerator	19.3%(148)	25.4%(194)	36.7%(281)	10.6%(81)	8%(61)
<i>2. The power stations (incinerators) set here; does it affect your property value?</i>					
Power station	21.5%(56)	30.4%(79)	27.3%(71)	11.5%(30)	9.2%(24)
Incinerator	23.4%(179)	23.8%(182)	25.6%(196)	11.8%(90)	15.4%(118)
<i>3. The power stations (incinerators) set here; does it affect your agricultural production?</i>					
Power station	15.4%(40)	31.9%(83)	23.1%(60)	8.1%(21)	21.5%(56)
Incinerator	14.6%(112)	18.4%(141)	18%(138)	8.9%(68)	40%(306)

### 5.2.2 Compensation of Environmental Effects

Regarding the compensation of environment effects on the residents of the community, we identified four categories: either there is monetary or nonmonetary compensation, and the compensation is mandated by law or by the vendor's voluntary actions.

According to the survey, presently there are two types of compensation to resolve NIMBY syndrome:

- (a) **Monetary compensation:** The amount of mandatory compensation to landowners in the area surrounding the high voltage power tower would be set by the government decree, plus 10%. There are two types of voluntary compensation. One is the compensation set aside from the construction company at the outset of the construction and the other is derived from the power plant management for ongoing damage. In the former, the compensation covers any ill effects incurred during the site selection to the construction process. The minimum amount is US\$100 per person, and the maximum is US\$600 per person. Voluntary compensation from the management of the power plants was usually negotiated between the community and the vendor. For example, in one case, the power plant's compensation was taxing about 0.5% on US\$1,000,000 revenue. There is also a compensation for low-income families, the elderly or the handicapped in the community. By Chinese tradition, in the mid-Autumn Moon Festival and Dragon Festival and the Chinese New Year a small monetary compensation (or welfare tip) would be distributed to these individuals. Regarding to compensation for solid waste incinerators, an incinerator in central Taiwan was granted US \$5 million for the environmental pollution and the loss of property. In addition, US \$ 10 per ton for sold waste and garbage managed by the incinerators have to pay to the community around the LULU sites. Totally, the community has earned US \$ 2.8 million per year.
- (b) **Non-monetary compensation:** An example would be the funding of scholarships; job opportunities for the community, especially for blue collar workers with no special skills and temporary workers; donations to the local houses of worship or community activities; participation in recreational activities; or improvement projects to beautify and enhance the local environment. These non-monetary

compensation were done on voluntary (not mandated by law) basis. These favors totally depended on the good will between the vendor and the community.

How did the community respond to the vendor providing so many different kinds of compensation? According to the survey report, 54.6% and 73.2% of those surveyed --even with the entire donations-- still believed that the plant itself had not improved the economic development of the community. However, 60.8% and 73.6% of the participants thought that the power plant and incinerators did not increase the job opportunities (Table 5).

The most common form of compensation that local residents require is a reduction in the electric bill (31.2% and 34.6%); the second most common was the construction of public welfare facilities, such as parks and other recreational facilities (25% and 17.9%) for electric power stations and solid waste incinerators; and others asked for direct monetary compensation (13.8% and 11.3%). Therefore, in this case study, taking deductions off residents' electric bills was the major consideration for mitigating confrontation (Table 6).

The LULU facilities are set here; are you satisfactory the compensation? Only 15% of the participants in the power station sites and 18.8% of the participants in the site of solid waste incinerators are satisfactory with the compensation. The very high proportion, 65.4% and 57.5%, respectively, of the residents do not have any common. It seems that the residents around the LULUs do not have positive evaluation on the compensation by the vendors (Table 5).

Table 5. Survey results on environmental compensation

<i>1. The site set here; does it help local economic development?</i>					
	Not at all	Does not help	Helpful	Very helpful	Unknown
Power station	25.4%(66)	29.2%(76)	36.5%(95)	3.8%(10)	5%(13)
Incinerators	37.8%(289)	35.4%(271)	16.7%(128)	1.4%(11)	8.6%(66)
<i>2. The site set here; does it help create jobs?</i>					
	Not at all	Does not help	Helpful	Very helpful	Unknown
Power station	25.4%(66)	35.4%(92)	28.5%(74)	2.3%(6)	8.5%(22)
Incinerators	41.8%(320)	31.8%(243)	14.1%(108)	1.8%(14)	10.5%(80)
<i>3. The site set here; are you satisfactory the compensation?</i>					
	Highly unsatisfactory	unsatisfactory	satisfactory	Highly satisfactory	Unknown
Power station	7.7%(20)	11.9%(31)	13.8%(36)	1.2%(3)	65.4%(170)
Incinerators	9.2%(70)	14.5%(111)	17.6%(135)	1.2%(9)	57.5%(440)

Table 6. The most favorable compensation ways

<b>Types of compensation ways</b>	<b>Power stations</b>	<b>incinerators</b>
Pay cash	13.8	11.3
Offer job opportunities	7.3	10.4
Support public facilities	25.0	17.9
Omit electric bill	31.2	34.6
Give scholarships	1.9	7.9
Community activities	1.5	6.8
Recipients for public assistance	7.3	11.0

### 5.2.3 Quality of Life Concerns

The following five risks were cited as the most important living standard concerns of the residents. (a) Too many high voltage power towers: Natural gas generated power plants used too many power lines, which affects the scenic environment. (b) Within the construction period, increased traffic congestion created more exhaust and dust, resulting in mud when it rained. (c) Coal-derived power plants and solid waste incinerators would create air pollution. (d) Some of the equipment that the power plants and solid waste incinerators used would create loud noises,

which affected the peace and quiet in the local community. (d) Waste water from the power plant and solid waste incinerators would pollute the local rivers or waterways.

According to the survey results, 58.9% of the participants recognized that these ill effects would have a most detestable effect on the quality of life. Within this figure, 54.8% considered air pollution to be the most intolerable, followed by water pollution (16.5%) and electromagnetic field pollution (12.9%) (Table 7).

Table 7. The most detestable pollution

<b>Types of pollution</b>	<b>%</b>
Electromagnetic field pollution	12.9
Noise and vibration pollution	6.6
Scenic pollution	2.8
Water pollution	16.5
Air pollution	54.8
Others	6.3

### 5.3 Noneconomic Factors Contributing to LULUs

#### 5.3.1 Lack of public participation

Taiwan government enacted the Environmental Impact Assessment Act (EIA of 1994) in 1994. The EIA of 1994 is adapted from the National Environmental Policy Act of 1970 of the U.S. The EIA requires two steps in evaluating the environmental effects in the building of power plants. It requires the contractor to sponsor a meeting of all concerned parties to participate in a hearing and to disclose detailed information on the plant construction for the residents' feedback. If the community has any strong opinions, the vendor has to explicate his process and suggest improvements. In order to pass the hearing smoothly, vendors had to keep things ambiguous, obfuscating both the language and the process. For example, to avoid confrontation on some limited factors, vendors would intentionally neglect to publish the meeting time/date and location, selectively send out invitations, or cause the hearing to become a propaganda meeting focused on convincing the local community on their objectives. Clearly, this was not the compromise sought between the vendor and the local community because it limited the opportunity for residents to oppose the ill effects. Knowing this, people refused to participate in such meetings. Instead, they chose a direct form of confrontation, such as a demonstration to block plant construction.

We provided a questionnaire to survey the opinions of the local community. The results were: (a) 59.2% and 79% in the sites of power station and incinerators were never notified of the hearing or participated in the hearing; (b) 95.4% and 97.3% of local people indicated that the vendors did not have detailed information; or only a little bit of information was provided, 4.6% and 2.7%, respectively for power stations and incinerators. From this survey, we understand that the vendor-sponsored hearing did not really encourage community participation and that the vendor did not provide comprehensive details on the plant plan. In taking such authoritarian actions, the question is: did the vendor mean to carry out the referendum? 46.6% and 55% of the participants in power stations and incinerators accepted the policy, and 38.5% and 33.9% were opposed to the policy, respectively. When we further asked those opposed why they rejected the policy, their answers were they thought the power plant and incinerators construction required specialized knowledge and therefore indicated that they did not have the ability to make the decision (Table 8).



Table 8. Survey results on lack of public participation in siting selection

<i>1. The site set here; did they have a public hearing?</i>					
	Many times	Few times	Only one time	Never heard of	Unknown
Power station	6.5%(17)	25.4%(66)	8.8%(23)	59.2%(154)	0
Incinerators	5.1%(39)	12.8%(98)	3.1%(24)	79%(604)	0
<i>2. The site set here; did they provide detailed information?</i>					
	Totally none	Only a little information	A little information	Plenty of information	Unknown
Power station	30.8%(80)	26.9%(70)	26.5%(69)	4.6%(12)	11.2%(29)
Incinerators	37.4%(286)	18.7%(143)	19.3%(148)	2.7%(21)	21.8%(167)
<i>3. The site set up here; did you agree to have a referendum to decide the plan site?</i>					
	Strongly disagree	Disagree	Agree	Strongly agree	Unknown
Power station	11.2%(29)	27.3%(71)	31.2%(81)	15.4%(40)	15%(39)
Incinerators	13.1%(100)	20.8%(159)	29%(222)	26%(199)	11.1%(85)

### 5.3.2 The problem of credibility gap

Trust is the foundation of social capital. Social capital is an invisible liability. It is through the society's mutual activity that forms this invisible liability. There includes three dimensions: social network, social trust, and social boundaries. A society high in social capital is marked by considerable trust among its people. The participants of this society mutually understand and share the concept of boundaries, and create a social network of relationships around these principles. Putnam (1993 & 2000) acknowledges that social capital is a unique characteristic of social organization. Trust, boundaries and network – all of these can be promoted and compromised with to elevate the efficiency of a society. Therefore, the higher the peoples' and vendor's mutual trust, the higher the society capital. With social capital, the vendor can smoothly execute the site selection and construction.

According to our survey on the respondents' trust, (a) 43.8% and 55.9% of the participants in the sites of LULUs did not trust that the power plant and incinerators had a sincere attitude towards improving welfare or prosperity of the community. This figure was equal to the number of participants that trusted the vendor. (b) 37.3% and 34.1% of the participants in the sites of LULUs did not believe the vendor had a sincere attitude towards improving the pollution and safety issues. 45.4% and 47.5% thought that the result was quite mixed. This confused constituents. The residents' trust in the power plant to have a positive or negative impact on the economic development of the local community was essentially similar to the above results. However, on the improvement of environmental pollution and safety threats, more respondents trusted the power plant. When we further interviewed the people's opinion on other long-term effects, we found that the pollution created by the power plant was less serious than the pollution created by a polluted factory. Therefore the people were more inclined to believe that the power plant and incinerators would be more likely to improve the pollution effects and create a safe environment (Table 8).

When we asked the vendors whether they thought the people's confrontation was rational, we found that the vendor trusted the local community less on this issue. Invariably, they thought the local community was selfish and egocentric and did not believe the residents could take a rational attitude to settling confrontations concerning the power plant site selection. From the abovementioned, the local community and vendor had a serious "credibility gap." They needed much communication to reach a compromise.

Table 9. Survey results on the credibility gap

1. The power plant set here; did the power plant have the sincerity to improve the local community's prosperity?

	Definitely do not trust	Do not trust	Trust	Definitely trust	Unknown
Power station	13.1%(34)	30.8%(80)	39.6%(103)	3.5%(9)	34%(13.1)
Incinerators	22.7%(174)	33.2%(254)	25%(191)	4.6%(35)	14.5%(111)

2. The power plant set here; did the power plant have the sincerity to resolve the pollution and safety issues?

	Definitely do not trust	Do not trust	Trust	Definitely trust	Unknown
Power station	10.8%(28)	26.5%(69)	40.8%(106)	4.6%(12)	17.3%(45)
Incinerators	13.6%(104)	20.5%(157)	40.7%(311)	6.8%(52)	18.4%(141)

### 5.3.3 Problem of local factions

In local Taiwanese politics, there were two problems that arose in NIMBY confrontation. One problem was the underground activities that emerged during the public facility construction because of the LULU's willingness to provide a monetary compensation for environmental effects. These underground groups profited by helping the vendor settle the problem. As a result, their involvement tended towards illegal means of resolving the conflict. From our interviews, we found a couple of illicit occurrences but they were not serious. According to the survey report, 30% of the participants had experienced or heard of this phenomenon. 55% of participants thought that politicians had a hand in the outcomes. These results suggest that underground situation today is much better than years past.

The other problem was the media's involvement during the construction process. Local politicians usually tried to capitalize on the opportunity to build his/her popularity with the local community and participated in the confrontation to attract voters. According to our study, in almost all the power plant surrounding areas, local politicians took part. In the name of trying to peacefully strike a compromise between the vendor and the local community, these politicians actually led the confrontation, politicizing the NIMBY syndrome. Especially during the election period, these politicians used the situation to build his/her momentum in the local community.

## 6. BREAKING THROUGH GRIDLOCK OF LULU SYNDROME

Combining the above research results, we conclude that NIMBY syndrome existed in the field of Taiwan's LULU site selection and construction. Compared to the modern American society, the contained facts are more complicated. In sum, it took two types of factors to explain the phenomenon, which is far more than a regular report (Dear, 1992; Mazmanian & Morell, 1994; Rabe, 1994; Takahashi & Dear, 1997).

In general, considering the privatization of power plants and solid waste incinerators in Taiwan society, the main factor causing NIMBY syndrome was the host community's concerns about the LULU site selection. It was perceived to cost the community in not only health consequences and property values, but also in their living standard. In this case study, we noted that it was difficult to strike a fair environmental compensation. We also observed that a lack of participation of the host community in policymaking did not foster society's trust in the process. To complicate this, underground elements and local politicians became involved to capitalize on the chaos. In a densely populated, narrowly situated island, such as Taiwan's, this situation was further taxed by the fact that the economy was highly developed; and, subsequently, the people's standards were higher than the developing country's standards. In this scenario, it therefore was necessary to use a different policy approach to settle.

What is the best way to settle the LULU syndrome? Dear (1992) suggested "community-based, government-based and court-based strategies." Rabe (1994) indicated that in

hazardous waste siting in Canada and the United States' facility siting approach, usually there are two strategies: the regulatory and market approach.

On the basis of two types of factors, economic/non-economic, are contributing to successful LULU sites, we offer three approaches, i.e. government-regulatory, market-based and community governance strategies.

### **6.1 Government regulatory strategies**

The government usually forcibly takes action to select the site. Both the vendor and host community must obey the government's determination. If a violation happens, there exists administrative law to punish offenders or arbitration in court for settlement. This is what Rabe (1994) called the "coercive siting process." This is also Taiwan's government's present adopted model for settling NIMBY syndrome. Because people do not welcome the facility, the government has to intervene to force the vendor or facility builder to pay more attention on the effects to health, property and living standard of the local community in the hopes of minimizing the negative reaction. Thus,

(1) The strategy for resolving health and property risks is as follows: (a) the government can force the power plant to periodically sponsor free health check-ups for the host community; (b) the government can monitor the land values and usage in the vicinity of the high voltage tower and confiscate it if necessary to see that the people are fairly compensated for the to avoid any further monetary conflict.

(2) The strategy for resolving living standard effects. The relevant government agency has to establish the air, water and waste material pollution control as recourse for avoiding the occurrence of accidental incidents and to improve the security system. The government labor security management department must periodically inspect the gas pipe and liquid natural gas security. The government also has to sponsor an association between the community and power plant and incinerator vendor to improve relations and to improve the community's landscape, making the detestable facility a welcome one for the host community.

### **6.2 The Market-based Strategy**

In the United States, many state governments require the toxic waste processing facility to pay NIMBY taxes (Levinson, 1999). It is quite impossible to pass the law of NIMBY taxes in Legislative body in Taiwan currently. Actually, a 'gentlemen agreement,' an informal and mutual agreement between representatives of the host community and vendors of LULU facilities based upon volunteered and negotiated, is encouraged by the Environmental Protection Administration, the Executive Yuan. Inhaber (1998)'s auction strategies and Mazmanian and Morell (1994)'s siting contract approach are all quite similar. They all emphasize self-determination and voluntary action by the host community. It is best to allow the host community to fully participate in the process of site selection, and to let the people understand all the detailed information about the construction and the business management. Depending on what is agreed upon by all parties, the contractor then should take responsibility for the environmental pollution collection or avoid the responsibilities of the destruction of the living standard, safety and compensation.

### **6.3 Community participatory strategies:**

Due to the multiple factors involved in LULU facilities, settling NIMBY syndrome in Taiwan is more complicated than most developing countries would encounter and requires a more organized strategy.

The public facility site selection has to increase the host community's participation to minimize NIMBY syndrome and to increase mutual trust, avoiding physical forms of confrontation, such as that in development in Chula Vista, California, south of San Diego. Young (1990: 25-26) proposed that risk communication should be the primary means to settle the NIMBY syndrome. Paehlke & Torgerson (1990) analyzed the relationship between toxic waste and the administrative state and concluded that NIMBY Syndrome should be handled by participatory management. Therefore, in Taiwan, we suggest to adopt the following steps to process.

(1) The strategy to resolve the problem of the expert dictatorship policy: First, we have to assess the effects on the environment, organize a hearing and make it a legal process. Second, we have to realize the executive legal procedure about the hearing and broadly disseminate and disclose the information to the public. Third, we have to establish the referendum guidelines, allowing the host community to have the right to vote in the referendum.

(2) The strategy to settle the credibility gap. The government procedure has to settle the power plant vendor's neighborhood dispute publicly and openly and carry it out in a legal manner. The implementation of this strategy relies on a clear and effective communication between the government, the vendor and the host community.

(3) The strategy to solve the problem of environmental compensation: This market-based and voluntary approach is worth adapting, especially in the compensation for the effects on the environment. Since the government cannot form a law to request the vendor or developer to make a monetary compensation, it can only set up a fair and just system to guide and to make a strict judgment on the effects on the environment. Once settled, the government has to fully support the decisions. It does not have to consider the compensation problem, unless residents produce results from a doctor's physical examination and show that they have really suffered from the facility. Therefore, the government can encourage compromise between the vendor and the people, and provide suitable compensation for the people. The government has to help the vendor and the neighborhood systematize the environment's compensation system and set up a tripartite committee, consisting of a community representative, vendor and a moderator (Stallen 1991: 59-60) to promote cooperation and monitor the pollution. This will establish the basis or improving the living environment and the welfare of the host community. Meanwhile, of the two forms of compensation –monetary or non-monetary – we recommend not choosing the monetary option because this would create a situation where people come to expect compensation all the time, which over time becomes problematic because it lures bad elements. The vendor should create job opportunities for the community and beautify the environment and establish the welfare facility and take care of the elderly and disabled or low-income families or set up a hospital or clinic.

The above mentioned strategy basically could settle five factors, regarding the health and property risks; the risk of destroying the quality of life; and the compensation for any effects on the environment; meanwhile avoiding the tyranny of the expert in policymaking and narrowing the credibility gap. In Taiwan, however, the local politicization problem in site selection tends to be the hardest factor in the NIMBY syndrome to settle. The local LULU officials that lead the community into confrontation with the central government's public facility's policy usually act as the NIMBY group's leader, forgetting that their duty is to execute the policy. These local leaders should obey the central government's directives but instead, choose to lead the people into serious confrontations to show that they "stand with the people." The reason is quite obvious. Because the people elect them, they are obligated to represent them. If they seek reelection, they also are under pressure to realize the promises they made to their constituents. Therefore, this becomes a phenomenon of populism. This is the toughest challenge for Taiwan's government policy makers and urban planners.

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# PROCEDURES FOR DEALING WITH TRANSBOUNDARY RISKS IN SITING NOXIOUS FACILITIES<sup>5</sup>

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## Abstract

The city of Hong Kong faces a number of siting problems that have health and environmental consequences which can affect a wider population than the area in which the facility is located. This paper focuses on ways to better manage the transboundary risks associated with facilities such as a waste incinerator, chemical waste treatment facilities and landfills. After describing the nature of the problem from the perspective of the different stakeholders or interested parties affected by the risk, the paper suggests a framework for evaluating alternative siting strategies. It then examines how a siting authority can deal with transboundary issues and the role that mitigation measures and compensation can play in gaining consensus as to whether the facility should be approved. The concluding portion of the paper elaborates on the elements of the Facility Siting Credo that may be helpful in finding a home for a facility with transboundary risks and raises a set of issues as to how this approach would be relevant for Hong Kong siting problems

## 1. INTRODUCTION

The city of Hong Kong faces a number of siting problems that have health and environmental consequences which can affect a wider population than the area in which the facility is located. In other words, these proposed facilities pose a set of transboundary risks due to the negative externalities that they would create with respect to the ecosystem and neighboring districts. Some proposed facilities that have aroused public concern because of their negative externalities on either ecological sensitive areas or nearby communities are<sup>6</sup>:

- Proposed Liquefied Natural Gas (LNG) Receiving Terminal and Associated Facilities by China Light and Power Company Limited (CLP)
- Proposed Waste Incinerator by the Hong Kong SAR Government
- Upgrading of the Chemical Waste Treatment Centre by the Hong Kong SAR Government

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<sup>5</sup> This paper is based on studies undertaken with my colleagues involved in the dialog associated with siting a high level radioactive waste repository in Nevada as well as related papers on siting locally unwanted land use (LULU) facilities. The ideas also reflect many discussions on siting issues over the years with Doug Easterling, Jim Flynn, Robin Gregory, Hank Jenkins-Smith, Roger Kasperson, Joanne Linnerooth-Beyer, Hayden Lesbirel, Michael O'Hare, Daigee Shaw, Larry Susskind and Paul Slovic. Support from NSF Grant No. CMS-0527598 and the Wharton Risk Management and Decision Processes Center is gratefully acknowledged.

<sup>6</sup> For more details on these proposed facilities and the key problems that each of them face see Lai et al. (2007) "Siting Problems in Hong Kong" (Chap. 5) in Lai, P.W., L.Y. Woo, K.C. Lam, W.Y. Lee and T. Fung, *Siting and Community Response to Locally Unwanted Land Uses: A Literature Review*. Centre for Environmental Policy and Resource Management, Department of Geography and Resource Management, The Chinese University of Hong Kong.

- Proposed Landfill Expansions by the Hong Kong SAR Government
- Proposed Central Slaughterhouse by the Hong Kong SAR Government

This paper focuses on ways to better manage the transboundary risks associated with facilities such as those noted above. It proposes a strategy for facilitating the siting process by focusing on the concerns of the relevant stakeholders and the nature of the risk. Section 2 describes the nature of the problem from the perspective of the different stakeholders or interested parties affected by the risk. Section 3 suggests a framework for evaluating alternative siting strategies using where to locate an incinerator as an illustrative example. The paper then examines how a siting authority can deal with transboundary issues and the role that mitigation measures and compensation can play in gaining consensus by the public and other key stakeholders as to whether the facility should be approved (Section 4). The concluding section elaborates on the elements of the Facility Siting Credo that may be helpful in finding a home for a facility with transboundary risks and raises a set of issues as to how this approach would be relevant for Hong Kong siting problems noted above.

## 2. NATURE OF THE PROBLEM

The nature of the transboundary risk problem from the perspective of the affected districts can be stated by using the following simple illustrative example. District Y is planning to site a facility that not only affects its own residents but also those of District Z. There may be benefits to both Y and Z from having the facility, but it is likely that Y gains considerably more than Z does either through tax revenues and/or employment opportunities for its residents. There are three interrelated questions that need to be addressed from the perspective of both districts:

- (1) What actions should District Y take with respect to mitigating its risks, recognizing that the negative impacts (e.g., pollution) may extend beyond its own boundaries?
- (2) Is there a role that a siting authority can play in managing these transboundary risks?
- (3) What role can compensation or benefit-sharing by District Y play in satisfying the concerns of District Z?

There are a number of different parties who are affected by the facility that need to be considered in the siting process:

**The developer** who is interested in constructing the facility: In many countries the developer is synonymous with a government organization. For example, in Hungary and Slovakia the water management authority is responsible for developing hydroelectric power plants for managing their country's energy needs. Government agencies in Lithuania and Sweden are responsible for providing nuclear power as a source of energy.

**The affected public** who both benefit from the facility and are affected by the risk. Residents in districts near the facility may be more adversely impacted by it than those some distance away. In Hong Kong, the local community has been concerned with the negative impact of a proposed central slaughterhouse on the risks of bird flu and the decline in property values

**Public interest groups** who have their own agenda regarding future development projects: For example, "green" groups in Hong Kong have been concerned with the impact of a proposed LNG receiving terminal on the local ecology and the impact of a proposed waste incinerator on the environment.

Two questions that arise when dealing with transboundary risks and stakeholder groups are:

- (1) What role should the public and different environmental groups have in making decisions regarding the siting and operation of certain facilities?



(2) How does one create trust in the process of siting facilities and managing them when there is great uncertainty associated with risks?

### 3. A FRAMEWORK FOR ANALYZING THE TRANSBOUNDARY PROBLEM

Consider the challenges facing a private firm or developer who is trying to find a home for a solid or hazardous waste facility. As a concrete example, suppose that the facility of interest is an incinerator. District Y has expressed an interest in hosting the incinerator right near its political boundary in a part of town that has relatively few homes and businesses. Residents in District Z are also subject to health and environmental risks from the facility.

A voluntary siting process has been proposed whereby all the residents in Y over 18 can vote on a referendum as to whether an incinerator should be located in their backyard. Suppose that if a certain percentage (e.g., two-thirds) of Y's residents support the facility, then it will be deemed approved and construction will begin. Those residing in Z have no official vote on whether the incinerator should be located in Y, but they can publicly protest the facility in order to encourage residents in Y to vote against it.

Each resident  $j$  in District Y will determine whether to vote in favor of a particular facility by considering the benefits to him or her ( $B_j$ ) and the perceived risks associated with the facility. The benefits can be direct compensation to an individual, such as a reduction in property taxes, or it can take the form of community-wide or regional improvements such as additional health-related services, higher salaries to attract more and better teachers for the schools and/or new recreational facilities. A benefits package may also contain contingent arrangements such as guarantees against property value declines due to the facility if a family tries to sell its home, and reimbursement for any health and/or environmental impacts from the facility.

The risks associated with the incinerator for each individual  $j$  in District Y are characterized by a perceived probability ( $p_j$ ) that some type of damage ( $D_j$ ) will occur to him or her. These risks can be mitigated (but not necessarily eliminated) through enforcement of safety standards and regulations. If the benefits package is attractive enough and/or the perceived risks associated with the facility are sufficiently small to resident  $i$  in District Y, then he or she will vote "Yes" to constructing the incinerator.

The developer has no economic incentive to provide residents in District Z with any benefit package or to reduce the risks facing this group. From the developer's perspective, the only votes that count are the ones from District Y. Thus it is conceivable that the majority of the residents in District Z may face certain risks from the new facility for which they will not be sufficiently compensated by the developer, so that they would disapprove of the facility even though it was approved by those living in Y.

The above example illustrates the divergence between private and social costs due to transboundary risks. The private costs to the developer only revolve around residents in Y, while the social costs include the impact on individuals in both Y and Z. Unless some steps are taken to protect District Z against possible economic, health and safety losses, the above voluntary siting process can prove costly when the benefits and costs of residents in both districts are taken into account.

Transboundary risks are a form of externalities which are normally associated with public goods or bads. Thus, a hazardous waste facility poses risks of different degrees to all individuals within a certain radius of the site, and there is little that a person can do to alleviate this risk once a facility is built, short of moving out of the area. Individuals can engage in collective action to lobby against having a facility in the first place, but this involves costs to them which they may not be prepared to incur. Hamilton (1993) has shown that private firms will want to locate facilities in communities or regions which generate the least political opposition and provides empirical

evidence that the host communities will not necessarily be the ones which generate the lowest externalities.

### **3.1 Importance of International Siting Authority**

The presence of externalities suggests a clear role for a siting authority or government agency to play an active role in the siting process. More specifically, such a group would need to impose strict mitigation measures and standards that reduce the risks to both the host community and its affected neighbors before any developer or firm engages in the search for a site. It would also specify who is liable in case an accident occurs and what the appropriate compensation would have to be.

#### *3.1.1 Role of Well Specified Standards*

To adequately reflect the concerns of all the affected residents, the siting authority would need jurisdiction over a region that encompasses both the host district as well as those areas subject to the transboundary risks from a facility. Furthermore, it would need to be empowered by a governmental body that was concerned with the welfare of a wide area rather than the narrower interests of citizens from one jurisdiction.

There is an additional reason for imposing strict safety standards by a public authority or governmental authority before the search for a site begins. The standards are likely to reduce conflicts that are otherwise likely to emerge between the developer who relies on scientific experts for characterizing risks and the residents in the community who have their own perceptions of the risks. While the experts normally measure risks in quantitative terms (e.g. the probability and the anticipated consequences of an accident), the public takes other factors such as dread, unfamiliarity with the technology and catastrophic potential into account when evaluating their concerns. (Slovic 1997). Residents in Z who oppose the facility can feed into these fears of those residing in Y, encouraging them to vote against the proposal.

Evidence on how the public's perceptions of risk differ from the scientists' views is illustrated by two empirical studies. One study showed that the amount that a layperson was willing to pay for risk reductions is influenced by his or her degree of dread and the severity of risks, such as hazardous waste and sulfur air pollution, where there is considerable scientific uncertainty in the degree of risk exposure and their potential effects. Scientists do not consider factors such as dread or lack of familiarity to be relevant in characterizing the degree of risk from a particular activity (McDaniels, Kamlet and Fischer 1992). Another study of laypersons and toxicologists revealed large differences between these two groups in their assessment of chemical risks. (Kraus, Malmfors and Slovic 1992).

#### *3.1.2 Role of Monitoring and Control Procedures*

In addition to imposing standards and regulations at the time the facility is sited to deal with risk perceptions of both the experts and the public, the public authority needs to undertake monitoring and control procedures at regular intervals to assess the performance of the facility once it is in place. One proposal that may convince the affected public that they will be protected against risks to themselves and future generations is to form a committee of local residents that is granted special oversight powers, including the power to suspend operations at the facility if the prescribed standards are not adhered to.

### **3.2 Use of Compensation or Benefit Sharing**

In order for residents to support a facility, the benefits associated with having it must be greater than the benefits of maintaining the status quo. One way to satisfy this condition is to provide

communities who site the facility, as well as those who are nearby, with compensation. However, compensation will be viewed as a bribe unless the affected groups feel that the facility satisfies rigorous safety standards that will be well enforced. Six types of compensation have been identified by Gregory et al. (1991) for facilitating siting decisions.

### *3.2.1 Direct Monetary Payments*

This is the most common form of compensation and can take the form of guaranteed annual payments or tipping fees on the waste that is stored. In Charles City, Virginia, the developer of a landfill collected a tipping fee which it paid to the city, amounting to about \$1 million in revenues annually. This has lowered property taxes and allowed for the rebuilding of the city's ailing school system. [O'Hare, Bacow and Sanderson, 1983)],

### *3.2.2 In-kind awards*

These take the form of grants to communities or regions for improving health care facilities, housing, education or other services that enhance the citizens' well-being and reduce risks that they face. In Swan Hills, Alberta, subsidized housing was provided for 35 housing units in conjunction with the siting of a hazardous waste facility (Rabe 1991). In Charles City, the operator collects the county's garbage free of charge. This was also the case in Grandview, Idaho where Wes-Con provided free garbage pickup to residents as part of a package associated with siting a waste-disposal facility [O'Hare, Bacow, and Sanderson (1983)].

### *3.2.3 Contingency funds*

These are used to cover losses from an accident or other adverse effects of the facility. For example, trust funds could be established to cover the damages and health-related costs to victims of an accident.

### *3.2.4 Property value guarantees*

These protect residents of the host community and surrounding areas against any decline in the resale value of their home due to the location of the facility. This type of compensation was offered by Champion International Corp. as part of a program for siting an industrial landfill. The company monitored the changes in the sale prices of homes in the county over a ten year period and paid residents if there were any adverse changes in the property value due to the presence of a landfill. (Ewing 1990).

### *3.2.5 Benefit assurances*

Guarantees direct or indirect employment for community members, either during construction of the facility or during its operation phase. These type of benefits have positive externalities that will make the facility more attractive to neighboring communities as well as the host site. The hazardous waste treatment center in Swan Hills, Alberta, promised 55 new jobs and convinced town leaders that other new developments, such as a new hospital, would now be feasible.

### *3.2.6 Economic goodwill*

This refers to contributions to local organizations and expenditures for projects that are important to the community and the surrounding area. The private corporation responsible for the Swan Hills hazardous waste facility planted 400 trees for town beautification, provided \$65,000 to support local

activities including golf course development and made charitable contributions such as sponsoring a hockey school and donating a bear rug to the town council chambers. (Rabe 1991).

### 3.3 Empirical Evidence on Compensation<sup>7</sup>

A number of surveys have been completed on attitude of residents toward a public authority who would impose well-specified standards that are monitored and the role that compensation can play in facilitating the siting process. This section briefly summarizes some of the key findings for different types of facilities.

Two surveys of particular relevance to this paper are by Bacot, Bowen, and Fitzgerald (BBF) (1994) and by Jenkins-Smith and Kunreuther, (JK) (2001) each of which asked respondents to consider compensation in the context of a landfill for municipal waste.<sup>8</sup> Respondents were first asked to indicate whether they would "accept" the construction of a landfill at a nearby site with no mention of benefits.<sup>9</sup> As shown in Table 1, a local landfill was acceptable to 30 percent of the BBF sample and to 25 percent of the JK sample when compensation was *not* included. However, in both cases, the rate of acceptance approximately doubled with the introduction of compensation. In the JK survey, the form of the benefits was left vague ("economic benefits provided to residents within 50 miles of the facility"), whereas BBF provided respondents with specific forms of compensation rebates on property taxes, state money for schools, and state money for road improvements. Tax rebates produced the greatest level of acceptance (63 percent).

The JK survey also investigated the impact of compensation on acceptance in the case where the facility being sited was a hazardous-waste incinerator and a medium-security prison. These two facilities differed markedly in the absolute level of acceptability (15 percent versus 29 percent in the no-compensation case); however, the introduction of benefits produced similar levels of increased acceptance (17 percentage points for the incinerator, 22 percentage points for the prison) as shown in the last two columns of Table 1. From these data, one might conclude that economic benefits have a substantial impact on public sentiment toward noxious facilities, although they fail to convince everyone that the facility should be built.

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<sup>7</sup> For more details on the empirical findings discussed in this section see Kunreuther and Easterling (1992).

<sup>8</sup> Bacot, Bowen, and Fitzgerald (1994) surveyed 844 Tennessee residents in 1989. Jenkins-Smith et al. (1993) surveyed 1200 U.S. households in 1993. This sample was split into eight experimental conditions, defined by the type of facility being considered (municipal waste landfill, hazardous waste incinerator, medium-security prison, or high-level nuclear waste repository) and by the order in which the respondent was presented with various compensation and mitigation measures. The effect of economic benefits for any given facility is assessed with a sub-sample of 150.

<sup>9</sup> In the Bacot, Bowen, and Fitzgerald (1994) survey, respondents were told that the landfill was proposed for a site five miles from their home. Acceptance was gauged by a voting question. Jenkins-Smith et al. (1993) experimentally manipulated the supposed distance to the landfill (either 1 or 10 miles away). Respondents indicated how acceptable such a facility would be. We have coded a respondent as "accepting" the facility if he or she gave a response of either "acceptable" or "completely acceptable."

Table 1. Effect of Compensation Measures in Increasing Acceptance of Facilities

<b>Municipal Waste Lanfill</b>				
	<b>Study 1<sup>1</sup></b>	<b>Study 2<sup>2</sup></b>	<b>Haz Waste Incin<sup>2</sup></b>	<b>Prison<sup>2</sup></b>
Acceptance <b>without</b> incentives	30%	25%	15%	29%
Acceptance <b>with</b> economic benefits		50%	32%	51%
Rebates on property tax	63%			
State money for schools	62%			
State money for roads	56%			

<sup>1</sup> Bacot, Bowen, and Fitzgerald (1994). Sample of 844 Tennessee residents. The 30 percent figure for acceptance without incentives was derived from the reported result that 70 percent opposed the landfill; 30 percent is an upper bound on the actual figure.

<sup>2</sup> Jenkins-Smith and Kunreuther (2001). Total sample of 1200 U.S. residents. Each condition has n = 150.

### 3.3.1 Radioactive waste repositories

The positive impact of compensation on public acceptance is **not** replicated when the facility to be sited is a radioactive waste repository. This conclusion is supported by the five separate studies reported in Table 2: Carnes et al. (1983); Kunreuther, et al. (1990); Dunlap and Baxter (1988); Herzik (1993); and Jenkins-Smith and Kunreuther (2001).<sup>10</sup> The different samples varied somewhat in their baseline willingness to accept a "local" high level nuclear waste repository (HLNW) with the greatest level of acceptance (60 percent ) occurring among Dunlap and Baxter's (1988) sample of residents living near Hanford, Washington. However, in none of the surveys did the introduction of benefits produce a major increase in acceptance. The largest increase (4 percentage points) occurred in the Carnes et al. (1983) and JK surveys. However, in the other three surveys (each of which offered 20 years of generous tax rebates), there was no evidence of increased acceptance.

<sup>10</sup> Carnes et al. (1983) surveyed 420 Wisconsin residents in 1980 on whether they "favored" the siting of a "nuclear waste repository in their community." Kunreuther et al. (1990) conducted a survey of 1001 Nevada residents in March 1987. Approximately half of these persons (n = 498) were asked about their willingness to vote for a HLNW repository at Yucca Mountain, with and without rebates; the other half was asked about their willingness to pay to have the repository located somewhere else [see Kunreuther and Easterling (1992) for results]. Herzik (1993) used a similar rebate question in a 1993 survey of 1212 Nevada residents. Dunlap and Baxter (1988) also used this sort of question in a survey of 658 residents of Franklin and Benton Counties in Washington State. Respondents indicated their willingness to vote for a HLNW repository at Hanford (which was then still in contention). Jenkins-Smith et al. (1993) asked 150 U.S. residents "how acceptable" a HLNW repository would be if it were located either 10 miles or 50 miles from their home (distance was varied experimentally).

Table 2. Limited Effectiveness of Compensation: the Case of Nuclear Waste Repositories

	<u>Study 1</u>	<u>Study 2</u>	<u>Study 3</u>	<u>Study 4</u>	<u>Study 5</u>	<u>Study 6</u>
Acceptance <b>without</b> incentives	20%	10%	27%	24%	60%	51%
Acceptance <b>with</b> economic benefits						25%
"substantial payments"	26%					
"economic benefits"		14%				
\$1,000/yr for 20 yrs			26%	23%		
\$3,000/yr for 20 yrs			30%			
\$5,000/yr for 20 yrs			30%			
\$100- \$900/yr for 20 yrs					51%	

<sup>1</sup> Carnes et al. (1983). 1980 survey of 420 Wisconsin residents.

<sup>2</sup> Jenkins-Smith and Kunreuther. (2001). Total sample of 1200 U.S. residents. Each condition has n = 150.

<sup>3</sup> Kunreuther et al. (1990). 1987 survey of 1001 Nevada residents (n = 498 answered compensation questions).

<sup>4</sup> Herzik (1993). 1993 survey of 1212 Nevada residents.

<sup>5</sup> Dunlap and Baxter (1988). 1987 survey of 658 persons living near Hanford, Washington.

<sup>6</sup> Frey et al. (1996) 1993 survey of 305 persons living in Wolfenschiessen, Switzerland

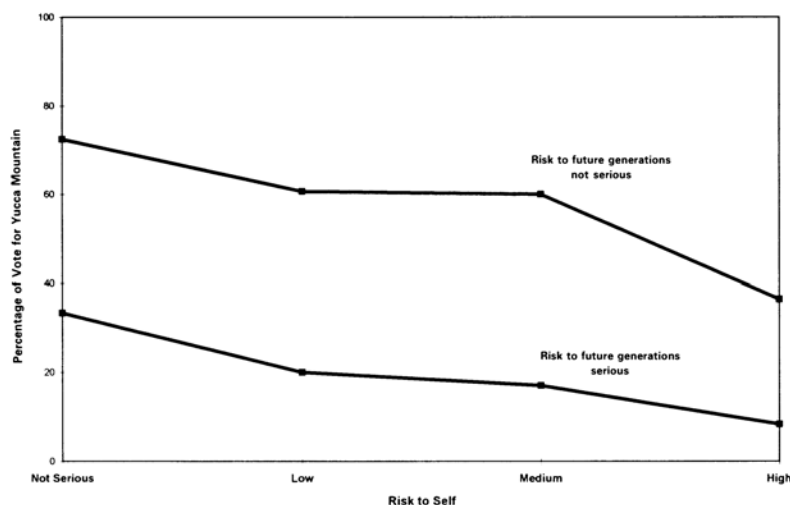
In Kunreuther et al. (1990), 27 percent of the sample voted to put a repository at Yucca Mountain in a question that did not mention compensation, compared to 29 percent when rebates were offered.<sup>11</sup> This difference was not statistically significant,  $\chi^2(3)$ . In addition, there was no significant difference in acceptance across the three dollar amounts: \$1,000 per year (26 percent), \$3,000 per year (30 percent), and \$5,000 per year (30 percent).<sup>12</sup>

<sup>11</sup> The referendum question was worded, "If a vote were held today on building a permanent repository, where would you vote to locate the repository?" Respondents were presented with four choices: Yucca Mountain, Hanford, Deaf Smith, and "none of the above." The following question was used to assess a respondent's willingness to accept a repository with compensation:

Suppose after thorough study, the Federal government decided to put a high-level nuclear waste repository at Yucca Mountain in Nevada. This repository would be built according to Federal safety standards. Suppose also that you could receive a [either \$1,000/\$3,000/\$5,000] rebate or credit on your Federal income taxes each year for 20 years. Would you vote to locate the repository at Yucca Mountain?

<sup>12</sup> The effect of dollar amount was nonsignificant regardless of whether the dependent variable was vote or change in vote. In the latter case, respondents were classified into one of three categories: (1) rebate had no effect on voting response; (2) rebate made repository more acceptable; or (3) rebate made repository less acceptable. The effect of rebate level was then assessed by testing whether the distribution of this change variable differed across the three dollar amounts. This yielded a  $\chi^2(4)$  of 4.16 (p > .3).

The contrast between radioactive waste repositories and other noxious facilities in the effectiveness of compensation is remarkable. *Threat to future generations* is a strong determinant of voting behavior in the case of HLNW repositories (Kunreuther et al., 1990). If a person believes that a repository will pose serious risks to future generations, rebates are unlikely to win his or her acceptance of a repository. This resistance to rebates is illustrated in Figure 1, which shows the proportion of respondents in the 1987 Nevada survey who favor a repository at Yucca Mountain (with rebates) as a function of perceived risk to self and risk to future generations. This figure shows that the majority of respondents reject rebates if *either* the perceived risk to self is high or the risk to future generations is deemed serious. Among respondents with both beliefs, only 8 percent vote in favor of the repository when rebates are offered.



**Figure 1.** Approval of Yucca Mountain by perceived risk to self and risk to future generations.

The data in Figure 1 cast doubt on one of the assumptions that underlie most compensation strategies: compensation will succeed in gaining a person's acceptance of a facility if that person believes he or she will be better off with the facility than without it. Compensation is likely to be rejected whenever a person believes that the proposed facility is somehow *illegitimate* (i.e., should not be built on ethical or moral grounds). This conclusion is supported by McClelland and Schulze (1991). In their study, subjects were given a Norfolk pine at the outset of the task and were asked to indicate the price at which they would sell the pine back to the experimenter. In the condition where subjects were not told anything regarding the fate of the plant, the average asking price was \$8. However, among subjects who were told that the plant would be destroyed at the end of the experiment, the average asking price was \$18 and a number of subjects reported an asking price that they knew was higher than the experimenter would accept.

Individuals who consider the proposed HLNW repository to be illegitimate will similarly be inclined to reject offers of compensation. The facility might be viewed as illegitimate because of a perceived inequity in the distribution of risks across generations or because of beliefs about the

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Very similar responses to compensation were obtained in a 1987 national survey conducted by the same authors (Kunreuther et al., 1990). Here, respondents were asked whether they would accept a repository 50 or 100 miles away in return for rebates of between \$1,000 and \$5,000 (distance and dollar amount were varied experimentally). Overall, 28.7 percent of the sample responded positively to the compensation offer, compared to 28.9 percent of the Nevada sample.

potential of the facility to contaminate the planet (Easterling and Kunreuther, 1995). Monetary payments are inherently unable to offset these objections. For example, a rebate package paid out over 20 years rewards the current generation for accepting the repository, but imposes uncompensated costs on future generations.

### 3.4 Empirical Evidence on Well-enforced Standards<sup>13</sup>

By requiring stringent standards which address public concerns with the risk, there is a greater likelihood that a positive vote will be forthcoming if a siting referendum was instituted. In the JK survey, individuals were asked about their attitudes toward alternative risk reduction measures as a condition for siting four different types of facilities: a prison; a landfill; an incinerator; or a high level radioactive waste repository. After the respondents stated their degree of acceptability of one of the four facilities, they were given a series of questions to determine whether one or more of the following measures would cause them to change their stated opinion:

- An independent agency approved by the local government will perform regular inspections to insure that the facility is meeting all federal and state regulations (INSPECT);
- The facility will not be built until local elected officials have approved the design (APPROVE);
- Local elected officials will have the authority to close down the facility if they detect any problems (SHUTDOWN); and
- Economic benefits were provided to residents living within 50 miles of the facility (BENEFITS).

The sample was randomly divided into two equal-sized groups. **GROUP 1** respondents were given the measures, in an additive fashion, in the following order; INSPECT, APPROVE, SHUTDOWN and BENEFITS. **GROUP 2** respondents began with BENEFITS, followed by INSPECT, APPROVE and SHUTDOWN in that order. The reason for the different orderings is to test whether the sequence of measures affects their acceptance of the facility.

Tables 3a and 3b present the percentage of respondents who would support the facility for **GROUP 1** and **GROUP 2** under five different scenarios. The scenarios consist of the different combinations of mitigation and compensation packages that were given to the survey respondents. The tables also show whether the change in the percentage of respondents who accept the facility after each of the sequential steps in the mitigation scenarios was statistically significant.

Table 3a. Percentage Completely or Mostly Accepting Facilities  
Based on Combinations of Safety and Economic Benefits Measures

(Group 1 Respondents: Benefits Offered Last)

Sequence of Measures	Prison	Landfill	Incinerator	Repository
No Measures	30.5%	18.1%	14.5%	12.4%
INSPECT	54.9%***	53.7%***	42.1%***	31%***
APPROVE	51.8%	46.3%	36.8%	26.2%*
SHUTDOWN	59.8%	65.8%***	55.4%***	42.8%***
BENEFITS	62.8%	56.4%	42.8%***	31.7%

Statistical significance of change from cell above: \*\*\* = <0.01; \*\* = <0.01; \* = <0.05

<sup>13</sup> This subsection is based on material in Jenkins-Smith and Kunreuther (2001). More details can be found in the paper.



Table 3b: Percentage Completely or Mostly Accepting Facilities  
Based on Combinations of Safety and Economic Benefits Measures  
(Group 2 Respondents: Benefits Offered First)

Sequence of Measures	Prison	Landfill	Incinerator	Repository
No Measures	39%	25.2%	14.5%	10.2%
BENEFITS	52.1%***	49.0%***	30.3%***	13.4%
INSPECT	65.1%**	67.7%***	47.4%***	30.0%***
APPROVE	56.8%**	57.4%**	39.5%*	25.5%*
SHUTDOWN	56.2%	75.5%***	52.0%***	42.0%***

Statistical significance of change from cell above: \*\*\* = <0.001; \*\* = <0.01; \* = <0.05

Focusing on the specific measures, INSPECT and SHUTDOWN have strong positive effects on acceptance of the facility for both *GROUPS 1* and *2*. In other words, whether BENEFITS are offered first or last has no impact in the effects of these two measures. Tables 3a and 3b also reveal that the approval of design by local officials consistently has a *negative* impact on the percentage of respondents who support the siting of these four types of facilities.<sup>14</sup> This finding suggest that, from the perspective of the public, the oversight of independent inspectors and the power to shut down facilities should be left in the hands of local officials. On the other hand the technical issue of the approval of the facility design should not be delegated to government officials.<sup>15</sup>

Two explanations for this differentiation of public views of the roles of local officials have been offered. One, consistent with the findings of Jenkins-Smith and Stewart (1998), suggests that while local officials are trusted to express the residents' interests, they are not seen as sufficiently competent to directly oversee a complex hazardous materials management program. O'Connor et al (1994) offer an alternative explanation; local officials may be seen as too susceptible to the influence of the facility operator, and therefore cannot be trusted with decisions about facility design. Either way, program designs that seek public acceptance for hazardous facilities must account for the differentiation in public expectations of different kinds of public officials.

Turning to the BENEFIT measure, it makes a big difference whether it is offered first or last. For the landfill, incinerator and repository, the final percentage of supporters is at least 10 percent higher when economic benefits are offered first (Table 3b) rather than last (Table 3a). Apparently, when the facility is perceived to be risky, providing economic benefits *after* safety measures have been instituted has a negative influence on the percentage of individuals supporting the facility. This finding implies that when economic benefits are offered first, they are more likely to be perceived by the respondents as compensation for the increased risk from hosting a facility. When these benefits are offered *after* safety measures have been addressed, they are perceived by some as a bribe for taking the facility.

This finding is a puzzling one, and requires further research. Indeed, it seems counter-intuitive in the light of Kasperson's (1999) argument that compensation is only ethically justifiable after safety measures have been addressed. Our findings suggest to us that, in the relatively untrusting times in which we live, the introduction of benefits after the safety issue has been addressed leads many of those affected to suspect that the facility is even more dangerous than they were initially led to believe. After all, if the facility is safe, why should those living

<sup>14</sup> For **GROUP 1** the APPROVE measure is only statistically significant for the repository. However, for **GROUP 2** it is statistically significant (in reducing approval) for all four facilities.

<sup>15</sup> More research is needed to determine who it is that people would trust to judge technical issues with respect to facility design. For work on this question, see Jenkins-Smith and Silva (1998).

nearby need to be plied with goodies? Hence, support for the facility is eroded by providing some forms of benefits as an apparent afterthought.

#### **4. A SITING PROCEDURE FOR DEALING WITH TRANSBOUNDARY RISKS**

At a National Workshop on Facility Siting in 1990, a group of practitioners and researchers developed a set of guidelines for siting noxious and/or hazardous facilities. These guidelines, which were formalized in a Facility Siting Credo, focused on developing a workable and fair procedure for locating a facility as well as an outcome which satisfied distributional (equity) and benefit-cost (efficiency) considerations.

A study of 29 siting cases, both successful and unsuccessful, across the United States and Canada, confirmed the importance of two features of the process in finding a community that agrees to host a facility: having a broad-based public participation process, and the perception by host community residents that the facility was the best solution to their waste problem. (Kunreuther, Fitzgerald and Aarts, 1993). Both of these elements should be considered in designing a siting process.

The Facility Siting Credo also emphasized the desirability of a voluntary siting process but did not explicitly take into account the presence of transboundary risks. This section proposes a two stage siting process which explicitly addresses the issues of transboundary risks while addressing the concerns of equity and efficiency through compensation. The implicit assumption is made that a new facility is viewed as socially desirable. However, if a volunteer site cannot be found then the status quo will be maintained rather than forcing a community or region to site a facility. The key questions are what type of facility to construct and where it should be located.

##### **Stage 1: Screen Appropriate Sites and Specify Standards**

In this first stage of the process, the Public Siting Authority (PSA) determines a set of sites that meet prespecified technical criteria. At the same time the PSA specifies a set of safety standards that a proposed facility will have to meet. The PSA can be based at the local, regional or national level depending on the nature of the transboundary risks and the candidate areas for the facility. The PSA could consist of representatives from more than one country if the facility poses transnational risks.

The screening and standard-setting process should take into account both the risks of the facility to the host community as well as the expected impact it will have on the surrounding areas. If there are transportation risks associated with shipping the material from different sources to their final destination, then this factor should play a role in determining what sites are suitable candidates. If the facility has the possibility of causing air pollution to neighboring areas, then this risk needs to be considered when setting specific performance standards for the facility.

One issue that should be addressed in screening acceptable sites is whether to exclude certain communities or regions on equity or fairness grounds. There are two extreme views normally taken with respect to this question. If a voluntary siting process is to be utilized, then one can argue that any community can decide for itself whether or not it wants the facility. On the other hand, suppose that most taxpayers feel that low income areas which already have noxious facilities should be excluded from consideration. Then a siting map should be drawn which excludes these places from being considered, even though they may be technically suitable areas.

##### **Stage 2: Engage in a voluntary siting process**

The proposed procedure for finding a site is a voluntary one based on a procedure that was successfully used in Alberta. Fourteen communities were initially interested in hosting a proposed hazardous waste facility. Nine of these were subsequently eliminated either on environmental

grounds or because of strong public opposition. Of the remaining five, Swan Hills presented a proposal (including benefits) that best met the needs of the developer (McGlennon, 1983).

A similar procedure was used in Illinois in an attempt to find a home for a low-level radioactive waste repository (English, 1992) and by the Nuclear Waste Negotiator in an attempt to find a state or Indian tribe willing to host an MRS facility for the temporary storage of spent nuclear fuel (Office of Nuclear Waste Negotiator, 1993; Easterling and Kunreuther, 1995). In each of these situations, planning grants were given to communities that expressed an interest in hosting the facility without implying a commitment to accept the facility. Rather, the funds were designed to initiate a process so that the community or region would have input into the process and could specify conditions, including compensation arrangements that would make the site acceptable.

Depending on the type of facility that is being considered, different types of compensation arrangements might be proposed. If a private developer is the applicant, the firm could offer a monetary payment that could be utilized by the community in any way it sees fit. Browning Ferris operated in this manner in contacting communities in New York State that might be interested in hosting a landfill through its Community Partnership Program. In 1992, the town of Eagle (with 1300 residents) overwhelmingly voted in favor of hosting such a facility in return for a benefits package that included tipping fees, local jobs, and free trash disposal worth between \$1 million and \$2 million (Angell, 1993).

A key aspect of this procedure is that no community is forced to accept a facility against its wishes. This means that it may take a great deal of time to site a particular facility; communities must gain some familiarity and comfort with the concept underlying the facility before they will be willing to enter into negotiations with the developer. In some cases (particularly with respect to radioactive waste disposal facilities), the developer might even conclude that the procedure will not succeed in finding a willing host community. In such a case, it may be necessary for the developer to revisit the choice of technology, examining whether other facilities might be more acceptable to the potential host communities. For the HLNW case, this revisiting of the waste-disposal technology should be performed by a group that includes not only scientists and utility executives, but also representatives of the general public. Opening up this decision process provides the only chance of the selected facility being regarded as legitimate by persons living in a candidate state (Easterling and Kunreuther, 1995).

## **5. GENERAL CONCLUSIONS AND RECOMMENDATIONS**

In this concluding section we will suggest a set of issues that need to be addressed regarding the involvement of the interaction between policy makers, risk management institutions and the public in dealing with transboundary risk problems facing the public and private sectors. It should have relevance to the siting problems facing Hong Kong today that are outlined in the introductory section of the paper.

### **5.1 Higher Quality Public Involvement**

Research clearly shows that public involvement is a necessary part of risk management. Research is less clear on the specifics of what that involvement should look like. Though some researchers recommend *greater* public involvement in risk management decisions, we are less certain that more is necessarily better. It is perhaps more appropriate to conclude that public involvement of high quality is more important than, for example, involving more members of the public, or involving the public more deeply in issues that they are poorly prepared to grasp. There is a risk in taking the tack of "involving" the public by allowing them to express their anger and rage, but doing very little to accommodate their views or change how things are done. This form of involvement is perhaps

better characterized as indulging the public, which sometimes happens under the guise of "involving the public."

High quality public involvement has not yet been well defined. We suggest that risk management institutions develop guidelines for high quality public involvement. These guidelines should be based on definitions of what is wanted by the public and from the public, and how their viewpoints will be incorporated into risk management decisions. Are there technical decisions where public values would be relevant? Can the public be helpful in defining approaches for relating to their own constituency? Is there training and education that the public needs in order to be an active, valued, and respected participant in risk management?

## **5.2 Earlier Involvement of the Public**

Very often, the difficulties in dealing with the public are brought about because those impacted by a project are among the last to know of its existence. Project development is a complex and inexact process. For project developers, the road that leads from an idea to a construction permit or operating license is a long and uncertain one. Only a very small number of the projects that are considered actually make it to the point of filing an application with a regulatory or licensing agency.

Usually by the time an application is filed, many decisions have been made that are very difficult to reverse, making it difficult, if not impossible, for a proponent to incorporate the public's input. Project proponents need better advice on how to involve the public earlier in the development cycle. And, risk management institutions need better guidance on how they can give that advice in a responsible way that is sensitive both to the needs of the public and to the constraints and problems faced by the proponents.

## **5.3 Greater Reliance on "Volunteer Communities"**

For the public to be a willing partner in technology, it needs to know what is in it for them. For a project to be of true benefit to a country or a region within the country, it must fit within their own framework of goals and objectives, and not just those of project developers. Project proponents should be encouraged to strive for a partnership with host countries and their neighbors. The first step in establishing that partnership is recognizing the critical importance of voluntariness in decisions about technology. The "normal" project development process can seem to community members as imposing the results of decisions made by others upon them, particularly when public involvement does not occur until far downstream from project planning. By working toward voluntary participation in project development, proponents may actually reduce the risks that a project will run into trouble that can result in costly delays or even more costly abandonment.

## **5.4 Role of Public Interest Groups**

One of the issues that deserve further discussion is the role that environmental groups and organizations can play if a voluntary siting process is utilized. Suppose that one of these public interest groups feels that it would be inappropriate for community Y to host a proposed incinerator because they feel that the technology is unsafe. It is fair game for information on the public interest group's views of the risk to be presented to the affected residents, who may then revise their feelings about the facility and/or demand additional safety and mitigation measures before agreeing to vote in favor of hosting it in their backyard.

Organizations like Greenpeace have strongly opposed the construction of incinerators in communities because they feel they produce environmental hazards. They have developed a set of guidelines for preventing these facilities from being built (Greenpeace 1991), but there is limited

empirical evidence as to what impact these efforts have had on community attitudes toward these facilities.

## 5.5 Increase Public Trust

We are currently at an important junction in the evolution of socially accountable risk management. All the research to date on the failures of risk management point strongly to the erosion of trust both in government and in many of our social institutions as an important causal factor in the conflicts that exist between the community of risk experts and the public.

At this juncture, we need to move forward in one of two directions. One path that has been advocated by a number of researchers is to work toward increasing public trust in risk management. While it is much too soon to express either optimism or pessimism about the likely success of this strategy, it is a significantly challenging problem that at the moment appears to have no easy answers.

A second path leads in the direction of developing risk management processes that don't rely on trust, or rely on it only minimally. Though it is seldom acknowledged explicitly, many of the steps currently being taken by government and industry to involve the public through community advisory panels and the like are, in effect, establishing layers of oversight such that the checks-and-balances principles inherent in democratic governments are instituted within technological risk management. This may be a fruitful avenue to pursue, and research along these lines is currently needed.

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# VISIONS OF THE FUTURE FOR FACILITY SITING<sup>16</sup>

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## 1. LESSONS FROM THE PAST AND THIS VOLUME

This volume is concerned with the management of siting locally-unwanted facilities that involves decision processes with high transaction costs. Its major purpose is to develop more robust and effective policies and institutions for managing this increasingly intractable problem.

The facility siting management policy has evolved over time. The first phase of this management policy applied traditional scientific management approaches, i.e. the technically-based site-screening and selection process, and the decide-announce-defend approach as Kasperson notes (Kasperson, 2005) or the hierarchical approach as Linnerooth-Bayer notes (Linnerooth-Bayer, 2005). However, it became clear that this approach was in numerous cases incapable of achieving the stipulated goal of siting the facility. The best strategy that the communities had in response to these approaches was to stage NIMBY protests so that they could avoid a situation where their communities became worse off by not accepting the facility, and they had nothing to gain if they accepted it.

In response to this situation, the second phase of the facility siting management policy involved the introduction of market-based instruments such as compensation, economic incentives and bargaining characterized as the bartered consent approach in Kasperson (2005) or the voluntary, market approach in Linnerooth-Bayer (2005). In some cases the facility siting was achieved, but in most cases, however, developers still are unable to win local communities' approval to build facilities. Compensation was viewed as a bribe by communities in some cases or has induced communities to take stronger positions strategically in the bargaining process in other cases. Many communities still refused to cooperate and negotiate siting deals with developers even with the addition of compensation and economic incentives. Frey, et al. (1996) attributed the failure of compensation schemes to the bribe effect and the crowding out of the public spirit, and Oberholzer-Gee and Kunreuther (2005) attributed it to social pressure.<sup>1</sup>

To counter such problems, the third phase in the evolution of facility siting management policy involved the provision of information and making the community an active participant in the siting process, i.e. the voluntary/partnership siting approach as Kasperson notes (Kasperson, 2005) or the egalitarian siting process as Linnerooth-Bayer notes (Linnerooth-Bayer, 2005). Schneider, et al. (2005) and Barthe and Mays (2005) have provided two case studies in Germany and France, respectively, of this approach.

The more recent siting cases employ a comprehensive approach that combines the approaches used in these previous three phases. The influential 'Facility Siting Credo' proposed by Kunreuther et al. (1993) is the most comprehensive list of must-dos for facility siting to date. The 'Sequential Multi-stage Siting Process' proposed by Quah and Tan (2002) is another example of a comprehensive approach. It includes such elements as the study of site selection, environmental impact assessments, benefit-cost analysis, mitigation, public hearings, negotiation, and compensation.

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<sup>16</sup> This paper appears in Chapter 10 in S. Hayden Lesbirel and Daigee Shaw (eds.), 2005, *Managing Conflict in Facility Siting: An International Comparison*, Aldershot, UK: Edward Elgar.

However, the recent experiences of the U.K., France, the U.S., Australia, Japan, Austria and Germany considered in this volume suggest that the extraordinary efforts of the comprehensive approach in general, and transparency of the process and community/citizen participation in particular, have still failed to deliver approved sites. It seems that the long search for a policy framework for siting facilities where transaction costs are high has not been a fruitful one. In actual fact, this result can be expected because the three phases of policy evolution have only moved policy instruments from the more closed and command-and-control end of a spectrum to the more open and transparent one without major changes in the political institutions which structure the decision process for siting a facility. Political institutions in the context of decision process are defined here as a set of formal and informal rules to determine *who* is eligible to make decisions and *how* the decision should be made at each level in the decision process.<sup>2</sup>

This paper argues that whether or not a policy instrument can be implemented effectively depends on whether or not the context of the political institution in which the decisions concerning the policy instrument are processed can minimize the failures of political institutions. Failures of political institutions range from rent seeking by special interest groups and politicians, agency problem, opportunistic behavior, poor accountability of politicians, voter ignorance, etc. Thus, the evolution of various policy instruments over the past three phases has not touched the very heart of the facility siting decision process, i.e. political institutions.<sup>3</sup>

## 2. VISIONS OF THE FUTURE: INSTITUTIONAL CHANGE

As mentioned in the previous section, there are two important elements comprising the institution of facility siting management, i.e. *who* is eligible to make decisions and *how* the decision is being made at each level of the siting process. These two elements are identified because they are the keys to the distributional conflicts that determine whether it is possible to reach an effective agreement between the parties concerning facility siting.

In the following discussion, the management of solid waste will be sometimes used as an example. In this case, a local government is responsible for providing services of garbage treatment for households in its constituency by running several incinerators and dumps that are locally unwanted by the community hosting the facilities. All of the households in the constituency are benefiting from the services provided. Thus, there are three players in the management of solid waste: a local government and two groups of communities, the host community and the benefiting community.

In addressing the question as to *who* is eligible to make decisions regarding siting facilities such as incinerators and dumps, the third phase that makes the community an active participant in the siting process is a step in the right direction. However, the basic problem with the community participation process is that usually only the host community is active in participating in the siting process simply because of the high stake involved in the outcome of the process, but the benefiting community, that who benefit from having the facility sited elsewhere, usually remain ignorant on the siting issue and enjoy being free riders. In their place, the government that is charged to successfully site incinerators and dumps plays the role of the agents of the benefiting community, the principals. However, because there are both the infamous agency problem and the rent-seeking problem prevalent in present-day democratic governments and, consequently, the level of trust in governments is low in most countries, the partial participation of only host community makes the transparency and participation approach ineffective.<sup>4</sup>

Thus, a robust and effective institution should call for the participation of both host community and benefiting community. The participation should be full-scale, i.e. it gives both communities not only the right to have their viewpoints being heard in the siting process such as public hearings, but also the right to make decisions regarding whether or not and where the



facility will be sited.<sup>5</sup>

This full-scale participation of both communities is based on the Tiebout hypothesis of 'voting with their feet' (Tiebout, 1956). Tiebout (1956) argues that people could vote with their feet, i.e. move from places they do not like to places they like better. If enough people do this, local governments will have to compete, or risk losing key people and human resources to other places. The people who have moved are now in places they like better. Their choice of places reveals their preferences for local public goods. The separate decisions made by each local government concerning which local public goods should be provided and how to provide and finance them lead to a Pareto-efficient allocation of public goods.<sup>6</sup> In the case of facility siting, the local public goods under consideration basically consist of the facilities such as incinerators and dumps that are needed by all but are not welcomed by the host communities. Because full-scale participation is another way to reveal people's preferences for incinerators and dumps, the combination of 'voting with their feet' and full-scale participation of both communities would lead to a Pareto-efficient allocation of them too.

This leads to the second question concerning *how* the decision is being made by the host and benefiting communities. If every one in the communities participated in each decision in the government, the transaction costs would be astronomical. Thus, in order to keep the transaction costs of full-scale participation lower, traditionally, both communities elect their own representatives on the basis of one-person-one-vote and delegate the power of governance to governments run by the representatives of this democratic system of governance. However, in this kind of governance system, in addition to the given role of the principals of their elected representatives, both communities play the roles of special interest groups as well. Kellow (Kellow, 2005) has provided an Australian example of the strategic rent-seeking behavior played by a group of residents in their favor but at the expense of the other group of residents. The residents 7 km away from the new site of a chemical storage and handling facility were able to invoke the risks to nature, along with the heritage issues, to resist successfully the proposed relocation. This successful opposition, however, meant that the facility would remain at its existing site, meaning a continuation of risks to residents as close as 0.5 km away. Barthe and Mays (Barthe and Mays, 2005) present a French case where different groups seek to exert power over others as well.

Thus, the representatives and government officials are not only the agents of both communities, but also, at the same time, the persons from whom both communities would use the political process to seek rents in the siting process. The agency problem and the rent-seeking problem are still inevitable even with the full-scale participation of both communities. These problems cause the principals to have little trust in governments and their representatives because of the strategic rent-seeking behavior on the part of other principals and special interest groups. Therefore, it is very difficult to site facilities in any place even with the transparency and participation approach.

There are two different kinds of reasons for the prevalence of the agency problem and the rent-seeking problem. The first is the traditional thinking that it is difficult for the principals to monitor the actions of their agents and interest groups in the face of asymmetric information. Information is usually asymmetric. In the case of solid waste management, the principals (the host and benefiting communities) usually know less about the environmental impacts of incinerators and dumps than their agents (government officials) because of the high cost of keeping informed, and as a result, it creates incentives for opportunistic behavior on the part of the agents and interest groups.

The policy implications of this are that, first, the principals should be well informed, and second, they should vigorously monitor the behavior and performance of each agent in order to induce the agent and interest groups to act advantageously on behalf of the principal.<sup>7</sup> On the one hand, there have been many attempts to keep the principals well informed. The communication

and information procedure for high-level radioactive wastes set up by the Waste Act of 1991 in France is an example of the attempt (Barthe and Mays, 2005). One of the purposes of the commonly used environmental impact assessment (EIA) is to provide the environmental impact information of a proposed facility to the public.<sup>8</sup> On the other hand, however, in facility siting cases, it is commonly observed that both host communities and benefiting communities usually are ignorant on monitoring the behavior and performance of each agent and, at the same time, the host community usually is more likely to play the political role of interest groups. What are the reasons behind the two observations?

This relates to the second kind of reasons for the prevalence of the agency problem and the rent-seeking problem. When the principal consists of a group of people who cast votes during various elections and referenda on the basis of one-person-one-vote, the free-rider problem in relation to public goods is inevitable. This is because the benefits of a principal's voting and monitoring the agents are public goods to be shared by all fellow principals and because the probability that any single vote will be decisive is low. Thus, members of the group that makes up the principal would like to be free riders to enjoy the public goods without shouldering the burden of the cost. That is, the people in both host communities and benefiting communities would remain ignorant on monitoring the behavior and performance of their agents.<sup>9</sup> In conclusion, it is not because it is difficult for the people in both communities to monitor their agents (government officials), but simply because they do not have incentives to provide public goods by monitoring their agents.

In addition, in the case of solid waste management, we often observe that a community that is the candidate of siting incinerators and dumps can successfully organize a coherent, unified interest group to effectively resist siting the facility in their community. However, the benefiting community usually remains unorganized and ignorant. This is simply because, compared with the benefiting community, the number of individuals living in the host community is usually smaller, the area of the host community is usually smaller, and consequently, the cost of forming an interest group is smaller.<sup>10</sup> On the other hand, the stake per individual at risk is larger for the host community. Thus, the opposition to siting incinerators and dumps usually goes without opposition from the benefiting community.

Thus, the fundamental reason for the prevalence of facility siting difficulties is the public good nature of the present-day democratic system of governance. Based on this finding, I believe that a more robust and effective political institution for managing facility siting should have the following two characteristics.

The first characteristic comprises the federal system of governments formed by a number of functional, overlapping and competing jurisdictions (FOCJ) proposed by Frey and Eichenberger in a sequence of papers (Frey and Eichenberger, 1995, 1996, 2000, 2001a, 2001b; Frey, 2001). The federal units are referred to as FOCJ according to their four essential characteristics: 1. Functional: The new political units extend over areas defined by the services (functions) with the nature of public goods to be provided. 2. Overlapping: In line with the many different services, there are corresponding governmental units extending over different geographical areas. 3. Competing: Individuals and/or communities may decide to which governmental unit they wish to belong, and they have political rights to express their preferences directly via initiatives, referenda and election. 4. Jurisdictions: the units established are governmental; they have enforcement power and can, in particular, levy taxes.

The FOCJ are based on theoretical propositions advanced in the economic theory of federalism. Frey and Eichenberger have provided many examples of existing FOCJ-like institutions providing such services as public security, natural hazard mitigation, education, environmental protection, management of natural resources, transport, culture, or sports in Europe and the U.S.

In the case of facility siting, an FOCJ instead of the traditional all-purpose jurisdictions can

be formed to provide a certain kind of services to its members by operating some locally-unwanted facilities. For example, a solid waste FOCJ can be formed to provide services of garbage collection and treatment by running those locally-unwanted facilities such as incinerators and dumps. Similarly, a water FOCJ can be organized to provide services of water treatment and supply for households, farmers and industries in a certain area. Dams and reservoirs are the locally-unwanted water facilities operated by this FOCJ. In both of these two examples, the members of a FOCJ include individuals in both benefiting and host communities because they all demand the services provided by a FOCJ.

FOCJ have at least two important advantages over the all-purpose jurisdictions. Take a water FOCJ as an example. First, there should be no free-riders of the water service provided by the FOCJ because the service is financed by the FOCJ members who are the recipients of the service. In addition, there should be no spillovers of the environmental costs of dams and reservoirs because the host communities of these facilities are also members of the FOCJ. In contrast, the problems of free-riders and spillovers related to the water service would be widespread in an all-purpose jurisdiction because the delineation of the area of a traditional jurisdiction is usually different from a watershed that is the natural geographical area of a water FOCJ. Second, the political environment in the FOCJ is much simpler than that in the all-purpose jurisdictions. This is because the FOCJ only need to cater for the interest groups related to water service, e.g. the benefiting and host communities of water service and facilities, while there are much more different interest groups related to every service provided by the all-purpose government. Consequently, the rent-seeking problem would be much more serious in the all-purpose government and would sometimes cause some minor interests or functions be ignored and sacrificed. For example, a housing developer with a strong connection to the mayor may successfully convince the all-purpose government to develop a new town in a beautiful mountain area within a watershed. Thus, the interest of providing clean water for water users that include residents living in parts of the jurisdiction of this all-purpose government and residents of its neighboring jurisdictions is sacrificed.

The second characteristic that a more robust and effective institution for managing facility siting should have is that, in order to curb the ubiquitous free-riding behavior in the one-man-one-vote all-purpose jurisdictions, individuals under the FOCJ can not only vote with their feet, but can express their preferences fully by means of a political system of one-dollar-one-vote. 'Dollar' here means a unit of taxes levied by a FOCJ to cover the costs of providing the service for its members. The one-dollar-one-vote system follows the Principle of Interest-Pay-Participation (PIPP): the person who has higher interests in the outputs of an organization should share higher responsibility for producing the outputs, e.g. by paying more taxes, fees or inputs. In order to take up higher responsibility, he should be endowed with more shares of rights to participate in the decision making and management of the organization.

According to this principle, those who pay a larger share of the cost of providing the service should have a greater share of the political rights to express their preferences and, consequently, a greater share of the aggregate benefits generated by the service. Both of an individual's shares of political right and aggregate benefits are equal to his share of aggregate costs. Shaw et al. (2003) have proved in terms of economic theory that through this kind of institution of jurisdictions the problem of public goods related to the present-day democratic system of governance can be avoided. The rationale behind this is simply that, even though the benefits generated by the outputs of an individual's contribution is still shared by all fellow members of the organization in this kind of institution, the marginal benefit he would receive is just sufficient to compensate him for his last unit of contribution needed to produce the outputs of an organization. This is one of the standard conditions for efficiency. Thus, the people in a one-dollar-one-vote jurisdiction would have strong incentives to pay attention to and monitor the behavior of their agents, interest groups and other fellow members, in addition to not avoiding paying taxes.<sup>11</sup>

Even though it seems FOCJ with PIPP could be politically unacceptable because it runs against the popular one-man-one-vote political system, among many existing FOCJ, there are three famous and successful water management institutions that are not only FOCJ but also employ the PIPP: the Water Associations (Genossenschaft) in Germany, River Basin Agencies (Agence de l'Eau) in France, and the Water Boards in the Netherlands.<sup>12</sup> All these three water management institutions have existed for a quite a while. Generally speaking, the members of the three FOCJ are users of water services (the benefiting and fee-paying communities of water services) and producers of water services (the host communities of dams and reservoirs). They elect their own representatives based on a one-dollar-one-vote system. The body of representatives selects and disciplines, administers, controls annual budget, approves work plans, monitors the performance of the water management and administration unit.

Carney (1998) has proposed an institution for the public lands that is also FOCJ and follows the PIPP to solve the long-term problems of the tragedy of the commons that has dissipated the resources in the public lands in the U.S. He argues that through transfer of the ownership of the public lands from the government to a publicly owned corporation, decisions will be made in a disciplined way that considers both the interest of today's and tomorrow's citizens, as owners of the corporation.

The FOCJ with PIPP would be welfare-enhancing simply because the members and representatives of a one-dollar-one-vote jurisdiction would have strong incentives to pay attention to and monitor the behavior of their agents and interest groups and would not shirk paying taxes. With strong incentives to monitor on the part of the members and representatives, the government officials of a jurisdiction would not shirk and would pay attention to what their principals say, and not what the interest groups say. Then people and communities would trust the government and representatives of a jurisdiction and their decisions regarding facility siting and management including which policy instruments to be used. In this kind of institutional environment, any policy instrument can be implemented effectively. Thus, the FOCJ with PIPP can not only promote welfare, but can also handle the difficulties associated with facility siting.

Take a solid waste FOCJ as an example. A FOCJ can be organized to provide services of garbage treatment for households in a certain geographical area. This FOCJ usually has several incinerators and dumps that are locally-unwanted. The members of the solid waste FOCJ are users (the benefiting communities) and producers of the services (the host communities of incinerators and dumps). They elect their own representatives based on a one-dollar-one-vote system. The body of representatives (can be called the solid waste parliament) monitors the performance of the management unit (can be called the solid waste government), selects and disciplines, administers, controls annual budget and approves work plans. In this FOCJ, because the political environment would be much simpler, the rent-seeking problem would be less serious than that in the all-purpose jurisdiction. There should be no free-riders of the benefits provided by the FOCJ and no spillovers of the environmental costs outside its jurisdiction. Most importantly, the members of the FOCJ with PIPP would have strong incentives not to shirk their own responsibility and to monitor their agents and interest groups. Thus, government officials and parliament representatives would pay attention to what their principals say, and not what the interest groups say. As a result, those problems created by opportunistic behavior under asymmetric information, i.e. the agency problem and the rent-seeking problem, would be curbed. In addition, people would have higher trust in the government and the parliament. In this kind of political institutional environment, any policy instrument can be implemented effectively. Thus, the solid waste FOCJ with PIPP can handle the difficult task of siting incinerators and dumps well.

### 3. SUMMARY

This paper indicates that any policy instruments or strategies would be useless without improvements in political institutional designs. The fundamental reason for the prevalence of facility siting difficulties is the public good nature of the present-day democratic system of governance where people do not have incentives to monitor the performance of the government. As a consequence, the problems of opportunistic behaviors such as the agency problem and the rent-seeking problem are prevalent. These problems cause the principals to have little trust in governments and their representatives. Therefore, it is very difficult to site facilities in any place even with the transparency and participation approach. Thus, we should go beyond our endless search for good facility siting policy instruments and move to find a robust and effective institution for managing the siting dilemma.

This paper demonstrates that a robust and effective institution for managing facility siting should have the following two features. First, it should call for a full-scale participation of both the host communities and the benefiting communities of the facilities under consideration. Second, the full-scale participation can be efficiently facilitated by a number of functional, overlapping and competing jurisdictions (FOCJ) and by employing the Principle of Interest-Pay-Participation (PIPP) to elect their representatives of an FOCJ parliament. The FOCJ with PIPP would be welfare enhancing simply because their members would have strong incentives to pay attention to and monitor the behavior of their agents and interest groups and would not shirk their own responsibility such as paying taxes.

### NOTES

1. However, Frey, et al. (1996) find a 'compensation cycle' which finally wins the support of host communities with higher compensation in the long run.
2. Generally speaking, there are three levels in the decision process. Rules are made and clarified first for individuals, later for communities, and/or still later for higher-level organizations, such as countries and international authorities.
3. Franzini and Nicita (2002) have made a similar point for environmental institutions and policy. They argue that 'Many cases of institutional failure, ranging from the problem of defining property rights to environmental resources, to the problem of actuating environmental policy in a reasonable time, not only fail to solve the externality, but create inertia in decision-making, aggravating environmental damage and increasing its irreversibility. Among the underlying causes of this inertia in solving the environmental externality or implementing policy is failure to reach agreement between the parties, which in turn is almost always a matter of distributional conflicts' (Franzini and Nicita, 2002, p. 8).
4. Two major sources of institutional failures are raised here. First, the agency problem is present because agents usually do not pursue the interests of their principals vigorously. The agency problem has long been recognized as the central problem of organization. See Smith (1776, Book V, Chapter 1, Part III, pp. 264-5). Fama and Jensen (1983) argue that this problem would arise when the agents who initiate and implement important decisions do not bear a major share of the wealth effects of their decisions. Second, rent seeking is the use of resources by a special interest group in activities directed at increasing the net benefits going to the interest group, e.g., producers, consumers, host communities, benefiting communities, and government officials, but it will also lower net benefits to society as a whole. Rent seeking was first discussed by Tullock (1967).
5. How decisions are made by both communities will be discussed in detail next.
6. A Pareto-efficient allocation of public goods is an allocation such that no reallocation of public goods could benefit the people of any one place without lowering the net benefits for the people of at least one other place.
7. For example, the principals can design a remuneration plan and contract for each agent that could induce the agent and interest groups to act advantageously on behalf of principals.
8. These attempts to solve the problem of asymmetric information are not successful. Shaw (1996) notes that even with the environmental impact information provided by the environmental impact assessment (EIA) regulation, the information required for the residents to understand the issues involved and make a clear decision is either inaccessible or incomprehensible to the lay person and, as a result, people feel threatened and out-matched. They are also mistrustful of the information provided by the EIAs. Barthe and Mays (Chapter 8) also find that the tremendous efforts of communication and information become an adversarial process in a French case.
9. Various manifestations of this free rider problem are often referred to as 'voter ignorance', 'the tragedy of the

- commons', 'prisoner's dilemma', 'social dilemma', etc. See Olson (1965) and Hardin (1968).
10. See Olson (1965, pp. 9–16, 22–65).
11. Of course, members of FOCJ are subject to FOCJ's authority and regulations. They must pay taxes to finance their FOCJ.
12. See the reviews by Andersen (1999), Dinar et al. (1997), OECD (1996), Uniterkamp et al. (1995), and Shaw et al. (2003).

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# The NIMBY Challenges

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# CHALLENGES OF MANAGING NIMBYISM IN HONG KONG

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## Abstract

Two questionnaire surveys were undertaken in Hong Kong to gauge public views on the siting of locally unwanted land uses (LULUs) and possible ways to resolve conflicts. The first was a Hong Kong wide survey and the second was undertaken in Tuen Mun, a district which has a disproportionate share of LULUs. This study attempts to determine how the public view these unwanted facilities and whether their perception of risks is related to the type of facility. The study found that despite the concentration of LULUs in Tuen Mun, local residents are not keenly aware of those facilities. This paper examines the findings in the local geographical, political and socio-economic context and explores trust building and risk communication strategies which may enhance public acceptance.

## 1. INTRODUCTION

The siting of locally unwanted land uses (LULUs) is one of the critical issues confounding Hong Kong's long term development. To cater for the territory's growing population and increasing affluence, Hong Kong has seen a demand for more power generation and waste disposal facilities as well as correctional institutes and medical centres to treat infectious diseases. The problem of siting these LULUs is probably as acute, if not more so, in Hong Kong as in other metropolitan areas because of the severe planning constraints imposed by the territory's small size and the increasing environmental awareness of the general public.

This paper reports the initial findings of a public policy research project, supported by the Hong Kong Research Council, on NIMBYism in Hong Kong. The objectives of the current paper are to:

- (a) elucidate how NIMBYism has arisen in the unique political, social, economic and geographical context of Hong Kong; and
- (b) explore how conflicts arising from LULUs might be resolved.

This research began with a conceptualization of the "not in my back yard" (NIMBY) phenomenon in various parts of the world and in Hong Kong [1]. A two-stage questionnaire survey was undertaken to gauge the public's understanding of the NIMBY phenomenon and their perception of the need for, and fear of, LULUs in Hong Kong and in their own neighborhood. The first was a telephone survey undertaken in early May 2007 in which a total of 1002 interviews were successfully completed. The respondents were randomly selected from all geographical districts of Hong Kong to reflect the views of the population of Hong Kong at large. Subsequent to the first territory-wide survey, a similar questionnaire survey was undertaken in Tuen Mun, an area of Hong Kong with a disproportionate share of LULUs. In this survey, 752 residents were successfully interviewed on the streets in various parts of Tuen Mun about their perception of the LULUs in their neighborhood and how the conflicts might be resolved. Owing to resource constraints, the questions posed in both surveys focused on environmental LULUs;

however, the researchers did not exclude any answers pointing to LULUs of other types in Hong Kong.

## 2. THE LOCAL CONTEXT

While NIMBY is a world wide phenomenon, the mode of its emergence, the dynamics between the key players and the means of resolution are shaped by the local geographical, political and socio-economic context.

Hong Kong is a special administrative region (SAR) of China, essentially a small city state that enjoys a high level of autonomy in all areas of public administration except defense and foreign policy. Hong Kong is run by the SAR Government, which is largely “administration-led” with little power bestowed to the local District Councils in planning matters [2]. In the Legislative Council, the political parties are reactive rather than proactive when it comes to Hong Kong’s environmental policy agenda. Infrastructure building in Hong Kong is mostly initiated by the Government, which is vested with the authority to plan in consultation with statutory and non-statutory boards and consultative committees and local District Councils. These boards and consultative committees are largely composed of non-official members of the public appointed by the government. The main function of District Councils is to advise the Government on matters affecting the well-being of the people and on the provision and use of public facilities and services. While members of the District Council can offer views on proposed developments, the final decision rests with the Government. This institutional setup has been criticized by some as being too centralized and top down [2], as a result of which local residents may feel alienated from central policy and plan making and seldom gain a sense of control of their immediate environment [3].

The difficulty of siting LULUs in Hong Kong is aggravated by the physical terrain and small size of the city. With only 1104 km<sup>2</sup> of land, Hong Kong is home to 6.9 million people. Hong Kong’s hilly terrain forces urban development to be concentrated on about 22% of the total land area. The areas outside the major urban developments are mostly too hilly and hence costly to develop, and most are designated country parks and water gathering grounds where major developments of any type, let alone LULUs, are strictly regulated. The physical terrain, the valley pockets and sea inlets in some parts of Hong Kong are not favorable for the dispersion of air and water pollutants.

Due to the easterly prevailing wind and differences in topography, not all of Hong Kong’s 18 electoral districts have similar environmental capacities. Given the prevailing easterly wind, most major air polluting sources are located in the western part of Hong Kong. Topographical and water circulation considerations have also excluded certain districts, such as Shatin, as potential sites for major air and water discharge facilities. Hence, it would probably be undesirable, at least from the environmental perspective, to equally distribute environmental LULUs across the 18 districts of Hong Kong.

Hong Kong is the world’s 11<sup>th</sup> largest trading economy, with mainland China being its most significant trading partner. While Hong Kong has enjoyed some significant economic growth in recent years, there are evidences of a widening social gap between the rich and the poor [4]. This has nurtured a sense of discontent with the government. Combined with the concentration of LULUs in some districts, social segregation has resulted in a labeling effect of the community and has nurtured grievances, mistrust and a sense of injustice.

At the same time, there is, among the general public, an increasing demand for environmental quality and democratization of the political system. Local civil societies are becoming more and more vocal in their demand for quality of life, open and transparent government and greater social justice.

All of the above have created a scene of spatial inequality, nurtured seeds of discontent, and crafted a milieu that makes it difficult to resolve conflicts arisen from the siting of LULUs.

While the Hong Kong SAR Government is seen by many as efficient and free from corruption and malpractices, the current planning approach and environmental assessment practices are apparently not enough to ease tensions and conflicts arising from major LULU proposals. To some [3], the planning approach is too technocratic and rational, top-down and insensitive to local needs. Likewise, the environmental impact assessment (EIA) process, which is effective in preempting pollution problems [5] and is becoming increasingly transparent and accountable [6], has nonetheless been criticized by some as being too focused on environmental technicalities and not adequately responsive to local concerns. There are also criticisms [6] that some EIAs fail to give sufficient justification for the choice of a particular site or route and that consultation is conducted at a time when project planning has gained so much momentum that the project can hardly be reversed.

### **3. NIMBYISM AS REVEALED IN THE TERRITORY WIDE SURVEY**

As expected, findings of the territory wide telephone survey confirmed that the phenomenon of NIMBYism is commonly found among the general public in Hong Kong. The term NIMBY was initially coined by Popper [7] to refer to any LULU that may be regionally or nationally needed but is considered objectionable to the people who live nearby. This was further expounded by Wolsink [8] who observed that “everyone acknowledges the importance of the public good, but not everyone is prepared to make a personal contribution, in this case by co-operating in the construction of an installation in one’s neighborhood.” This characterisation is borne out by the territory wide survey, which showed that significantly more people envisage the need for having a particular LULU for the whole of Hong Kong than for their region or local district (Fig. 1). The perceived need is also markedly greater for facilities that most people use (e.g. refuse transfer station) than those that people do not readily associate with, such as a chemical waste treatment facility.

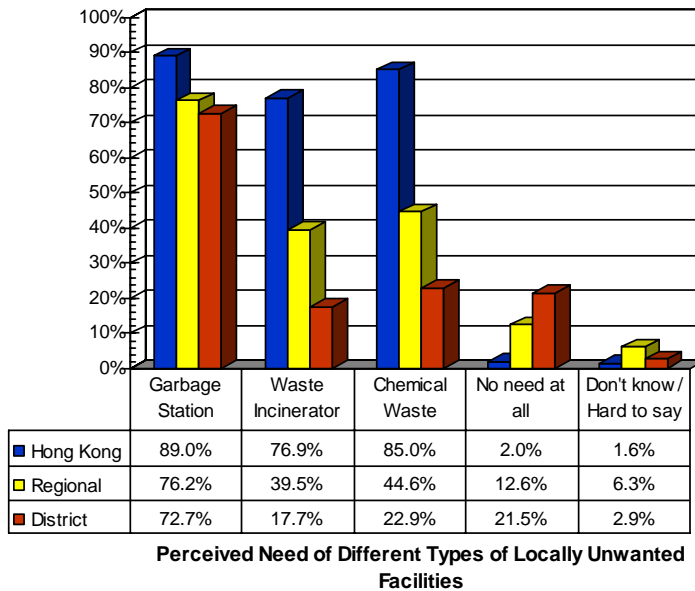


Figure 1. Public perceived need for locally unwanted facilities in Hong Kong, the region and local district.

Our survey [9] also showed that slightly more people opine that it is fair to site LULUs according to the need of different districts or to evenly distribute them in space. While the planning approach of spatially dispersing LULUs is a potential candidate for overcoming local resistance [7] and has been followed to a small extent in countries such as Japan [10], its implementation in Hong Kong is not likely to be viable because of the uneven environmental assimilative capacity between districts. Furthermore, some districts in Hong Kong are not large enough to generate sufficient demand to justify a facility to meet their own needs.

The challenge in siting LULUs is further confounded in Hong Kong by the lack of trust in the government. Generally speaking, the public has more trust in civil societies and environmental non-governmental organizations (NGOs) than in the government and the private sector (Fig. 2). While public participation is often seen as a way to foster trust [11], our survey shows that only a small percentage (13.3%) of the respondents agreed and strongly supported the statement that the consultation undertaken by the government is adequate. The lack of trust in the government in managing LULU facilities may have significant implications. The literature abounds with cases in which social distrust increases the perceived risk of a facility [12] and leads to strong opposition to the proposal [13].

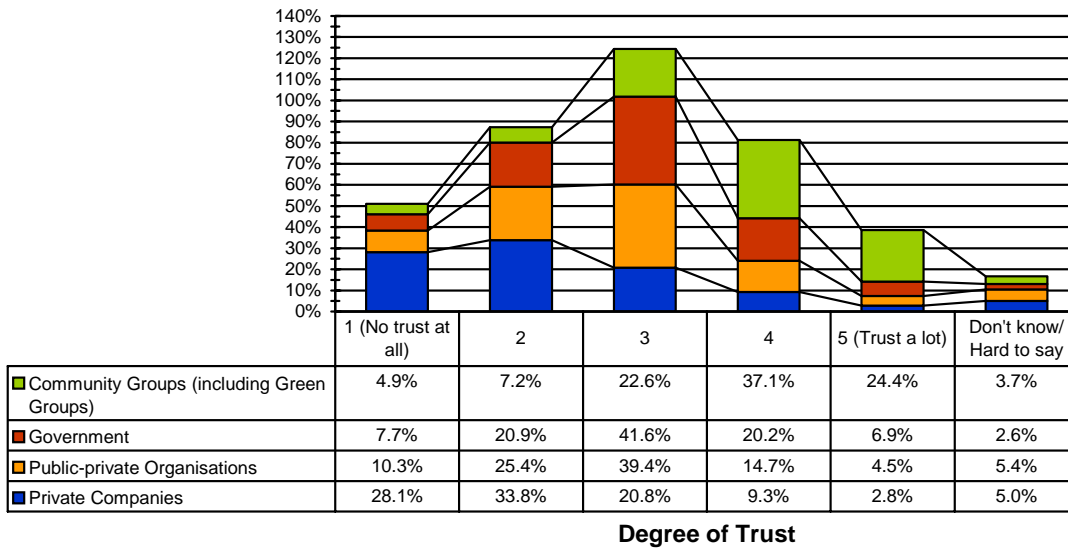


Figure 2. The degree of trust that the general public in Hong Kong places in non-governmental organizations, government, public-private organizations and private companies.

LULUs are well known for imposing externalities involuntarily on the residents of the local community [14]. These externalities may include environmental impacts, health and safety impacts, social impacts and economic impacts. Our survey results indicate that more people are concerned with environmental and health impacts and associated risks than with social and economic losses [9]. The relative importance of externalities as perceived by the Hong Kong public is similar to those observed in Japan with respect to waste management facilities [15]. However, the perceived externalities in Taiwan [16] are somewhat different: in descending order, declining property value, negative health impacts and reduced crop productivity for incinerators and power stations. The rank order of these public concerns may have implications for the mitigation measures that can be adopted to alleviate public opposition.

#### 4. FINDINGS OF THE TUEN MUN SURVEY

A single one of Hong Kong's 18 districts, Tuen Mun, is home to many of Hong Kong's LULUs. It has one of the territory's two power stations, one of its two major psychiatric hospitals and one of its three strategic landfills. Tuen Mun was also the site of one of the three major refugee camps in the 1990s. Located within the boundary of Tuen Mun are also Hong Kong's only aviation fuel receiving facility, steel plant, river trade terminal, and a large waste recycling park. There are also plans to build a mega columbarium-cum-crematorium and a sewage sludge incinerator which would serve the rest of Hong Kong.

Located on the western extremity of Hong Kong's mainland, Tuen Mun is seen as the most appropriate site for major air pollution sources because it is on the downwind side of the prevailing wind. It is also close to Hong Kong's international airport and the Pearl River Estuary, making it a favored site for handling aviation fuel and river cargo traffic. In addition to negative physical impacts, this disproportionate share of LULUs in Tuen Mun generates other negative externalities such as loss in aesthetic values and decline in community attractiveness.

Probably because of financial stringency at the time of development, the community facilities of Tuen Mun such as town halls, libraries, urban parks, sports grounds and the light rail system are not as well furnished and impressive as those in other New Towns of Hong Kong. It was not until the early 2000s that Tuen Mun was linked up with the rest of Kowloon by a mass transit railway system. For various reasons, Tuen Mun has a socio-economic profile that is not on par with the Hong Kong average. For example, according to the 2006 Bi-census, Tuen Mun has a smaller percentage of people who have received secondary education (15.8% vs. 21.9%) and a lower household median income (\$15,000 vs. \$17,500 per month) than Hong Kong as a whole. These factors only reinforce the negative image and stigma of Tuen Mun.

Despite the concentration of LULUs in Tuen Mun, it is paradoxical to note from the questionnaire survey that 55% of Tuen Mun residents were not aware of the occurrence of LULUs in their district unless prompted by the interviewer. This is reinforced by the survey finding that 47% of the respondents do not agree with the commonly held belief that Tuen Mun has a disproportionate share of LULUs compared to other districts. Furthermore, only 14% of the Tuen Mun respondents could correctly name a LULU in their neighborhood.

There is no apparent single reason to account for the observed paradox. The phenomenon can be ascribed to a number of possible factors. Firstly, Tuen Mun residents are probably more concerned with making a living and increasing household income than with the neighborhood environment. Secondly, LULUs are not evenly dispersed within Tuen Mun; most of them are concentrated in a special industrial zone, known as Area 38, situated purposely on the outskirts of Tuen Mun Township. This special industrial zone is about 1.8 km from the town centre and 1 km from the nearest large housing development.

The lack of awareness about LULUs among Tuen Mun residents is paralleled by their lack of knowledge of the planning process involving LULUs. The Tuen Mun survey shows that 86% of the respondents did not know how LULUs are planned and sited, and 31% did not have trust or a lot of trust in the government (Fig. 3). It merits mentioning from the same figure that the level of trust in the local District Council, where LULU proposals are discussed, is in fact low and very close to that of the government.



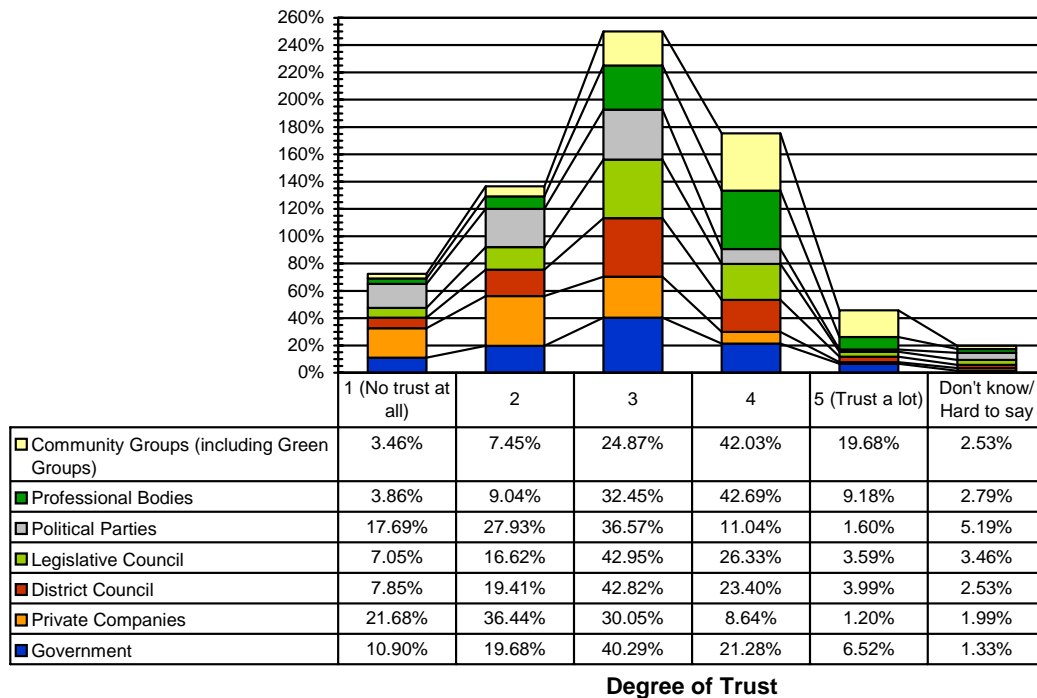
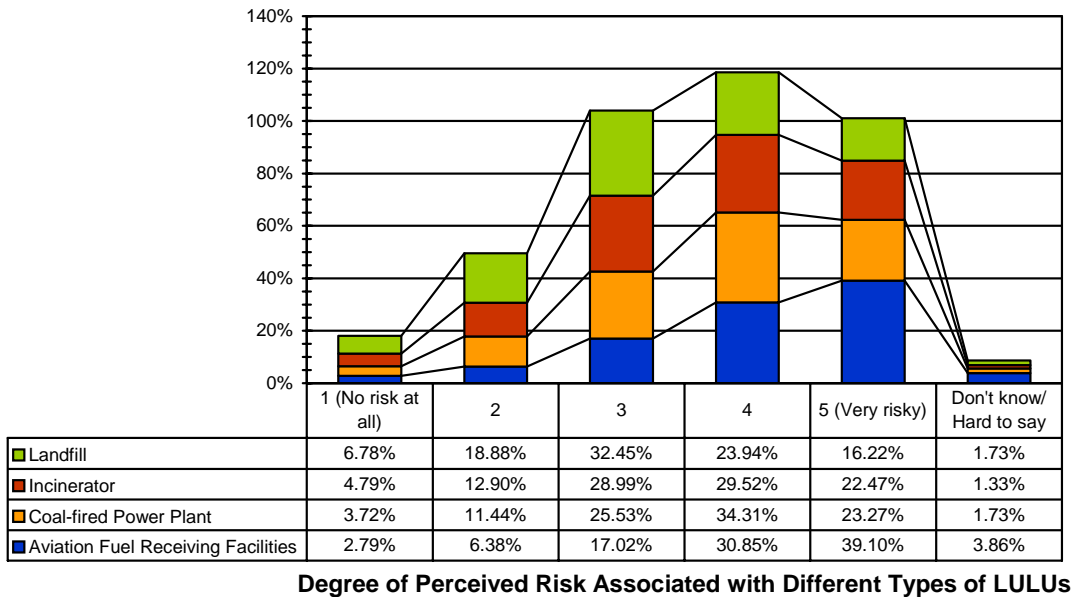


Figure 3. The degree of trust of Tuen Mun residents in non-governmental organizations, Legislative and District Councils, government, public-private organizations and private companies.

Probably because of the lack of trust in the government and the establishment, over 58% of the respondents cited the media, such as newspapers and TV, as their main source of information about LULUs. This is in stark contrast to the mere 2% of respondents who reported knowing LULUs through town hall meetings organized by the government. The over-reliance on mass media as the source of information probably explains why some local residents named LULUs in Tuen Mun which had been widely reported in the news media but were not yet in existence at the time of the survey.

When Tuen Mun residents were asked whether they would welcome some specific types of LULUs in their district, the majority of them opposed to having more LULUs despite the fact that some were aware of the benefits those facilities could bring to society. In fact, their feelings were so negative that they opposed to LULUs of all types. This negative attitude is probably linked to the finding that 79% and 68% respectively of respondents reported that consultation undertaken by the government was inadequate or ineffective. Another 27% reported that they had no faith in the local District Council in handling matters related to LULUs.

It is nonetheless interesting to note that what was in doubt is not the government's technical competence, but the risks and uncertainty associated with hazardous installations (Fig. 4 and Table 1). Similar to what is commonly reported in the literature, LULUs which may carry risks of low frequency and catastrophic consequences are those elicit the greatest fear and opposition [16, 17]. This finding lends support to the findings of previous studies that the public reacts differently to different types of LULUs, and that those which impose high impacts and risks to humans are the least welcome.



**Degree of Perceived Risk Associated with Different Types of LULUs**

Figure 4. Risk level of different locally unwanted facilities as perceived by Tuen Mun residents

Table 1. Tuen Mun residents' perception of risk characteristics.

Statement	Don't Agree/ Totally Don't Agree	Somewhat Agree	Agree/ Totally Agree	Don't Know/ Hard to say	Decline to respond
The facility will bring catastrophic effects if accidents occur	5.05%	9.31%	84.85%	0.80%	0.00%
Environmental impacts arising from the facility are not easy to reduce	4.12%	11.30%	83.11%	1.46%	0.00%
The risks associated with the facility would fill people with fear and dread	10.11%	17.69%	71.54%	0.66%	0.00%
The technology of the facility may not be reliable	30.45%	27.66%	35.5%	6.38%	0.00%
Public are not familiar with the impacts and risks associated with the facility	9.71%	21.81%	65.02%	3.46%	0.00%
The facility may impose impacts and risks upon future generations.	9.04%	12.50%	75.93%	2.26%	0.27%

## 5. POLICY IMPLICATIONS

The findings of the two surveys, undertaken respectively in the whole of Hong Kong and in a district seen by many as having a disproportionate share of LULUs, suggest that NIMBYism is an issue and a challenge to infrastructure building. The results also suggest a level of mistrust and breakdown in communications between the planning authority and the host community.

Whilst members of the public do not doubt the technical competence of the government, there is a notable absence of trust in the government and in the mechanisms of communication and consultation. In the absence of trust, majority of the public rely on the news media as the source of information.

The research findings confirm that different types of LULUs invoke different levels of fear and should be treated differently. Generally speaking, the public are less resistant to LULUs which create environmental nuisances than those which bring about uncertain and uncontrollable risks [17], such as hazardous installations and infectious disease medical centres.

The survey results also call into question the efficacy of the current planning process and public consultation strategy in informing and engaging the public. It is well known that the news media play an important role in risk communication [18], and if and when the risks are misunderstood and amplified, mistrust can be accentuated [14, 19]. The lack of trust may result in impasses that are extremely difficult to resolve.

What is probably needed in Hong Kong is a new public engagement strategy in which the public are not merely passively consulted but are proactively engaged in the planning process. As underscored by Lidskog [20], dialogue alone does not necessarily guarantee that an intended siting can be carried out. What matters most are frequent, open and continuous interactions between the authority and the local community which describe options and alternatives, clarify interests, and aim at consensus-building. Particular emphasis should be placed on risk communication and clearing up misunderstandings.

Our surveys also suggest that economic compensation is of secondary importance compared to other measures of enhancing public acceptance, such as adoption of effective public consultation programs, environmental monitoring and safety audit, implementation of mitigation measures, and giving due consideration to options and project need. This is consonant with some previous findings [e.g. 21] that economic compensation is a promising measure only for low-risk and benign LULUs such as landfills and prisons. In the case of Tuen Mun, improvement of transport facilities and community facilities are probably more effective measures than monetary rewards. Such improvements could enhance the image of Tuen Mun and counteract the labeling effect. It is probably because of the negative “label” that some local residents are resistant to having any more LULUs in their district. Removing this stigma may be useful in enhancing the public acceptance of LULUs. This conclusion calls for a re-examination of strategies adopted and a move away from seeing siting merely a technical issue to one which embraces the social, economic and political dimensions.

## 6. CONCLUSIONS

The NIMBY syndrome poses significant challenges to development in Hong Kong, as it does in other countries. This phenomenon is particularly exacerbated by Hong Kong’s small size and hilly terrain, and its small and administration-led government that accepts little public input from the local community in the planning process. It is paradoxical to observe that the residents of Tuen Mun, a district envisaged by many people as having a disproportionate share of LULUs, are not keenly aware LULUs in their district. This can be ascribed to the survey finding that not many people know about the planning/siting process involving LULUs, and the majority does not have a high level of trust in the government or the local District Councils. In the absence of trust and a consultation process in which the public have faith, the majority of the public learns about LULUs through the news media and sees LULUs as “add-ons” which may degrade the attractiveness of the community. To resolve the conflicts arising from the siting of LULUs, it is imperative to build trust and engage the key stakeholders and the public in meaningful dialogues focusing on risk communication, justification of the need for the project, and presentation of

options and alternative alignments. The survey results indicate that monetary compensation is probably of limited effectiveness in reducing public resistance.

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# ARE CASINOS NIMBYs?

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## Abstract:

The casino gaming industry is proliferating all over Asia and in the next few years it is estimated that the economic benefits from casino gaming will be of such that it would be extremely difficult for governments to resist proposals for one or more casinos. The benefits would largely include earnings from tourism, earnings from foreign gamblers, capturing underground or black market casino gaming, gains from tax revenues, increased gains in related businesses, multiplier effects from primary expenditures, and last but not least, increased recreational opportunities and leisure. While there is no doubt that there would certainly be some good gains from casino gaming, there is also much to be said of the social costs that are likely to be associated with casinos such as lower productivity of work labor, possibility of some erosion of institutional integrity, criminal activities, and problems associated with pathological gambling. There is also an often neglected issue and that is: would these social costs be more of an economic burden and the negative social externalities that go with it to the local residents upon which the casino facility is sited? Would Singapore being a small city-state be shouldering this asymmetric burden for the larger global community? This paper specifically addresses this question. We investigate this issue by presenting some empirical results drawn from the recent experience of Singaporeans to the proposed and eventual establishment of two casinos in Singapore. We also attempt to elicit the key factors which seem to determine the decision of the larger Singaporean public in supporting or opposing the casino proposal and evidence of a NIMBYistic attitude. We explore some effective conflict resolution mechanisms that can be put in place for minimizing public opposition towards casino facilities. It seems that a simple terminological change from the term ‘casino’ to the more elusive, refined and subtle but comprehensive term, ‘international resort’ does affect the likelihood of acceptance rates among those studied.

## 1. INTRODUCTION

In March 2004, the Government of Singapore announced that it has softened its longstanding opposition to the idea of a casino in Singapore. This proposal sparked off a heated debate on the issue of casino development and legalization of casino gambling among Singaporeans.

The controversy of a casino stems from the differences in perspectives: one camp, pragmatic and rational, adopts a cost and benefit approach to the issue; another, moralistic and religious, opposes the project on moral grounds as they regard gambling as belonging to the category of vices (alcohol, tobacco, illicit drugs, and prostitution). It is often argued however that there are much economic benefits to be reaped – earning tourist dollars, recovering lost underground gambling revenues, and increased tax revenues for the government. There are, however, concerns about the spill-over economic costs – lower productivity of workers due to pathological gambling problems, cost of treatment of such addiction, and cannibalizing of the retail and hotel sectors outside the casino sector (Hoon and Ho, 2004). More importantly, there might be social costs, such as more street crimes (burglaries, thefts, and robberies) and white-collar crimes (fraud and embezzlement), environmental externalities due to heavier human

and vehicular traffic, and an increase in likelihood of dysfunctional families arising from pathological gambling (Tan, 2004).

The fact is that Singaporeans are not averse to gambling itself. Currently there are many legal avenues to gamble such as buying lottery, betting in horses and football, and playing slot machines in club houses. Singaporeans have also been traveling to overseas regional casinos in Genting Highlands (Malaysia), Macau, and Melbourne, or they can choose to gamble by going on cruise ships that go to the international seas. Naturally, there is also illegal gambling in the underground gambling dens which are heavily sanctioned but hard to eradicate entirely. Ronald Tan (2004) estimated that in 2003 some \$5 billion was wagered on legal gambling activities, \$2 billion was wagered in underground betting and gambling, and a further \$1.8 billion to \$2 billion was spent in casinos outside Singapore. Altogether, the amount spent on gambling represents 5.5% of Singapore's GDP and is considered to be large for the economy. It seems however that it is not gambling *per se* that the people are opposed to, but the proximity of a casino to their homes which bothers them. This is a typical *not in my backyard* (NIMBY) attitude, that is the local communities refuse to accept facilities designed to serve the state's general economic and environmental welfare (McAvoy, 1999).

Noxious facilities are typical examples of NIMBY facilities. Such facilities are not welcomed because they pose potential health threat, cause pollution, create nuisance, and impose other economic and social costs on the host communities. The state wants and needs to develop them because they benefit the state as a whole by providing for goods and services which are previously unavailable or they lower the costs of provision for currently available goods and services (Quah and Tan, 2002). Because of this asymmetric distribution of the costs and benefits, it is often extremely difficult to site NIMBY facilities. Consider this too: casino gaming is an economic good that is in demand across the world. However, many countries still sanctioned casinos for the same concerns stated earlier, thereby creating a large amount of unsatisfied demand. When a casino is developed in Singapore, it will be supplying a good to the whole world, analogous to a local community hosting a facility that benefits the whole state. However, Singapore will bear the costs and problems associated with the casino, while the world consumers benefit by reaping consumer surplus due to a greater world supply. Therefore, a casino is a NIMBY facility.

It is necessary to qualify that the government is not considering the development of a casino *per se* but an integrated resort-casino (IR). The proposed IR will be a world class resort with many different facilities that cater for different groups of users – retail and dining for those who enjoy shopping and fine dining, entertainment shows for family fun, hotels facilities for tourists, conventional facilities for convention attendees, and most importantly, the casino for recreational gamblers. The IR seeks to enhance “Singapore's reputation as a premium ‘must-visit’ destination for leisure and business visitors” (Ministry of Trade and Industry, 2004) and should not be regarded as a sleazy gambling den. It is an important investment to the government because the tourism industry contributes to 10% of Singapore's GDP and 7% of the workforce through direct and indirect channels (Economic Review Committee, 2003). However, industry players found Singapore is losing its attractiveness as it lacks tourist attractions, a natural environment, cultural attractions, and a vibrant nightlife (Khan and Abeysinghe, 1999). Furthermore, it faces strong competition from the region, such as China, Hong Kong, Thailand, and Malaysia. These countries have increased their investments in the development of infrastructure and tourist attractions to enhance the tourist experience. Therefore, the IR is envisioned to be one of the key tourist products that will enhance the attractiveness of Singapore as a tourist destination and gain access to previously ‘unreached’ group of tourists.

This paper does not seek to examine the costs and benefits of the casino, instead we focus on the individual decision making framework that explains the factors affecting Singaporean's decision to accept or reject the casino. We will address the question of whether the casino is a

NIMBY and examine the effectiveness of various conflict resolution mechanisms that could maximize the acceptance rate from an unwilling public.

The paper is organized as follows: section 2 discusses the proposal of the casino in Singapore, surveys the literature on NIMBY, and draws further evidence on how a casino might fit the bill of a NIMBY; section 3 discusses some of the conflict resolution mechanisms that the government can adopt to reduce the level of opposition to the casino; in section 4, we present the results of an empirical study on the questions that we set out to answer; and finally section 5 summarizes the results with implications for public policy.

## **2. CASINO AND NIMBYs**

In this section, we discuss the casino proposal and draw comparisons to the NIMBY concept. NIMBY concept is widely applied to public projects that are asymmetrically beneficial for the general public and not to the host community. A casino does not fit the bill easily, but in a globalized context, Singapore is supplying a good that has great demand by the world community that is appears under-produced. If Singapore builds a casino, she will have to bear the negative consequence of social problems, such as higher crime rates and lower productivity of labor, while the whole world will stand to benefit.

The IR is envisaged to be an iconic attraction with a comprehensive range of world-class amenities which may include hotels, convention facilities, retail and dining, entertainment shows, themed attractions, and most importantly, a casino. It will be at least in the league of world-class Singapore tourism products such as the Singapore Zoological Gardens, Night Safari, and the Esplanade – Theatres by the Bay. This allows the economy to increase its revenue from the exporting of services, create jobs, stimulate local and foreign investment, and bring about greater economic growth through the multiplier effect. Furthermore, the economic rents that arise from the legalization of a popular activity such as gambling can be captured (Eadington, 1999). Hence, there is much economic benefit to be reaped in the development of an IR with casino facilities.

The NIMBY syndrome describes the specific attitude of the people who do not want certain facilities to be located near their residences. It does not matter whether the facilities are relevant and necessary to the state. There are two main characteristics of a NIMBY (Quah and Tan, 2002). First, there is much involvement of the government in the development process. NIMBY facilities usually receive substantial government subsidies and the government will provide for the conditions that are necessary for the operation of the facility, such as the acquisition of land for development, legalization of its existence and the protection of market by restricting entry of competing firms. The government has to decide on the merits of developing the facility and then decide on the siting location if the facility is expected to be beneficial.

The second characteristic is that the facility has much negative environmental externalities. NIMBY facilities pose harm to the environment where they are sited, such as creating water, air and noise pollution, destroying the aesthetics of the community, or even causing life-threatening hazards. Examples of NIMBY facilities that have been studied include the both non-hazardous and hazardous types, the former includes schools, hospitals, airports, and landfills; the latter refers to chemical plants, refineries, toxic waste treatment plants, nuclear power stations, and waste disposal. The harm to the environment is usually only borne by the community that hosts such facilities whereas the benefit is reaped by the whole society. This asymmetrical distribution of costs and benefits usually results in the development of a NIMBYistic attitude towards the facility.



## 2.1 Casino as a NIMBY

In the first instance, a casino does not easily fit into the NIMBY characteristics described above. However, there is definitely a high level of involvement by the government because it has to legalize casino gambling before the casino can be built. Furthermore, the government has set up a ministerial committee to assess the proposals and award the contract to develop the IR to the corporation that is able to conceptualize and deliver a world class IR. A casino also creates much negative externalities to a society including potential destruction of the moral and cultural environment of a clean and honest society. Besides these considerations, the key linkage is that when Singapore develops the casino, she will be the local community host supplying a good to this highly globalized world and she will have to bear with the negative externalities while tourists around the world benefits. This is analogous to the typical NIMBY situation where she is the host community that has to bear all the costs while the world on the whole benefits from the facility.

The adverse impacts to society can be summarized as follows: 1) the likelihood of pathological or excessive gambling and its related consequences; 2) increase in street crimes issues linked to casinos, such as burglaries, robberies, prostitution, loan sharking, and drug dealing; 3) potential of corruption of political bodies and law enforcing bodies; and 4) infiltration of gambling operations by criminals, organized or otherwise (Margolis, 1997). Many of these social ills will impact Singapore, the location where the casino is sited, and not the world in general.

The gambling literature studying the relationship between the social costs of gambling and a casino has been rather inconclusive. For example, Vina and Bernstein (2002), after studying the relationships between a casino with unemployment, bankruptcy, fraud and embezzlement, found that the conclusions drawn from data analysis are divided and depended heavily on the methodology applied and the sample of data available. Vina and Bernstein argue that unemployment rates appear to be more closely related to the bankruptcy rate than the introduction of gambling. They observe that many economies had developed casinos to stimulate their deteriorating economies, in other words, bankruptcy was rampant *before* the introduction of casino. Their results also show that very small proportion of individuals with pathological or extreme gambling tendencies possess a higher bankruptcy rate than the national average.

Therefore, the actual social costs of a casino are not clear. However, the development of a NIMBY syndrome is usually not based on the actual cost imposed on the society but on the perceived risks and costs to society (Portney, 1991). A survey on the literature on NIMBY reveals that many of the opposed projects are technically safe and that authorities had conducted safety and technical tests to determine the sites which would be most suitable for siting the NIMBY facilities. However, local residents often do not trust the government but they lack the necessary information to make rational judgment, so they perceive the harm to be greater than what the facilities truly possessed. Often, the NIMBYistic attitude arises from an asymmetric information coupled with a general distrust of the government in their decision making process.

Therefore, if we draw comparison between a casino and the characteristics of a NIMBY, we can establish certain similarities. Though it is not environmentally hazardous, it is morally repugnant and the asymmetrical distribution of perceived costs and benefits cause the people to develop NIMBYistic attitudes. Frey *et al.* (1996) also argue that the concept of NIMBY can be applied to issues that affect the community and involve wider moral consideration. A casino can thus be regarded as a NIMBY facility and we can analyze the casino in the same manner as an environmentally noxious facility and consider the issues that it poses such as the need for conflict resolution in siting a NIMBY.

### 3. CONFLICT RESOLUTION IN NIMBY SITING

The need to resolve the differences in the points of views of the government and the public is an important area of public policy making. Often conflicts arise due to the NIMBY syndrome can cause significant delay in the siting process and incur much opportunity cost. Furthermore, NIMBY facilities are usually necessary for the development of the state, for example a waste treatment plant, an incinerator, or a power plant. Without them, the economic and social development of the state could come to a standstill. Therefore, the literature on NIMBY dwells extensively into the conflict resolution strategies and other compromises which can minimize the damage and maximize the acceptance with least amount of delay in building the proposed NIMBY facility (O'Hare *et al.*, 1983).

Many times it is the decide-announce-defend (DAD) procedure that causes the most amount of opposition to the siting of a NIMBY. Sometimes the people may develop mistrust for the government or the local authorities and the authoritarian procedures may cause the public to feel that they are treated unfair. These can lead to a higher level of opposition to the project. In a democratic setting, authorities will not proceed with the siting process for fear of political backlash in the withdrawal of political support during elections or the eventual withdrawal of the NIMBY facility from the local community.

There is growing consensus among scholars that successful siting strategy should include both citizens and experts in the decision making process. A siting strategy that includes citizen participation is advocated because it ensures that the process will be fair and democratic (McAvoy, 1999). Although this will make the decision making process more complex, it allows the other strategies to work more efficiently, namely, the design of mitigation policies to deal with the perceived risk, benefits and costs, and the design of compensation packages that may increase the support for the NIMBY project. In environmentally harmful NIMBY facilities, it is also necessary to conduct a proper environment impact assessment with the involvement of the community. However, that by itself is insufficient to get higher acceptance by the local residents as it is the perception of risk that matters. Therefore, public participation is the preamble to successful conflict resolution.

#### 3.1 Mitigation Policies

Mitigation measures usually involve some form of redesigning of the facility or improved monitoring and decision procedures. It is meant to reduce the actual and perceived risks of the facility. Whilst public participation is the preamble to conflict resolution, Quah and Tan (2002) argue that public participation can be a form of mitigation policy that governments can adopt and it reduces the amount of asymmetric information leading to natural reductions in perceived risk. The literature also suggests that mitigation is more effective than compensation because it seeks to address the real problems posed by the facility and attempts to clarify and change the unfavorable risk perceptions which may be held by the members of the local community.

In the Singapore casino proposal, the government has attempted to impose social safeguards against casino gambling component. These social safeguards aim to address problem gambling and "mitigate potential impact on our families, social values and work ethos" (Ministry of Trade and Industry, 2004). According to the proposed social safeguards, the schemes include, among others, a minimum age requirement, a membership system for Singapore residents, some self-exclusion programs, certain guidelines on credit extension, a facility to allow setting of voluntary loss limits. These social safeguards would only be imposed on casino gambling and do not apply to the non-gambling components of the IR. It is expected that these safeguards will reduce the possibility of developing some of the social problems mentioned earlier.

One of the most important safeguards is the admission by membership. The proposed membership fees are S\$100 for a day membership or S\$2,000 annually. This is to ensure that

those who patronize the casinos will only be those who can afford to do so. This should allay the fear that people with little discretionary income will gamble away the money that has genuine needs and familial responsibilities (Eadington, 1998). On top of this, there is a proposal for exclusion measures to prohibit those who are likely to develop pathological gambling problem from entering into the casino. These measures by themselves are likely to be insufficient to mitigate the risks, and education on the problems of gambling can only be the long term strategy. Hence, education is included as a safeguard.

Although the effectiveness of the safeguards is uncertain, the government has also set up a forum for the public to feedback on the safeguards proposed and to propose their own. This strategy to solicit feedback from the public and to engage them to take ownership of the problem is likely to increase the support for the casino.

### **3.2 Public Relations**

The DAD siting procedure mentioned earlier is one of the quickest ways to develop a political confrontation and ruin public relations. Adopting a DAD procedure shows a lack in sincerity on the government's part to engage the public in policy making. Adopting an announce-discuss-decide (ADD) procedure would be one of the public relations strategies that can increase the level of support. Inputs of the public can be properly factored in to the decision making process and mitigation policies that are genuine in dealing with the concerns of the people can be put in place. In fact, the decision to build the NIMBY facility can even be scrapped without a loss of political credibility. Therefore, maintaining good public relations is a vital element in the resolution of conflicts.

One advantage of good public relations is that the public can be made aware of the same facts that the state officials know, and the public will see the economic benefits of the facility to the surrounding community as well as the benefit to the state as a whole. Managing the media relations can also help to provide favorable publicity thus allowing the government to convince those who opposed the project that they were acting narrowly and subverting the general welfare of the state (McAvoy, 1999). Nonetheless, Young (1990) finds it is difficult for the state officials and technocrats to communicate their knowledge of the risk and hazards to the general public in a constructive and credible manner. He argues that effective risk communication involves keeping the lines of communication open, being honest, consistent, and cooperative on the part of the officials, and engaging journalists to understand how to frame the technical and social dimensions of risk issues. While he concedes that it is impossible to eliminate all the risks that the NIMBY facility pose and it may be impossible for even the most honest and open of managers to change the public's attitude toward industrial risks completely, improved risk communication provides a better chance that the merits of opposing arguments will be heard and sincerely considered.

### **3.3 Monetary Compensation**

Conventional economic wisdom emphasizes the role of compensation measures in conflict resolution. It assumes that everything can be assigned a monetary value and compensation can be made so that one is indifferent to the cost incurred. In similar fashion, monetary compensation is meant to reimburse the residents of the damage and harm that are associated with the NIMBY facility. It is even hoped that monetary compensation can tilt the balance and reduce the amount of opposition. However, monetary compensation can be most effective and decisive only when the harm inflicted by a NIMBY facility is the loss of property values. When it comes to the intangibles that the residents might be attached to, such as the aesthetics of the environment, monetary compensation is less effective (Quah and Tan, 2002).

One reason for the difficulties in designing monetary compensation packages is the problem of valuation. Other than the difficulties in valuing the intangibles, there is also a problem of loss aversion (Kahneman *et al.*, 1991). Theoretically the willingness to pay and the willingness to accept values should not have serious discrepancies, the empirical literature suggest that losses are valued more than gains. This implies that the minimum compensation that people demand to give up a good far outweighs the amount they would be willing to pay to keep or acquire the same good. The result is that the compensation will be very much understated if the economic valuation of the compensation is based on the willingness to pay measures rather than the compensation demanded measures.

There is also a growing literature that argues that money compensation is not effective for other moral reasons. O'Hare *et al.* (1983) find evidence that compensation in cash is often viewed as a bribe through their case studies. Frey (1997) also suggests two key reasons why monetary compensation fails – a bribe effect and a crowd out effect. Bribe effect reduces the willingness to accept the facility by imposing moral costs on the decision to support the project with compensation. The crowd out effect reduces the intrinsically motivated support, in other words, individuals who initially supported the NIMBY facility for the benefits to the whole society did so out of the civic duty and public spiritedness, however, when monetary compensation is offered, the intrinsic motivation to support is substituted with a transfer of responsibility to the compensating authorities and the level of support for the project is reduced. In that sense, compensation crowds out public spirit and reduces the acceptance of the facility.

### **3.4 Compensation with Public Goods**

Compensation need not be in monetary terms, but of goods in-kind. Goodwill measures such as providing better street lighting, building more recreational facilities, can be important to the local residents as it helps to maintain a strong and positive presence within the host community (Kunreuther and Easterling, 1996). Two types of public goods as compensation can be identified, first, a public good that might directly mitigate the specific detriments caused by the public harm, and second, a good that has no association with the harms but will benefit the public in general. Examples of the latter type of public goods include subsidized education and involvement in community development.

Mansfield *et al.* (2002) argue that public goods may be perceived as a fairer method of compensation and not thought of as bribes as they benefit the society and not the individual. People might feel that the moral responsibility for the negative outcomes of the NIMBY facility be spread throughout the community when the compensation is a public good, thereby easing the burden on any particular individual. It reduces the guilt associated with the compensation and restores the intrinsic motivations of civic duty and public spiritedness, thereby increases the chance of acceptance. Various scenarios of public harm related to NIMBYs such as landfill, airport, recycling transfer centre, and were set up and public goods that were designed to be independent to the public harm were offered as compensation. These test whether there are significant differences between compensation with money and with public goods. In a willing to accept framework, they concluded there is evidence that public goods are more valuable than cash in the presence of a public harm. Therefore, public goods or other in-kind compensation is an attractive alternative to monetary compensation for public harm – it is likely to be cheaper than monetary compensation and everyone is made better off. More importantly, it is known to be more effective in overcoming opposition from citizen groups. Therefore, compensation by public good is better than monetary compensation, and the authors observe that this type of compensation had been used in some successful facility sitings.

Conflict resolution allows the government to bridge the gap between its desire to site a NIMBY facility and meeting the expectations of the public. The measures of mitigation,

managing public relations, and compensation are often limited in effectiveness when implemented in isolation. It takes a combination of all three strategies to deal effectively with the fears and concerns of the public. As we have argued, suitable mitigation policies depend on the type of NIMBY and must be perceived to be effective before the public will accept the NIMBY. Together with compensation schemes, mitigation policies will play an important complementary role in increasing the local residents' likelihood of accepting a proposed noxious facility. It is important to note that the NIMBY syndrome is a formula for paralysis, not progress, the need to resolve the conflict quickly is essential if society is to develop a rational balance between risk and progress.

#### 4. THE SURVEY AND SOME EMPIRICAL RESULTS

In this section, we will discuss the empirical results of a survey that was done to determine the factors that are significant in influencing an individual whether to support the development of a casino in Singapore. We have employed a Probit Model to discover the significant factors in the individual decision making framework.

##### 4.1 The Survey

The survey was administered to 513 Singapore citizens or Permanent Residents above 21 years of age. Ethnicity was not a major concern in this study but instead, religion plays an important role because of the moralist/religious argument against the casino.<sup>17</sup> The breakdown of the 513 respondents in terms of their religion is given in Table 1, along with the population statistics given by the Singapore Department of Statistics. The sample population is small, and hence the proportion does not correspond exactly with the true population data despite the randomness in surveying. Nonetheless, the Buddhist and Taoist groups remain the biggest population in the sample.

**TABLE 1: RELIGIOUS AFFILIATION IN THE SAMPLE POPULATION**

Religion	Sample Population		Proportion of Population* (%)
	Number of Respondents	Proportion (%)	
Buddhism and Taoism	184	35.9	44.2
Christianity (including Catholicism)	126	24.6	18.7
Islam	57	11.1	14.0
Hinduism	34	6.6	4.8
No religion	112	21.8	18.3
<b>Total</b>	<b>513</b>	<b>100</b>	<b>100</b>

\* The population proportion figures are calculated based on the breakdown given by the Singapore Department of Statistics (2001). It has been adjusted to account only for those who above 21 years of age.

<sup>17</sup> Although it has been argued that gambling is entrenched in the Chinese culture, and hence ethnicity seems to be an important factor, the reason for its exclusion is that religious values often overlap with cultural values, especially if the religion is indigenous to the ethnicity, for example, Malays with Islam, Chinese with Buddhism and Taoism, and Indians with Hinduism.

The survey was developed according to the arguments for and against the development of a casino and contain key factors that will influence the decision making process. The survey questions can be found in the Appendix. Two separate surveys were administered – one asked about the development of a *casino* and the legalization of *casino gambling*<sup>18</sup>, while another asked about the development of an *integrated resort-casino* (IR) and the legalization of *casino gaming*<sup>19</sup>. There are two reasons for doing so, first, it controls for the possible psychological effect in using different terminologies, and second, it tests whether there will be a transformation of good effect. It is possible that when an individual perceives the proposal to be a casino *per se*, the respondent might be more averse to the idea, however if the good is viewed as a resort, then the opposition for its development might be reduced. Similarly, gambling is viewed as a vice while gaming is a form of entertainment. Therefore, it is necessary to control for this effect. This effect also has important policy implication and therefore worth investigating. As for the remaining of the survey, the order and phrasings remain the same.

We are interested in the factors that might affect the support of the casino and other than the respondent's religion, and the personal characteristics examined include gender, age, income level, education level, whether one cares about the development of a casino (or integrated resort-casino), whether one has children or plan to have one, and whether one gambles, or more importantly, the frequency of participation in legalized gambling. The question that asks about whether one cares about the proposal is meant to control for awareness of the developments – a more informed person will examine the situation in detail and make an informed choice, while someone who does not care, is likely to do so based on hearsay. The question with regards to having a child (or planning to have one) is to examine the concern for the future, that is, if the respondents had answered “yes”, it is possible that they might be more concerned about the future generation and therefore might choose not to support the casino proposal.

The next set of questions asked for the respondent's perception of the effects of a casino/IR in Singapore, such as whether the casino will lead to more social problems, whether there is a risk of Singaporeans developing a gambling addiction, and if the casino will bring economic growth through tourism and increased employment. A third set of questions also seeks to find out about the mitigation effects that could have taken place due to 1) an acceptable level of public participation in the policy making process; 2) a perception of the effectiveness of the safeguards proposed in controlling the potential social problems; and 3) a perception of the importance of siting location to the respondents. All the variables that we are interested to examine are summarized in the list of variables found in Table 2.

The respondents were asked whether they support the proposed project before being asked about the factors that might influence their decision making process. At the end of the survey, three further questions were asked to determine whether conflict resolution mechanisms can take place. In a willing to accept framework, we want to test if the respondents are willing to be accept a compensation package in monetary terms or in the form of public goods in return for their support. The compensation in monetary terms is in the form of a tax rebate, calculated as a percentage of their current tax. The provision of public goods are of two types: 1) more social workers who are able to mitigate the risk of social problems and pathological gambling; and 2) pure public goods such as the provision of education, giving of more money to the development of the arts in Singapore, and donations to charitable organizations.

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<sup>18</sup> Gambling is defined as “an activity in which a person subjects something of value – usually money –to a risk involving a large amount of chance in hopes of winning something of greater value, which is usually money.” (Thompson, 1997, 3)

<sup>19</sup> A game is defined as an activity that is free and voluntary, governed by rules, and involves some form of risk in the uncertainty of results (McGowan, 2001). It can be classified by a game of skills or a game of luck. A sport game is usually of the former type, while gambling in a slot machine is a game of luck. Playing of cards against the dealer is difficult to classify as it involves both elements.

## 4.2 Model Description and Methodology

The set of the survey questions allows us to develop a *latent variable model*,  $y_i^* = \mathbf{x}_i' \boldsymbol{\beta} + u_i$ , where  $y_i^*$  is the individual's perceived net benefit of the project after undergoing a mental calculation of the costs and benefits. The matrix  $\mathbf{x}_i$  contains the personal characteristics and the independent variables which determine the costs and benefits and the mitigating factors of the project while  $\boldsymbol{\beta}$  is a matrix of estimates that describes the marginal effect of each causal factor. We asked the respondents whether they support the development of the proposed casino or IR and record the response as a binary variable, *support*, where 1 is for a “yes” answer and 0 for a “no”. It is reasonable to infer that a respondent would only support the proposed project if the perceived net benefit is positive. With this, we can use the Maximum Likelihood Estimation (MLE) method to estimate the marginal effect of each causal factor and we propose to use a Probit Model to do so.

The Probit Model specification is given as follows (Woodridge, 2000, 530–531):

$$\Pr(y_i = 1 | \mathbf{x}_i, \boldsymbol{\beta}) = \Phi(\mathbf{x}_i' \boldsymbol{\beta}) = \int_{-\infty}^{\mathbf{x}_i' \boldsymbol{\beta}} \left[ (2\pi)^{-1/2} e^{-v^2/2} \right] dv$$

We have chosen a Probit Model because we assume that the error term in the latent variable model for each individual ( $u_i$ ), which is independent of all the independent variables, is normally distributed. Since we believe that all the factors that are important for the debate have been included in the analysis, it is the individual's idiosyncrasy that might lead the respondent to support (or not to support) the project. Hence, the assumption of normality is imposed.

With two different set of questions, we use three models, 1) Integrated Resort-Casino (IR) Model, 2) Casino Model, and 3) Pooled Model. In the Pooled Model, all the observations are regressed as one equation and a binary variable, *casino*, acts as an independent variable to allow for differences in the intercepts. All three models have the same independent variables given in the list of variables (Table 2) which also has the expected effect of the relationship of the factors with the support level for the casino or IR.

**TABLE 2: SUMMARY OF LIST OF VARIABLES**

<b>Variables</b>	<b>Description</b>	<b>Remarks (if any)</b>
<i>gender</i>	1 if male; 0 if female.	
<i>educ</i>	1 if primary and below; 2 if secondary; 3 if diploma; 4 if degree or higher.	
<i>income</i>	1 if income is below \$2000; 2 if income is between \$2001 – \$6000; 3 if income is between \$6001 – \$9000; 4 if income is more than \$9001.	
<i>age</i>	1 if 21 – 30; 2 if 31 – 40; 3 if 41 – 50; 4 if 51 – 60; 5 if 61 and above.	
<i>budtao</i>	1 if Buddhist or Taoist; 0 if otherwise.	
<i>christianity</i>	1 if Christian; 0 if otherwise.	Effect of religion relative to those without any religion.
<i>islam</i>	1 if Muslim; 0 if otherwise	
<i>hinduism</i>	1 if Hindu; 0 if otherwise	
<i>children</i>	1 if have children or plan to have children; 0 if otherwise.	Effect of concern for the future.
<i>gamble</i>	0 if does not gamble; 1 if gambles once in a quarter or less; 2 if gambles once in a month; 3 if gambles once in two or three weeks; 4 if gambles at least once a week.	Expect a positive sign, as a gambler is more likely to support the development of a casino.



**TABLE 2: SUMMARY OF LIST OF VARIABLES (CONT.)**

<b>Variables</b>	<b>Description</b>	<b>Remarks (if any)</b>
<i>care</i>	1 if cares about the proposed project; 0 if otherwise.	The level of awareness towards the proposed project.
<i>addiction</i>	1 if perceives very low risk; 2 if perceives low risk; 3 if perceives moderate risk; 4 if perceives high risk; 5 if perceives very high risk;	Perceived risk of Singaporeans developing an addiction to gambling. Expect a negative sign, as the higher the perceived risk, the higher the associated social costs.
<i>public_part</i>	1 if perceives enough public participation; 0 if otherwise.	Expect a positive sign, as more public participation is likely to bring about more support.
<i>growth</i>	1 if expects proposed project to increase tourism, create employment and promote economic growth; 0 if otherwise.	Perceived positive economic impact. Expect a positive sign.
<i>social_prob</i>	1 if very unlikely; 2 if unlikely; 3 if likely; 4 if very unlikely	Perceived risk of social problems. Expect a negative sign, as this represents the perceived costs to the society.
<i>safeguards</i>	1 if expects proposed safeguards to work; 0 if otherwise.	Perceived effectiveness of safeguard. Expect a positive sign.
<i>site</i>	1 if prefers Marina Bay; 2 if prefers Sentosa Island; 0 if otherwise.	Whether choice of site matters, and the proposed site which is preferred. Expect a positive sign as Sentosa Island is further away from the main island than Marina Bay.

### 4.3 Regression Results

Regression results for each model can be found in Table 3 and the standard errors given in the parentheses are heteroskedasticity-robust. The first question is to determine whether the multivariate regression function differs across the two groups that were asked the same questions using different terminologies, that is, the IR group and the Casino group. In order to answer it, we have done a Chow Test<sup>20</sup> was used with the following hypotheses:

**H<sub>0</sub>**: There are no structural differences across the two groups of respondents;

**H<sub>1</sub>**: There are structural differences across the two groups.

The Chow statistic calculated is 1.833<sup>21</sup> and the corresponding *p*-value is 1.75%. This implies that at 5% level of significance, there is statistical evidence to reject the null hypothesis and conclude that there are structural differences in the two groups of respondents who were asked either to support the development of a casino or an integrated resort-casino.

The rejection of the null hypothesis in the Chow Test means the models that correctly describe the different respondent groups are the IR Model and the Casino Model and not the Pooled Model. Before we discuss the significant factors for each model, the implication of this is that there is a behavioral aspect to the problem and this is very important for policy making. It appears that the casino proposal can undergo a psychological transformation just by simply changing the name to an integrated resort-casino and the gambling industry into gaming industry. The amount of moral/religious opposition to the casino and gambling can be mitigated simply with a change in perspectives where the respondents no longer view the project as a gambling den but an institution developed to attract tourists and promote growth. Therefore, by supporting it, it is not seen as endorsing the vice but agreeing to the liberalization of the gaming/entertainment industry.

When we compare the significant factors for each model, we find that it tells a consistent picture as above. First, we observe that in the IR Model, none of the religious variables (including the *constant*) returns with a statistically significant estimate, while only *hinduism* is insignificant under the Casino Model. The intercept has to be interpreted with caution, as it contains not only the component that is fixed among all the respondents, but it also contains the factor of being “non-religious”. For example, the negative sign in the estimates for *christianity* and *islam* in both models means that relative to a non-religious person, a Christian or a Muslim is less likely to support the project. The non-significance of estimates on the religious factors in the IR Model implies that the religious opposition to an integrated resort-casino is weak or even non-existence. While in the Casino Model, only *hinduism* is not statistically significant, all other religious factors, including the constant, is statistically significant. When we compare across the models, religious factors will play a more important role in influencing the level of support especially for the Casino Model. For a person who feels that there is average risk in social problems and addiction to gambling, it is estimated that a Christian or a Muslim is 36% to 40%<sup>22</sup> more likely to oppose to the development of a casino compared to a non-religious person; however, in the IR Model, a

<sup>20</sup> Chow test statistic is given by  $F = \left[ \frac{SSR - (SSR_1 + SSR_2)}{(SSR_1 + SSR_2)} \right] \times \left[ \frac{n-2(k+1)}{k} \right]$ . (See Woodridge, 2000, 530–531)

<sup>21</sup> The values for the three models are  $SSR_{IR} = 31.289$ ,  $SSR_C = 24.731$ , and  $SSR_{Pooled} = 59.680$ . The degree of freedom (*k*) is 17.

<sup>22</sup> This is based on the calculation,  $\beta^{LPM} \approx 0.4\beta^{probit}$  where *LPM* refers to a linear probability model. The actual fall in probability depends on the individual and the level taken as reference, however, this calculation allows us to estimate the change in probability when all the other values are taken to be its average. All the calculations in the change in probabilities are calculated as such.

Christian is only 5% more likely to oppose the project, while a Muslim is 32% more likely to do the same. This implies that *ceteris paribus*, a Christian is more likely to displace his religious objection to the project if the project is an IR.

The important implication of this result is that in the area of public policy, if the government can successfully shift the debate on the proposal from a casino to an integrated resort-casino, then it is more likely to garner support from the public. As suggested by the insignificance of the estimate on the intercept of the IR Model, even the non-religious moralists will be less likely to object to the proposal if the other factors such as the risk of social problems and the effectiveness of the safeguards are taken care of. However, it should be stated that the *p*-value for the coefficient estimate on *islam* in the IR Model is 12.0%. Although it is still statistically insignificant, it is the only estimate that exhibits such small *p*-value among the religious factors, therefore, it is possible that in the true population, Muslims may oppose the project on religious grounds even when the debate has shifted.

The only personal characteristic that is statistically significant is the frequency of participation in gambling (*gamble*). This result is expected as those who like to gamble are more likely to support the presence of a casino. Other factors that are statistically significant for both models are revealed in the variables: *addiction*, *social\_prob*, and *growth*. All these factors are related to the costs and benefits of the project and they are similarly expected to play an important role in influencing the decision making process. While *social\_prob* and *growth* have similar effect on the level of support for both models, it is interesting to highlight that in the Casino Model, the fear of a risk of addiction to gambling is strongly negative – an estimated 28% drop in the marginal probability on support. It can be implied that the relationship between a casino and the perceived risk of addiction is strongly related while the same relationship for an IR is considerably weaker (a 13% fall in probability of support). This is consistent with the earlier conclusion that there is a psychological aspect related to the perception of the casino good and not the IR.

The three factors that examine the mitigation effects also proved to be very interesting. It is observed that the variable, *safeguards*, is equally important whether the project is perceived as a casino or an IR. The effectiveness of the safeguards proposed by the government will lead to higher support for the project by 25% and it indicates that the government should enforce the proposed rules or even enhance them to increase the level of support, as it is perceived as effective in mitigating the risk of social problems and the

**TABLE 3 REGRESSION RESULTS FOR DIFFERING MODELS**

<b>Dependent Variable: <i>support</i></b>			
<b>Independent Variables</b>	<b>IR Probit Model (<i>casino</i> = 0)</b>	<b>Casino Probit Model (<i>casino</i> = 1)</b>	<b>Pooled Probit Model (pooled data)</b>
<i>Casino</i>	–	–	–0.00686 (0.1486)
<i>Gender</i>	0.0861 (0.2070)	0.131 (0.2270)	0.0571 (0.1479)
<i>Educ</i>	0.127 (0.1386)	0.0599 (0.1497)	0.133 (0.1006)
<i>Income</i>	–0.370* (0.1976)	0.216 (0.2005)	–0.126 (0.1313)
<i>Age</i>	0.0491 (0.1076)	–0.0703 (0.1315)	0.0473 (0.08061)
<i>Gamble</i>	0.397*** (0.08943)	0.302*** (0.08403)	0.297*** (0.05559)
<i>Children</i>	0.239 (0.2468)	–0.397 (0.2603)	–0.0398 (0.1747)
<i>Budtao</i>	0.245 (0.2783)	–0.621** (0.3045)	–0.238 (0.2022)
<i>Christianity</i>	–0.136 (0.3198)	–0.908*** (0.3346)	–0.584*** (0.2186)
<i>Islam</i>	–0.814 (0.5231)	–0.989** (0.4247)	–0.959*** (0.3174)
<i>Hinduism</i>	–0.192 (0.4737)	0.467 (0.5179)	–0.299 (0.3904)
<i>Care</i>	–0.190 (0.2212)	–0.506* (0.2679)	–0.267 (0.1635)
<i>Addiction</i>	–0.324** (0.1483)	–0.709*** (0.1659)	–0.446*** (0.1046)
<i>social_prob</i>	–0.383** (0.1625)	–0.455** (0.1888)	–0.415*** (0.1169)
<i>Growth</i>	1.116*** (0.3457)	0.910*** (0.2855)	0.893*** (0.2074)
<i>public_part</i>	0.376 (0.2296)	0.562** (0.2583)	0.404** (0.1671)
<i>Safeguards</i>	0.652** (0.2233)	0.602** (0.2338)	0.666*** (0.1569)
<i>Site</i>	0.248* (0.1275)	0.135 (0.1349)	0.168* (0.08751)
<i>Constant</i>	–0.0424 (0.8024)	2.474*** (0.8069)	1.037* (0.5683)
<b>Number of observations</b>	260	253	513
<b>Percent correctly predicted</b>	83.08	86.17	82.46
<b>Log likelihood</b>	–98.265	–76.337	–187.299
<b>McFadden R-squared</b>	0.451	0.558	0.468

**Notes:** Standard errors are given in parentheses.

\* Test statistic is significant at 10%.

\*\* Test statistic is significant at 5%.

\*\*\* Test statistic is significant at 1%.

development of problem gambling. The variables, *public part* and *site*, have differing effects for each of the model, as the former is only significant for the Casino Model, while the latter is significant only for the IR Model. The reason for this observation is possibly that the perceived risk for the casino is higher and therefore the effect of public participation on the support is stronger. With regards to the siting of the casino, the distance between the casino and local residence is not as important to the people because of the efficiency of the transport system in Singapore and the smallness in size. This is not to say that the distance matters for an IR, in the IR case, but perhaps the reason why *site* matters is because of the environment – Sentosa Island is definitely more desirable for it has been a well developed tourist attraction and hence more suitable for the development of an IR. Once again, we can conclude that the mitigation effect is not consistent for each model because each good is perceived differently.

In summary, the costs and benefits factors and some mitigation factors matter, while the only personal characteristic that matter is the frequency of gambling. Besides this, moral/religious values apply to the Casino Model, implying that there is a difference in the perception of the proposed good. Perhaps one of the reasons why the opposition to the proposed project was so strong and the public debate so heated up over this issue was because the media had focus exclusively on the issue of a casino and not an integrated resort-casino. The results show that a casino is viewed as a moral/religious issue, while objectivity and rationality prevails for the integrated resort-casino, even though analytically they are the same. Therefore, it is likely that the NIMBY syndrome arose mainly because of the morality of the project and not from other rational reasons such as the spill over effects of social costs. This implies that the failure of economic theory to understand moral principles might make it difficult to achieve conflict resolution through negotiation and compensation.

#### **4.4 Conflict Resolution and Compensation Mechanism**

In the NIMBY literature on conflict resolution, we have seen that support for a project can be garnered not only by mitigating the risk factors but also by a process of compensation. Three different types of compensation are offered to survey respondents to determine this. These are 1) monetary compensation through a tax reduction; 2) increase the number of social workers to deal with the social problems of problem gambling; and 3) increase its public spending on public projects (e.g. education, development of the arts, giving to charitable organizations) using the tax proceeds from the casino.

Compensation with money or public goods has its advantages, but it might crowd out intrinsically motivated support for such projects (Frey, 1997). Some people might switch its response from a support to non-support as they suspect that the government might have hidden but negative information and wanted to ‘sweeten’ the deal. For example, the public might perceive that the project is more risky than what was previously expected.

We offered three hypothetical types of compensation packages and asked the respondents again for their support for the development of the project. The descriptive statistics in Table 4 allows us to see the effectiveness of each type of compensation. *Compensation* is a dummy variable which has meaning similar to *support* – it is assigned 1 when the respondent answered “yes” to the support for the project when compensation was offered and assigned 0 for “no”. While most of the respondents maintained their original response, we observed that some of the respondents changed their level of support when compensation was offered. For example, we observe that the number of positive switches (*support* = 0, *compensation* = 1) for the IR Model using the tax rebate is 27. This represents 10.4% of the total number of respondents answering the IR survey. However, 21 respondents also switched from support to opposition when the compensation was offered. This means that the net increase in support was merely 2.3%. This level of net increase in support

apparently does not depend on the type of project proposed as a net increase of 2.4% was achieved when the respondents were asked to support the casino's development. Compensation using public goods yielded a higher positive change of 8.1% and 8.7% respectively for IR Model and Casino Model while compensation by increasing the number of trained social workers gave a negative result of 4.6% and 5.9% respectively.

To test whether each type of compensation mechanism is likely to lead to a significant change in the rate of support, we conducted a Mean Equality test on the rate of support. The following hypotheses are set up for each type of compensation:

- H<sub>0</sub>:** There is no change in the level of support with the offer of compensation, that is,  $\overline{compensation}_i = \overline{support}$ ; <sup>23</sup>
- H<sub>1</sub>:** There is a change in rate of support with the type of compensation, that is,  $\overline{compensation}_i \neq \overline{support}$ .

Taking into account that there is the high correlation between the two series of observations, that is, there is a high likelihood that a respondent would support the project with compensation if he/she had supported the project without compensation, and vice versa, we adjusted the standard errors with the necessary covariance factor<sup>24</sup> and calculate the *p*-value.<sup>25</sup> The *p*-values for the equality test are given at the bottom of Table 4.

Though offering compensation with monetary terms yields a positive change in the level of support, according to the results, the change is not statistically significant. This implies that it is not a useful tool in conflict resolution. There might be several reasons for this observation: first, the strong negative switch is probably caused by a withdrawal of support for the project fearing that the government has hidden information about the social cost of the project; second, the respondents might perceive it as a bribe and thus withdraw their support; third, the income tax rebate may not be a good conflict resolution tool because income tax rates in Singapore is already very low; and last but not the least, the public may be skeptical about the sincerity of the government in giving tax rebates as the government is known to be shrewd in balancing its budget and the public may fear that it will take back what it gives through other means.

<sup>23</sup> The original distributions of *support* and *compensation<sub>i</sub>* are binomial. However, the Central Limit Theorem states that when the sample size is large enough, the mean values of *support* ( $\overline{support}$ ) and *compensation<sub>i</sub>* ( $\overline{compensation}_i$ ) can be approximated by the normal distribution.

<sup>24</sup> When *X* and *Y* are not independent, the standard error is adjusted by the following formula:

$$S.E.(\bar{X} \pm \bar{Y})^2 = \frac{S.E.(X)^2}{n_x} \pm \frac{2Cov(X, Y)}{\sqrt{n_x n_y}} + \frac{S.E.(Y)^2}{n_y}$$

<sup>25</sup>  $p\text{-value} = 2 \times \Phi\left(-\left|\frac{\bar{X} - \bar{Y} - \mu_{H_0}}{S.E.(\bar{X} - \bar{Y})}\right|\right)$ , where  $\mu_{H_0}$  is the test hypothesis value.

**TABLE 4: EFFECTS OF COMPENSATION ON SUPPORT**

Type of compensation	Monetary Compensation (Income Tax Rebate)		In-Kind Compensation (Social Workers)		In-Kind Compensation (Public Projects)	
	IR Model	Casino Model	IR Model	Casino Model	IR Model	Casino Model
<i>support</i> <sup>#</sup> = 1 and <i>compensation</i> <sup>+</sup> = 1	97 (37.3%)	89 (35.2%)	88 (33.8%)	82 (32.4%)	108 (41.5%)	101 (39.9%)
<i>support</i> = 1 and <i>compensation</i> = 0	21 (8.1%)	19 (7.5%)	30 (11.5%)	26 (10.3%)	10 (3.8%)	7 (2.8%)
<i>support</i> = 0 and <i>compensation</i> = 1	27 (10.4%)	25 (9.9%)	18 (6.9%)	11 (4.3%)	31 (11.9%)	29 (11.5%)
<i>support</i> = 0 and <i>compensation</i> = 0	115 (44.2%)	120 (47.4%)	124 (47.7%)	134 (53.0%)	111 (42.7%)	116 (45.8%)
<i>support</i> = 1 (%)	45.4	42.7	45.4	42.7	45.4	42.7
<i>compensation</i> = 1 (%)	47.7	45.1	40.8	36.8	53.5	51.4
<b>Net change (%)</b>	<b>2.3</b>	<b>2.4</b>	<b>-4.6 *</b>	<b>-5.9 **</b>	<b>8.1 ***</b>	<b>8.7 ***</b>
Mean Equality test ( <i>p</i> -value, %)	38.7	36.6	8.21	1.27	0.09	0.02

**Notes:** Percentages of respondents in each category are given in parentheses. The sum of the figures may not add up correctly due to rounding errors.

<sup>#</sup> *support* = 1 if the respondent supports the project without any compensation given, 0 otherwise.

<sup>+</sup> *compensation* = 1 if the respondent supports the project when the compensation is given, 0 otherwise.

\* Test statistic is significant at 10%.

\*\* Test statistic is significant at 5%.

\*\*\* Test statistic is significant at 1%.

The net drop in the support from those who had previously supported the proposal is statistically significant for both models when the offer of social workers was proposed. This provides more evidence that crowding out may have taken place, and the respondents had withdrawn their support for the project suspecting that the project might bring about more social problems than the government is willing to admit. Therefore, they felt that it is not worth taking the risk. This form of compensation hence is not well received.

All in all, the results suggest that the best form of compensation is to use the tax proceeds to provide for public goods such as education, development for the arts, and giving to charitable organizations. Not only are the positive results largest among the types of compensation mechanism, they are also statistically significant at 1%. With the onset of increasing healthcare costs, a fund to help subsidize medical costs for the poor and the desolate could be set up with the tax revenue and this might be welcomed by the public. Other innovations may include the setting up of an education trust fund which gives scholarships to the needy or children of low income group, or supplementing the tourism development fund which will provide a steady stream of income that can be used to maintain and develop tourist attractions of Singapore. This is contrasted to the current practice of ad-hoc injections of money into the tourism industry by the government. The provision of public good remains the most effective and the preferred method of compensation under the

willing to accept framework and this is consistent with the results discussed in Mansfield *et al.* (2002).

## 5. CONCLUSION

While casinos are not typical examples of a NIMBY facility, it can be shown to have similar characteristics because the social costs are shouldered by the local residents upon which the casino facility is sited but the larger society benefits. While there is no doubt that there would certainly be some gains from casino gaming, such as increased tourist expenditure there is also potential social costs such as lower productivity of regular work labor; possibility of some erosion of institutional integrity; criminal activities; and problems associated with pathological gambling.

This paper also examined the factors affecting the public's decision to support the casino. On behavioral grounds, it is found that with a simple change of the terminology from casino to integrated resort-casino and casino gambling to casino gaming, the acceptance level increased. The reasons for such psychological effect need further examination. This survey results also found that moral and religious values affect one's response only in the casino case, the respondents may have regarded gambling as a harmful activity, linked to many types of vices such as drinking, prostitution and drug taking; but treated gaming as an activity that involves skills and talents and is merely harmless entertainment facilitating economic progress.

Governments might find this result relevant should they decide to pursue any projects that draw resistance. By creating a positive image, governments can attempt to steer the public to a neutral, rational ground. In particular, for the development of a casino or IR, when the government is able to focus on the latter, rational factors such as the costs and benefits of the project will prevail and correspondingly, moral objections will be reduced. Whether government can do this successfully depends on how it manages its public relations and how the policy makers present themselves in engaging the public.

Relating to this is the issue of conflict resolution in the siting of NIMBYs. This paper found that mitigation policies can affect the level of support for a casino in Singapore. About 47.3% of the respondents answered that the safeguards proposed will be effective. According to the models, on average, the level of support can increase by as much as 25% if a person perceives the safeguards to be effective. This suggests that the government could do more to promote the effectiveness of the safeguards by emphasizing them and proposing more measures to increase the level of safeguards that might mitigate the risks associated with the casino gambling. These steps are likely to increase the support for the project.

This paper further examined the usefulness of monetary compensation it is clear that monetary compensation is not likely to garner higher level of support because the main factors in opposing the casino, besides moral reasons, are the fear of social repercussions. Compensating individuals is perceived as a bribe and does not address the issues that the public are concerned with. Compensating with goods or services that mitigate the problems related to the project is possible but not welcomed by the public. The form of compensation that is likely to be well received and effective in increasing support is the provision of public goods. Governments can consider proposing certain public goods to be provided using tax proceeds or advise the operators of the casino to provide certain services for the community as a form of goodwill gesture to increase support for the project.



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**ANNEX**  
**SURVEY QUESTIONNAIRE**

- 1) Are you a Singaporean or Permanent Resident of Singapore<sup>26</sup>? Yes / No
- 2) Do you care about the legalization of casino gambling<sup>27</sup> and the development of a casino<sup>28</sup> in Singapore? Yes / No
- 3) Gender: Male / Female
- 4) Age: 21 – 30 / 31 – 40 / 41 – 50 / 50 – 60 / 61 – 65/ above 65
- 5) Highest education level attained:  
Primary or below / Secondary / Diploma / Degree or higher
- 6) Religion: No religion / Buddhism / Christianity / Islam / Taoism / Hinduism / Others
- 7) Income earned: Below \$2000 / \$2001 – \$6000 / \$6001 – \$9000 / Above \$9001
- 8) Dwelling type: HDB (3 rooms or below) / HDB (4/5 rooms, EC) / Private Condominium / Private Property.
- 9a) Marital status: Married / Divorced / Widowed / Single
- 9b) Do you have children or plan to have children? Yes / No
- 10a) Do you buy lottery (ToTo, 4D, Singapore Sweep) and/or bet in horse races or football matches? Yes / No
- 10b) On average, what is the frequency you participate in such activities:  
Frequency: \_\_\_\_\_
- 11) Do you support the development of a casino in Singapore? Yes / No

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<sup>26</sup> This survey is only administered to those who are Singaporeans or Permanent Residents of Singapore and above 21 years of age.

<sup>27</sup> Another set of survey is administered with the phrase “**casino gambling**” replaced by “**casino gaming**”.

<sup>28</sup> Another set of survey is administered with the word “**casino**” replaced by “**integrated resort-casino**”.

12) What do you think of the risk that the people of Singapore develop an addiction to casino gambling if there is a casino in Singapore?

Very low / Low / Moderate / High / Very high

13) Do you think that there has been enough public participation over the decision to build a casino? Yes / No

14) Do you expect the development of a casino to increase tourism, to create employment, and promote growth? Yes / No

15) Do you think that a casino in Singapore will lead to more social problems (e.g. higher bankruptcy rate, lower productivity, more broken families)?

Very unlikely / Fairly unlikely / Fairly likely / Very likely

16) Do you think that the safeguards proposed by the government (e.g. restriction of age, strict membership rules, imposition of high entry charges) are likely to work? Yes / No

17a) Do you think that the site for the casino matters? Yes / No

17b) If "Yes" in Qn 17a, which site do you prefer? Sentosa Island / Marina Bay

18a) Will you support the development of a casino, if the government proposes to increase tax rebate as a result of increased revenue due to the casino? Yes / No

18b) If "Yes" in Qn 18a, what proportion of your current income tax do you wish the rebate to be?

Tax rebate: \_\_\_\_\_

18c) If "No" in Qn 18a, what is your reason?

Reason: \_\_\_\_\_

19) Will you support the development of a casino, if the government increases the number of social workers to deal with the social problems mentioned earlier? Yes / No

20) Will you support the development of a casino, if the government increases its public spending on public projects (e.g. education, development of the arts, giving to charitable organizations), using the tax proceeds from the casino? Yes / No

# IS A SCIENCE-BASED INDUSTRIAL PARK A NIMBY OR A YIMBY: THE CASE OF TAICHUNG SIP

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## Abstract

For Kotler (2001) who documented successful cases of place marketing and local development around Asian, development of a science-based industrial park (SIP) would be a jewel. Who and which locality dare to say NO to such tempting ventures that promise thousands of jobs and a chance to be connected with global high-tech enterprises? A SIP is the kind of development that most locality would describe as a YIMBY (yes in my back yard) venture that places a locality on the world map. Anyone who attempts to label it a NIMBY (not in my back yard) would run against the mainstream. End of the story? Not yet. This paper takes Taichung SIP as an example, examining her conception to actual development, and finally offers an insight to her future in the areas of environmental impact assessment and spill-over effects. The Taichung SIP story offers an insight to the heated debate on the evolving definitions of LULUs in the Taiwan context.

**Keywords** : Taichung SIP; LULU, NIMBY; YIMBY

## 1. INTRODUCTION

For Kotler (2001) who documented successful cases of place marketing and local development around Asia [1], development of a science-based industrial park (SIP) would be a jewel. Who and which locality dare to say NO to such tempting ventures that promise thousands of jobs and a chance to be connected with global high-tech enterprises? However, would there be no NIMBY when there is a YIMBY? This paper takes Taichung SIP as an example, examining her future in the areas of environmental impact assessment and spill-over effects. The Taichung SIP story offers an insight to the heated debate on the evolving definitions of LULUs in the Taiwan context.

This research is implemented by means of literal analysis and inductive inference, using domestic and oversea journals, doctoral dissertation, thesis, international and in-time news network, relevant profession books, etc. Adopting historic approach, the research identifies the cause and effect with sequence of time scales; furthermore, predicts the probable variations based on the research result from cause and effect.

## 2. SCIENCE-BASED INDUSTRIAL PARK AND TAIWAN'S ECONOMY DEVELOPMENT

### 2.1 The origination of science-based industrial park

At the early stage, Taiwan established its foundation on economy development with labor-intensive light industry. Nevertheless, the industrial zones experienced bottlenecks with

their development. Dr. Hsu, Hsien-Shou, the chief commissioner of National Science Council at that time, proposed to establish SIP to help the country become modernized in industrialization development. Hence, SIP formally stepped forward into the skeleton of Taiwan's economy development [2].

Accordingly, the primary consideration of SIP locality in the early development was accessibility. In 1980, the first SIP opened the door in between the city and county of Hsin-Chu. In 1986, the Hsin-Chu Science City was brought up for further discussions [3]. The image of science city, which integrates science, inhabitation, education, culture and entertaining, has become the most brilliant topical subject in late 1980s, and also the significant slogan in Taiwan's economy development. The conception of science city was originated from Silicon Valley's experience which links up universities, research institutes and appropriate localities that are good for converging and integrating R&D, technologies, industries and talents. With further extension and congregating effect, it can generate clustering of high-tech industry and transformation of traditional industries to an advanced level.

## **2.2 The influence of SIP in late 1980s**

The establishment of Hsin-Chu SIP in 1980s had explicitly brought Taiwan to a further step of high-tech and industrial development, and has become an icon of interaction development between science-tech and metropolis. Consequently, economic development policies under the name of SIP became the locus of regional economy and culture development. With programmatic measures, the government set up core SIP on applicable sites assisted with constructing satellite industrial zones to propel the development of relevant industries in neighboring areas with a view to advance production techniques and high-tech industry congregation.

On the other hand, as SIP has brought abundant economy fruits, it has delivered social problems at the same time. There is no doubt that SIP boosts up local economic development; in contrast, as many researches indicate, it brings various toxic substances from altering materials and changing processes during production procedures. Comparing with the rapid changes that happen in production procedures, it takes long-term research observation to assess the risk of using some certain chemical materials. This metaphorically suggests that the evaluations to both environmental effects and to potential health risk are always far behind the scheming and the instituting of relevant policies and measures, and is a serious threat that any society should pay attention to.

## **2.3 The instant emergence of Taichung SIP**

In 1998, the Executive Yuan proposed the target principles of "facilitating regional balance" and "sectional social economy development". In the light of having Hsin-Chu SIP in the north and Tainan SIP in the south, the government intended to set up the third SIP in central Taiwan. In addition, Chen Shui-Bian drew a rosy picture of setting up the Central Taiwan SIP when releasing his political points for presidential run in the year of 2000.

To promote establishing Central Taiwan Science Park, Science Park Administration launched initial programming of doing pertinent research and evaluating latent capacities of environmental resources. It's illustrated in the research result report that while hi-tech industries are centralized at two ends of the island, traditional industries are still the main force for central Taiwan. Facing the competition from Mainland China and Southeast Asia, it is essential that traditional industries in central Taiwan be upgraded to counter the migration forces. Thus, the development target should be focused on accelerating industry upgrading to keep the base in Taiwan for balancing development [3].

The selection of the core locality was made in September, 2001. Based on Taichung City and the neighboring Taichung County (Daya Township and Taichung City) and Huwei Township, Yunlin County, Central Taiwan Science Park is specialized with semi-conductor, photoelectric, precision machinery and agricultural biotech. It is anticipated that Taichung SIP be developed as a new modal SIP of the country in the new era that is different from Hsin-Chu SIP and Tainan SIP with the development patterns and procedures.

In National Science Council's report released on September 24, 2002, it recommended Taichung base as: an excellent locality with completed transportation network, perfect living functions and service facilities with premium groundwork of developing precise machinery. Central Taiwan Science Park (hereafter as CTSP) is composed of Taichung Site and Yunlin Site with expected developing area of 413 hectares and 96 hectares. The Taichung Site is located at the border of Daya Township, Taichung County and Shi-ton District, Taichung City. With the highway system, there are Chung-Shan Highway, the Second Central Highway, Chungchang Speedway and Chung-Kang Road. As for railway transportation system, it's just 9 kilometers from Taichung Railway station and 9.2 kilometers from Wurih High Speed Railway Station. The site provides complete and convenient transportation network (shown as fig. 2.1) [6].

Huwei Site in Yunlin County is neighboring the Industrial District in High Speed Railway (HSR) Yunlin Stations. Traffic to north and south will be served by HSR, First Freeway, Second Freeway and Tai. No. 1 Highway. It has a circular network for the area. As the National Science Council set up the pre-opening office in October, 2002, CTSP started its development, and the government stepped into the practical establishing stage.



Figure 2.1. Location of Taichung SIP  
(Copy From Web site of Central Taiwan Science Park, <http://www.ctsp.gov.tw> )

Commencing from July, 2003, CTSP Taichung entered the first phase of constructing public facilities and private plants. In this stage, National Science Council invested at least NT\$20 billions on building roads and piping. Since the first firm started its massive production in 2005, Taichung Site has reached its productivity value up to NT\$100 billion, and is estimated to exceed NT\$240 billion in 2007[5]. The administration efficiency as well as the land development that has been done is far beyond imagination in the whole procedure.

### 3. TAICHUNG SIP UNDER THE HALO OF YIMBY

Taichung SIP is third and the youngest science-based park; nevertheless, the most sparkling one of recruiting industry firms to the park. Since July, 2003 up to the end of 2006, eighty-five overseas and domestic industry firms have their plants built with total investment capital of NT\$1.7244 trillion, which created brilliant turnovers of NT\$178.5 billion (see fig. 3.1), providing 17,352 job opportunities. This outstanding performance has brought up a flourishing economy development for the Great Taichung Area with an expected annual turnover to exceed NT\$240 billion [8].

It took Taichung SIP the shortest time in Taiwan to experience every phase of its development from having the concept brought up, passing the environment evaluation, ground preparation, and the entering of industry firms. According to preparatory office, ninety percent of companies have entered the park up to the year of 2003. It is said that some companies even give pressure to the central government to open the Phase 2 expansion when not being able to get into the park. Under the economy depression when major firms strive to invest in Mainland China, these splendid phenomena have never been seen in Hsin-Chu SIP and Tainan SIP and have undoubtedly inspired people [8], [9].

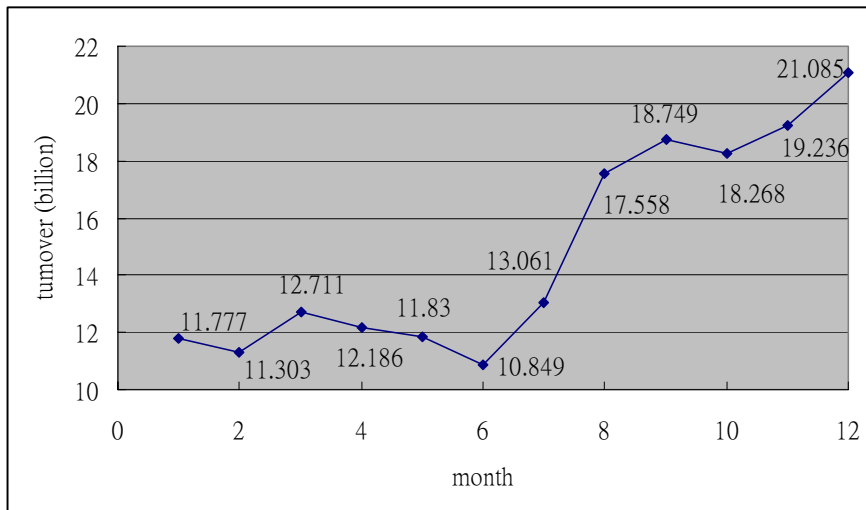


Figure 3.1 Turnovers of Taichung SIP in 2006

(Data source : Central Taiwan Science Park, <http://www.ctsp.gov.tw>)

The above figures are frequently brought up to publicize its administration efficiency. However, does its over-average establishing speed reveal some questionable points? Have the evaluation and communication been ignored during the process of establishing a SIP? It's not easy to have an objective standard, and above all, it's beyond our scope to give any answer for it. Whereas, we'd like to address three features that are likely to be bypassed in rational discussion and are easy to be assumed as YIMBY. In fact, these three features happen to occur in Taichung SIP project.

#### 3.1 There were previous successful projects

Before CTSP was set up, Hsin-Chu SIP has contributed a lot to Taiwan's economy development that has impressed people in Taiwan. This impression has obviously been transferred to CTSP while people give high expectation to the prosperities it might bring to the Great Central Taiwan Area; thus, industries endeavor to be stationed in the park.



### 3.2 The project has been appointed as target achievement of the ruling government

Under the competition mechanics of democratic politics, the ruling government is usually eager to propose some welcoming development project to meet public opinions so to upgrade its achievement satisfaction. In this case, even there are drawbacks in some projects, the ruling government will try very best to embellish their advantages and keep away from commenting on the disadvantages. While CTSP project was emerged when it's getting close to the presidential election as a target achievement, it is easy for people to neglect the negative effects that might be produced.

### 3.3 The social economy condition was lower than the general average at the project proposed

CTSP was proposed in year 2000 when the prosperity index still stayed at high point and successively declined afterwards. In fact, if we look back the economy index from year 2004, we will find that the establishing period of CTSP was just at the lowest point of Taiwan's economy boom (see figure 3-2). It is predicted that people are eager to see a prosperous economy development and the emotion is easily reflected on the development project that was proposed at that time, then neglected the possible detriments that it might cause.

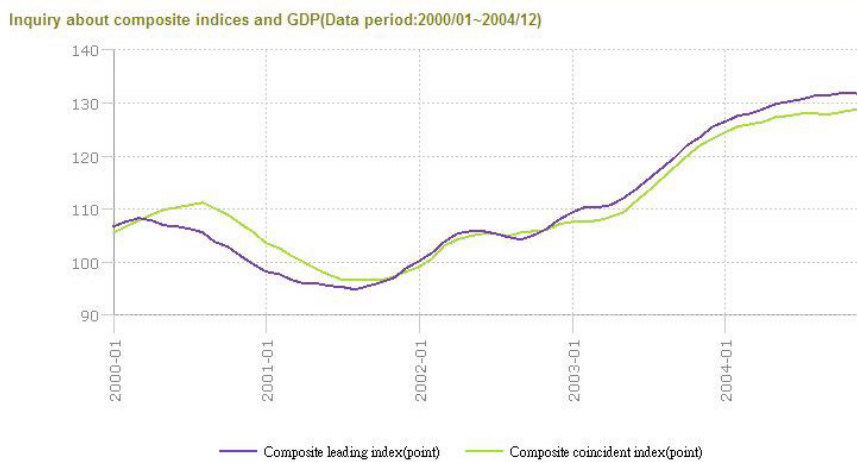


Figure 3.2 Taiwan's business indicators (2000-2004)

(Data source : Council for economic planning and development, <http://www.cepd.gov.tw/>)

CTSP is destined to be a YIMBY and never be a NIMBY with the expectation it shoulders from the public, and with the administration satisfactory it undertakes of being a superior SIP of the time. When CTSP was defined as YIMBY, many essential demands and negotiation have been subconsciously ignored. While these conflicts disappear by no means, they will emerge from time to time in the follow-up development.

## 4. ANALYSIS ON TAICHUNG SITE'S NIMBY

Being a YIMBY, CTSP has been questioned these years with some certain issues that could be regarded as a Potential NIMBY. Below are some issues that deserve further attentions:

#### **4.1 Sewage emission issue**

As a production base that was built over night, the CTSIP of Taichung has seen the production line in operation within two years while major infrastructure was still in the pipelines. Key among them is the waste water treatment facilities. The total cost of sewage emission piping is NT\$4 billion with total length of 21km. The original designed route starts from Taichung City through Shueh-Tien Road and Chung-Shan Road of Wurih Township to Da-Du County, then discharges the sewage into Da-Du Creek. CTSIP embeds the piping ten meters under the ground surface; however, it was strongly opposed by local people because they believe that the construction will destroy the groundwork of houses on both sides of the route. In addition, if by any chance the piping gets broken, it will pollute the underground water resources. Consequently, the public ask that the sewage piping change its route to nearby Fa-Tsi River. On the other hand, CTSIP appraises that it is feasible routing through Fa-Tsi River as it might involve using private lands (more difficult to acquire). In the past two years, while communication continued, there has been no crisscross between two sides [10]. On August 7, 2006, a self-help committee of about 500 people was summoned by Da-Du township head and townhall councilors to fight against CTSIP for fitting up sewage piping. Their reasons are: 1. CTSP didn't negotiate with local people to get a consensus before they started construction, 2. the traffic on the main route (Tai. 1 Route, Sha-Tien Section) was affected during the construction, 3. it was concerned that underground water will be polluted if sewage leakage occurs, 4. while the sewage is discharged to Da-Du River, crops along the river-bed will be polluted, so as the ecological environment, 5. as it has caused the damage, it has seriously affected farmers' livelihood.

On September 9, 2006, a public meeting was convened by the committee and CTSIP at Tsue-Fan Elementary School. The meeting was wrapped up by three resolutions: 1. CTSP to change piping route to run along Fa-Tsi River to discharge sewage into Da-Du Creek and has to avoid going through Wurih Route and Da-Du Route in order not to cause traffic disorder, 2. CTSP to immediately stop constructing sewage piping and wait for other alternative measures to have environment protection assessment come out with relevant explanation seminar to local public, 3. CTSP to issue a formal document within seven days to notify the alternative measures for the sewage piping construction [10].

#### **4.2 Arsenic pollution event**

As it is possible that some arsenide might be released by some firms during production procedures, the misgivings of arsenic pollution has always existed. It is revealed by Taiwan Academy of Ecology in its report that the arsenic density in the air of Taichung Site is in conscience on the high side [11].

For the time being, most countries do not proceed restraint measures on arsenic emission. Few countries like Singapore has stipulated that since January 1, 2001, the emission value be limited as 1 mg/Nm<sup>3</sup> (1 atm 0oC, standard rectification with no oxygen obtained) for any industrial production procedures.

#### **4.3 Conflict on living space application**

Six years ago, when looking down from Da-Du Mountain in Taichung Metropolitan Park, one could see green grasslands all around. To our regret, water towers, industrial plants and dormitories have occupied all over the hill ever since this grand construction of Taiwan was built up.

Under so many changes in time, space and environment, there is no standard answer whether it will bring positive or negative effects to the region. It is especially true when competitors are increasing, and it's not exactly as prosperous as it expected when it was

established. Unfortunately, Greenery can never be taken back once it has decided to be a SIP. The Da-Du terrain will never again be green grasslands to Taichung public.

## **5. POSSIBLE MEASURES FOR RESOLVING CONFLICTS**

We might miss the initial critical stage to systematically manipulate environmental problems brought by hi-tech industries if we don't face it in time. During the environment evaluation process, we could see some statements from Ministry of Economy and some media insinuating that environment evaluation is a stumbling block to economy development. They only emphasized that our economical competition might be influenced by environment evaluation or by the short of supports from the government, but they never asked about whether sewage emission would affect crop growth, whether endless development strategies would cause edge-out effect by water resource; moreover, whether chemical cocktail which is manufactured during production procedures would bring risk to the health of workers and residents in that area. It seems that environment supervising system hasn't been set up, so as the selection of SIP site and sci-tech policies to be included into the consideration of environment protection and social equity concern [12].

It is unfair that the environment is so risky to the public health while the government only benefits greatly to high-tech industry on tax policy with resource subsidies. The macro development of SIP concerns only the economy effect with the industrial groups, but neglect the eternal management of applying our resources on our country land. Environmental pollution, which is under the protection of economy development, can usually avoid its responsibilities. Nonetheless, Taiwan is not the only one that has the problem. Silicon Valley, where Hsin-Chu SIP took as a model, found serious pollution problems in 1980s. Having the highest density of industrial plants, Silicon Valley has never ceased its litigation disputes on high-tech pollution and labor health problems [12]. In year 2004, a universally known one was the case that IBM employees suited IBM Company. As the result that residents fight strongly against environment issue, labor issue, as well as gender issue, it has been brought to the attention to enterprises to take their responsibilities to the environment as well as to the society.

Following the globalization of hi-tech industry, the problems that Taiwan is facing have already occurred throughout the world. Barcelona Mobil Network revealed that electronic disposal problems in China, India and Africa. Private associations and media throughout Europe, Asia and America all report the situation labors have in electronics plants. Their focuses might be different; they all stand out the focal points like: labors in hi-tech manufacturing, cross-region environment problems, diversified complicities, and global criterion.

On the other hand, it doesn't mean that there is no ways to resolve the conflicts between environment protection and economic development. Recently, WEEE, RoHS, EuP, and REACH (Registration, Evaluation and Authorization of Chemicals) have delivered clear messages to the electronics industry. Green revolution movement reminds the business sector to take social responsibility from producing to disposing, and also reminds governments to modify attentive strategies. Using inappropriate subsidy policies or sacrificing precious environment quality might protract industry transforming, or even cause un-intended damages to the country's competitiveness both in manufacturing and environmental awareness.

## **6. CONCLUSION AND SUGGESTIONS**

This article gives Taichung SIP development a historical inspection, and points out three features of a development project that has possibly been over-expected to be a YIMBY. However, it doesn't mean that project that obtains these three features should be considered as an unhealthy

one. On the contrary, it may be a development project with superior qualifications that might bring to the country grand contributions. Only because of its halo of being a YIMBY, decision makers should be extraordinarily careful about whether its halo would conceal its injuries upon other parts, and whether its halo would make us miss the initial critical stage to systematically manipulate environmental problems brought by high-tech industries. If we don't realize these problems and be watchful as early as possible, conflicts will be more violent after the halo disappears from its site.

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# **A SURVEY OF OPINIONS FROM RESIDENTS IN TSEUNG KWAN O ON THE NUISANCES OF THE SOUTHEAST NEW TERRITORIES (SENT) LANDFILL**

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## **Abstract**

In Hong Kong, there are three sanitary landfills that cater for municipal solid waste (MSW) and construction waste dumping: the Southeast New Territories (SENT) landfill, the Northeast New Territories (NENT) landfill and the West New Territories (WENT) landfill. In Tseung Kwan O (TKO), three landfill sites (TKO Landfill-I and TKO Stage II and III landfills) were in operation from the 1970s to the mid-1990s, and SENT began service in 1994 with a designed capacity of 100 hectares and 43 million cubic metres. It handled 6,211 tonnes of solid waste per day (51% of which was construction waste) in 2006. In 1988, TKO became a new town, and massive land reclamation was completed in the 1990s to accommodate a population that is predicted to grow to 400,000 by 2010 and eventually to 450,000. TKO is still expanding, with buildings under construction or in the planning stages. SENT needs to expand in the near future due to the increasing demand for waste disposal in Hong Kong. TKO's town centre is only 2.8 kilometres away from SENT. Nuisance complaints started to emerge in 2004/05, and the situation has not improved, even though the authority concerned has attempted to enhance the management and control of the waste treatment process. The survey reported herein therefore aimed to collect the opinions of TKO residents about the nuisances of the SENT landfill. Street interviews were carried out in July 2007, with 416 questionnaires collected. Nuisance from odour (60%), waste trucks (16.5%) or both (22.7%) are the major concerns. A significant portion (64.6%) of the interviewees had even considered moving away from TKO, and 76% were worried about their property values. Only 30% of TKO citizens knew about the SENT extension, and 90% of them were opposed to it. Of these, 61.5% hoped that the government would enhance waste recycling or look for other landfill sites for expansion (22.2%). Only 16% of those in opposition agreed to the use of incineration for solid waste treatment. In summary, SENT creates a nuisance for TKO residents, who strongly oppose its extension and most of them, agree to the enhancement of waste recycling schemes for better waste reduction.

## **1. INTRODUCTION**

Hong Kong is a high-waste society characterised by the over-consumption of resources and a high level of waste production. In 2000, the daily average per capita production of domestic waste reached 1.13 kg, but it had declined to 0.97 kg by 2006. The municipal solid waste (MSW) disposal rate was at its highest level of 1.40 kg per capita in 2002 and 2003, but had declined slightly to 1.35 kg by 2006 [1]. Existing waste management mainly relies on three sanitary landfill sites and eight refuse transfer stations (RTSs) [2]. The one incinerator in operation is

mainly for chemical waste, and several other incinerators were closed down in the early 1990s [2].

The three operating strategic landfills are the Southeast New Territories (SENT) landfill, the Northeast New Territories (NENT) landfill, and the West New Territories (WENT) landfill. In Tseung Kwan O (TKO), three landfill sites (TKO Landfill-I and the Stage II and III landfills) were in operation from the 1970s to the mid-1990s, and SENT began service in 1994 with a designed capacity of 100 hectares and 43 million cubic meters. In 2006, it handled 6,211 tonnes of solid waste per day (tpd), including 51% construction waste [2]. The NENT is the smallest landfill, with a capacity of 2,252 tpd, and WENT is the largest, with a capacity of 6,577 tpd (2006 figures) [1]. Because of its proximity to urban areas, SENT was actually the largest landfill in 2005, accommodating 8,202 tpd of solid waste. The 23.3% reduction in 2006 was achieved mainly by reducing the amount of construction waste delivered to it [1, 3]. The high utility rate for domestic and commercial waste to be disposed of at SENT remains unchanged [4].

Incinerators and landfills are classic “locally unwanted land uses” that create a nuisance or potential danger from health threatening substances to the general public in the vicinity. The operation of a chemical waste treatment facility with an incinerator has stirred much debate in the Tsing Yi district council on possible health concerns from chimney emissions, even though there is no evidence that these emissions contain unsafe chemicals.

Other landfill nuisances in Hong Kong include fly infestation, odour and waste collection vehicles (waste trucks). When landfill operations are not up to standards, an odour nuisance occurs during the wet season, and fly infestation has been recorded. A common year-round nuisance stems from the moving of trash collection vehicles, which can be noisy and smoky. Recently, the disposal of sewage sludge to landfills has also created an odour problem.

The types of solid waste dumped in landfills in 2005 included municipal waste (~53%), construction waste (~37%) and special waste (~10%) [3]. In 2006, construction waste dropped to 27% of the total waste disposed of at landfills, and municipal waste increased to 62% [1, 2, 3]. Construction waste had been on the rise until the implementation last year of a construction waste charging scheme and sorting facility. The amount of such waste was drastically reduced, by 38%, in 2006 over 2005 [3]. The total quantity declined from 52,211 tpd in 2005 to 29,884 tpd in 2006. Of this, 6,556 tpd was sent to landfills in 2005, and 4,125 tpd in 2006; the majority of construction waste was sent to public fill reception facilities [1]. Consequently, the total quantity of waste in 2006 was 15,039 tpd, compared with 17,679 tpd in 2005 [1].

Despite this reduction in construction waste, the amount of municipal waste going to landfills remains unchanged. It reached 3.4 million tonnes per year in 2006 and is still on an increasing trend due to robust growth in commercial, industrial and tourism-related activities [2, 4]. As Hong Kong faces the possibility of running out of space in its existing strategic landfills early, the extension of landfills and the building of incinerators were proposed by the HKSAR government in a recent policy address announced in October 2007 [4, 5].

MSW consists of [i] domestic waste and [ii] commercial and industrial waste. Solid waste from domestic sources in Hong Kong consists mainly of putrescibles, such as perishable food and kitchen waste (43.5%), paper (26.2%), plastic (18.5%), glass (3.4%) and textiles (3.3%), whereas waste from commercial and industrial sources is mainly putrescibles (29.2%), paper (25.3%), plastic (18.2%), wood/rattan (10.6%), textiles (4.8%), bulky waste (3.4%), etc. [1]. The recovery rate for commercial and industrial waste is around 65%, whereas it is only 20% for domestic waste (2006 figures) [1, 2, 3]. To enhance household waste reduction and improve waste recovery for recycling [5], the HKSAR government is currently considering a producer’s responsibility scheme, a household waste charging scheme and green taxes (e.g., a plastic bag levy).

The possibility of toxic materials or nuisances from landfill sites having an impact on residents in the vicinity is always of concern. The three existing strategic and sanitary landfills have proper management measures to control the leachate or gas emissions that may cause harm to the general public, but the nuisances that arrive are problematic, thus creating an unwanted land use. WENT in the Tuen Mun district is relatively far from the residential area of Tuen Mun town centre and is blocked by Castle Peak. NENT is also far from the new town of Fanling, but the villages in the vicinity of both landfills do occasionally complain about nuisance from odour and waste trucks. There were also cases of fly infestation in Tuen Mun several years ago due to the poor on-site management of waste disposal and a delay in top-soil covering in WENT. Unlike WENT and NENT, SENT is visible from TKO town centre and also close to the TKO new town. The TKO town centre (TKO South) is only 2.8 kilometres from SENT, and a housing development under construction in TKO East near Siu Chik Sha (e.g., LOHAS Park, Dream City) is just 1.2 kilometres away from SENT, which is located in Tai Chik Sha.

TKO became a new town in 1988, and massive land reclamation was scheduled to accommodate a population estimated to reach 400,000 by 2010 [6]. Today, TKO has a population of 340,000, and its total development area is about 1,738 hectares. According to a recent development plan, the population is expected to reach 450,000 [6]. Due to the increasing quantities of MSW production in Hong Kong, SENT needs to expand in the near future. In fact, figures from the Environmental Protection Department (EPD) indicate that the number of refuse collection vehicles using the SENT landfill decreased from 1,700 vehicle loads per day in 2004 to 1,400 in 2007. The amount of domestic waste sent to SENT has also been reduced, but commercial and industrial waste, including sewage sludge, from Kowloon and parts of Hong Kong Island is sent primarily to SENT daily [4].

The aim of the survey reported herein was to collect the opinions of TKO residents on the nuisances that have arisen from the SENT landfill site and their comments on its proposed extension.

## **2. SURVEY METHOD**

A standard questionnaire was prepared to collect these opinions, and the interviewees were also asked face to face about their understanding of and comments on the planned extension. Five volunteer interviewers, who were residents of TKO, performed face-to-face interviews with pedestrians on the street. Within the period 3 to 17 July 2007, 416 questionnaires were collected successfully during the afternoon from 4:30 pm to 7:30 pm. Of the respondents, 38.7% were male and 61.3% were female; 94.3% were TKO residents, with the remainder only working in TKO.

## **3. RESULTS**

Of the respondents, 30.8% had an educational level of college or above, 57.8% had a secondary school level, and 10.6% had a primary school level. Only 3.9% of them were older than 60; 36.8% were between the ages of 40 and 60; 43% were between 20 and 39; and 16.3% were under the age of 20.

A majority (91.8%) of the respondents knew of the SENT landfill in TKO, and 67.7% of them had learned of its existence before they moved there. However, when asked if they were aware of nuisances from SENT, 51.8% said no, and 48.2% said yes. Of those who said that these nuisances had a significant effect on their daily life, 60.8% said that odour was the major problem, 22.7% said the nuisance was mainly from waste trucks going to the landfill, and 16.5% said both nuisances were disturbing. About one third of the respondents who reported nuisances

said they had thought about moving away from TKO, and 76% of them were worried their property prices would be affected.

The respondents were also asked whether they knew about the extension of the SENT landfill to the Clear Water Bay Country Park, but only 29.8% of them did. However, 90.7% of the respondents disagreed with the extension proposal. Of those who agreed with the extension plan, 43.6% said it did not matter, and 56.4% said that trash has to be put somewhere. Of those respondents who did not approve of the SENT extension, 61.5% believed that the government should put more effort into waste recycling, 22.2% believed that the trash could go elsewhere, and 16.3% agreed with the use of incineration to manage the waste.

## **4. DISCUSSION**

### **4.1 Establishment of the TKO new town and landfills**

TKO became Hong Kong's seventh new town in 1982 after official approval by the executive council. TKO Bay was reclaimed, and the first public housing estates, Tsui Lam Estate and Po Lam Estate, were built in 1988. More public and private housing developments have been established since then. TKO's population is 340,000, as of 2007, and the figure is expected to reach 450,000 with a total development area of 1,738 hectares in the next decade [6].

The majority of the new town development between 1988 and 1998 was carried out in the northern part of TKO. The development of TKO South began in 1998 with more land reclamation in the Tiu Keng Leng area and the erection of a residential area in the TKO town centre, and most residents had moved in by 2005. The 190-hectare TKO Industrial Estate is located in the south-eastern part of the new town [6]. To accommodate this population growth, TKO has undergone a feasibility study to expand the roads or passages linking it to Kowloon. These are to be built together with more town development after completion of a mass transit railway (MTR) line. Three train stations are already in operation in TKO.

The Stage I and Stage II/III TKO landfills were opened in the early 1980s and closed in 1994 and 1995, respectively. The SENT landfill was opened in 1994 to cater for municipal waste from Kowloon and Hong Kong Island, with a capacity of 5,340 tpd and an anticipated operating life of 18 years (until 2012) [2, 7]. These landfills are located in the Siu Chik Sha (Stages I/II/III) and Tai Chik Sha (SENT) areas, south-east of TKO. From 2005, when more residents moved to TKO South, numerous nuisance complaints emerged, especially during the wet season and in the summer when winds blow in from the south or south-east. TKO town is in a valley, with three sides surrounded by mountains: High Junk Peak, Sheung Yeung Shan and Razor Hill to the east and Black Hill to the west. To the south is Junk Bay. This geographic setting may make the odour nuisance more severe.

The TKO Industrial Estate is very close (0.5 kilometres) to the SENT landfill. Its odour problem could be serious, but most of the people there work inside buildings with central air-conditioning and were less available for this survey. Most of the complaints have been from residents of TKO, especially TKO South, and hence the survey was targeted at those who live in TKO.

### **4.2 Major findings of the survey**

Street interviews were carried out at TKO MTR station Exit B, the Tong Ming Court main entrance, on Yuk Nga Lane and at the King Lam Estate main entrance. Yuk Nga Lane and the King Lam Estate are in the northern part of the TKO new town, which is called the Po Lam area. TKO station and Tong Ming Court are in the TKO town centre in the south, just 2.8 kilometres away from the SENT landfill. The Po Lam area is 5 to 6 kilometres away. Hang Hau is around 4



kilometres away and to the east of TKO, but was not covered by the survey for lack of resources. The questionnaires obtained were more or less evenly distributed in the four collection points. This may explain why 52% of the respondents did not report any nuisance, as north TKO is farther away from the landfill site.

The respondents from TKO town centre seemed to be the most affected, which indicates that guidelines on the distance to be maintained between landfill sites and residential areas are needed. Judging from the distances of different areas of TKO, a 5-kilometre guideline is highly recommended. Of course, as this survey was not done to determine such a guideline, a separate study is needed.

### **4.3 Distance between operating landfills and residential areas**

A recent development in the Siu Chik Sha area (e.g., LOHAS Park, Dream City) is only 1.2 kilometres away from the SENT landfill, and around 70,000 residents are expected to move in between 2008 and 2010. One wonders why the HKSAR government would allow a residential area to be developed in proximity to an operating or closed landfill. The best solution would be to close the SENT landfill and set guidelines for the distance between a residential area and a landfill.

If SENT is closed, then the MSW currently being dumped there will have to be sent to WENT and NENT, thus causing more traffic nuisance to other areas of the New Territories. In addition, the capacity of these landfills is limited. In fact, SENT is already getting close to its capacity, due to the increasing amount of municipal waste being dumped there, and its lifespan has been shortened to 2012 or even 2010. Hence, it is possible that it will be closed in 2010, and the residents of TKO will thus need to suffer for four more years.

### **4.4 Is an extension of the landfill justified?**

Unfortunately, the HKSAR government has already compiled plans to expand SENT, WENT and NENT in its Environmental Impact Assessments. Waste could alternatively be treated through incineration, but finding a suitable place to build an incinerator will not be easy, as more people will oppose any unwanted land use. Will TKO be chosen again?

Only 30% of the respondents knew about the SENT landfill extension, although the authority concerned had in fact started consultations with the district council on the extension in 2005; 90% of respondents opposed such an extension. Of those opposed, 62% opined that the government should improve the waste recycling scheme, 22% said that the waste should be sent somewhere else, and only 16% agreed with the use of incineration.

To tackle the MSW problem, the government published a policy document in 1998, which projected the waste recovery target to be 58% in 2007, from a recovery rate of 30% in 1998 [7]. In 2004, the average MSW recovery rate for recycling was only 40%, and the government published another policy framework for 2005-2014. This set an MSW recovery rate target of 45% for 2009 and of 50% for 2014 [8]. In 2005, the recovery rate was 43%, and it increased to 45% in 2006 [1, 3], three years ahead of the target. The government's estimates in the second policy framework were too passive and conservative. If we could increase the recovery rate by ~2% per annum, according to the 2005 and 2006 figures, then perhaps a recovery rate of 50% could be achieved in 2009 and of 60% in 2014. Of course, a novel policy and more aggressive strategy are needed to enhance waste recovery for recycling and to promote waste reduction.

Of the two major types of MSW, the recovery rate of commercial and industrial waste is around 65-68%, and the recovery rate of domestic waste was only 12-14% in the 1990s, increasing to 20% in 2006 [7]. This lagging trend is of course related to the composition of household waste, which is made up of 43.5% putrescibles (perishable waste), such as kitchen and food waste [1]. Only 26% of household waste is paper, and 18.5% is plastic. For commercial and

industrial waste, paper (25.3%), plastic (18.2%) and many metals and textiles are recyclable. Only 8.6% is putrescibles [1].

However, the plastic shopping bag levy and the household waste charging scheme, if they were put in place, could significantly improve waste minimisation or avoidance and the recovery rate of domestic waste to be recycled. These policies, which are designed according to the “polluters pay principle” and the “producer responsibility scheme”, would be most useful in waste reduction and recycling. However, neither has yet been implemented. Last but not least, the waste collection scheme has to be improved to facilitate better household waste collection at the source for recycling [2, 5, 7]. A dry-wet separation scheme and a domestic waste composting scheme have been tested without success. The separation at the source scheme would be the more effective in enhancing the waste recycling and recovery rate. Perhaps a centralised food and kitchen waste collection scheme that includes domestic and commercial sources of food waste is needed to enhance waste reduction in Hong Kong.

#### **4.5 Is waste incineration an option?**

Waste incineration could be an option with a modern “extra heat treatment process after gasification” at more than 850°C or even 1000°C or above, to degrade all chemicals, including dioxins. Such a process controls the air emissions from incineration and is demonstrated to be more efficient in reducing air pollution, as compared with the out-dated designs used in the 1970s, and could thus meet a high environmental standard to suit the needs of Hong Kong. However, domestic waste with a high content of food and kitchen waste would be difficult to burn, and high-temperature incineration is costly, produces carbon dioxide and is thus not a sustainable method of waste treatment. An improved waste sorting scheme would also be required to minimise the input of toxic chemicals to the incinerators, making one wonder whether it wouldn't be better to just sort for recycling.

In addition, site selection is a difficult task in a densely populated city with numerous mountains such as Hong Kong. The experience of the Tsing Yi chemical treatment plant also raises the problem of the difficulty in gaining public acceptance for unwanted land use, reflected in the NIMBY (“not in my back yard”) attitude. All in all, the re-introduction of incineration to Hong Kong for waste management remains problematic.

#### **4.6 Is zero waste achievable?**

According to the experience of Taiwan, after the implementation of a scheme that charges fees for extra bags of household waste, the amount of domestic waste was reduced and less waste than anticipated was delivered to the recently built incinerator. In fact, a lot of waste buried in landfills was sent to the incinerator to keep it operational. Taiwan's Environmental Protection Administration (EPA) also promoted kitchen waste and bulk waste recycling from 2001 and 2003, respectively [9]. In addition, the Executive Yuan of Taiwan has adopted the principle of sustainable resources and zero waste. The EPA launched a “Zero Waste Program” to minimise waste and began to promote green manufacturing, green consumption, source minimisation, resource recycling, reuse and reprocessing [10]. These plans are committed to decreasing waste by 25% in 2007, 40% in 2011 and 75% in 2020 [10].

Since 2001, the volume of waste recycled by government agencies in Taiwan has gradually increased. It doubled in 2003 compared with 2001 and doubled in 2006 compared with 2003 (from 0.58 million tonnes in 2001 to 1.05 million tonnes in 2003 and 2.11 million tonnes in 2006) [11]. Per capita waste production in 2005 was 0.5 kg, down from 1.3 kg in 1999, and, hopefully, zero waste will be achieved within the next decade in Taiwan [11].

It is thus believed that a household charging scheme and other green taxes, such as those implemented in Taiwan, could greatly increase waste recycling and waste reduction efficiencies,

and, consequently, a waste incinerator and extensions to landfills would not be needed in Hong Kong in the near future. The construction waste charging scheme, together with the other facilities and sorting systems in place, has already helped to significantly reduce (by 38%) the construction waste delivered to landfill sites in 2006, compared with 2005.

#### 4.7 Further study

In the future, an opinion survey on the household waste charging scheme should be carried out to seek consensus on the implementation of such a scheme for waste reduction and better waste recovery for recycling. A survey similar to the one reported here, but focusing on the new development areas of TKO and TKO South, is needed. TKO North should serve as a control for comparison to set guidelines on the reasonable distance between operating landfills and residential areas.

#### 4.8 Conclusion

In conclusion, the SENT landfill causes nuisances from odour and waste trucks to the residents of TKO, who are also worried about the impact of such nuisances on their property prices and have considered moving out of the area. A majority (90%) of the respondents do not agree to the extension plan for the SENT landfill, and they urge the government to improve its waste recycling capabilities. Only 16% agreed with the use of incineration for MSW treatment. As there is no criterion or standard guideline on the distance that should be kept between residential areas and operating landfills, a reference distance of 5 kilometres is suggested.

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# **THE ROLE OF STRATEGIC ENVIRONMENTAL ASSESSMENT IN IDENTIFYING SUITABLE SITES FOR INDUSTRIAL FACILITIES: A CASE STUDY OF THE PROPOSED LIQUEFIED NATURAL GAS (LNG) RECEIVING TERMINAL AND ASSOCIATED FACILITIES IN SOUTH SOKO ISLAND**

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## **Abstract**

Difficulties are often experienced in identifying environmental suitable sites for siting of unwelcomed industrial facilities that may pose environmental and ecology impacts on the nearby sensitive receivers. Therefore, green group and public aversion to the construction and operation of these facilities in or near the environmental sensitive sites or their community often results in concreted opposition. Identifying the suitable locations for siting these facilities is extremely complex and difficult, in particular as these facilities would result in certain degree of environmental impacts.

This paper uses a case study of the proposed LNG receiving terminal in South Soko Island, to analyze how Strategic Environmental Assessment (SEA) plays a crucial role in identifying suitable location for siting the LNG receiving terminal and its associated facilities in Hong Kong and how it is useful in identifying feasible sites for carrying further detailed Environmental Impact Assessment (EIA) study for the LNG receiving terminal and its associated facilities.

In 2004, the Castle Peak Power Company Limited (CAPCO) approached government and indicated their intention to develop a LNG Terminal in Hong Kong. A SEA process which consisted of a comprehensive territory-wide site search study for the LNG receiving terminal was thus carried out before a statutory EIA was conducted under the EIA Ordinance (EIAO).

In identifying suitable locations for the LNG receiving terminal and its associated facilities, the SEA process provided the best available environmental information and other relevant information such as planning, engineering, marine environment at the early conceptual stage of the project. Among other things, the SEA process provided a board evaluation on the environmental acceptability of all possible locations and contributed effectively on the determination of two preferred locations namely the Black Point option and South Soko option for carrying out the statutory EIA process under the EIAO. With the help of the SEA process, all the environmentally undesirable sites were being eliminated in the early planning stage of the project thus avoiding abortive works spend on these sites. This has also resulted in avoiding and minimizing environmental problems that might not be able to be mitigated through environmental measures and helped to preserve environmentally sensitive areas.

This paper describes the SEA and site search process on identifying the suitable site for the LNG receiving terminal and its associated facilities in Hong Kong. The paper also illustrate in detail the benefits that have been gained through the application of SEA process in the site search exercise.

# **THE ROLE OF ENVIRONMENTAL IMPACT ASSESSMENT IN SITING ECOPARK IN TUEN MUN AREA 38 FOR RECYCLING FACILITIES**

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## **Abstract**

EcoPark is a key initiative of the Hong Kong government to promote the growth of local recycling industry and jump-start a circular economy by providing long-term land with basic infrastructure for the environmental and recycling industries as stipulated in the document “A Policy Framework for the Management of Municipal Solid Waste (2005-2014)”. While the project is environmentally friendly by encouraging and promoting the reuse, recovery and recycling of waste resources and returning them to the consumption loop, the EcoPark may give rise to various potential environmental impacts to the nearby sensitive receivers and land uses.

After some thorough considerations, a piece of reclaimed land of about 19.5 ha in Tuen Mun Area 38, a special industrial area, was selected as the preferred location for the development of an EcoPark in Hong Kong. The EcoPark will be developed in two phases with Phase I (about 8 ha) of the construction works commenced in July 2006 and scheduled for completion in early 2008.

The Hong Kong Environmental Impact Assessment Ordinance (EIAO) (Chapter 499), which comes into operation since 1 April 1998, provides a legal framework and plays an important role in shaping the development of the EcoPark from consideration of alternative sites, evaluation of alternative recovery methods, public participation to recommendation of mitigation measures. This paper will outline the key processes and environmental outcomes of the EIA system in overcoming the challenges of siting the EcoPark in Hong Kong for recycling facilities. The EIA has also applied an “umbrella” approach in assessing a comprehensive range of recovery processes without exact configuration and internal layout of each recycling lot. By relocating the existing sites used non-systematically for waste recycling activities to the controlled environment of the EcoPark, the local population to the immediate environment at the former sites of waste recycling will benefit from the environmental improvement.

# RELOCATION OF FLOATING DOCK IN HONG KONG

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## Abstract

Yiu Lian No.3 is one of the three floating docks in Hong Kong and has been operating at Yam O Wan, northeast of Lantau since 1989. Due to the Hong Kong Government's proposal in 1998 to change the land use of northeast Lantau from the basis of various port facilities to tourism and recreation, the Yiu Lian facility would then become incompatible with the overall planning context in that area. Although the related government departments had no objections in principle to the request for relocating the Yiu Lian facility from Yam O Wan to Tsing Yi, the project proponent still had to obtain an environmental permit (EP) for the decommissioning and operation of the facility as these works are classified as "designated projects" under the Environmental Impact Assessment (EIA) Ordinance.

While floating dockyards are important for supporting port activities in Hong Kong, they are an unwelcome industry from an environmental angle. This is because floating docks normally generate large volumes of wastewater each time they clean the hull of all types and sizes of vessels, and the wastewater is normally discharged into the sea with minimal screening. These dockyards are also the key source of toxic TBT, which originates from the TBT-based anti-fouling paints from the vessels. Through the EIA process, the project proponent had abandoned the initial airlift suction dredging proposal for retrieving the anchors but adopted the leave anchor approach to avoid disturbing marine sediment during decommissioning. The specially designed anchor, "sinker" which has the self-penetration property to make dredging for the anchor trench unnecessary was also used at Tsing Yi. Under the conditions of EP, the floating dock was not allowed to serve any TBT vessels in future and the wastewater had to be collected and treated to meet the Water Pollution Control Ordinance discharge standards during its operation at Tsing Yi.

# PLANNING AND MANAGEMENT OF GREEN AREAS IN MYSORE CITY

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## Abstract

Natural and cultivated greenery serves to preserve and improve the overall urban environment. In addition, it is a source of entertainment and relaxation to the people. Mysore city in India is relatively better placed in the overall Indian perspective and urban green spaces. Unfortunately municipal resources are found to be rather inadequate to fully meet the greenery needs of city. Increase in population and unbridled urbanization of Mysore city has depleted green spaces as the city continues to expand horizontally. One of the adverse effects of the rapid and relatively unplanned growth of the so-called 'Garden City' is the heavy encroachment on gardens, parks, playgrounds and other organized opens spaces and tanks. This has resulted in shrinking of green areas. Mysore city has a total of 316 big and small parks. There are several parks in the city in the range of 4 to 5 hectares of area. Not many out of the 316 parks in the city measure less than half a hectare. Chamundi Hill is a unique landmark of Mysore City and is considered as one of the rich heritage sites having religious, tourism and ecological importance. Mysore is poised to launch its new Master Plan aimed at beautifying the city under the aegis of Jawaharlal Nehru National Urban Renewal Mission of the Central Government, the Central Ministry of Tourism, the Asian Development Bank and World Bank. To protect and preserve the beauty of the city and retain its character, various agencies are actively engaged. All parks and green spaces within the city will possibly witness better maintenance.

**Keywords:** Greenery, ecological equilibrium, Comprehensive Development Plan, theme park, biodiversity, environment-friendly.

## 1. INTRODUCTION

Raising and preserving parks and green areas are a part of our ancient culture. They continue to be a part of life sustaining habitats, today. Surely, if a megalopolis or city or even an emerging town, is to be cleaner and greener, more convenient, less noisy, more like it was in the good old days, a better place to raise our children, it should contain more and more well maintained parks and green areas. Luckily, many brilliant and creative minds around the world are trying to find ways and means to make the cities of the future more livable, more sustainable and to ensure that they are the cradles of human excellence and creativity.

Indians, from ancient times, have revered trees as manifestations of the Almighty. Trees are in fact worshipped even today. Indians have been worshippers of nature since *Vedic* times. The tradition of nurturing and worshipping plants such as the *Tulasi* and *Aswatha*; trees such as coconut and areca nut have been in vogue in India for centuries. Even now, there are many people who try to grow plants wherever possible – in kitchen gardens, balconies, inside drawing room, on rooftops etc.

Greenery means not just fresh air, it also means beauty. The beauty of nature captured in a demarcated area is one of the main purposes of green spaces. They contribute to entertainment and relaxation of people but also they are serving to preserve and improve the overall urban



environment. **Socially** – Greenery is a pleasant and diverse landscape within the city can foster a sense of wellbeing, belonging and self-esteem; wholesome contact with nature generally enriches the quality of life. Greenery provokes and demands individual initiative and genius. **Economically** - Greenery is also important to access quality environment. This is crucial in the development of the city. It can also influence tourism and promote employment activities. Income and inputs for living can be generated from lopping of trees and compost manure production. **Educationally** - It provides an opportunity for gaining, understanding and appreciation of nature and the need to conserve it. Lastly, **Conservation** of wild life and natural open space can safeguard assets for the future generation.

Mysore city in India is relatively better placed in the overall Indian perspective and urban green spaces. Unfortunately municipal resources are found to be rather inadequate to fully meet the greenery needs of cities. This paper highlights the planning and management of green spaces like parks, zoological gardens, avenue trees, water bodies and quasi forests that play a vital role in the city. The main aim of this paper is to assess the present state of the green spaces in the city and to evaluate their potential for sustainable development and augmentation of eco-resources.

## 2. BACKGROUND OF THE STUDY AREA

Mysore, the capital of erstwhile Wodeyar Kingdom, is also known as a city of Palaces. Situated on the plateau of its own name at a height of 770 meters above mean sea level, this picturesque city is known for its pleasant weather and courteous people. Mysore is a planned city and the successive rulers, and the Government of Mysore State since 1947 and even before have tried to keep it so. The city owes much to *Maharaja* (King) Krishnaraja Wodeyar IV (1884-1940), one of the most celebrated rulers of the princely States of India and his two *Diwans* (Ministers), Mirza Ismail (1883-1959) and Sir M. Vishveshwaraya (1860-1962), for its well laid roads, parks and gardens, lakes and water fronts, fairs and festivals; and above all for the great educational and cultural institutions that abound in Mysore.

The palaces and temples in the city speak volumes about the heritage and architecture of medieval times and the kind of patronage the city received from its rulers. The Constitution of the City Improvement Trust Board (CITB) in Mysore in 1905 was one of the farsighted and excellent measures that Krishnaraja Wodeyar took for the general welfare of the State and Mysore City in particular. CITB not only is a heritage institution in our State but also a role model in other parts of India including the princely States (Devanath, C. J, 2005, P.4).

For example, Slums were cleared, new extensions were laid out to provide sites etc., for not only meeting the residential needs but also for bringing up the necessary public buildings, Government offices, accommodation for amenities like parks, open spaces for sports and recreations, commercial areas and to provide land for construction of religious and charitable institutions like temples, churches, mosques and *choultries* (community halls) and so on. Lung space also has been equally emphasized as playgrounds for children, sports grounds for youth and students. Parks used to be proportionate to the size of the extensions. Vast areas of land were used for constructing palaces, mansions, municipal and government buildings in a grand style with beautiful architectural features invariably in sync with one another (Ibid, 2005, p. 4).

Even while licensing the buildings, care was taken to see that the purposes and norms were strictly adhered to. Farsightedness could be seen in making roads and circles and road margins reserved so that in future the roads could be widened without resorting to acquisitions and avoid huge wasteful expenditure.

Equally was the interest and realization of the need of adequate vacant land around these buildings not only as a lung space but also to provide beautiful environmental surroundings like gardens, parks and wooded greenery which enhanced the overall beauty and charm of not only each construction but also the city as a whole (Ibid, 2005, p. 4).

## 2.1 Geographical Setting

Mysore City lies in a saucer shaped basin flanked by the Chamundi Hills on the southeast and a raised platform on the west. The convergence slopes towards the center, yet the city is so well drained that it can never be flooded. It is situated in the larger context of south central part of the Deccan Plateau with 12° 18' North latitude and 76° 12' East longitudes. The gradient within the city ranges from 1 to 100 m to 1 to 50 m. Its situation amidst beautiful sylvan surroundings with majestic Chamundi Hill (1085 m) as a backdrop is majestic indeed. The northern part of city drains into the river Cauvery and the southern part into the river Kabini, a tributary of the Cauvery. The general slope of the city is towards the South. Physical geography of the city has been very helpful in extending drainage and sewerage facilities all over city.

Despite being located not too far away from the Equator and in the interior of the Peninsula, Mysore has a salubrious climate. Neither too hot nor too cold, it is always pleasant although some climatic changes have become visible as forest areas have shrunk. The city's water bodies have been encroached upon by peasants and land sharks. The city lies in the rain shadow region of the Western Ghats and, therefore, receives no more than 850 mm rainfall per annum mainly during the months of April to November. Even in the rainy season, relative humidity does not exceed 60 percent. April and May are the hottest months. Being located on an undulating plateau, the city and its surroundings have large tracts of the land suitable for forests and pastures. Its forests are described as deciduous (they shed leaves in summer).

## 2.2 Population Growth

Mysore, the city has been growing steadily and is expected to have more than a million populations before the first decade of the twenty first century ends (See Table 1). City Development Plan for Mysore has estimated the population to be 0.89 million for 2006 and projected population in 2031 can be as low as 1.7 million (growing at the historic rate of 2.5%) or as high as 3.0 million (growing at the rate of 2.5) (Shenoy, V. Bhamy 2007, p.6).

Table 1. Mysore: Growth of Population-1901-2001

Year	Population	Variation	%
1901	68,111	- 5,937	- 8.00
1911	71,306	3,195	4.69
1921	83,951	12,645	17.73
1931	107,142	23,191	27.62
1941	150,540	43,398	40.51
1951	244,323	93,883	62.30
1961	253,865	9,542	3.90
1971	335,685	81,820	40.10
1981	479,081	143,396	40.00
1991	653,345	174,264	36.30
2001	785,800	132,455	20.30

Source: Census of India 2001, Series-30, Karnataka, Bangalore

Increase in population and unbridled urbanization of Mysore city has eaten away green spaces as the city continues to expand horizontally. The Mysore Urban Development Authority (MUDA) has proposed new residential layouts on the periphery of the city.

## 2.3 Land Use Pattern

Mysore is a booming city. As elsewhere, fast growth is accompanied by decrease in the quality of life of the people. The city is getting over crowded; there is a growing tendency to violate prescribed norms so far as change in the land use is concerned. The objectives of land use

planning may in brief be summarized as: improving physical environment, strengthening urban economy, conserving ecological equilibrium and fostering social values.

Table 2. Land Use in Mysore -1995

Sl. No.	Land Use	Area in Hectare	% of Developed Area
1	Residential	3075.30	40.40
2	Commercial	182.23	2.41
3	Industrial	1021.01	13.40
5	Public/ Govt. Offices	856.45	11.32
6	Parks and Open Spaces	415.77	5.49
7	Traffic and Transportation	1530.73	20.22
8	Water Bodies	182.68	2.41
9	Public Utility	37.26	0.49
10	Agricultural purposes	285.34	3.73
11	Total Area	7568.77	100.00

Source: Mysore Urban Development Authority, Mysore, 1998.

The Comprehensive Development Plan (CDP) for Mysore City has the Local Planning Area (LPA) of 233.13 sq. km and conurbation area of 92.21 sq. km. The present Mysore - Nanjangud Local Planning Area covers 495.32 sq. km of which the Mysore city conurbation covers 156.69 sq. km; the proposed Nanjangud town conurbation, 9.2 sq. km; and green belt, 329.43 sq. km (including the villages and the areas reserved for their future expansions). The ratio of conurbation area and green belt works out 1:2. A land use survey was conducted by the Town Planning Department in 1995 the table gives the results of this survey and Table 2 gives the land use pattern proposed in the Master Plan 2011. Public and semi-public uses cover an area of 865.45 hectares constituting 11.32 per cent of the total area.

Table 3. The Proposed Land Use analysis for 2011 AD

Sl. No.	Land Use	Area in Hectare	% Developed Area
1	Residential	6097.87	43.45
2	Commercial	344.07	2.45
3	Industrial	1855.05	13.22
5	Public and Semi-public Areas	1180.78	8.41
6	Parks and Open Spaces	1055.05	7.52
	+ Nehru Loka (Chamundi Hill)	1634.82	-
7	Traffic and Transportation	2380.56	16.96
8	Water Bodies	178.95	1.27
9	Public Utility	43.35	0.31
10	Agricultural purposes	898.99	6.41
11	Total Area	15,669.49	100.00

Source: Mysore Urban Development Authority, Mysore, 1998

New developments have taken place along the Mysore-Bangalore road, Mysore-Nanjangud Road, Mysore-Mangalore Road, Mysore-Manadavadi Road and Mysore-Krishnaraja Sagar Road. A number of large residential colonies have come up in these areas. While planning for new residential layouts, existing green spaces may get cleared up and give way to public and semi-public buildings or houses.

The extent of the urban sprawl and lack of order is evident from the growth rate over the last five years. According to the City Development Plan which has a Twenty Year Vision Document for Mysore, the expansion is significant and there is a 70 per cent in the total area of the city since 2001. The area of Mysore city according to the MUDA has increased from 7,569 hectares in 1995 to 9,221 hectares in 2001 representing a growth of 22 percent. This expansion is

expected to continue unabated and the total land areas of Mysore are expected to encompass to 15,669 hectares by 2011. An analysis of the land use pattern of Mysore shows a tilt towards residential areas, which cover a greater portion of the city, and this is expected to increase in the next few years. At present, residential areas account for 2,850 hectares and this will increase by a whopping 114 per cent which will cover about 6,098 hectares by 2011.

The city's development is highly slanted towards Mysore south, including the industrial areas located in Nanjangud, while residential areas developed by MUDA have come up in areas such as Vijayanagar and J. P. Nagar. Besides the MUDA layouts, private developers have undertaken an array of residential layouts for which plots have been sold, and the projects are in various stages of implementation.

### **3. EXISTING SCENERIO OF GREEN AREAS**

Aerial photographs and satellite imagery of the city shows the green and wide natural valleys running through the various parts of the city. The valley starting from Kukkarahalli Lake traverses more than 10 kms in the southern direction while the valley downstream of Doddakere and Karanji cover the *Elethota* up to Dalvay Lake in the north-south direction. In the north the valley starts from Kyatamaranahalli Lake and reaches Kesare in northern direction. On the east Chamundi hill and its associated ecosystem offer yet another green belt. These valleys are essential for effective drainage and prevention of urban floods and are already quite green. These are the areas that need to be declared green areas and protected from adverse urban impact as they open up several ecological and economic prospects. It is important to adopt a network approach to conservation of green areas so that contiguous stretches can be formed and their ecological benefits are enhanced. It is possible to derive synergistic benefits from conserving and managing the natural valleys as green areas and make Mysore a sustainable city rather than an urban jungle.

A considerable portion of the 'Royal City' Mysore is occupied by parks and gardens intercepted by beautiful sylvan avenues. But because of various constraints being faced by the Mysore City Corporation (MCC) and lack of funds and relevant human resources for the Department of Horticulture, many parks are in a state of neglect. One of the adverse effects of the rapid and relatively unplanned growth of the so-called 'Garden City' is the heavy encroachment on gardens, parks, playgrounds and other organized opens spaces and tanks. This has resulted in a problem in terms of shrinking green areas. A majority of parks are underdeveloped and in a state of decay. Kuppanna Park in Nazarbad is a classic example. Developed by erstwhile Maharajas of Mysore, it is now in a state of total neglect. The park near Renukacharya temple is no different. It was once bagging awards during Dasara festival for its maintenance. Now it has become a grazing ground for cattle. Parks and green areas face the threat of encroachments by way of accommodation for other types of land uses.

#### **3.1 Parks**

Parks have been a part of human civilization since time immemorial. Though the conceptual indefiniteness about the difference between a garden and park continue, the dictionary defines a park as a tract of land set aside for public use. An expanse of enclosed ground sometimes landscaped for recreational use, within a town or city. The dictionary has this to say about a garden - a plot of land adjoining a house used for the cultivation of grass, flowers, vegetables or fruits and for recreation.

Mysore city has a total of 316 big and small parks. The MCC has various problems in their upkeep including labor and water shortage. Despite sinking bore wells, it has become difficult to get water for conservation and there is an opposition from the public to make use of Cauvery

river water. The MCC or the MUDA have earmarked sufficient areas for parks in each and every layout formed or being formed. But after taking over such parks, even after more than two or three decades, only weeds can be seen in them providing a haven for reptiles and insects.

The MCC is maintaining all these parks, except four parks which are maintained by associations of localities. Concerned citizens must take a stand against allowing the system to deteriorate. People should let their representatives know that public parks are a priority. Of these at least four parks can be considered quite big in size.

Out of the 316 parks in the city, 120 are developed by the MCC while the remaining are just fenced off areas, having a lush growth of Parthenium and other weeds. Only 80 parks have irrigation facilities and hence, they are moderately developed. MUDA is yet to hand over 90 parks to the MCC for development and maintenance. There are 300 parks in the city belonging to the MCC and the MUDA. Another 16 parks came under the purview of the Horticulture Department. Hoteliers, theater owners and business establishments have come forward to construct a compound wall around the park. The city is having numerous parks that are just as old as heritage buildings (MSV, 2006, p. II).

The Cheluvamba Park in Yadavagiri is the largest among the well-maintained parks. There are several parks in the city in the range of 4 to 5 hectares of area. Not many out of the 316 parks in city measure less than half a hectare.

### *3.1.1 Cheluvamba Park*

Cheluvamba Park, the best maintained of all and measuring 5 hectares, is situated opposite *Akashavani* (All India Radio) on Krishnaraja Sagar road. This park attracts a large number of visitors, particularly during Dasara season. The entire park area gets illuminated and a number of seasonal flowering plants are grown. This park houses a small green house featuring various indoor plant species. Towards the north end corner, the park has a playing area for kids. This park has a radio house at the centre. Two decades or three ago, many people came here only with the intention of listening to AIR programs during evenings.

### *3.1.2 The Curzon Park*

The Curzon Park, having three wings (on both sides of *Kote Anjayenaswamy* Temple and opposite Opera Talkies) is spread over 2.5 hectares of land. The Curzon Park, as everybody is aware, is famous for its Dasara Flower Show. This also houses horticultural offices. One of the major hurdles here was the drainage, into which sewage water used to be let in. The sewage water that use to flow through the middle of the park, is diverted and now, only the rain water is allowed to flow in the drain. A Japanese style arch bridge has been constructed over this huge drain. Special steel grills erected all round the park are an added attraction. Future plans include illuminated artificial waterfall and small water fountains to attract and entertain visitors. The entrance of this park has an impressive arch made of stone. This park has separate walkways for casual strollers and joggers.

### *3.1.3 Science Park*

The Mysore city can be proud of its Science Park. It is indeed a novel idea to indulge and induce enthusiasm in science, and is set in the midst of nature and spread over more than one hectare. Situated in the premises of Regional Institute of Education, just opposite All India Institute of Speech and Hearing, the Science Parks is an attraction for children of all ages. This park has 24 scientific models. The park can be visited Monday through Friday, between 2.30 pm and 5 pm. There is no entry fee. It would be better if children are brought in groups along with a science teacher.

### *3.1.4 Parks for the Blind*

Many projects are done for the benefit of physically challenged. But Mysore is one step ahead in this respect. The city has a park exclusively for the visually impaired persons which are located opposite to the Curzon park. This exclusive park for the blind was set up by the Central Government. This half hectare land has another specialty. Most of the plants are medicinal. The theme of this park is 'touch, feel and understand'. The background music includes croaking of frogs, chirping of birds and sound of trees swaying in the breeze, which help the blind to visualize nature.

At the approach road, grills are affixed on either side. Attached to this, ornamental plants have been grown in earthen pots. The blind can pluck the leaves and smell them. Each plant has its name written in the Braille script. Still further, there is a Helen Keller Bridge which has water up to the knee level. Steel grills are affixed on either side of the bridge and the visitors can hold the same and touch and feel the aquatic plants. The park is open to public and entry is free. The Regional Natural History of Museum would arrange for pick-and-drop free of cost.

### *3.1.5 Heritage parks*

Mysore is known as a heritage city. But when we think of heritage, we just think of old buildings. But we have numerous parks in the city that are just as old as these heritage buildings. The largest among them is the Heritage Park in K. C. Layout, having 14 hectares, presently coming under the MUDA. It is yet to be developed. The other park in the same layout is of 7 hectares area, being developed by the MCC.

### *3.1.6 Herbal Park*

A unique herbal park has been developed in this city. It is a pride of Sri Cauvery Composite Pre-University College, situated in Kuvempu Nagar. The park has ornamental and flowering plants. There are herbal plants numbering more than 30, with the name of each plant displayed at its front. This school, by growing such plants, is clearly focused on teaching environment lessons. There is another herbal park very near the Saraswathipuram swimming pool; this is attached to the College of Indian Medicine. It is a must-to-be-visited place for those interested in herbs and their various uses.

### *3.1.7 Avenue Plantations*

Avenue trees are found along major roadsides in the city. The residential extensions, apart from avenue trees, coconut trees are prominent within the residential slot in Saraswathipuram, V. V. Mohalla, Jayalakshmipuram, Vidyaranyaapuram, etc. There is a substantial eagerness on the part of residents of the newly developing areas to provide for themselves arboreal surroundings. Its main function is to provide a canopy and thereby increasing the proportion of greenery and reducing heat island effects. The street pattern of Mysore follows the gridiron pattern with arterial roads from the city centre radiating in outward directions. The palace is the focal point from where all the arterial roads start and run radially leading to towns and cities in the hinterland.

### *3.1.8 Bonsai Garden*

It is said that the art of Bonsai originated in a Chinese village long ago. It is an art involving miniaturizing plants and growing them in pots (Datta J. G. 2005), p.16). The word Bonsai means 'pot tree' (bon=pot or tray, sai=tree). The Chinese believed that horticulture was not just

meant for outdoors. To live amidst the world of green they mastered the art of Bonsai (tree in a shallow container), bringing horticulture and art together. The Japanese, however, refined this into a fine art form and propagated it to the rest of the world especially after World War II. Select plants/trees/shrubs/fruits and bring them in with the soil, for soon the drops from the sky will give way to some gleaming rays from the sun where all the little green dwarfs need to be displayed for a healthy growth. If this is strategically placed in a courtyard in living room with intermittent gleams from the skylight above, the effect is just an awesome cool green on eye. The whole composition in the shallow tray should give an illusion of depth and space for a countryside landscape.

In Mysore, a Bonsai Garden called *Kishkindha Vana* is located within the Sri Ganapathi Sachidananda Ashram on Nanjangud road just 3 kms from the Town Hall. The garden is well maintained and produces various varieties of fruits and flowers throughout the year. The trees bear fruits even out of season. Certain parts of garden are cool, while others are warm. Some spots have rainy atmosphere while other are misty.

In a highly urbanized setting, it may sometimes be very difficult to show a tree which grows in deep jungles. Although one has access to dedicated magazines and television channels, nothing can replace direct experience. In such circumstances, the Bonsai concept can be of great help. Bonsai technique allows us to have a miniature forest. Just as well-maintained zoos can be great assets to a country, gardens too can be of immense value. To develop a miniature garden of rare trees in a small area can be of great educational value. However, it should not be considered as a substitute for conserving our forests. Bonsai is not a mere decorative art but also explores the possibility of using for medicinal purposes, the leaves, twigs, bark, flowers and fruits that these Bonsai plants yield.

### *3.1.9 Institutional Greens*

Mysore is known for institutional and public/civic buildings such as KR Hospital, Ayurvedic Hospital, Medical and Engineering Colleges, Central Library, Police Training College, Post and Telegraphic Training Centre, Central Sericulture Research and Training Institute, Palaces, Central Food Technological Research Institute, Regional Institute of Education, Speech and Hearing Institute etc. These are important and major public institutions which provide large scale lung space with greenery in the city. Particular mention may be made of the University of Mysore, which occupies about 300 hectares including the Kukkarahalli tank and has well maintained orchards, gardens and woodlands. Here are located a number of government offices and educational institutions with large open space for parks, gardens and sports. Nazarbad has a zoological garden. If one takes only residential density into account, Mandi and Lashkar Mohalla are the most densely populated. Densities are high in areas immediately to the north and south of Central Business District.

### *3.1.10 Urban Forestry*

It is a specialized type of forestry that has the objective of cultivation and management of trees for their actual and potential contribution to the physical, social and economic well being of the urban community. It embraces a multi-dimensional system that includes maintenance of water sheds, water bodies, biological control of weeds and pests, human and animal habitats, outdoor recreation facilities, landscape design, recycling of municipal wastes, tree care in general and future production of wood and fiber as raw material. Aesthetically trees and shrubs provide their own unique beauty in all settings. Maintenance and development of urban forestry resources requires the understanding and cooperation of electricity, water supply, sewage, telephone and public works departments.

### 3.1.11 Green Belt

It is defined as the management of forest and other plant communities in and near cities for the primary purpose of providing open space, recreational opportunities and other amenities including prevention of environmental degradation. The green belt is for the purpose of protecting and preserving the flora, fauna and scenic beauties and as a visual buffer against the often-ungainly industrial or utility areas and sprawls; and as a means to replenish oxygen – mitigation of carbon dioxide and carbon monoxide poisoning. The green belt practices proposed in Urban Development Plans should be strictly enforced. To maintain ecological balance in the city satisfactorily, man must stop the indiscriminate destruction of trees and denudation of wooded areas.

The MUDA has reserved 356 sq. kms as Green Belt between the conurbation and the LPA boundary with a view to provide better climatic conditions. Steps are necessary to be taken by all the departments and agencies concerned to prevent encroachment of land in the Green belt. Large scale tree planting, provision of recreational facilities and other public and semi-public uses have to be proposed in the green belt. In addition, arrangements have to be making to monitor and increase green activities in the green belt area.

### 3.2 Lakes and its surrounding regions

In Mysore, some Lakes have disappeared and on them now stand towering symbols of urbanization, irresponsibility and lack of love for nature or its beauty. To cite an example, the famous Doddakere Lake is now the venue of Dasara Exhibition and football grounds. The Jeevanna Rayanakatte near City Railway Station and Subbarayanakere on the Chamaraja Double Road have both dried up and have become parks. There are many lakes small and big which have met their end due to lack of will on the part of authorities and the citizens. At present, there are about 5 major and 20 smaller water bodies greatly contributing to its ecological balance. They assist in ground water recharging, support livelihood by way of fishing and grazing, and quench the thirst of the bovine population and other types of live stock and supply the water needs of wild birds and animals.

Lakes in and around the city are virtual jewels. **Kukkarahalli Lake** is now shining like a jewel being restored to its pristine glory after it was languishing in neglect for years. This Lake is most popular in the city which has a catchments area of more than 175 hectares. The water body spreads over 104 hectares and has a depth of eight meters. The Asian Development Bank granted a financial support for de-silting of the Kukkarahalli Lake, fencing around its boundary, laying of the path for walkers, creation of a flower garden etc.

The **Karanji Lake**, including its surrounding areas is nearly 42 hectares, located near the foot of Chamundi Hills and next to the Mysore Zoo is very popular among tourists. The Karanji Lake now includes an aviary for chirping birds, generating cheerfulness among the visitors to the lake. The birds are within handshaking distance from them. Boating in the lake has started. The running track around the lake, a butterfly park and a walk in aviary which boasts of nearly 65 species of birds it has now become very popular among the locals too. The high observation tower gives a grand view of greenery stretching all around and the Chamundi Hill. Karanji Kere is the habitat of a large number of migratory and resident water birds in addition to being a tourist attraction.

**Dalvoy Lake** is about 8 kms from the city on Nanjangud Road and is one of the oldest and well-know lakes of Mysore. It occupies an area of about 22 hectares. The quantity of water in the lake has drastically decreased due to inadequate rain and the residential buildings that have come up around it blocking the flow of rain water into the lake; topography has become adversely affected.



Plans are afoot to restore the major lakes of Mysore under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM). Lingambudhi, Karanji, Kukkarahalli, Basavanakatte, Bogadi, Devanoor, Hebbal, Kyatamarahalli, Gobli, Nachanahallipalya, Uttanahalli, Dalvoy, Kamanakere, Marulawadi and Bommenahalli lakes have been short-listed for restoration (Bennur, Shankar, 2007, p. 3).

### 3.3 THEME PARK - Chamundi Hill

Chamundi Hill is a unique landmark of Mysore City and is considered as one of the rich heritage sites having religious, tourism and ecological importance. It acts as catchments for the surrounding more than ten lakes such as Karanji Lake, Dalvoy Lake, Gobli Lake, Uttanahalli Lake, Parasiahna Lake, Devikere, Hirekere, Goralkatte, Kunthikola etc (Kushalappa, K. A. 2005, p. 12).

It has a rich biodiversity with 450 plant species of which about 50 are medicinal plants, 145 species of birds and 60 species of butterflies. The tree cover precariously existing over the granite rock formation moderates city temperature and also acts as a “carbon sink”. Every visitor to Mysore city invariably goes to the top of the hill to pray at the Chamundi temple and to enjoy the scenic beauty of the city from top, day and night.

There are remarkable improvements in the growth of various plant species in the western parts of Mysore, thanks to the efforts of the Department of Forests. The eastern aspect still looks barren and highly degraded due to the pressure from villages like Lalithadri, Uthanahally and Chamundi hill, who use fuel-wood for cooking, use the land for grazing and due to the forest fires during dry seasons. Many stray semi-wild cows let out in the name of Goddess Chamundi are also adding to the grazing pressure.

The vegetation of Chamundi Hill is renewing because of conservation measures initiated by the Forest Department. Rejuvenated shrub jungle dominates its profile, but frequent fires are impeding its growth and may leave the hills barren in due course. As an immediate impact of the fire and the destruction of low-level shrub vegetation, leopards and other carnivores in the hills will be forced to move out in search of prey. If the shrub jungles are destroyed, the prey will deplete and the leopards will be forced to enter the surrounding villages, thus increasing the man-animal conflict. A long-term negative impact will be on the soil due to destruction of vegetation leaving the hills barren.

**a) Present Situation:** Out of about 2000 hectares only about 613 hectares is under the Forest Department as “Reserve Forest”, 404 hectare as private land and about 995 hectares is termed as public and other government lands. It is in the last category of land that most of the encroachments have occurred. Most of the lands all along the foothills have been either granted or encroached upon. Several buildings and residential areas have already been developed hindering the rainwater from flowing into the surrounding lakes.

**b) Green cover in the Hill:** The Forest Department took up “tree planting” during 1930s, by digging large pits and planting small uprooted trees. The success was not as good as expected due to shallow soil, poor nutrient status, erratic rainfall and heavy biotic pressure. However, *honge*, *dhupa*, *godda*, *basavanapada*, *ala*, and neem have been successful and are still existing here and there and growing even today. Later, contour trenching was adopted and planted eucalyptus seedlings in large numbers on degraded soils and are surprisingly surviving today even between rocks.

Now with the thrust given to plant only the native species, planting is restricted to species like *honge*, *ala*, *goni*, *hunse*, *tapasi*, *bevu*, *hale*, *nelli*, *bela* etc., and the success rate is good. It is therefore necessary now to remove all eucalyptus trees to make way for indigenous species, coming up naturally or planted.

Extensive planting by digging contour trenches and large pits was possible due to the Norwegian Project (1997-2000) and invested Rs. 3.8 million (Ibid, 2005, p.12). The entire

boundary is now fenced with chain-link mesh that prevents villages and their cattle getting into the forest through unauthorized entries. However, the main roads are open without proper gates through which such trespassing is possible.

#### **4. PRIVATE PUBLIC PARTICIPATION**

The onus of developing the parks was too burdensome for the MCC and hence, proposed for Private Public Participation (PPP). In Mysore, the only park maintained by a private organization is Vishwamanava Park, under the care of Raman Board and added that there are also several other parks unofficially maintained by the local residents.

Plans are on the offing to call a meeting of industrialists, businessmen, major hoteliers and various NGOs, along with the Corporation Commissioner and other officials, where the issue of handing over the maintenance responsibilities of major parks in the city to private establishments will be discussed.

The MUDA, after preparing a layout and fencing off the park areas, simply hands it over to the MCC for development and maintenance. Actually, it is the responsibility of the MUDA (it being the Development Authority) to develop the park in MUDA layouts and then hand them over to the MCC for maintenance. But, under the present circumstances, the MCC is overburdened and owing to scarcity of funds, is unable to undertake development works.

All the failed attempts to conserve the rich forest resources of Chamundi Hill indicate that people's participation is essential for protecting this unique heritage site. The citizens of Mysore should be actively involved in the development of Chamundi Hill. Finance should also come from them to maintain the assets once created by the government. Earnest and intense efforts are necessary to augment property tax collections.

People were motivated and made aware of the need to protect and conserve the natural resources of Chamundi Hill for their own survival through water and soil conservation measures.

The MCC will chalk out a program to persevere and develop 316 parks in the city with the help of private sponsors (The Hindu, 2003, p.3).

#### **5. PLANNING AND DEVELOPMENT OF GREENERY**

Planning helps to maintain and improve the quality of life and health services. As an administrative tool, planning makes it possible for the executive to guide operations rationally. Every aspect of planning and development should be infused with a concern for imaginative and effective use of open spaces.

Mysore is poised to launch its new Master Plan aimed at beautifying the city. It is appropriately called '*Sundara Mysooru*' (beautiful Mysore) Plan. Rs. 3000 million would come from the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) of the Central government, Rs. 500 million from the Central Ministry of Tourism and Rs. 3000 million from the Asian Development Bank and World Bank. Work has also started on drawing up an urban forestry strategy and an information pamphlet on this strategy through the Forest Department and NGOs is being circulated.

However, the MCC has decided to develop parks in phases. It has invited tenders worth Rs. 17.5 millions to develop over 60 parks in the first phase. Lawns, mounds, water cascade and jogging tract will be developed; ornamental plants and shade-giving trees will be raised. However, alarmed by the bad shape of various parks, which is marring the image of the city, concerned commoners, industrialists, philanthropists, experts in various fields and officials of the MCC are now planning to rejuvenate and maintain over 200 parks.

Karanji Lake has been developed and conservation of water in lakes through desilting and restoring water flow inlets has been undertaken; and nature lovers will not only enjoy the scenic beauty of the lakes, but also will be delighted with the nature manifest in park (Satyanarayana, 2004, p.10).

- A **mini bird sanctuary** in Nature Park is being developed and will be an added attraction. Butterfly Park is another main attraction in the nature park, established on the small island, linked by a bridge. Commonly seen butterfly species in the park are, Black Crow, Plain Tiger, Grass Yellow, blue Tiger, Tailed Jay and many more. Flowering plants like Lantana, Ixora, Marigold, Zennia, Almondo, etc. have been planted to lure the winged beauties.
- The **boating facility** is proposed to be created on the left side wherein pedal-boats and rowing boats will be used instead of the mechanized boats, so that the peace and tranquility of the nature park is not disturbed; noise pollution is avoided.
- **Aviary** will be of a walk-through type, erected around the naturally available trees in the region, instead of using synthetic materials. The aviary is located just a furlong down the entrance, on the right side.
- **Environment-friendly** – Solar lamps along the path, stone benches and tables, hygienic and attractive waste baskets, lawns, topiary, drinking water taps, toilets, etc. have been provided, keeping in view the environment-friendly aspect so that a conducive atmosphere to watch birds of hundreds of different species is put in place.
- Separate **parking spaces** are allotted for buses, four-wheelers and two wheelers at the entrance gate. Entry of vehicles of all kinds into the lake region is strictly prohibited. To facilitate morning jogging in a peaceful and oxygen-rich atmosphere and is open to public.

To promote a green environment in a residential or industrial area, the first step is to control development or building construction activities. Typically, it is known as “The Scenic Zone” in city planning law and it is playing an important part in the preservation of urban green through its proper maintenance. The other is to preserve green areas in their existing condition and wherever possible to enrich and diversify them.

Open space can also be administered through regulatory means, which provide some of the most basic controls on the “quality of the environment” in terms of guiding the patterns and design of development keeping in view setbacks to densities.

The water front property design should be functional, maintainable, cost effective, visually pleasing and environmentally sound and also enable the people to relax there. Including a wooded buffer strip and aquascaping in the shoreline design is one way. A buffer strip improves and maintains the water quality by providing a filter area to trap sediments and excess nutrients, reduce maintenance time and cost, preserves natural beauty of a setting, screen undesirable views and frames good views and provides erosion control and shoreline stabilization. The aquascaping plan – visitors parking area can be thought of, short native woody plants, moisture loving forest perennials can be planted, ornamental native aquatic plants can be planted to create a natural shoreline and improve water quality by reducing erosion and filtering runoff water etc. Jogging track, pedestrian pathways, boating, seating furniture etc. are being provided.

## 6. SUGGESTIONS AND CONCLUSIONS

In reviewing the approved Comprehensive Development Plan, the following policy measures are suggested in the context of green areas in Mysore. Here, to protect and preserve the beauty of the

city and retain its character, it is necessary to constitute an Urban Arts Commission. Further, the flowering trees should be planted suitably all along the roads in the city. All parks and green spaces within the city should be better maintained. May be the private sector and the NGOs should also be roped in for this purpose. In future, greater effort will be needed towards the greening of Mysore and the urban fringe to mitigate the effects of concrete jungle and reduce the pollution problem and heat island effects.

The Horticulture Department is the best institution to maintain public parks as it has the knowledge, expertise and manpower to do so. Some basic aspects like the species of trees and plants to be chosen to plant in the park of a particular locality, taking into consideration the overall aspects of that area, the kind of landscape required, availability of water, continuous maintenance of vegetation, etc. are some of the finer aspects requiring agricultural and horticultural expertise and knowledge.

Protecting the natural valleys and topographical drain-ways to facilitate the filling up of lakes during monsoon; development of waterfront areas with activities which would enable the people to come and relax there; and identification of lake specific activities and suggesting the lakes for optimum use. Dredging and desilting of water bodies suitably in due season and using this silt for upgrading agricultural land require to be a priority area of action.

The important suggestion is that the use of sewage recycled water for irrigation of parks. The sewage water that generally goes waste and occasionally gets released into some of the parks in the city could be duly treated and reused for irrigation, instead of wasting Cauvery water, which should be conserved and used exclusively for domestic consumption.

Some of the areas in the urban pockets i.e., within the conurbation limits are quite fertile and high yielding coconut groves. They should be maintained as agricultural zones. According to Zoning Regulations, in the case of land coming within 500 m of the agricultural zone from Nehroloka boundary, no land shall be alienated for any non-agricultural purposes. The long pending proposal for Nehroloka Theme Park at the foot of the Chamundi hills should be taken up soon.

The temple authorities are already collecting the entry fee at the top but it could be enhanced and collected at the lower entry point of the Hill itself and share with the Forest Department to plough back for Hill development. The temple also should be able to part with their revenue, at least about 5 per cent for the Hill development. After all, Goddess Chamundi also needs proper environment around to stay and bless her devotees.

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# Public Participation and Risk Communication

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# REASSESSING THE VOLUNTARY FACILITY SITING PROCESS FOR A HAZARDOUS WASTE FACILITY IN ALBERTA, CANADA 15 YEARS LATER

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## Abstract

Voluntary siting for hazardous facilities is preferred over traditional siting methods since the former process tends to overcome opposition by encouraging potential host communities to focus more attention on benefits (e.g., jobs) rather than the risk of contamination or other potential impacts. Yet, there are few case studies on the aftermath of voluntary siting to evaluate “success” according to principles from the siting literature e.g., justice, equity, and informed consent. This paper reports results from a study of three communities near the same large-scale hazardous waste facility that was put 15km northeast of Swan Hills Alberta, Canada. This facility represents one of the earliest (1982) and purportedly most successful voluntary siting processes in North America. However, it is deceptive to claim that the process was a success from the point of view of justice, merely because Swan Hills was not in a disadvantaged/vulnerable bargaining position. If the scale of “community” affected is widened, that argument holds less sway. That is, there are serious concerns about justice, informed consent and distributive equity. Based on the perceptions of 453 residents in the region, 15 years after the facility became operational the findings reveal that while Swan Hills residents still favour the facility residents in two towns 70kms away (Kinuso and Fort Assiniboine) do not. In fact, the perceived fairness of the original siting process is the strongest predictor of facility related concern. Implications for the viability of voluntary siting, the appropriate role for informed consent, and the associated role of scale are discussed.

**Keywords:** voluntary siting, community, scale, justice, fairness, distributive equity, informed consent, Swan Hills, Alberta

## 1. INTRODUCTION

There is a deepening worldwide waste disposal crisis in the sense that several places continue to struggle with finding new places to dispose of wastes that cannot be recycled or reused. Though new approaches to thinking about “waste” are taking hold – e.g., cradle-to-grave product design and responsibility - in the short term at least, we will continue to need such waste sites. [1] A key problem to finding such sites is opposition from local residents, and increasingly, from non-locals. Traditionally, many jurisdictions relied on hierarchical, technically, and professionally driven processes; whereby governments hired experts and together decided on a site which the government would announce to oftentimes unsuspecting communities. At its worst this was the so-called “decide-announce-defend” approach. [2] More recently such processes have been modified to include significantly more community participation, but at the core many have remained hierarchical and technical, prone to the same debilitating community opposition as decide-announce-defend.

It is in this context that voluntary facility siting grew to be one of the preferred approaches for finding sites for particularly contentious point-source technological environmental hazards like hazardous waste and nuclear waste facilities. [2-4] The value of such an approach is that it

tends to overcome the problem of “host community” opposition by focusing more attention on benefits (e.g., jobs), rather than just the risk of contamination and other potential negative impacts. Further, there is an element of consent and ostensibly, control, whereby potential host communities vote in a local referendum (plebiscite) to decide their own fate. [5, 6] Yet, because of its relatively newfound status critical attention from academics and practitioners alike has focussed mainly on the degree to which this process overcomes the shortcomings of traditional siting, rather than on the degree to which such a process satisfies broader principles of just/equitable siting. [3, 4, 6] For example there are few studies which assess voluntary siting in philosophical/theoretical terms [5] or from the point of view of locals who have to live with the results of a voluntary siting process.[7]

In particular, useful insights may be gained by looking at: the processes in practice, the communities that “host” an actual facility, and other communities affected by the same facility. As Puschak and Rocha[1] point out, we should be cautious about the long term success of voluntary siting, since there has been a relative, “lack of systematic analysis of voluntary siting outcomes and empirical evidence that voluntary siting outcomes have been more successful than other approaches” (p. 27 see also[3]). Such evaluations require engaging with residents and other stakeholders, or as Gowda and Easterling assert, “This task will not be solved within the minds of policy analysts, but requires a journey into the cultures, belief systems, and experiences of the various groups that have a stake...” (p.920). This paper addresses these issues by reporting the results from research related to the Swan Hills (hazardous waste) Treatment Center (SHTC)<sup>29</sup> in Alberta, Canada. The next section briefly reviews principles of just/equitable siting in relation to voluntary siting, particularly as they pertain to the ostensibly successful SHTC process. This is followed by a review of the principles in the context of the resident’s views of: facility siting, inter-community relations, and the facility itself.

## 2. VOLUNTARY SITING

### 2.1 The Promise of Voluntary Siting

A key advantage of voluntary siting over traditional approaches relates to consent and equity – yet these are also the areas of most criticisms. It is important to put the voluntary process in the context of how it improves on the decide-announce-defend approach. The voluntary process is meant to address concerns about fairness (equity) raised by non-voluntary approaches, by virtue of allowing host communities to show their (majority) willingness to host a site, through a local plebiscite [3, 7, 8]. The latter is particularly important since it presumably allows a sometimes “silent” majority to approve a facility rather than allow a vocal minority to prevent the facility. [6] Further, that majority decision is supposed to be achieved only after thorough process of information gathering and interpretation related to things like facility need, site suitability and safety. Ideally these assessments happen through experts hired by the community with funds provided to the community by the proponent. The process is based on the Pareto-optimal principle that since the host community is presumably better off (e.g., new jobs) and the rest of society is better off (i.e., they have a new place to put their waste) voluntary siting is better than not building a new facility.[5] This is an important equity consideration in the context of an era of rapidly aging/filling local sites. That is, this acknowledges that current host communities have taken *their* turn dealing with the hazard; and that the status quo is unfair if it is allowed to continue if other communities avoid taking their own turn. In a similar sense, the process allows

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<sup>29</sup> Because the facility has changed ownership numerous times it has had different names. It is also known in the siting literature and elsewhere as the Alberta Special (hazardous) Waste Treatment Facility (ASWTF) or the Alberta Special Waste Treatment Center (ASWTC) at Swan Hills

these other communities to show their altruistic side but offering to host new facilities. In this sense a facility may actually foster community pride.[9, 10]

### *2.1.1 Canadian example – Hazardous waste treatment facility at Swan Hills*

Canadian examples of voluntary siting have often been cited as landmarks of how siting can and should be done successfully. In particular the voluntary process that resulted in the 1987 construction of the hazardous waste treatment facility 15 km northwest of Swan Hills (pop. 2500) Alberta is heralded as a noteworthy success [3, 4, 6, 8, 11]. For example, Kuhn and Ballard[6] (p.537) proclaim,

*The Swan Hills integrated hazardous waste facility, located in north central Alberta, stands as a hallmark of siting success. The process began in 1981 and concluded in 1984. The approach used was clearly successful considering what was achieved and at what cost. Where other hazardous waste programs have floundered, the Province of Alberta sited a facility in three years at a relatively low cost of \$Can.5 million.*

Nevertheless, cost savings and timely siting should not be the only considerations for declaring siting success. The way the process was carried out has also received considerable praise since it simultaneously addressed: overall facility need, alternatives, facility location, and perhaps above all, community participation and assent through a plebiscite. In fact, in a book on the topic, Rabe carefully argues that the process turned the NIMBY syndrome on its head. That is, rather than individuals/communities espousing the need for waste facilities, but at the same time refusing to host such facilities, i.e., NIMBY; the Alberta's hazardous waste facility was actually fought over by at least two potential hosts. Rabe recounts the dramatic fact that Ryley, a community of 500 and also over 100km nearer than Swan Hills to the provincial capital of Edmonton, publicly protested the decision by the provincial government to "award" the facility to Swan Hills. That it was considered an "award" has a lot to do with the fact that a hospital, other improved infrastructure, and 100+ local jobs all eventually accrued to Swan Hills alone. The reason provided for choosing Swan Hills over Ryley, besides some likely political manoeuvres by the former's provincial representative[3], is that Ryley was closely located to several other towns and only 80kms from the capital, Edmonton. The choice of Swan Hills helped avoid two equally problematic solutions for following through with a Ryley facility: a) holding a multi-community plebiscite; or b) dealing with opposition from other local communities that would likely not receive any direct benefits if the existing Ryley-only vote in favour of the facility was upheld. This issue of the scale of community plebiscites is a central theme of this manuscript as it also applies to the Swan Hills case.

## **2.2 Limitations of Voluntary Siting (Philosophy, Experience, and Practice)**

### *2.2.1 Philosophy of justice - Individualist/market worldviews vs egalitarian worldviews*

Environmental injustice refers to replication of historical injustices experienced by disadvantaged groups (e.g., racial minorities, low income groups) in current realms of hazardous facility cleanup and facility siting. [12] By distinction, environmental equity tends to pay less attention to the past and instead focuses on either procedural equity (e.g, public participation in facility siting) or the spatial distribution of hazards relative to disadvantaged groups, regardless of how the pattern emerged - outcome equity. From a philosophical/moral standpoint environmental justice is a multidimensional concept and voluntary siting tends to emphasise certain forms of equity, potentially at the expense of others, and often disregards environmental justice altogether.[12] For example, the typical version of voluntary siting is market driven and according to cultural theory there is a tacit assumption that all involved support an individualistic-competitive worldview. That is, it is assumed that individuals and groups

should be free to compete for mutually beneficial gains as long as nobody else (i.e., society at large) is any worse off. Yet, others subscribe to an egalitarian worldview that would ensure that the highest consumers of waste-producing goods – the wealthy – should likewise bear the highest responsibility for the waste, for example hosting a waste facility.[5]

From a justice point of view, among the egalitarians' concerns is the fact that the communities that invariably come forward as potential voluntary siting hosts tend to be challenged with multiple disadvantages including low income, high unemployment, and visible minority status. For instance, Gowda and Easterling describe how Native American communities have tended to be the most prominent groups offering to host monitored retrieval storage facilities for nuclear waste in the US. [7] In the words of one Native American representative, "Just because there are two willing partners to do this tango is no reason to hold the dance" ([5], 127). Though there are various mechanisms for sorting out the actual compensation to ensure something better than the lowest "bid" is actually paid to the "winners", the egalitarian's concern is that the reason for even bidding in the first place is due to a position of vulnerability and reduced bargaining power. [13] For example, there are other cleaner industries that pose lower direct health risks that could likewise benefit disadvantaged communities. These are recurrent themes in the environmental equity and justice literatures. The justice literature in particular is concerned with the *intentional* targeting of these vulnerable groups based as opposed to simply a coincidence of "neutral" market forces. [12, 14] It is for these reasons that egalitarian/justice-oriented writers are among the strongest supporters of increased efforts at waste reduction outright, to avoid the need for large-scale waste disposal facilities in the first place.[5, 15] For example, for some facilities dread of catastrophe may be so high that even financially compromised groups may not be willing to host. [16]

### 2.2.2 Practice - Informed consent

In terms of the practice of voluntary siting, the manner in which informed consent is carried out is critical. While communities typically vote for or against a facility, who gets to vote in the first place has not been critically assessed. For example, what counts as a reasonable distance from a facility to warrant participation in the decision process and negotiation for compensation? Is distance even the key consideration? [17] Gowda and Easterling report that though a single community may vote to host a facility, their neighbours may be excluded from such a plebiscite or voluntarily exclude themselves on ethical grounds. One result is strained inter-community relations.[7]

### 2.2.3 Practice – Distributive equity

As if inter-community conflicts are not discouraging enough, excluding nearby communities also violates principles of distributive/spatial/geographic equity if compensation is localized to only a single community. The distribution of costs and benefits needs to be considered on a scale commensurate with the scale of the facility, whereby a large scale facility should require regional scale (e.g., county, state/province) compensation arrangements.[7] The latter is further necessitated on the grounds that the management of large facilities might better be left to more diffuse oversight than from the operator and a small local community alone. [18]

### 2.2.4 Subjective experience - Stigma versus pride

Another objection to the market-driven voluntary facility siting approach is that the focus on compensation crowds out altruistic reasons for hosting – particularly by more affluent communities. Wealthier communities typically do not "need" waste facilities, but little attention gets placed on convincing them to host facilities if siting is cast as an economic choice rather

than a choice to “do ones’ part for the environment”. Some explain to be a result of the NIMBY phenomenon [3], while others are concerned about compensation being misconstrued as bribery [19] or exploitation [5]. A related concern though, is that the focus on economics and not on altruism creates the by-product that these facilities remain sources of contamination stigma not altruism. Whereas communities should be applauded for being willing hosts, they are, potentially, chided for being environmental dupes. [20]

### 3. SURVEY FINDINGS

This section reports findings from a survey conducted in the communities of Swan Hills, Kinuso and Fort Assiniboine as they pertain to the aspects of voluntary siting discussed above. It is important to realize that the overall project was not meant to study voluntary siting per se, it was a multi-method (interviews, survey) study aimed at understanding the social construction of environmental hazard risk in the everyday lives of residents. The results here are mainly from a telephone survey conducted with a stratified random sample of 453 residents in 2002, with an overall response rate of 69%. The methodology for this study and related studies on the same communities is detailed elsewhere. [10, 17] Likewise the site history and community characteristics are described elsewhere, but for context here, Swan Hills (pop. 2500) is closest to the facility (15km) and can be characterized as a resource town (oil/gas, forestry, waste); Fort

Assiniboine is 70km to the south and is predominantly an agricultural community; while Kinuso 70km to the north is: surrounded by First Nations reserves, comprised largely of First Nations people, and sustained largely by tourism, agriculture, and hunting/trapping.

#### 3.1 Philosophy of Justice

By some measures, the SHTC process is a success since; at first glance it appears to satisfy problem of environmental justice. We did not approach the problem by asking residents their philosophy of justice according to cultural theory. Instead, it is potentially useful to look at the initial “bargaining position” of Swan Hills residents in the early 1980s - the time when the siting process began. Graph 1 shows that around the time the facility siting process was happening (1981) the median household income was already above the provincial median (\$29,000 vs \$24,500). If Swan Hills was at an economic disadvantage, it was not a dramatic one relative to the province. Further, relative to Ft. Assiniboine and Kinuso, Swan Hills has expectedly remained relatively wealthy for the 20 years since the process happened and the 15 years since the facility became operational. From the point of view of environmental justice Swan Hills also had never been the victim of any known historical.

Yet there can be at least two claims made against this facility from an egalitarian point of view. First, though the facility is located near a relatively wealthy community, as it is a small community Swan Hills can hardly be considered a major producer of hazardous waste. This raises questions about sustaining motivations for waste reduction within larger centres in the province that *are* the major waste producers. Second, and more importantly, there has been a legacy of injustices against First Nations communities in Alberta. The siting process did not adequately acknowledge the unique way of life of the First Nations communities along Lesser Slave lake near Kinuso [17, 21] . Not only were the Lesser Slave Bands not allowed to vote in the plebiscite to decide the facility’s original fate, they were not beneficiaries any of the initial compensation. For example, though the facility operators did pay for health studies in the area through Provincial Court arranged pollution fines[10]; no First Nations member has worked at the facility and no health care facilities have been built in their area as a direct result of the siting process. That is, no lasting compensation has been felt.

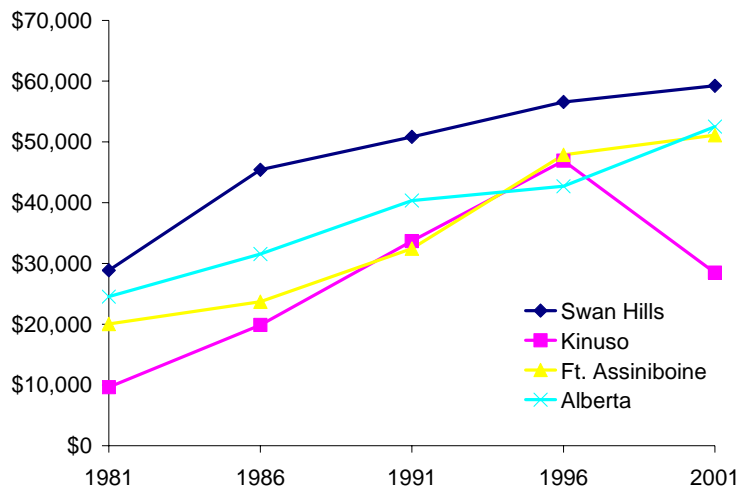


Figure 1. Canadian Census: Median Household Income for Selected Alberta Communities 1981-2001

### 3.2 Informed Consent

Informed consent is potentially divisive, even in sparsely populated areas like rural Alberta. Though the First Nations communities were not actually studied directly by our group [17] (see [21]), the reactions in the towns of Kinuso and Fort Assiniboine provide further insight into the issue of fairness, informed consent and voluntary siting. Given that our research happened between 1998 and 2002, any specifics about perceptions at the time of the voluntary siting process would be subject to recall biases. Thus, we focused on two key questions in our survey “If you had the opportunity to vote today on whether the facility should be exactly where it is today, how would you vote?”; and “How fair do you feel the process was that put the Alberta Special Waste Treatment Facility near Swan Hills”. Figure 2 shows that of decided voters, while those in favour in Swan Hills (79%) is exactly the same as the actual result when the facility was first sited [3]; if all three towns were allowed to vote in a plebiscite in 2002, those in favour (49%) and those against (51%) were almost even. Notably, the largely First Nations community of Kinuso opposed (90%) the facility by a large margin, while the predominantly agricultural community of Fort Assiniboine likewise opposed (54%) it.

Perceived fairness shows a similar pattern with the striking difference that the number of undecided residents in Swan Hills is the highest of all the results. Though the large majority of *decided* voters in Swan Hills (90%), and a smaller majority overall (56%) felt the process was fair, a majority in Kinuso (75%) and Fort Assiniboine (52%) did not. What is most interesting is that 36% from Swan Hills would not express their opinion— a statistically significant difference from the number of undecided voters in the other two towns. Given there is a general reluctance from residents to say anything bad about Swan Hills[10], it may be that these people have concerns about the fairness of the process that they would rather not openly express, despite the anonymity of the survey. Further, this fairness measure is a strong predictor of facility-related safety concern. In fact fairness was typically the most important predictor of facility-related safety concern (all towns, Kinuso, Ft. Assiniboine), moreso than perceived economic or social benefits, and an effect of similar size to various types of “trusted” information sources. [22]

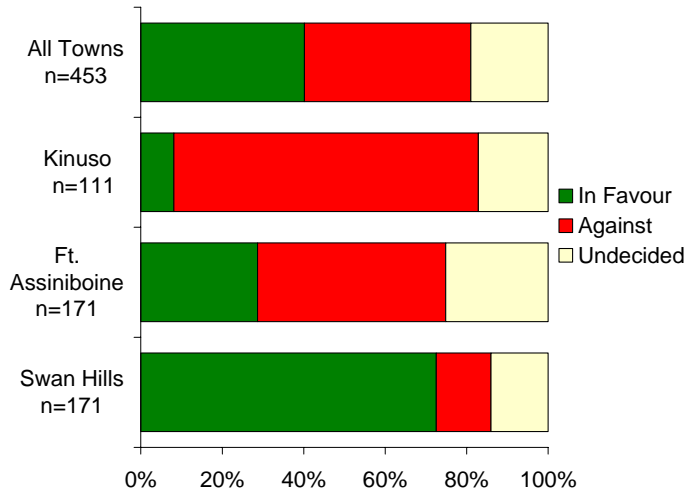


Figure 2. Hypothetical vote for existing SHTC "today"

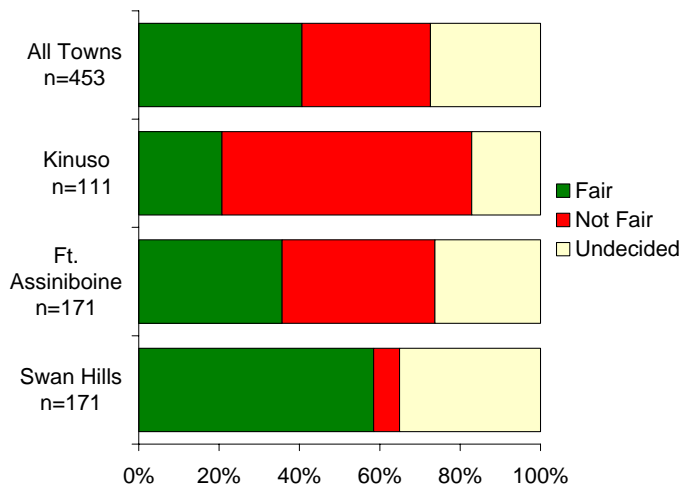


Figure 3. Perceived fairness of voluntary facility siting for SHTC

### 3.3 Distributive Equity

There is a mismatch between (involuntary) risk and benefits on a regional scale. In terms of regional benefits, Figure 1 shows that Swan Hills has retained its higher than provincial median incomes since before the facility was located nearby, and since the over 100 operational jobs came to the town from the facility in 1987. By comparison the towns of Kinuso and Ft. Assiniboine do not seem to be any worse off relative to Swan Hills over the same time period – with the exception of Kinuso in 2001. Thus, on the basis of median income one might dismiss claims of distributive *inequity*, on the basis that the relative gaps have remained fairly constant. Nevertheless, the amenities – including a 24 bed hospital – went to Swan Hills alone as part of the negotiated compensation package.

In terms of negative impacts the First Nations communities surrounding Kinuso have successfully argued that the potential negative impacts from the facility extend far beyond the 15 km radius that encompasses Swan Hills. [21] This idea was reinforced in 1996 when a major

leak of PCBs, dioxins and furans set in motion a series of hunting and fishing bans that affected a large the region surrounding the facility that extended to Fort Assiniboine and Kinuso. [23] In effect this was the realization of the fears expressed in at least two major environmental assessment processes related to both facility siting (1984) and the eventual expansion of the facility (1995). It is questionable though whether Kinuso or Fort Assiniboine residents would have accepted compensation for fear that it might be interpreted as a means to keep them quiet about future facility malfeasance.[19] This seems likely given the general sentiment against the facility in Kinuso especially. Compensation, when provided post hoc can also create problems of inter-community conflict as demonstrated in one Swan Hills resident's comments about the legitimacy of First Nations complaints:

Resentment came in the community when they read media articles saying that the "First Nations or Aboriginal people living near the plant..." well they don't. The closest ones live at Kinuso, the Swan River band, and that's about 70 km from the plant. The other native people involved in this action live 100 and 120 km away from the plant. They do visit occasionally to hunt moose and that's it. (David, does not work at SHTC).

As we argue elsewhere there needs to be mutual respect for different ways of life, whereby hunting moose may be central to one way of life, and merely an indulgence to another.[10]

### **3.4 Pride vs Stigma**

The majority of Swan Hills residents want the facility, and are indeed proud of the part they are playing in dealing with the province's hazardous waste. In the words of one resident, "I feel we are doing a favour to the rest of the world, like somebody has to look after this and a lot of other places were too afraid to." (Anne, does not work at SHTC). Further, when presented with the following two statements in the survey: "Outsiders are saying bad things about Swan Hills without the facts" and "Swan Hills does not get enough outside credit for hosting the facility." an almost unanimous 98% and 93% of the 171 respondents agreed. Yet, this combination of pride and the stigma from "outsiders" has created a unique situation whereby the facility operators, and indeed the community is motivated to keep negative reports about the facility (and town) secret from outsiders. For example, the leak in 1996 was not reported to the provincial authorities until three days after it was known. Further, in a related paper we argue that this situation continues to have the potential to frustrate appropriate facility monitoring [10]; a situation that might not exist under a more regionalized management scheme [18]. In the words of one resident who has latent concerns[10] about the facility, but who is nevertheless frustrated with the bad press they repeatedly get,

"The media, I have no respect for [(sic) them]. They come up here with full intentions of taking a perfectly good thing and then they turn around and turn it into something ugly, and I have no respect for them whatsoever. They don't get their facts right, they're all wrong. They don't even get their names right. So I have no faith in them and they're the ones feeding the public the wrong information and if they're going to do it properly, sure you've got your negative side, but don't forget about the positive side, you know. You never, ever see them write about the positive side." (Dagmar, does not work at SHTC).

It is people like Dagmar who are torn between a commitment to their community and a desire to inform "outsiders" about facility-related problems as necessary.

## **4. DISCUSSION AND CONCLUSIONS**

The SHTC voluntary siting process may *not* be as successful as some have argued. [3, 4, 6, 8] Certainly it was successful in the sense that a facility has been treating the province's hazardous waste for 20 years and the town of Swan Hills was not financially, racially, or historically



disadvantaged when they volunteered to be hosts. Indeed they were and are a relatively wealthy community who are arguably doing their part for the greater good.

Though the people of Swan Hills are generally satisfied with the local hazardous waste treatment facility (SHTC) - the towns of Fort Assiniboine and, especially, Kinuso are much less content. The reason for this situation can be traced back to the voluntary siting process itself since it involved both an inadequate process of informed consent and unfair initial compensation<sup>30</sup>. It is doubtful though, that *any* compensation would satisfy these latter two communities given their general dislike of the facility. A key predictor of this dislike can be traced to the perceived fairness of the original siting process that excluded all but the residents of Swan Hills despite the fact that a facility of the SHTC's magnitude has the potential for negative impacts on a regional scale.

Thus, the definition of "community" is central to the voluntary siting process. Indeed there may be some useful direction provided in the environmental assessment literature as it relates to directly affected parties [24]. Of paramount importance though is that the scale of "community" affected should be on the same level as the scale of potential negative impacts. There is ample evidence here to question the legitimacy of the single-community-single-facility negotiated settlement model. Though involving multiple communities complicates the process considerably, there are at least two key benefits to such an approach. First, it goes a long way towards satisfying the principles of procedural and distributive equity. Second, it could potentially lead to a greater emphasis on the altruistic roles played by the communities, rather than incite inter-community conflict and put single-town residents in a mindset of being closed to outsiders.

Whether a process involving a scaling up of "community" addresses widespread concerns about justice – vis a vis an initial disadvantaged bargaining position for certain groups – is uncertain. Certainly this will depend on the types of communities involved. Due attention needs to be paid to the historical legacy of any injustices to any group who becomes involved in negotiations. Further, the process should confront head on alternative means for rectifying injustices, beyond just a potentially risky facility.

There is an ongoing urgency to debate issues surrounding voluntary siting, a dialog that has waned in recent years in the environmental management literature. Voluntary siting remains one of the preferred ways to locate sites for disposing waste hazardous and nuclear wastes in Canada. For example, voluntary siting is the means by which Canada's Nuclear Waste Management Organization ([www.NWMO.ca](http://www.NWMO.ca)) will find a deep geologic repository for Canada's high level nuclear wastes. Whether or not the manner in which the NWMO defines potential community hosts has a bearing on the "success" of the process will be telling.

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# **POWER TO THE PEOPLE! CIVIL SOCIETY AND DIVISIVE FACILITIES**

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## **Abstract**

Nuclear power plants, airports, incinerators, and even trailer parks regularly engender opposition from potential local host communities in which these divisive facilities are to be located. A large literature proposes a wide range of possible “solutions” to not in my back yard, or NIMBY, problems, but fewer scholars have investigated broader patterns by which such projects are located. This paper calls for a reorientation of scholarship on land use conflict to better capture methodological advances in the social sciences, such as large-scale data analysis and political geography. Using these new analytical tools uncovers a critical factor in siting often overlooked in past studies of land use conflict: the strength of local networks and social capital. Given the importance of civil society in the location process, policy planners envisioning new technologies for combating global warming must not overlook the potential of local communities to resist proposed projects, even those for the “public good.”

## **1. INTRODCUTION**

Holding up posters stating “Ban Bioweapons in Boston,” residents in Boston’s seventh district in the South End have been protesting against the National Emerging Infectious Diseases Laboratory being built in their neighborhood. With three-quarters of its funding from the Federal Government, the construction of the bio-safety level four laboratory, which would study the world’s most dangerous germs such as Ebola, has angered local groups and civil rights organizations. Opponents pointed out the urban, densely populated, primarily African American and Latino area where the laboratory is located could be at risk from potential leaks and accidents. Proponents of the facility, which will be completed in 2008, argue that its presence in an urban setting is necessary to ensure timely responses to any future outbreaks of biological agents and because of its proximity to well trained researchers at Boston University and other local hospitals and research facilities. Residents of South Boston are not alone in their Not In My Back Yard, or NIMBY, mobilization against controversial or unwanted projects.

Citizens around the world have raised their voices, and sometimes their fists, to protest facilities they envision as bringing negative externalities into their neighborhoods. Residents resisted attempts to site have bullet-train extensions (Groth 1987), airports (Apter and Sawa 1984; Feldman and Milch 1982; Feldman 1985), nuclear power plants (Nelkin and Pollack 1981; Lesbirel 1998), temporary housing post-disaster (Aldrich 2008), and AIDS hospices (Takahashi 1998). Anti-project movements opposed attempts to site dams (Hagiwara 1996), accommodations for asylum seekers (Hubbard 2005), military bases (Smith 2000), chemical plants (Broadbent 1998), jails (Hoyman 2001; Hoyman and Weinberg 2006) and even group homes (Clingermyer 1994) in communities around the world.

Due to the asymmetric distribution of costs and benefits, these projects, even though many are necessary for modern life, engender considerable distrust and hostility (Quah and Tan 2002). Controversial facilities often create broad, diffuse benefits for society as a whole – power

generation, public housing, and waste disposal – but focus the costs on those who live proximate to the site. Without garbage dumps, electrical power stations, and similar projects, modern life in advanced industrial democracies would be paralyzed. While these projects are often seen as essential by proponents, local residents may suffer from psychic disutility because of fears of a leak or accident at nuclear plant or from noise, water, ground, and air pollution released by manufacturing facilities. Property values and public health may decline. The diffuse benefits and focused costs of these projects are the opposite of public goods, such as national defense, which bring with them diffuse benefits and diffuse costs. As a result, some scholars label these projects as (local) public bads (Frey, Oberholzer-Gee, Eichenberger 1996: 1298 fn. 1).

Williams and Whitcomb (2007) have underscored how even “Green” politicians oppose the construction of divisive facilities in their constituencies. Massachusetts Senator Edward Kennedy, among other high profile politicians, fought the construction of a wind farm off Cape Cod, several miles from their beach homes in Martha’s Vineyard, after their proposal in 2002. Over time, many scholars have gone beyond seeing land use conflicts as isolated or local phenomena which come about because of misinformed, ignorant, or private-good seeking local residents (see Van der Horst 2007). Scholars have argued persuasively that resistance from citizens can push developers and government decision makers to create better designed and thought out policies (McAvoy 1999). Whether or not we envision resistance to planned facilities as selfish, private-good seeking or a rational response to unnecessary or dangerous projects, such clashes over public bads have been the target of a great deal of investigation by researchers.

Research on controversial facilities can be divided into three main categories: *particularizing approaches*, *universalizing approaches*, and *variation-explaining approaches*.<sup>31</sup> Particularizing approaches rest on the assumption that cases of land use conflict are basically different. Hence each case is often investigated in isolation from others, and the history and sociocultural environment of the participants are critical in understanding relevant events. Past scholars focused on the institutional settings and psychology of protest groups (Wellock 1978; Nelkin and Pollak 1981; McKean 1981; Touraine, Hegedus, Dubet, and Wiewiroka 1983; Garcia-Gorena 1999; McAvoy 1999; Weingart 2001). These studies create rich, in-depth understanding of individual cases, and only occasionally seek to generalize and provide broader, testable hypotheses.

A second approach might be deemed as the universalizing approach. Such scholars see all cases as essentially the same; Not in My Back Yard conflicts are the result of market failures. Because the “market” for controversial facilities cannot easily or naturally clear itself through the actions of private or public investors and local residents, additional mechanisms are necessary to reach equilibrium. Viewing NIMBY politics as a “dragon to be slain,” researchers have proposed economic, experimental and theoretical solutions such as Dutch auctions (Inhaber 1998, 2001) or property value guarantees (Smith and Kunreuther 2001) in an attempt to diffuse or prevent such conflict (Kunreuther and Kleindorfer 1986; Ehrman 1990; Brion 1991; Jenkins-Smith and Bassett 1994; Rabe 1994; Quah and Tan 2002). Other proposals to struggles over Locally Unwanted Land Uses (LULUs) include deliberative democratic mechanisms and citizen referenda (Mitchell and Carson 1986; Munton 1996).

A final approach to land use conflict might be categorized as explaining variation. Here, scholars seek to explain the variation in the distribution of unwanted facilities, often using correlation between variables, such as race and the presence of controversial projects (Wolverton 2002). One branch of this approach, known as environmental racism, links controversial facilities to discrimination and racism (Falk 1982; Takahashi 1998). The strongest form of this genre posits that majority ethnic, religious, and racial groups deliberately place unwanted or

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<sup>31</sup> For an alternate approach to the literature see Aldrich 2005b and Aldrich 2008, chapter one.

controversial facilities in the backyards of minority populations. Rather than proposing theoretical solutions to the issue or engaging in abstract theorizing about the causes for resistance to unwanted projects, these researchers regularly practice “action research” in which they participate in law suits and seek to alter public consciousness and business and government practice (United Church of Christ 1987; Bullard 1994, 2000; Cole and Foster 2001; Abel 2001). As a result of pressure from environment justice activists, President William Clinton signed Executive Order 12898 on 11 February 1994 to ensure that “[a]ll communities and persons across this Nation should live in a safe and healthful environment.”

Another, less-visible branch within the explaining-variation scholarship has identified social capital as an important factor which can be linked to the patterns of distribution of divisive projects (Hamilton 1993; Clingermayer 1994; Aldrich 2008). In these studies, the depth of interconnectivity between citizens in a community, more than their race or ethnicity or other relevant characteristics, is most strongly correlated with the presence or absence of nuclear power plants, waste facilities, and similar projects.

## **2. CRUCIAL BUT UNDERDEVELOPED ROLE OF METHODOLOGY**

Despite a large and growing literature on controversial facilities, there is a sizable gap between the standard theoretical literature on the causes and potential “solutions” to NIMBY responses and a pragmatic, real-world-data-based understanding of where controversial facilities have been placed. That is, we have evidence on a large number of often unsuccessful or infamous cases where private developers or government agencies sought to construct new, controversial facilities. But we have fewer studies of broader patterns of exactly where authorities sought to locate facilities, and those analyses that have used large-scale analyses have occasionally been hobbled by poor research designs.

Schively (2007: 263) in her review of literature on controversial facilities has proposed “[m]odifying the types of analysis that are conducted in the LULU-siting review process” so that developers and government officials alike can work with local residents to more smoothly site such projects. Here, I agree with her call for change, but alter its focus from developers and governmental authorities to researchers and scholarship. Social scientists continue to produce large numbers of small-N case studies or articles centered on potential solutions to NIMBY problems. The laundry-list of potential fixes for the problems of unwanted facilities includes reverse auctions, guarantees of real estate prices over time, medical assistance and insurance for local residents, and compensation. Despite a plethora of new technologies and methods for gathering and analyzing data on these location-based conflicts, many social scientists have yet to embrace new methodologies and technologies for understanding where developers seek to place controversial facilities.

Another problem with many of the existing studies of controversial facilities is that they have not taken the question, “Compared to what?” seriously enough. That is, while some studies claim that certain siting methods were inequitable, for example, arguing that an attempt at constructing a new waste dump was carried out in an undemocratic way, such arguments invoke strong counterfactuals. A counterfactual is a claim that involves situations which were not directly observed because they did not yet occur. For example, if a new waste management facility is placed in the backyard of a large number of new immigrants, and observers criticize the siting as unfair, researchers would need to understand the other, alternative sites which were possible locations for the project. It could be that all technically feasible sites available to the company or governmental authority were located near new immigrant groups, in which case the final location for the site reflected the make-up of the technically suitable areas, and not deliberate discrimination. Whatever the specifics of the case, researchers must gather additional information on what could have been. In this way, counterfactual thinking is critical.

Further, as scholars we need to be able to lay out all reasonable explanations for a phenomenon and explain why the argument that we are making is the best. We must be able to provide proof that our theory or explanation for how or why a certain facility was or was not built is better than other, alternative theories – and too many of us are not providing the alternative theories in our discussions of divisive facilities. While it may seem obvious at first glance that an unwanted project was placed in an area because of high levels of poverty at that site, a better test of such a theory of discrimination against the impoverished would pit this argument against theories based on politics, racial and demographic composition, local socioeconomic conditions, technical criteria necessary for the plant, and other potential explanations for site selection (cf. Hamilton 1993; Aldrich 2007). To do so we would need a large body of cases to investigate, either drawing in a full sample of all such cases across the region or nation or a smaller but randomly drawn sample to ensure that our cases are representative of the larger population of phenomena.

The field of political geography offers some tools to ameliorate problems in the field of controversial facilities. Given that the response to proposed controversial facilities almost always varies by geography, with more proximal residents more opposed than those further away (van der Horst 2007), and researchers identifying strong relationships between distance from the proposed facility and local attitude (Takahashi 1998), we need to take geography itself more seriously in our work. Ethington and McDaniel (2007), for example, emphasize the importance of geographically-based “strong contextualism” in thorough studies of political agency. More broadly, political geographers seek to tie the behaviors and norms of local residents and potential voters to their neighbors, communities, and spatial networks. They also emphasize that all institutions also have a geographically-defined character, with “regional, continental, and global footprints that define the character, operation, and resources of those institutions” (ibid 137). Hence racist policies such as Jim Crow Laws, political attacks on African-Americans, and challenges to desegregation grew out of specific places and spatially-rooted histories in North America. For those scholars involved in research on land use conflict, the broader analytical tools and methodologies of political geographers would be of great benefit.

In understanding issues such as location and demographics, political geographers and social scientists alike have moved to studies based on geographic information systems (abbreviated as GIS) analysis and quantitative analysis of larger numbers of cases. A number of scholars have shown the applicability and usefulness of these techniques in their work on controversial facilities. S. Hayden Lesbirel’s (1998) ground-breaking work on nuclear and thermal power plant siting in Japan used a large scale dataset from which he was able to investigate the factors which sped up or slowed down the siting processes. Lesbirel argued that he found “considerable predictability in the nature of participants who become involved in siting disputes, the patterns of those participants’ responses to projects, and the relationships of those responses with approval times” (1998: 142). By linking the number of months necessary to site and build nuclear power and fossil fuel power plants to factors such as electricity demand, political party composition in the area, and bargaining patterns, Lesbirel used quantitative analysis to reveal broader models of the decision-making heuristics of Japanese utility companies. Importantly, Lesbirel linked the events in Japan to broader theories on negotiation and compensation, and allowed scholars in other field to utilize and apply his insights.

Other empirically sound analyses have utilized a combination of geographic, socioeconomic, racial, and political data in their work. Ann Wolverton (2002), for example, used data from the North American Toxic Releases Inventory (TRI) in combination with demographic and industrial variables to investigate claims about connections between location decisions and race. Importantly, her analysis linked together detailed racial, income, and other socioeconomic data with government-mandated data produced by federal facilities and industry

groups, and used that large amount of information to illuminate the connections – and, in some cases, lack therein – between standard theories on race and locational decision making.

Other work in social science has used large data sets based on geographic information to uncover otherwise hidden relationships between place and political mobilization. Cho and Gimpel (2007) investigated the clusters of labor and capital necessary for political campaigns, building on past research that has tied a higher presence of campaign volunteers to metropolitan areas with greater levels of existing networks. Geocoding information on the location of volunteers and contributors to the campaign allowed them to link together both historical information – for example, who voted in past elections – with new events, such as the discovery of new contributors and the work of new volunteers. With a geographic dataset linked to political, demographic, and historic variables, Cho and Gimpel were far better equipped to analyze important questions of place than standard, alternative methods.

### 3. POTENTIAL EXPLANATION FOR LOCATIONAL DECISION MAKING

Drawing from the literature on the siting of unwanted projects, and recognizing the importance in laying out all possible explanations for phenomena, we can identify six common explanations for the patterns by which these types of facilities are sited. Table 1 below summarizes the potential reasons why authorities may chose one location over another.

Technocratic criteria assume that siting decisions ignore local demographic, political, or economic conditions, and select on the objective merits of the location. Dams should have water-resistant bedrock, nuclear power plants should be adjacent to extant power grids, flat land and strong headwinds are desirable for airports, and so forth. Although developers and political authorities frequently reference technocratic criteria (Jackson and Jackson 2006), research has shown that once we take such technocratic criteria into account, siting is not random. Developers do make sure that their selected sites pass some minimal threshold of meteorological, geological, and geographic benchmarks, but at that point other factors come into play (Aldrich 2008). Put another way, when making decisions, technocratic criteria are satisfied, but not maximized.

Two forms of discrimination theories exist for siting unwanted facilities. The first is political discrimination, and rests on the premise that the political party in power punishes their opponents by placing unwanted facilities in their backyard. In Japan, for example, scholars argue that the hegemonic Liberal Democratic Party (LDP) has deliberately placed nuclear reactors in the backyards of opposition party politicians (Ramseyer and Rosenbluth 1993).<sup>32</sup> The second form of discrimination is racial, and argues that racial and ethnic majorities in power use their positions to place unwanted facilities in the backyards of minority groups (Bullard 1994).<sup>33</sup>

Another theory about the distribution of facilities is that authorities place controversial facilities in underdeveloped and impoverished communities, recognizing that such localities are often more willing to take unwanted projects because of potential income from relevant taxes and employment. Alternatively, wealthier communities can hire better lobbyists, lawyers, and

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<sup>32</sup> There is, at present, no evidence to support this argument, at least in the siting of facilities in Japan (Aldrich 2008; Aldrich forthcoming).

<sup>33</sup> Many scholars seeking evidence of discrimination looked at current racial and demographic conditions and assumed that those statistics applied in earlier times, ignoring the actual demographics of the time period in which the facilities were sited. When Wolverton (2002) retested the hypothesis put forward by the GAO and UCC, she discovered that “race and the presence of TRI facilities (in Texas) are currently correlated, but [found] no such correlation at the time of siting” (Becker 2004:4 fn 3). Studies of facility siting continue to use current day demographic data when studying relationships between ethnicity and siting (cf. Pine, Marx, and Lakshmanan 2002). While a disproportionate number of North American facilities are located near minority populations, it is not clear whether this is the result of discrimination.

activists to fight off unwanted projects. Empirical results for socioeconomic-based siting have been mixed (Mohai and Bryant 1992). An alternative approach focuses not on the power of the community, but on the power and influence of the politicians from the relevant area. Politicians, at either local, regional, or national levels, can intervene in the siting process if they have sufficient influence. These power-brokers may lobby developers and bureaucrats to bring “home the bacon” to their constituency, envisioning projects such as nuclear power plants as benefits, and not negatives (Tanaka 1972: 102-104). Alternatively, politicians may seek to ensure that their constituents are not saddled with local public bads.

Table 1. Six Explanations for Siting Outcomes

<i>Explanation</i>	<i>Logic</i>	<i>Key Siting Criteria</i>
<b>Technocratic criteria</b>	Bureaucrats control siting process, overlooking politics and local feedback.	Hydrology, geology, and meteorology
<b>Partisan discrimination</b>	Dominant political party punishes political opponents.	Concentration of political opponents
<b>Racial/ethnic discrimination</b>	Racial/ethnic majority punishes minority.	Concentration of ethnic and racial minorities
<b>Economic conditions</b>	Wealthy neighborhoods push away facilities; poorer ones seek potential jobs, taxes, and income.	Socioeconomic status of community
<b>Political intervention</b>	Strong politicians bring home what they see as “pork” or push away “bads.”	Number and strength of legislators to intervene in process
<b>Civil society characteristics</b>	Mobilization against facilities depends upon quality and capacity of voluntary groups.	Solidarity and relative strength of groups within civil society

Note: Adapted from Aldrich 2008

A final but critical approach to siting rests on the recognition that “social capital, defined by trust and cooperation, facilitates collective action to address community issues” (Poley and Stephenson 2007: 5). These works on civil society recognize that social capital and civil society are not distributed evenly across societies or even over urban spaces: certain neighborhoods hold more densely networked populations, while others are more atomized. Stronger community networks allow them to overcome the typical barriers to collective action recognized by Olson (1965). Further, qualitative research has shown that anti-facility organizations with strong internal networks are better able to expand their goals beyond single-issue ones (such as stopping the proposed project) to broader, multi-issue ones (such as environmentalism, civil rights, and so forth) (Shemtov 2003).



Communities with higher levels of social capital are most likely to strenuously and continuously resist siting attempts. Developers and government officials seeking locations for unwanted facilities seek to avoid delay and controversy and evaluate potential host communities through a variety of mechanisms, including “windshield surveys,” local polling, focus groups, conversations with power brokers, and past voting records. Once a community has been judged strong or weak in its mobilization potential, site projects only in those areas judged to be weaker in civil society.

#### 4. CIVIL SOCIETY

Social scientists have come to take the role of civil society seriously in studies of economic and political development. The work of well-established scholars like Robert Putnam (1993, 1995, 2000, 2007), Jonah Levy (1999), Koichi Hasegawa (2004), and others influenced institutions, such as the World Bank, to promote civil society as a way of fighting corruption, improving governmental efficiency, and growing economies. Further, some social scientists have argued that civil society plays a role in processes ranging from decreasing homicides and crime rates (Matthew and Bartowski 2004) to speeding up recovery from disaster (Nakagawa and Shaw 2004). Recently, social scientists have begun to use the concept of civil society in studying locational decisions.

A number of cases have confirmed the importance of social capital in the site selection process. Surveyors use what are colloquially called “windshield surveys” of potential sites for low-level radioactive waste. The surveyor drives through a community observing signs of poverty and low social capital, such as uncut yards, trailer parks, and boarded up windows. In one case, uncovered through court documents, a surveyor had noted the large number of trailers in the area and marked it down as “in” the candidate list (as opposed to being excluded). Here, surveyors paid close attention to local signals of potential resistance to siting plans (Sherman 2006).

Gabrielle Hecht’s work on France (1998: 248) uncovered a potential connection between siting decisions carried out by the French government and the state-owned utility EDF (*Électricité de France*). Her work illuminated regional surveys carried out by the state in the late 1950s which showed that the northwest coast had the most favorable reception for potential nuclear power plants. EDF attempted to build nuclear power plants precisely in the areas identified by earlier surveys as having a more pro-nuclear attitude, such as Brittany. However, despite the survey results, which seemed to indicate that the Normandy area would be less hostile to plans for atomic power, these communities strongly fought against the government’s plans. If France, known to be a strong state which regularly “steamrollers” its citizenry, takes local levels of social capital into account, it should be no surprise that authorities in England similarly carried out pre-selection surveys of potential nuclear power plant host communities when making siting decisions (Rüdiger 1994).

Studies show that firms, wary of additional costs of litigation, regulatory hearings, and damage to their reputation, seek to site new controversial facilities or expand existing ones in those areas where local communities are more receptive, or at least less hostile to their plans. Based on data on firms in 156 American counties during the 1980s, Hamilton uncovered a strong relationship between measures of potential resistance in the area and the firm’s decision to expand their hazardous waste storage, processing, or disposal facilities. Relying on the voter turnout in presidential elections as a proxy for mobilization potential and holding constant a number of other factors, such as local capacity surplus, the demand for waste processing, and socioeconomic factors, Hamilton found, “that firms processing hazardous waste, when deciding where to expand capacity, do take into account variations in the potential for collective action to raise their costs” (Hamilton 1993: 101).

Other studies have shown that tighter social networks create institutions and policies which can keep out unwanted facilities. Using data on 164 American metropolitan areas, Clingermayer (1994) investigated the density of exclusionary zoning devices, such as prohibitions on the siting of group homes for alcoholics, mentally retarded, and juvenile offenders. Controlling for a number of factors, including home ownership, racial composition, socioeconomic status, and the like, he found that “ward representation variable is positively and significantly related to the exclusion of group homes. This effect is far stronger than that of any other variable in the model” (Clingermayer 1994: 987). The factor of ward representation enhances the homogeneity of the community, making it more likely that constituents in that politically-defined area are more alike – racially, ethnically, and so on – than dislike. In such areas, research has shown that at least in the short- and medium-term, social capital is higher and interpersonal networks dense (Putnam 2007).

Recent research on post-Katrina New Orleans similarly uncovered strong relationships between social capital and mobilization potential and siting decisions by the City of New Orleans and FEMA. Following Hurricane Katrina, local and national emergency officials wanted to begin placing temporary housing, usually in the form of travel trailers, in and around New Orleans. Although intended for residents as they restored their water-damaged dwellings, and for temporary workers, emergency personnel, and government authorities, was the officially stated goal of city planners, residents, and government officials, local residents saw the temporary “FEMA” trailers as an eyesore and a potential hazard to their neighborhoods, and resisted the siting of such facilities in their backyards.

Against this backdrop, the City of New Orleans and FEMA worked together to draw up lists of potential sites for trailers and trailer parks. Aldrich and Crook (forthcoming) analyzed the data for 114 zip codes in and around New Orleans, including factors that measured socioeconomic factors, race, floodwater damage, education, and house ownership. Only one variable had a strong, significant relationship with the number of trailers slated to be placed in the zip code: turnout in the presidential elections. Local communities with stronger voluntarism through turning out to vote were exactly the communities which received plans for fewer trailers. Aldrich and Crook argue, as Hamilton (1993), Putnam (2005), and others do, that higher turnout for elections reflects altruism and voluntaristic tendencies, which are signs of denser social networks and deeper social capital.<sup>34</sup>

Those areas which were less densely populated by volunteers and altruistic-types were the areas selected by the city to receive the brunt of the trailer burden, as shown below in Figure 1. The solid line represents the predicted number of trailers, per zip code, based on voter turnout, holding other factors, such as race, socioeconomic conditions, and flood damage constant. The dotted lines represent the 95 percent confidence intervals around the estimate.

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<sup>34</sup> Voting, even in advanced industrial democracies, requires the expenditure of time and brings with it opportunity costs, such as lost time at work, recreation etc. Further, the actual benefits of voting are hard to quantify, and for many citizens, hard to justify. Hence scholars understand that those who turn out to vote are demonstrating an “other-focusedness” in which they are willing to expend resources to participate in the election process.

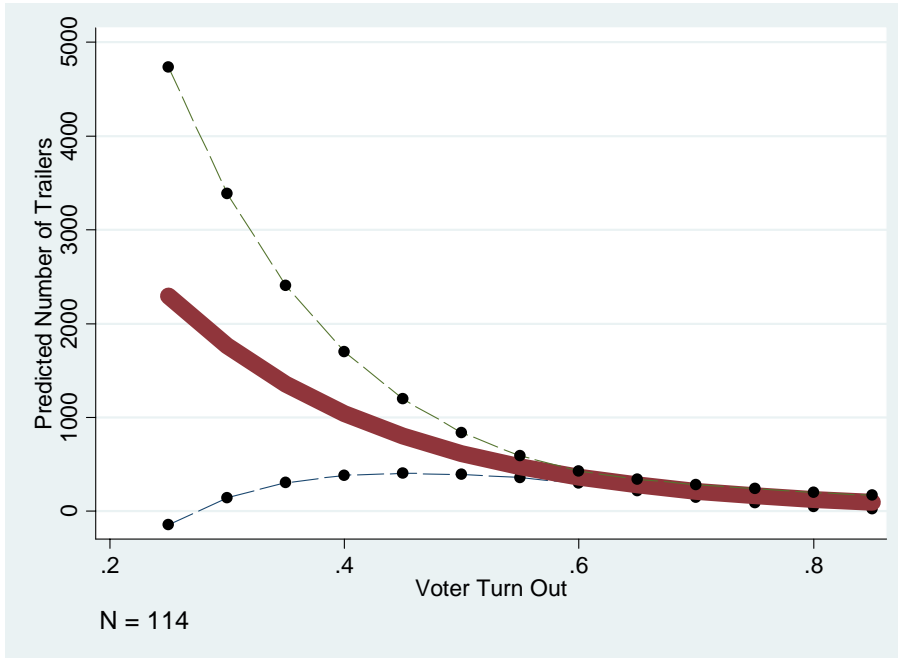


Figure 1: Trailer Placement Linked to Strength of Civil Society

Note: Data from Aldrich and Crook (forthcoming)

A zip code where the vast majority of the population – eighty percent – turned out to vote was slated to receive only 100 or so trailers, while an area which had very few – thirty percent or fewer – would receive 10 times as many mobile homes. It is not just North American authorities that take civil society into account when siting controversial facilities, however.

In Japan, governmental authorities have been strong and consistent entrepreneurs in the field of commercial nuclear power. Although private utilities handle the vast majority of responsibilities for planning, constructing, and managing Japan’s 55 nuclear power plants, the state subsidizes the industry with favorable loans and research grants, amortized risk through a variety of insurance and re-insurance mechanisms, and channeled hundreds of millions of dollars in funds from a submerged tax on electricity use to funds which are distributed to host communities for nuclear power plants. The state has created these various policy instruments in the face of widespread fear of and opposition to nuclear power, an obvious situation given Japan’s three fatal experiences involving nuclear weapons: Hiroshima, Nagasaki, and the “Lucky Dragon” fishing boat incident in 1955. Against a broad “nuclear allergy” (*kaku arerugi*), the state has supported private electric power companies (EPCOs) in their search for suitable sites for atomic reactors.

Beginning in the late 1950s, and continuing through the 1970s, the Ministry of International Trade and Industry (*Tsūshōsangyōshō*, then known as MITI, as of 2001 its name was changed to METI) helped survey potential host communities. Official documents revealed that planners looked closely at the strength of local civil society organizations, especially fishing and agricultural cooperatives (known in Japanese as *nōgyō* and *gyōgyō rōdō kumiai*). Decision makers noted closely the density of these associations, recognizing that more powerful, better connected groups would likely be the first to organize against planned nuclear power plants in their vicinity.

A quantitative analysis of close to 200 localities across Japan shows that when utilities and government authorities encountered areas with weak or weakening civil society organizations,

they were far more likely to select such towns and villages as hosts for nuclear power plants. Figure 2 below shows that an area which merely maintained its original membership in fishing and farming cooperatives – that is, had no change – was as likely to be chosen for a nuclear power plant as an area which increased the strength of those civil society groups. However, once a locality lost thirty percent or more of the strength of its cooperatives, its probability of being selected as a nuclear power plant host community, holding all else equal, increased a hundred fold.

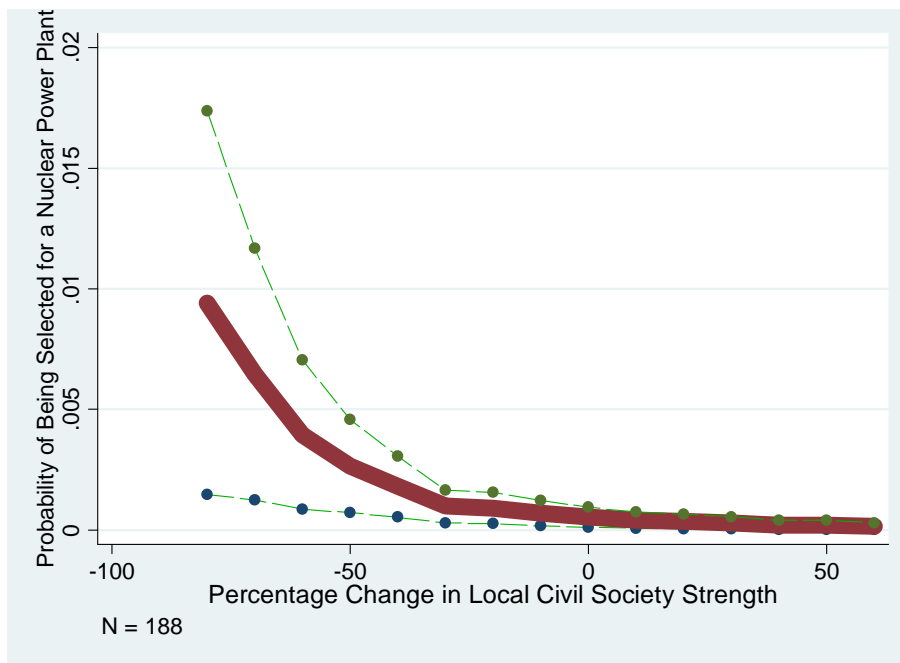


Figure 2. Decreasing Civil Society makes Localities More Attractive to Developers

Note: Data from Aldrich 2007 and Aldrich 2008

It was precisely these fishing cooperatives and other local civil society groups that, when intact and powerful, could stall the siting of nuclear power plants for years (Lesbirel 1998). For example, Iwai-shima fishing cooperatives in the village of Kaminoseki helped lead the resistance against planned nuclear power plants there for decades. As in the previous figure, the solid line at the center of the above figure is the predicted probability, in this case, the potential that any technically suitable locality has for being selected as the host for a nuclear power plant. The dotted lines on either side of the solid line are the 95 percent confidence interval, as explained above.

Japanese government planners used a similar set of decision making tools when planning sites for airports. As the government discovered at the Narita Airport case, local residents were often quite upset at the noise pollution generated by the sound of enormous jet engines over their heads (Apter and Sawa 1984), and this resistance has been seen in France (Feldman and Milch 1982; Feldman 1985). As Figure 3 below demonstrates, a locality which simply maintained or even increased the strength of its local civil society organizations – primarily fishing and farming cooperatives in these cases – was very unlikely to be chosen as the location for a large scale, government managed airport. However, when such a locality began to lose members in those civil society organizations, the state considered it a far better target.

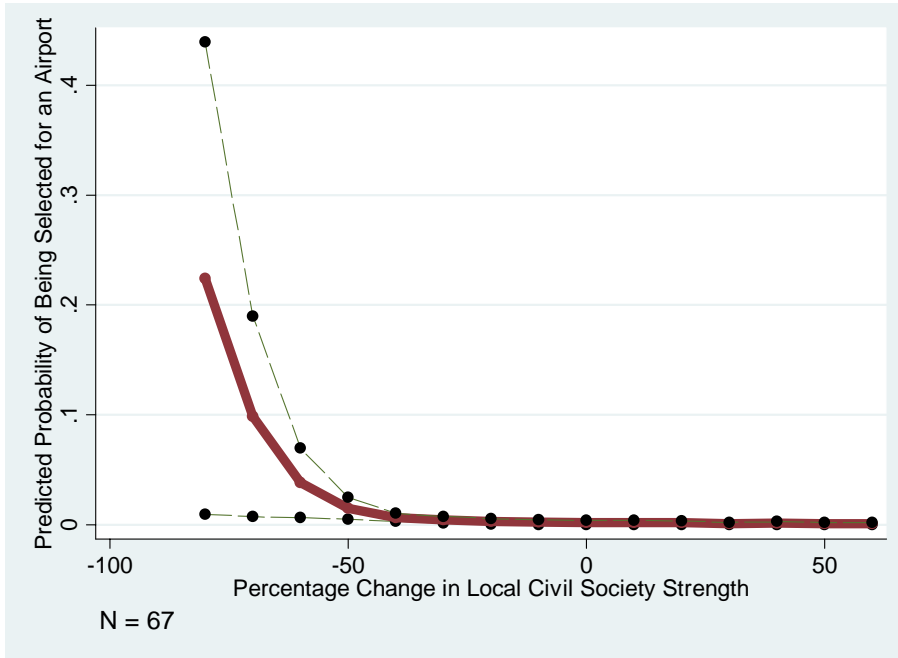


Figure 3. Weaker Civil Societies More Likely to be Chosen as Hosts

Note: Data from Aldrich 2007 and Aldrich 2008

Hence the probability of a town or village which has lost more than 50 percent of its farmers and fishermen has for being selected as a host community for an airport is around 1 percent, while a locality which has lost upwards of 80 percent has a 20 percent chance of being chosen.

Given the plethora of evidence that authorities, both governmental and private, take civil society seriously when choosing sites for controversial facilities, the next question is obvious. Are these decision makers choosing wisely? It could be that, while they imagine that an area rich in interpersonal connections will be a poor target for an unwanted project, it might not resist any more than an area that with sparse social capital. Using 208 attempts to build nuclear power plants, dams, and airports in the latter half of the 20<sup>th</sup> century, I analyzed the outcome based on the strength of local group membership. As Figure 4 below displays, an area which was able to maintain or increase the strength of its membership in fishing and farming cooperatives was far better positioned to fight off attempts at controversial facility placement. As in the previous figures, the strong solid line at the center is the predicted probability of the quantity of evidence, namely the chance that the proposed facility will be completed.

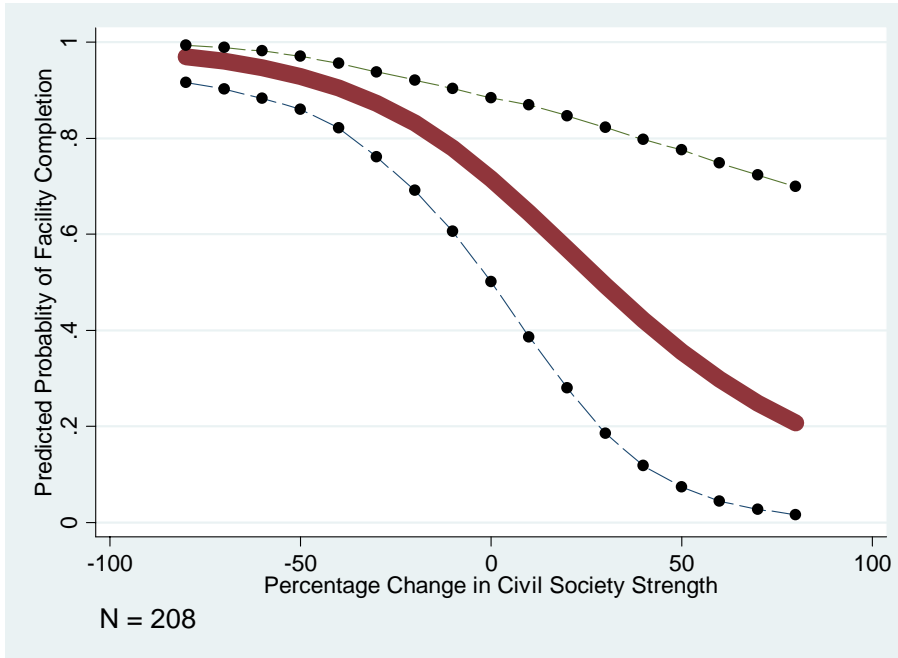


Figure 4. Strength of Civil Society Predicts Success or Failure of Public Bads

Note: Data from Aldrich 2007 and Aldrich 2008

A town or village which had lost essentially all of its membership in civil society associations – meaning a loss in the potential of that area to mobilize and defend itself from proposals for public bads – faced a daunting prospect. Facilities in these localities had close to a 90 percent chance of coming to completion. Completion here is defined as the event where, for example, a nuclear power plant would come on line and produce power, a dam would begin to generate hydroelectricity, or an airport would open to planes. On the other hand, where social movements and associations increased in strength over time, the probability of a proposed facility being completed dropped tremendously, to only 30 percent.

Planners in North America, Japan, France, and England who have taken civil society seriously have recognized an empirical fact: a strong local civil society can more easily sabotage unwanted projects than weak ones. Dense interpersonal connections facilitate the community's capacity to work together, mobilize, and defend themselves against projects they see as bringing primarily negatives in their backyards. Weaker communities, though, where individuals do not volunteer, or join groups, or work together easily, are more likely to fragment under pressure and make better targets for developers.

Not all authorities seem to recognize the power of the people, so to speak, when it comes to potential siting conflict. The British Government in mid 2007, for example, seeks to embark on a new nuclear program, but as experts have pointed out, "The availability of potential sites will therefore directly affect the government's view of the overall feasibility of a new nuclear build programme and the development of its energy policy" (Jackson and Jackson 2006: 5). Many pages of a commissioned report on potential sites underscore the various technical criteria for siting plants: distance from existing electrical grids, need to be near supplies of water for cooling, distance from highly populated areas to allow for evacuation. But nowhere does the report discuss local reactions. Despite various graphs and figures in the report which discuss the appropriateness of new and existing nuclear sites, none of the facts involve local opinion

polls, measures of civil society, or the strength of anti nuclear groups in the area. Such an approach ignores the power of civil society at its peril.<sup>35</sup>

## 5. BROADER QUESTIONS: AVENUES FOR FUTURE RESEARCH

Having demonstrated the importance of civil society in the heuristics of locational planning, I now look briefly to broader issues relevant to NIMBY politics. I envision two larger areas of theory growing out of work on local public bads: policy instruments and the benefits of conflict between state and civil society.

First, a relatively uncharted field of study focuses on the policy instruments used both by the state and by social movements in conflict over these types of issues. When seeking to convince recalcitrant local communities in Japan of the benefits of hosting nuclear power plants, despite any accompanying risks, the government there has created a number of new policy tools to assist its goals. Among these are “submerged” taxes on electricity use which funnel money to peripheral communities which agree to act as host communities. The *Dengen Sanpō*, or Three Power Source Development Laws, created in 1974 by the Japanese government can provide often impoverished, depopulated local rural communities in Japan with up to \$20 million a year in subsidies, grants, and special programs. France and Japan both have experimented with similar jet fuel and travelers’ taxes which funnel money to local communities hosting airports; the bulk of the funds are spent on noise mitigation strategies.

Beyond important questions of such submerged or “iceberg” policy instruments which impact the attitudes of local residents without being affected by typical budgetary or legislative politics (Howard 1997; Hacker 2000), these tools are only some in a broader toolkit of potential instruments available to decision makers. In the United States, the 2005 *Kelo v. New London* decision has reinvigorated discussions of the takings clause and the scope of the government’s power of eminent domain. The three decade struggle over the Narita Airport was touched off by the decision to use land expropriation against local farmers (Apter and Sawa 1984). Research on policy instruments is being stimulated by a new generation of scholarship. The January 2007 issue of *Governance: An International Journal of Policy, Administration, and Institutions* brought in the guest editors of Pierre Lascoume and Patrick le Gales to re-examine the issue of policy instruments.<sup>36</sup> Our work on cases of state-civil society interaction over public bads can contribute a great deal to answering questions about policy instruments.

A second field of research to which our studies can contribute is that of the *benefits of conflict* between civil society, whether local or extra-local, and authorities, whether governmental or private. Some earlier researchers worried about “excessive” conflict between state and civil society which might indicate long-term instability or potential collapse of industrialized governance (Crozier, Huntington, and Watanuki 1975). Despite such concerns, they seem to have been misplaced. Research now has focused on the ways in which conflict between even local residents and states can lead to better, more sustainable plans. For example, Greg McAvoy (1999) emphasized how contestation between communities in Minnesota and the state and federal governments over planned waste disposal facilities forced the state to reconsider its options. Looking back on the options available to the state at the time, it is now clear that had the state gone ahead, it would have invested millions of dollars in poorly tested, less useful technologies and been locked into a less efficient approach to waste. Instead, “Not in My Back

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<sup>35</sup> Interestingly, the bottom line for British planners is a strong push to build new plants on the sites of existing, but decommissioned or soon to be decommissioned reactors. Despite a lack of open discussion about the role of public acceptance, authorities recognize that once a plant has been placed in an area, the local population is less likely to resist future sitings due to habituation to the facility (see Aldrich forthcoming, 2008).

<sup>36</sup> See also Aldrich 2005 for a discussion of country-specific tools when siting controversial facilities.

Yard” opposition from citizens pushed the state to create new, more efficient plans for handling waste.

Similarly, Aldrich (2008) has illuminated how long-term contestation between Japanese citizens and the central government of that nation forced the development of a new set of “softer” policy instruments which moved away from expropriation, police force, and other standard, Weberian policy tools. While a number of different government agencies in Japan handled conflict with local citizens over the post-War period, only those bureaus encountering long-term, high level contestation from well-organized civil society developed more sustainable tools for handling conflict now and in the present. Hence new policy instruments and innovative strategies can be created through contentious interaction between states and civil society in the field of unwanted projects, and we should use our knowledge to further such investigations.

## 6. TOWARDS THE FUTURE

How can we apply our growing understanding of NIMBY politics to larger, world wide concerns? Given new recognition of the dangers of global warming and greenhouse gasses, (thanks to new media such as Al Gore’s *An Inconvenient Truth*), a number of technologies – both familiar and untested – are being raised as potential solutions to reducing emissions. The nuclear power industry is gearing up for a “renaissance” of nuclear power, wind turbines are becoming popular among fans of green energy, and proponents of carbon sequestration hope to tackle the back end of the problem by placing carbon dioxide in buried reservoirs.

In this new environment, with planners concerned over the gasses emitted by typical thermal type electricity generation, such as coal, nuclear power has been given a new life. The Bush Administration, through a series of generous tax breaks and subsidies, has sought to restart the North American commercial nuclear power program, and some investors have joined the bandwagon. Proponents of nuclear power have adopted a new “frame” when discussing it, emphasizing the green aspects of nuclear technology despite arguments beginning in the 1970s from anti-nuclear groups that such power plants are the cause, not the solution, to environmental problems (Pralle 2007).

Whatever the future holds for nuclear power and alternative energies, the fate of such facilities rests solely in the hands of local residents. Environmental groups, local fishing cooperatives, and residents already oppose trials of carbon sequestration and research suggests little difference between plans for sequestration and other projects promoting the “public good” (Schively 2007b). While policy makers envision the smooth implementation of new technologies, for local residents, weigh potential local costs over diffuse social benefits. Civil society has been a critical factor in the ways in which divisive facilities are sited in the past, whether nuclear power plants or trailer parks, and it will continue to play a role around the world as citizen expectations for their governments rise and transparency increases. Too often, planners and social scientists alike have overlooked the fact that the power – and hence the future success or failure of these technologies – truly lies in the hands of the people.

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# INFORMAL EXCHANGE NETWORK AND THE NIMBY DISPUTES IN DEMOCRATIZATION: REFUSE INCINERATOR POLITICS IN TAIWAN

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## Abstract

The vast literature on the process and consequence of democratization largely neglects a very important aspect of political reality, the political gridlocks caused by overloads of participation. Changes in ideology, institutional settings, and political practices after democratization have spurred one wave of social movements after another, especially those right-defending ones because of the prevalence of liberalism. Among these movements, the most prominent one has been the NIMBY protest. While neither administrative expertise nor institutional settings are available for the authority to manage such governing challenges, how would political elites have coped with the problems? The case of Taiwan indicated that the informal exchange networks that have prevailed in pre-democratization era offered some effective measures and increased the odd to succeed in implementing siting decisions. While these networks are often criticized for causing policy inefficiency and being corruptive in nature, and thus became a target for further reforms, they seemed to be essential in supplementing the deficiency of formal institutions in troublesome siting gridlock.

**Keywords:** Patron Client Networks, Grassroots Activism, Environmental Impact Assessment, Informal Politics, Noxious Facility

## 1. INTRODUCTION

Not-In-My-Backyard (NIMBY) or Locally-Unwanted-Land-Use (LULU) protests has emerged as a special type of environmental movements and attracted scholarly practical attention in recent decades (Shaw, 1996; Lesbirel and Shaw 2005). While protests against specific public facility projects by local activists are not uncommon in most industrialized countries (Rabe, 1994), they have become especially thorny issues plaguing many newly democratized countries. Theoretically, this kind of protests can happen only in a regime with a certain degree of civil freedom. In an authoritarian or totalitarian political system, such noises could easily be deterred or muffled through such forceful means as crackdowns, arrests, or even blunt assassination. As the authoritarian control unshelved, friendlier political environment will encourage citizens to speak up their minds and thus fermented such protests. These protests should then pose great challenges to the democratic neophytes who have essentially no experiences in dealing with such participation overloads with intensified confrontations, while the institutional capacity for public authority to manage such contentions is still yet to be built up. Political gridlock seems to be a quite expectable result.

Based on such understanding and reasoning, it is puzzling to find out that Taiwan has built up more than 22 median-large refuse incineration plants in the two decades after

democratization,<sup>37</sup> with a total capacity almost 70% higher than the overall demands.<sup>38</sup> Refuse incineration facility is a typical NIMBY facility because it triggers the concerns with possible environmental degradation (such increasing traffic loads by garbage trucks and associated bad smell), health risks (e.g., dioxin spread through the chimney, and consequential depreciation of real estate values. These negative traits of incineration plant make the siting decision very unlikely to be achieved via a voluntary approach. Then, what explains such exceptional success in terms of overcoming the NIMBY protests?

It seems less because that the protests in Taiwan have been less tough to deal with. A scrutiny indicates that strenuous and violent resistance in planning process did occur and become a great headache for the governments in different localities. There were also numerous proposed projects that have been forced to drop after a prolonged period of negotiation. Nevertheless, many stubborn objections in some corners were eventually settled one way or the other. How have these been achieved? What mechanisms were actually working? By citing a case in central Taiwan, this paper demonstrates the incentive structures of different stakeholders in the NIMBY protests, the strategies that local political elites have applied to change the incentive structures, and the problems of such informal politics that would encounter in later stages of democratic development.

## 2. POLITICAL REFORMS AND NIMBY PROTESTS

NIMBY syndromes in the course of democratization is worthy of more scholarly attention not only because of its practical importance in the capacity-building of the nascent democracies, but also because of the theoretical implication in the adaptation of political elites to active grassroots participation in public affairs. In a broader sense, a study of NIMBY details political elites' tactical adaptation to new political contingency as well as the institutional evolution to changing political values in the course of democratization. Such illustration will improve the general understanding on the nature of democratic consolidation.

The initiation and deployment of democratic reforms provides favorable conditions for the NIMBY protests to emerge. By nature, a NIMBY protest is easy to mobilize because of its unique interest distribution structure-- a mixture of a public good and private bad in economic terms (Frey et al. 1996). Since the siting policy imposes intensive costs to a relative small amount of stakeholders who are concentrated geographically, the alerted cost bearers not only have strong incentive to participate the collective action, but also encounter less mobilization costs in organizing political actions. The possible free-riding problem, according to Olson's (1965) savvy,<sup>39</sup> tends to be effectively handled by the seriousness of potential losses, strong solidary incentives, and thick local networks serving as monitoring mechanisms. Such protests were not popular in authoritarian regimes, however, mainly because all bottom-up mobilization for political actions were subject to stringent control by the authority, while the struggles to defend individual rights was also less legitimate under the dominant ideology of supreme collectivity (such as class or nation).

As political liberalization was initiated for whatever reasons, NIMBY protests found their way out of the previous constraints. On the one hand, more citizens started to be released from

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<sup>37</sup> By median-large it means the incineration capacity over 300 tons per day. Up to the end of 2006, there were 22 such plants in operation, while addition two were built but not yet in operation because of political entanglements.

<sup>38</sup> The total amount of general waste collected by the governments was about 7 million tons per year, within which about 4.4 tons were managed by incinerators in 2006. Yet the total capacity of incineration plants in Taiwan reaches 7.2 million tons. Figures collected from internal document of EPA.

<sup>39</sup> According to the typology developed by Oye and Maxwell (1994), NIMBY is an "Olsonian scenario" in which concentrated cost-bearers are fighting against diffused-beneficiaries.

the mentality of collectivity and learned more about their basic rights on refraining from property rights and health infringement. They became more willing to engage in right-defending actions because the costs of participation reduced: less likely to be stigmatized, arrested, or jeopardized physically. In the meantime, the gains of collective actions also became accessible. As elections became fairer, administrative procedures crystallized, rules and laws followed more strictly, and power among governmental branches were more balanced, the system rendered more leverages to policy stakeholders to make the public authority more responsive to their interests. Furthermore, as more and more social movements successfully pressed their demands, the experiences would be shared by different groups and in different localities. Through such social learning, potential protesters might acquire a sense of political efficacy for further appealing actions.

As shown in the case of Taiwan, victim protests against existing pollution prevailed first among different kinds of environmental movements. These protests burst out as authoritarian control began to loosen in early 1980s and posed great challenges to the authoritarian regime. Since pollution was usually a matter of live and dead incident, victims usually had very strong incentive to get remedial measures from governments by all, legal as well as illegal, means. At that time the nationalist party (Kuomintang) considered such protests less threatening because the protesters had no political ambition in overthrowing its ruling status. Therefore it decided to concede to their demands and granted huge amount of compensation to prevent the victims from becoming the supporters of emerging political opposition force. As these victim protests succeeded, similar protest and negotiation strategies were widely applied by other social protesters. Potential victims near the noxious facilities therefore learned to fight for their own interests and became the mainstream of environment movements in late 1980s and early 1990s. On the one hand they were encouraged by the success of these pollution protests. On the other hand, they were also alerted by grievance of earlier pollution incidents and thus lost faith to the governmental promises on this matter.

Another important element of NIMBY conflicts is the degree of risk that these facilities usually involve. The concept of risk is the combined effect of the seriousness of the impacts and the probabilities of inflicting such impacts. When either is high, the risk tends to be less tolerable. When the risk becomes too high to tolerate, it becomes the less likely to use compensation or other voluntary means to solicit consent from the hosting community. In addition, the types of impacts matter too. When it refers to threat to health, especially the irrecoverable damages, the risk tends to be less acceptable and the incident tends to involve more emotional ingredient, and thus less likely to be managed by a voluntary agreement between facility owner and hosting residents. Further, the assessment of risk might be more a political than scientific issue (Hiskes, 1998). It involves identifying and interpreting scientific evidence, communicating between experts and laymen, and the consequential perception of risk by the public that might in return have some effect on social construction of risk reality in later stage.

One special condition that increases the difficulty of noxious facility siting is the uncertainty of the risk level. There are usually debates on the assessments of either the probability or the consequential impacts. Stakeholders in different positions choose to believe and spread the information favorable to their interests, while the cogent evaluation is either nonexistent or hard to identify. Such uncertainty and lack of trustworthy information create high transaction costs and thus great obstacles to reach agreement between facility builders and candidate communities (Lake, 1993). A creditable public authority in providing or assuring the accuracy and reliability of information thus is very important for solving the siting gridlock.

Although advanced democracies can not refrain from such NIMBY syndromes either, such protests in new democracies have some features that make them even harder to manage. First, after a long period of authoritarian rein, the governments were used to make decision in an isolated environment and were very insensitive to grassroots demands and public images

associated with the decisions. They had no experience and thus no intention to design policies by inviting inputs from stakeholders in advance, which would inevitably complicate the matter a lot. Therefore, even though public participation has become a norm for technocrats after democratization, they still tried to hide their decision making endeavors behind the veil of complicated administrative procedures and regulations.

Second, sometimes technocrats would like to take stakeholders' interests and opinions into account, yet there could be essentially no institutional channels to govern the intensified conflicts in interests. Since the facility usually had to be sited either here or there, activists in different localities were actually in competing positions. While the public authority tended to follow the least-resistance approach in siting decision because of the lacking of effective mediation and negotiation mechanisms, whoever was less tough would be victimized. Consequently, confrontation usually escalated to an unbridled scale.

Third, once a site is targeted, there is a negotiation process between facility owners and local residents. The government either as the facility owner or as the third-party to promote the policy by assuring the redemption of the promised deals needs some credibility to reach an agreement with the opponents. The credibility is even more important when the degree of risk is higher. Nevertheless, evolving from its authoritarian predecessor, the new regime accumulated very limited trust from the ruled. Arbitrary and sometimes predatory decisions were legacy of authoritarian rules while rent-seeking and corruptive endeavors in the name of public interests prevailed. Such bad reputation has also prevented the technical evaluation or assessment on risk level of the facility by the bureaucrats from being reliable, while the absence of assurance mechanism to carry out the promised contracts by facility proponents made such deal very unlikely to be reached at least in earlier phase of democratization.

Forth, NIMBY issue has already been highly politicized for uneven distribution of benefits and costs. It will become even more difficult to manage if politicians try to solicit private interests through such incidents. In nascent democracies, periodical elections are held to become avenue for opposition forces to access to ruling status. Yet the incumbent candidates usually take advantages the public resources at hand and take the credit of the success in siting the unpopular facilities. The opposition forces, in contrast, were very feeble in this stage and need opportunities to promote themselves. A confrontation incident like this would attract media attention and thus can gain publicity by combining election campaigns and protesting movements. The tried very hard to dig out uncovered scandals, helped in organizing protest activities, and solicited external supports for local activists. Although such involvement of opposition politicians was not unusual in mature democratic systems, the sabotage effects became especially prominent in democratizing context mainly because the rule of games were not in place and the drastic means allied by both sides tended to further ruin the foundation for possible cooperative solution.

### **3. INFORMAL EXCHANGE NETWORKS AS THE SOLUTION VENUE FOR NIMBY**

Given aforementioned features, siting noxious facilities in a democratizing context tends to be much more complicated and thus the common practices in western countries might not be applicable. Theoretically, two broadly defined categories of solution tactics can be identifies, namely, coercive (strong-armed regulatory or preemptive) and voluntary (cooperative, incentives-based, or consensus-building) ones. In practice, however, a combination of both kinds of tactics has usually been the case in struggling to overcome local objections. Coercive measures have become less legitimate and too political costly when the dispute-solving system is yet to be built but the decision making politicians have been subject to periodical verdicts of elections. Neither a voluntary deal would be achieved in such a high uncertainty, low credibility

transactional scenario. More sophisticated compensation schemes would therefore be proposed and more politicized negotiation process should be expected.

To understand the source and essence of NIMBY issues, such terms as transaction costs or market failure in economics are very helpful. Yet to understand why NIMBY has actually been overcome in the democratization context, it is better to check the political process through sociological lens. It is a political decision in which some members of the system try to exercise coercive power over others, imposing some costs on other members who would not like to bear. Nevertheless, it is less a pluralistic democratic process in which various interests are relatively well represented and lobbying mechanisms can render symmetric pressure by all threatened communities to the decision makers.<sup>40</sup> In stead, most targeted communities have neither reliable institutional channels to express their interests, nor remedial mechanisms to review unlawful or unjust public policies. They have to resort to such extra-system means as social movements, or such extra-legal means as violent protests. Therefore, to know how siting gridlock has been solved is largely in tandem with how such collective actions have been dissolved. In other words, to solve the gridlock is not to turn all opponents into proponents by such measures as compensation, but to make the opponent not powerful enough to barricade the project.

If dissolving local protests is the core task in overcoming NIMBY resistance, several key practices can be expected. First, incentive structures of the protest actions should be taken into account carefully. While participants have the common goal in blocking the construction of unpopular facility, each, as either a leading elite or a follower, has respective interests and selective incentives that may differ from collective ones. To dissolve the collective action, it is essential to offer a combination of diversified incentive schemes that can distract individual participants from collective goals to the pursuance of private interests.

Second, the locus of decision making point should be devolved to local level. One essential reason for such devolution is that local elites are usually better endowed with the local knowledge regarding interest conflicts, personal preferences, power distributions, and other details of local political contour. Such information is the essential base for contriving creative compensation schemes that satisfy a wider array of protest participants.

Another reason for devolving decision making power to local elites is that they control solid networks, local factions that can countervail the mobilization ability of protesters. Local politicians have to maintain solid networks constantly to mobilize votes in election campaigns. Such networks by nature consist of such solidary element as loyalty, long-term friendship or lineage, but mostly their sustainability relies heavily on intensive interest exchanges: political elites deck the stakes to their loyal followers in exchanges for political supports in elections. Local political ecology is usually full of competition and alliance, merging and diffusion of among major factions. Therefore, an agreement among major factions in siting decision would be essentially truncate the forces of opponents.

Among different informal rules, substantive scholarly attention has been paid to such special social relationship maintained and practiced by political elites. For example, informal exchange networks, reciprocity and patron-client relations have been applied by Lomnitz (1988) to explain bureaucratic corruption and governmental wastes. Similar social relations in the name of clan, clique, or faction appear in different political and cultural contexts and exhibit great influence on political consequences. To name just a few, Dittmer and Wu (1995) explain China's power transition and succession by the paramount influence of "factionalism." Collins (2004) explains the stability and instability of former Soviet Union countries by such "clan politics" as inter-clan deal versus inter-clan competition. Similarly, Mexican politics is characterized by the persistence of "camarillas" (or cliques) and competition among them (Smith, 1979) to deal with the promotion problems for the bureaucrats. Fukui and Fukai (1996)

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<sup>40</sup> Feinerman et al. (2004: 369) argue that politicians will stick firmly to principles and function most efficiently when subject to symmetric pressures.



observe that political leaders in Japan also maintain an electoral *keiretsu* (electoral coalitions between central and local politicians) to mobilize votes.

In addition to the cases in developing or non-western countries, informal politics has also been documented in the mature democracies. A stream of literature led by Molotch (1976) has developed to analyze the power structure of urban governance. It is found that there was striking continuity of different mayoralties based on a long enduring coalition between political and business elite (Stone, 1989), in the name of urban regime (Stoker, 1995) or growth machine (Logan and Molotch, 1987; Jonas and Wilson, 1999). Such regularity in cross party, cross policy cooperation is not only driven by a structural logic of common interests among political and economic elite, but also formed by informal interaction among elites.

Informal politics has also prevailed in Taiwan since its authoritarian era. The most noticeable aspect is the activities of local factions that account for the budgetary inefficiency and corruptive practices (Wang, 1994). According to Bosco's observation (1994), faction was formed in Taiwan since the establishment of local elections in the early post-Second World War period. As mentioned above, such segment of political system happens in different society in different names. Political leaders tend to make full use of their personal networks to survive or to contest for spoils in the newly introduced competitive system (Nicholas, 1966). In an authoritarian regime like Taiwan in 1950's, since no opposition among parties were allowed, political competitors segmented the ruling party to compete for party nomination and for government offices. From the perspective of ruling party, it is practical to rely on the political intermediaries who had served the same function in the Japanese colonial period. These intermediaries were local gentry with thick networks and probably business interests that gave them strong incentives to build up connections with the ruling class for both social status and welfare. When the ruling party implemented semi-free local elections shortly after its control over the island, these intermediaries started to play a role in securing the votes for the ruling party and local factions were thus created became important elements of Taiwan's local politics.

#### **4. THE CASE: THE SITING OF REFUSE INCINERATION PLANT IN YUNLIN COUNTY**

##### **4.1 Overall Incinerator Policy**

Waste management policy in Taiwan has gone through several stages in the past decades, including landfills, incineration, and waste reduction oriented management stages. Before 1990s, landfill was the major end-pipe solution for trash. Township governments were in charge of trash collection as well as disposal at that time. As the lowest level of the governmental system seriously constrained by financial capability, they could only manage the garbage in an expedient manner, such as dumping the trash on secluded riverbed or remote valley. In addition to the sanitary problems these dumpsites caused, such practices became less feasible when the volume of trash grew rapidly together with the population growth in 1980s. Therefore, the county governments started to help by constructing landfill facilities with greater storage capacity and higher sanitary standards. Although landfills are typical NIMBY facilities, they did not cause noticeable problems under the authoritarian regime, which had long educated its citizens to sacrifice self-interests for collective ones. Neither had any large-scale protest been ever organized to defend basic rights against pollution until late 1980s.

All kinds of NIMBY protests mushroomed in the course of democratization since late-1980s.<sup>41</sup> The suffered citizens no long believed in the "public good" rhetoric, rather they turned to believe that the government was there for solving their problems rather than asking

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<sup>41</sup> For example, see Tang and Tang 1997.

them to bear an unfair share of the costs of governmental policy. Consequently, siting decisions for landfills became highly contentious and almost no additional landfills could possibly be constructed since then. As the existing facilities were saturated in most local jurisdictions, trash crises ensued. Tons of household garbage was piled up on the streets without possible destination.<sup>42</sup> In some other cases, garbage trucks might sneak across county boundaries to dump the garbage in others' landfills until they were blocked by angry folks. In an even worse scenario, the government might sign a contract with mafia organizations that would dig a big hole on a private ranch and dumped the trash in it without any sanitary treatment. In one way or the other, each local government had to solve the waste management problems without available landfills.

As "garbage wars" prevailed in different corners of the countries, the central government forged a new waste management policy, the incineration policy, in early 1990. The Environmental Protection Administration set aside a huge amount of budget ready to subsidize local governments to construct their own incinerators. Because local governments usually do not have big enough fiscal scale to afford an incineration plant at a cost of 3 to 4 billion NT Dollars, heavy subsidy from the central government is required. This "one jurisdiction one incineration plant" policy enabled local governments to create a huge additional garbage management capacity promptly as long as they could smooth out the siting problems.

Incineration plants enjoy some advantages in overcoming fierce local objections, at least in early 1990s. First, since incineration plant can generate electric power and therefore earn constant income, it can offer better compensation scheme to the neighbor residents, such as subsidy on electricity bill, fee warm-water swimming pool, or even cash reward to the community. Secondly, incineration plants look much less irritating than landfills. In contrast to landfills that have to be in the open space with awful smell, an incinerator plant can hide the garbage in a building with nice and friendly appearance, probably with a giraffe painting on the smoke stack and beautiful garden in front. As long as the garbage trucks do not leak or smell bad, there would be not noticeable pollution associated with the facility. Lastly, because incinerators carry a mythical image of high-tech solution and because its generating electricity by the waste fits the green idea, the public usually does not have ideas if there is any problem associated with such advanced facility.

In late 1990, many environmental groups started to promote the idea that an incinerator could be dangerous because of such toxic materials as dioxin it discharges. Folks in this country therefore sense the risks hiding behind the nice-look chimneys and protest against them.<sup>43</sup> Nevertheless, these obstacles were mostly excluded successfully by local governments. All of a sudden the central government found that there is not enough amount of garbage to feed so many incinerators overall the island. Facing stronger and stronger criticism from environmental groups and scholarly community, in recent years the EPA has adjusted its waste management policies to a third stage with a waste reduction approach. It withheld some granted construction projects for further evaluation. Yunlin incineration plant is a case in a embarrassing situation. It has been highly politicized in the course of siting decisions. While the local politicians eventually overcame NIMBY protests and finish the construction work, the plant is not able to put into operation because of the extended political contention after new magistrate was elected in 2005.

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<sup>42</sup> Sometimes local governments would intentionally do so to create a counter pressure on the NIMBY protesters.

<sup>43</sup> To make the facility look friendly to local residents, the chimneys of incinerators would be paint with cute drawings, such as a giraffe with long neck that fits the high chimney.

## 4.2 Local Initiative in Building Incineration Plant

According to original EAP policy, every county or city would be allowed to build at least one incineration plant at full subsidy, while in heavily populated urban areas there could be more. The logic behind such artificial segregation among local jurisdiction is obviously a political concern. Expecting possible protests, the bureaucrats in EPA did not want to carry the responsibility of choosing the sites of incineration plants but shifted the responsibility to each local authority. Local elites are indeed more substantive to complicate interest conflicts among different stakeholders and more capable of contriving innovative and mutually acceptable solutions. A division of labor between central and local governments sounds very reasonable.

From the perspective of local authorities, they prefer to have their own disposal facility mainly because of the terrible experiences of garbage war not long ago. Another reason is rooted in the nature of “fiscal inequivalence” that such project carries. The subsidy for construction costs is a very big amount of budget from the central government without any matching funds requirement.<sup>44</sup> From the perspective of local constituent, it seems very unwise to give up such opportunity that to make full use this largesse paid by nationwide taxpayers. Since most local jurisdictions are constantly suffering from financial stress, they can arrange to have this huge budget to pay for many other administrative expanses through accounting techniques and thus reduce local financial deficits. Further, through proper contractual arrangement, local government might be able to generate extra incomes by burning business wastes.

There are also some hidden incentives for local political elites too. The huge construction fees can actually be very lucrative stakes that can be decked to their faction followers. The rents range from the compensation for land acquisition, land agent fees, kickbacks from construction payments, and dividends from investing in the contracted operation company. The politicians can even have the company hire their relatives with lucrative pays.

This is a typical case in which rational individual decisions has resulted in irrational macro consequence. When every local government tries to maximize its garbage managing capacity independently, all together a big spare capacity will be accumulated collectively. Given the big fluctuation of garbage amount and relatively low transportation costs in contrast to high equipment and storage costs,<sup>45</sup> garbage incineration business has very big scales of economies. Artificial segregation according to administrative jurisdictions is thus expected to create enormous inefficiency in running this business. What remain unattended are the budgetary wastes caused by informal political process that have help overcoming local NIMBY protests.

## 4.3 Managing the Confrontation by Local Faction

Yunlin County as a rural jurisdiction did not have urgent need for incineration facility and thus was not very aggressive in getting one until mid-1996. When local leaders eventually proposed their building plan in August 1996, they were requested to follow a public-private cooperation model to be a paragon of administrative reform overwhelmed in this country. According to this model, a private company bids to gain a contract to build and operate the facility, while the government is obliged to pay back the construction costs together with a package including interest and the operation fees during 20 years. Another important task for the government is to help the company to overcome the siting gridlock.

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<sup>44</sup> In addition to construction costs, there will be maintain and operation costs after the facility is in operation stage.

<sup>45</sup> Storage cost could be quite high also because the NIMBY syndrome may follow to spell protests.

In 2000, Onyx Ta-Ho, a famous environmental service company, gained the contract and started to proceed administrative requirements.<sup>46</sup> It started by targeting Linnei Township as the designated site and went through Environmental Impact Assessment without reconciling disputes with local residents. The whole process gained full governmental supports and shown incredible efficiency, given that such project involving land-use change usually required complicate administrative chores and lengthy reviewing process. The unanimous consent in decision points indicates a top-down instruction that has clean out all possible bureaucratic hurdles for the project.

The sudden announcement of siting decision did alert local residents, but the accelerated administrative procedure did not leave them enough time to mobilize mass protests before the construction work started. Local activists eventually organized the “self-rescue” association to mobilize possible resources, internal and external, to stop this project. Nevertheless, except for EIA that requiring the survey of public opinions on this matter, there was no channel for the residents to participate in the policy making. The project accelerated under clamorous protests.<sup>47</sup>

In the course, the grassroots protests were organized by a handful of elites from the opposition party and supported nominally by some environmental groups. A legislator (Ms. Su Chi-Fen), a county councilman (Ms. Yin Ling-Yin), and the head of Township government (Mr. Chen Shan-He), were the prominent leaders in this movement. In addition to their self-interest, they proposed some public interest rhetoric too. First, they argue that public health would be jeopardized once the incineration plant is in operation. It is too close to the major water work supplying drinking water of the great vicinity. The toxic materials discharged from the plant will inevitably pollute the water and thus influence the health of the citizens.

They also pointed out the scandal-like terms that the project entailed. In such a public-private partnership arrangement, according to official document, the deal has been too generous to the private business. First, the company with a relatively small capital size of 0.350 billion NT Dollars is contracted to build and operate a facility of 3.3 billion,<sup>48</sup> and to earn net income as high as 4.470 billion at least,<sup>49</sup> roughly 12.8 times of its original capital size.<sup>50</sup> The income will mainly come from selling the electricity generated by burning the garbage. The capital size seemed too small to assure a sound capacity to manage possible accidents.

Second, the county government had promised a very high amount of garbage input to the incineration plant to guarantee that the company would not suffer from business loss. Precisely, the government will pay the company an operation fee that is calculated by multiplying a unit price (determined by bit tendering) and the guaranteed amount of garbage (determined by negotiation). In this case, the unit price is as highest as it could have been (2555 NT Dollars per ton), which aroused tremendous suspicion about possible scandal in the bid tendering process. The guaranteed amount of garbage has also been well too high (6 million tons a day), which would impose tremendous pressure for local government to collect sufficient garbage for the plant. While the operation fee has largely covered up the operation costs, the income from selling the generated electricity would be purely the surplus. What a wonderful business it would be.

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<sup>46</sup> Ta-Ho is a joint-venture between Taiwan Cement Corporation and VEOLIA Environment Group, the second-largest waste management and environmental services company in the world. Since it is first time for Ta-Ho to involve in construction work, Ta-Ho solicited professional help by forming a joint-venture with RSEA Engineering Corporation (a newly privatized state-owned company) to become Ta-Ron Co.

<sup>47</sup> The project conditionally passed the EIA review without going into the second stage of EIA process, which would require much more administrative hurdles to overcome.

<sup>48</sup> Construction costs include building and machine 2.5 billion, land procurement 0.5 billion, administration cost 0.1 and interest 0.2.

<sup>49</sup> Upon the request by the council member from the opposition camp, Ms. Yin, the developer was required to enlarge original capital size to 1 billion NT Dollars.

<sup>50</sup> All these figures are listed in the financial proposal provided by the company.

Another obvious stake-decking arrangement in this case is that according to the contract the government has to pay back the construction costs in 20 years, with an interest rate as high as 18 percent. It raises a question why the government would not have borrow the money from banks with much lower interest rates, or issuing bonds itself with about 5% interest. The contract with all these unfair terms was approved by the county council without fierce objections. Once it was put under the scrutiny of the protestors, hidden issues were revealed and raised a certain degree of public attention. Nevertheless, such public attention did not transfer to effective political actions that can stop the progress of facility construction. Nor had the collective actions of opposition camp achieved any favorable results. The county government successfully controlled the scale of violent protests by both crackdown and persuasion. It also effectively demobilized and sabotaged the plebiscite held against the facility by Township government, leaving a question why the county government could have managed the intensive confrontation so successfully. The key seems to be the faction network that has been rooted long in this locality.

Yunlin is one typical county that has been dominated by faction influence. The magistrate, Mr. Chang Ron-Wei has very strong factional background. As a poor agricultural county, it has very limited tax revenues and thus has to rely heavily on subsidy from the central government. Such financial dependence enabled the ruling party to have strong influence on Yunlin's local elections. With relatively less powerful opposition force, the KMT intentionally divided local elites into two camps so that each of them would compete to gain the Party's nominations for elections of official positions.

Mr. Chang originated from one of the major faction, Faction Lin, as its major cadre. Failing to grasp power in the leadership struggle in faction, he left the faction and KMT in 1997 to run the magistrate election independently, but KMT successfully had its nominated candidate elected. After the sudden death of the magistrate, Mr. Su, in his incumbency in 1999, Mr. Chang got a chance to defeat candidates from both KMT and the opposition party, Democratic Progressive Party (DPP). As an election victor and local resource distributor, Mr. Chang returned to Faction Lin and resumed his leadership. Nevertheless, Mr. Chang never goes back to KMT partly because his judicial record would prevent KMT from nominating him in next election, and partly because DPP had become the ruling party in 2000. Staying outside of KMT left more leeway for Mr. Chang to maneuver between two parties.

Such strong faction background inevitably engaged magistrate Chang in rent seeking activities for his faction followers. Like factional operations in different localities in Taiwan, one most lucrative and vertically integrated business was the construction work. Every local government needs to provide public infrastructure, therefore faction leaders would have closely connected constructors who can get contracts from the government, and transfer public funds to private accounts of public officers that can be used for elections and other private uses. Local factions usually also run gravel extraction business and invested in cement production business so that the construction materials can be control. In addition, factional network also includes a sector of real estate business that can procure lands before major urban rezoning decision (e.g., from agricultural use to industrial or commercial uses) and sell them out with a price more than ten times higher. The network can also finish the private construction projects aside public projects (such as parks, schools, or transportation facility) to add the value of the private projects. When elections are close, they can put these construction works as mortgage to get loans from credit unions, which could also be invested by followers of the same faction.

This huge network of businesses can run their own private businesses when different faction was holding the governmental office. Yet when their leaders get elected, it is their turn to make the hay when the sun shines. Against this backdrop, When Magistrate Chang came into office; he was very aggressive in building the incineration plant to demonstrate his ability as

a leader to feed his faction followers. Resuming Faction Lin as a leader, he still faced some internal suspicion or even objection so that such demonstration was very important.

The first and probably the most important task in the process was to acquire a piece of land for construction which inevitably has to manage NIMBY problem. When encountering strong resistance, the faction had very strong networks to demobilize possible protests. They know the key persons to contact, to persuade, to buyoff, or to intimidate by semi-violent measures.<sup>51</sup> The faction also owns real estate brokers to that know well about real estate market and thus it could target the poorer area with fewer landowners and thus with least resistance.

In the process the goals were not merely to ease the objection, but also to transfer public funds to private accounts. Since the faction controlled the public authority, it could change the title of the land through urban planning procedure. Its followers could purchase the land with very low prices and thus gain access to the lucrative compensation scheme paid by governmental budgets, including compensation for the land and the plants on it. Once the land was ready, the faction would also gain essential profits from the construction job. The faction could either invest directly in the private company to gain long-term revenue, or they could also gain instant income by forcing the company to pay kickbacks directly through the monitoring mechanisms as public administrators. A construction project involving a budget as high as several billion NT Dollars referred to a very huge rent to be distributed.

After the incineration plant is put to operation, the faction may gain stable revenue from investing a business that the government guaranteed its stunning profits. The faction could run a business of collecting business wastes and send them to the incinerators because the local government, also controlled by the faction, had the authority to issue a special license for that business, and the license for the incineration plant to burn such materials. In these processes, the faction leaders and their followers have numerous chances to acquire an incredible amount of rents from public funds without getting public notice.

This explain why the county magistrate insisted in building the incineration plant, and why the Township head, Mr. Chen He-Shan change his attitude right after second tenure election. In running that position, Mr. Chen stood with his folks for votes. After being elected, he would like to join the faction of the magistrate and thus tried to solve the NIMBY protests for the magistrate. The angry folks launched a recall campaign but failed in collecting enough votes.

It is noticeable that the central government had been supportive to construction of the incineration plant. The Environmental Protection Administration did not re-examine its overall incineration policy until the construction work was almost done, even though there had been very strong appeal to do so from scholarly community and environmental groups. After the pro-green DDP wan the presidential office, President Chen visited the site and urged the folks not to support the recall campaign. It is probably because the non-partisan status of magistrate Chang gave President Chen strong incentive to absorb this faction into DPP to change the long-enduring political contour of Yunlin.

When all political and administrative measures have failed to stop the construction project, the judicial branch gave a surprising strike. The prosecutor successfully brought the case to the court. A bunch of public officers, including Magistrate Chang, the head of Environmental Protection Bureau, the head of Urban Development Bureau, and the county-head Mr. Chen were all found guilty in embezzlement of construction-related fees. No matter what, the incineration plant has been completed during this prolonged struggle and ready to put into operation, unless the newly elected magistrate can think of an alternative plan to deal with the sunk costs at high as 3 billions.

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<sup>51</sup> Since most factions also have connection with or incorporate some gangster leaders to take care of underground businesses, their “advises” carries somewhat different quality and credibility.

## 5. DISCUSSION AND CONCLUSION: LOOKING FOR A BETTER SOLUTION

In brief, NIMBY syndromes can most effectively be managed at a local level that can organized effective long-term network. The central government's devolving the troublesome siting decision to local jurisdictions, in which faction as an effective informal exchange network was applied to reduce transaction as well as administrative costs. It is not to say that local faction has done the job in an effective and just manner. Oppositely, to assure factional network function well, a huge share of public funds will be transferred to private purses. Nor has the faction managed the issue of environmental justice, which refers to the unfair distribution of environmental bad to socially underclass. Sadly this political network usually worked on the other way around. The demobilizing efforts of the political faction deprived the chance of local residents to gain fair access to decision making power. Even worse is that the compensation that should have paid to the local residents of noxious facility for their sacrifice tended to be usurped by the faction members. Political factions help solving the policy gridlocks indeed, yet they were solved in tremendous costs.

To similar strategies and solution pattern can be found in different local jurisdictions. First, local government had to reduce the legitimacy of possible protests to prevent possible external resources from infusing. The society as a whole has become apathetic to such protests become they have been too many and they were largely self-interested oriented. Keeping strict administrative procedures on the one hand can avoid possible judicial problems, on the other it shows the external society the rightness of local government to pursue public interests in due course. Of course the due course could be managed by some skills. Since once the project fulfills the EIA requirement, the system essentially closes the public participation channels within administrative procedure for stakeholders, therefore EIA becomes the most critical step. The key to assure a satisfactory result is obviously in choosing the report reviewers, the members of EIA committee. The authority to appoint the members is in the hand of magistrate or Mayor. While local scholarly community is usually in a very limited scale, it is not hard to build up a long term relationship with a handful of scholars and gain cooperation from them in reviewing these cases.

Once the administrative procedure was taken good care, most stubborn obstacles were left to local informal exchange networks. They control essential knowledge about the nubs of social relationship. They were sensitive to personal conflicts and interest preference of grassroots elites. Therefore they were usually very capable of persuading people to keep themselves away from protests, or design satisfactory compensation scheme to the grassroots elites in key mobilization positions. Factions work as lubricant for the siting gridlock.

While existing literature in institutional analysis often treats informal rules as a residual category, in the sense that it can be applied to virtually any behavior that departs from, or is not accounted for by, the written-down rules. Such a vague and diluted concept does not explain political phenomena well. In contrast, literature in democratization seldom mentions the process and impacts of institutions in drastic transition. The case of Yunlin incineration plant illustrates the how local factions, a popular informal rules, have faired in the course of democratization. It is expected that, on the one hand, informal rules will be transformed in accordance with the changes of formal institutions, and the transformation on both parts may have a synergic impact on the policy performance. On the other hand, the informal rules may actually offset the influence of the democratic institutions.

In the first two decades of democratization, many democratic institutions have been set up to enhance public participation and to empower scholarly community to make the governmental decision more accountable to diffuse public and environmental interests. Nevertheless, such informal institutions as local factional networks have accommodated themselves into new democratic settings and work against democratic logic. As illustrated in the case, the function

of Environmental Impact Assessment was oppressed and the decision was made based on private, factional interests rather than public interests. From this perspective, how informal rules can be transformed toward the same direction as democratization is a meaningful issue to explore. Factional patron-client systems will not disappear automatically after democratization, because when the political system becomes more democratic, elections become more competitive and expensive, the financial burden to maintain the clientele system becomes heavier, economic rents to compensate the expense are more needed. This case illustrates the incentives and strategies of central government, local politicians, community residents, and environmental activists. It also demonstrates the complex dynamics among electoral politics, democratic environmental governance, and grassroots social movement.

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# COMMUNITY DRIVEN REGULATION, SOCIAL COHESION AND LANDFILL OPPOSITION IN VIETNAM

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## Abstract

In the absence of enforcement of environmental regulations by government authorities, local communities can sometimes be successful in forcing a polluting facility to close or reduce its pollution levels by applying direct pressure to the facility owners. Known as community-driven regulation (CDR) or informal regulation, there have been a number of documented cases in Vietnam where such pressures have been effective in reducing pollution at industrial facilities. This paper is the first to present evidence of similar efforts by communities against public facilities in Vietnam, namely landfills. Examining four landfills that experienced significant opposition from local communities, we found that the measures taken by communities to express their concerns ranged from writing letters to local authorities and the media to complaining to officials and landfill operators, to blocking truck access to the landfill. The results of these efforts were mixed. One landfill remains closed because residents have been blocking access since 2004. They have not been satisfied with the promises from local authorities to reduce pollution, build a compost factory at the site, and create a community landfill monitoring committee. They simply want the landfill closed. At two of the landfills, pressure by the local community achieved some reduction in pollution at the landfill, improved compensation, and resulted in some new infrastructure in the area. At the fourth landfill, little has been achieved other than a small reduction in the amount of pollution. We conclude that more formal mechanisms are needed to involve the public in siting and operations of noxious facilities.

## 1 INTRODUCTION

The success of economic development in Vietnam since the adoption of *doi moi* in 1986 has not been without cost, notably the increasing environmental degradation of the country's air, land and water resources (MoNRE, 2006). In recognition of this problem, the Vietnamese government has passed a number of environmental regulations and has attempted to increase the capacity of environmental agencies. However, the regulatory regime continues to be weak. At times, legal regulations (such as Environmental Impact Assessment regulations) simply play a ritual role rather than being used to mitigate pollution successfully (Doberstein, 2003; O'Rourke, 2004). Lack of enforcement is a significant problem for a wide variety of environmental regulations (Dang & Nguyen, 2006). In light of these weaknesses, vocal opposition by local communities has emerged as an important method for pressuring polluting facilities to reduce their pollution levels (Phuong and Mol, 2004; O'Rourke, 2004).

Recently, several researchers have attempted to examine the effectiveness of community pressure on polluting firms. Their studies reveal some promising strategies for responding to the environmental impacts of industrialization and urbanization (O'Rourke, 2004; Phuong and Mol, 2001). Some refer to this type of pressure as community-driven regulation (CDR) (O'Rourke, 2004) while others use the term informal regulation (Hettige et al., 1996; Phuong and Mol, 2001). Although the evidence is limited to date, the outcome of community pressure appears to vary from

case to case, depending on the social and economic characteristics of the affected communities. There are a number of key factors that contribute to the success of community actions against pollution, including social cohesion and external linkages (O'Rourke, 2004).

An important gap in the literature on CDR and informal regulation is that there has been no research on the issue of community activism against noxious public facilities, with the exception of Nguyen and Maclaren's (2005) study of community opposition to a landfill in Vietnam. The main focus of previous research has been on community actions against industrial pollution. In their study, Nguyen and Maclaren speculated that social cohesion might help to explain the solidarity of one village's opposition to Hanoi's landfill. Since Nguyen and Maclaren did not measure levels of social cohesion, they recommended that further research should examine this potentially important aspect of community activism.

For a couple of reasons, community actions against noxious public facilities might be different from those against industrial firms in Vietnam. First, unlike some public facilities such as landfills, industrial firms usually bring substantial economic development opportunities to local communities. In contrast, noxious public facilities like landfills are more likely to bring stigmatization rather than improved employment prospects. The media also tends to play a different role in public versus private facility conflicts. As noted by O'Rourke (2004), media in Vietnam often side with local residents in their fight against polluting private firms. In contrast, residents who oppose publicly-owned facilities, such as landfills or even state-owned enterprises, may receive less support from the media because the media is strictly controlled by the government.

This paper examines the extent and effectiveness of community-driven regulation in dealing with landfill problems in Vietnam. It has several objectives, including characterizations of: (1) the nature of CDR around landfills in Vietnam; (2) the factors that play a role in the effectiveness of CDR; (3) the importance of social cohesion as a contributing element to CDR; and (4) the influence of CDR and social cohesion on decision-makers at higher levels of government.

In discussing the effectiveness of communities in dealing with local industrial pollution, O'Rourke (2004) focused mainly on the ability of a community to reduce pollution and close a facility. In this study, we expand on the idea of an effective community in more detail. Probably the most effective result of community opposition to a polluting facility that a community can achieve is to close the facility. The next effective result might be to force the facility managers to stop or reduce the pollution. If the facility is not closed or the pollution is not stopped or reduced, the ability of a community to force government to provide more compensation is also a measure of the effectiveness of the community. Compensation could take the form of direct monetary compensation or in-kind compensation, such as better local infrastructure or new employment opportunities. Finally, forcing government into dialogue is another measure of effectiveness, even though it may not necessarily result in any action by the government.

## **2 COMMUNITY-DRIVEN REGULATION**

According to O'Rourke (2001: 124), community-driven regulation occurs when "communities directly pressure firms to reduce pollution, monitor industrial facilities, prioritize environmental issues for state action, pressure state environmental agencies to improve their monitoring and enforcement capacities, and raise public and elite awareness of environmental issues and trade-offs between development and environment". Other researchers have defined informal regulation in a similar manner (Pargal and Wheeler, 1996; Hettige et al., 1996; Phuong and Mol, 2001).

The main idea of CDR or informal regulation is that when formal regulation is weak or absent, communities often use other channels to achieve pollution abatement at local factories (Pargal and Wheeler, 1996). Without recourse to legal enforcement of existing regulations,

communities must rely on their own efforts to challenge the polluter. Community pressure for abatement of pollution from factories can take many forms, including: demands for compensation, complaints to authorities, threats to market reputation, social or political pressure on plant managers and regulators, proposals for negotiated pollution control agreements; or even the threat of violence (O'Rourke, 2004; Hettige et al., 1996).

Case studies in many developing countries (e.g. Indonesia, China, Thailand, Bangladesh) have shown that community pressure is sometimes able to impose a cost that forces the polluting firm to change its level of pollution (Hettige et al., 1996). The greater the perceived damage and the community's ability to organize, the higher the compensation exacted by the community (Pargal and Wheeler, 1996). These case studies have also shown that communities may be able to pressure firms successfully to abate even in the absence of formal regulations or their enforcement.

Research in Vietnam has demonstrated similar findings to those from other developing countries: CDR in Vietnam has to some extent been successful in making polluting firms reduce their levels of pollution (Roodman, 1999; O'Rourke, 2004; Phuong and Mol, 2004). Using six case studies in different provinces of Vietnam, O'Rourke (2004) found that the success of CDR in pressuring industries and the state depended on social cohesion, connectedness, and capacity of the community. An important implication of CDR is that it may actually strengthen the authority of state environmental agencies because of public demands for environmental inspections and enforcement of regulations. O'Rourke (2004) also notes that the economic dependency of communities living in a polluting firm's vicinity may reduce the effectiveness of CDR. However, several other case studies in Vietnam indicate that even when community members depend on industrial firms, they tend to react strongly and ask for better environmental quality when they are affected by pollution (e.g., Frijns et al., 2004; Phuong and Mol, 2004).

There has been little investigation of the relationship between the social and economic characteristics of local communities (e.g. income, occupation and education levels) and the effectiveness of CDR. Examining the effectiveness of informal regulation in Indonesia, Hettige et al. (1996) demonstrated that poor communities with low levels of education and information might permit inappropriately high pollution, either because they are not aware of it, they cannot evaluate its consequences, or they are unable to organize to combat it. O'Rourke (2004) found similar results in Vietnam, in that poor communities were unable to organize as well as wealthier communities. Further research will help to confirm whether community characteristics are indeed related to CDR effectiveness in the context of Vietnam. Finally, as mentioned earlier, CDR has been applied to industrial firms in Vietnam and not to public facilities like landfills; therefore, the question of whether the elements of CDR are the same in this context also needs further investigation.

Adapting O'Rourke's concept of CDR for the present study, we redefine CDR as various forms of community pressure on state and private facilities to reduce or stop the pollution from those facilities. We use the term "community-driven-regulation" rather than "informal regulation" because it not only focuses on community' initiatives, but it also represents the conjunction between communities and state agencies. CDR is not a static process, but may increase in intensity and change its form over time. For example, community opposition against pollution may escalate and intensify when the demands of the community members remain unanswered. Depending on the responses of the polluting facility and environmental authority, communities may take more contentious actions such as site occupation, site blocking, and even violence (O'Rourke, 2004).

The strength of community opposition against a polluting facility has often been characterized by network density (i.e, the number of social networks in the community and the number of residents participating in them) (Kousis, 1999). For example, in his study of rural protests against a polluting facility in China, Jing (2003) found that family networks played an

influential role in the village's struggle against pollution. The pervasiveness of pollution also affects the strength of community opposition (Kousis 1999). As distance from a polluting facility increases, there tends to be less exposure to pollution from that facility and less community concern. Distance decay of concern has been found in a number of studies in North America (e.g., Furuseth, 1988; Elliott et al., 1993; Lober, 1995; Okeke and Armour, 2000) and has been shown to be important in Vietnam as well (Nguyen and Maclaren 2005).

The effectiveness of CDR in dealing with local industrial pollution appears to depend on a number of factors. Third parties such as non-governmental organizations (NGOs) and media are important for the success of CDR because both may play a role in uncovering and publicizing causes of industrial pollution (Roodman, 1999; O'Rourke, 2004). However, as noted earlier, the question of whether a third party such as the media is still willing to side with local residents opposing public facilities needs more investigation. O'Rourke (2004) indicates that communities face different challenges in mobilizing against state-owned as opposed to private enterprises because the state, as owner, is often both polluter and regulator. Social cohesion is another important factor affecting the effectiveness of CDR since community mobilization often encounters collective action problems, shirking and free-riders (O'Rourke 2004, Rydin and Pennington, 2000).

### **3 THE IMPORTANCE OF SOCIAL COHESION AND SOCIAL CAPITAL**

Previous research suggests that social cohesion is a central element of successful CDR. This section will elaborate on the concept of social cohesion and relate it to social capital. Social capital and social cohesion are closely linked in the literature. Some researchers consider social capital to be a part of social cohesion. For example, Kearns and Forrest (2000) argue, "A great constituent of social cohesion is common values, social order and control, social solidarity and reduction in wealth disparities, social networks and social capital". Other researchers consider social capital as the same as social cohesion, which in turn is a function of factors such as traditional interactions and institutions, a common heritage, values, etc. (Pargal et al., 1999). Schmitt (2002) defines social cohesion as having two dimensions: inequality and social capital. Inequality concerns the goal of promoting equal opportunities and reducing disparities and divisions within a society. This also includes social exclusion. The latter concerns the goal of strengthening social relations, interactions and ties. From Schmitt's view, social cohesion seems to be a broader concept than social capital. Other researchers considering the distinction between social cohesion and social capital contend that social cohesion focuses on a sense of belonging (Jenson, 1998) and a sense of attachment to neighborhoods (Stafford et al., 2003) more than social capital does. According to Stafford et al. (2003), social cohesion has two aspects: structural and cognitive. Structural aspects of social cohesion include family and friendship ties, and participation in organized associations. Cognitive aspects of social cohesion involve trust, attachment to neighborhood, and practical help (or norms of reciprocity). Stafford et al.'s interpretation of the different types of social cohesion is similar to the interpretation of social capital given by Gootaert and Bastelaer (2001).

Clearly, there is much overlap between social capital and social cohesion, and the difference between the two concepts is still subject to debate. Almost all researchers agree that both social cohesion and social capital contain many of the same elements such as trust, networks, and norms of reciprocity (e.g., Lyon, 2000; Pretty and Hugh, 2001). In this paper, we draw on Lavis and Stoddart (1999) in defining social cohesion as the networks, norms of reciprocity and trust that bring people together to take action. The focus is on the quality and quantity of social interactions that appears in a community, rather than on the resources gained through these interactions (Stafford et al., 2003). This definition of social cohesion also implies to include cognitive aspects of social cohesion: sense of attachment. Place attachment is particularly important in Vietnamese

villages because of village history. Villages were often founded by a small group of people who were then worshipped by their descendents (Huy Vu, 1993). The people in a village not only have close relationships because of their attachment to place, but also because of the historical relations of mutual assistance and solidarity from struggling with environmental uncertainties and foreign invasion (To Lan, 1993).

Another reason why this definition seems appropriate is its inclusion of family and friendship ties (often referred to as strong ties). According to Dalton et al. (2002), family relationships are a central part of social capital in Vietnam, in which the role of parents is essential to the family. Dalton et al. further argue that the belief of the Vietnamese people in filial piety, the acceptance of patrilineal authority, and the traditions of ancestor worship have deepened the importance of family in Vietnamese society. Thus, research on social cohesion in Vietnam must take into consideration these two important characteristics. In addition, social cohesion in this paper can be understood as social capital + sense of attachment to the neighborhood.

The main perspective taken by many academics is that social capital/social cohesion is particularly important for individuals and communities with constrained material resources and is a precursor to collective action and potential community improvements (Ostrom, 1990; Lyon, 2000; Pretty and Hugh, 2001; Fukuyama, 2001; Petro, 2001; Gootaert and Bastelaer, 2001). Trust and networks are essential components of social capital and/or social cohesion that lubricate collective actions. According to Putnam (1993) the greater the level of trust within a community, the greater the likelihood of cooperation, and cooperation itself breeds trust. The denser the networks in a community, the more likely the community's members will be able to cooperate for mutual benefit (Coleman, 1988; Putnam, 1993). Thus, high levels of social capital are associated with cooperative social problem-solving because voluntary cooperation is easier in a community that has inherited a substantial stock of social capital (Coleman, 1988; Putnam, 1993).

While many researchers have written about the role of social capital in the sphere of economic and community development, few scholars with the exception of Pargal et al., 1999; Beall, 1997, have examined the connection between social capital and waste management and none have referred specifically to social cohesion.

One of the greatest weaknesses of social capital and/or social cohesion theory is the absence of consensus on how to measure it. A number of researchers have noted the challenges of measuring social capital (Putnam, 1993; Holliday and Waikung, 2001; Inkeles, 2000; Paldam, 2000). First, social capital consists of many social qualities, which are difficult to quantify. Developing methods for measuring trust and networks is not easy and there is little consensus on how to do it (Petro, 2001). Second, the absence of a standardized definition of social capital makes it difficult to develop indicators and methods for measuring social capital. Different types of associations can create very different kinds of social capital (Coleman, 1988; Putnam, 1993, Petro, 2001). Finally, the complexity of social capital means that a single indicator cannot capture all of its aspects, although some researchers have used aggregation techniques to develop social capital indexes (c.f. Grootaert, (1999), Grootaert et al., (2002), and Grootaert and Narayan, (2004)).

Despite these problems, there are a number of indicators that have been used frequently to measure the level of social cohesion and/or social capital in society, such as the density of membership in voluntary associations, the extent of interpersonal trust between citizens, and their perceptions of the availability of mutual aid (Putnam, 1993; Lochner et al., 1999). Measurement of social cohesion has to be made on the basis of current theory and the conceptual framework of the specific study (Harpham et al., 2002). Based on the conception of social cohesion elaborated upon above, we measure social cohesion in accordance with the approach used by a number of researchers (e.g., Putnam, 1993; Nochner et al., 1999; Gootaert and Bastelaer, 2001; Harpham et al., 2002).

## 4. METHODOLOGY

This paper investigates community-driven regulation in four communities in northern Vietnam that are adjacent to major landfills: Nam Son, Trang Cat, Ha Khau and Hung Dong communes. Residents in all four of these communities protested in a variety of ways and at various times against pollution from the landfills. A questionnaire survey was delivered to 730 randomly selected households in the four communes between January and May 2005. The number of questionnaires delivered in each commune was roughly proportional to the commune population (about 10% of households). The first part of the questionnaire included questions related to socio-economic characteristics of the households and distance from the landfill. The second part asked about community concern about the landfill, such as perceived impacts, as well as respondents' attitude toward the landfill, trusts in landfill experts and technologies, and sources of environmental and landfill information. The third part explored information on CDR, such as measures taken by the respondents to oppose the landfill, and the frequency and effectiveness of those measures. The final part addressed social cohesion of the community such as trust, networks, reciprocity, unity and sense of place attachment. All of the questions were fixed-responses questions, except the questions exploring reasons for the concern about the landfill and for the unity of the community, which were open-ended.

The overall response rate for the survey was high (76%) for a drop-off questionnaire, probably due, in part, to the high level of concern about the issue. Another reason for the high response rate was that the first author conducted two to three call-backs to non-responding households in each study community.. This helped raise the response rate considerably.

After the survey, follow-up interviews were chosen from a purposeful sample of about 10 residents at each site who had completed the survey and who was identified as being "active" participants in the landfill debate. An "active" participant was one who had concerns about the landfill and had made those concerns known in some way.

In addition to the follow-up interviews, 29 key informants were interviewed (in Vietnamese) at the study sites, including five environmental regulators from the provincial Departments of Natural Resources and Environment (DoNREs), four municipal waste management officials from the respective cities' Urban Environmental Companies (URENCOs), and 20 commune officials. DoNRE officials were selected because they are responsible for environmental monitoring and regulation of landfills and URENCO officials are normally responsible for waste collection and for managing the landfill. Commune officials are often the most knowledgeable of all local residents about the siting and operations of the landfill.

The follow-up interviews and the interviews with officials and experts included questions of how the respondent and his/her organization responded to community pressure to reduce the impacts from landfill operations; and whether his/her organization considered factors such as strong social cohesion when deciding where to site the landfill. Most respondents understood the concept of social cohesion, but if they did not, it was explained during the interview.

## 5 RESULTS

The results presented below first examine several aspects of the effectiveness of CDR, including our own assessment of effectiveness at the four sites, measures taken by respondents to oppose the landfill, and their satisfaction with the outcome of those measures. The second section looks at the relationship between community pressure and distance of respondents from the landfill while the third assesses the relationship with socio-economic characteristics of the respondents. The final section presents results on the relationship between social cohesion and CDR. Several measures of social cohesion are examined, including trust, family and friendship

networks, associational activity, reciprocity, sense of unity in the community and attachment to place.

### 5.1 The effectiveness of CDR

In order to analyze the effectiveness of CDR, it is useful to rank the study communities according to their success in dealing with landfill pollution. Table 1 identifies the outcomes of community pressure by site, based on interviews with commune, URENCO (Urban Environmental Company), and DoNRE (Department of Natural Resources and Environment) officials. Both promised and achieved outcomes are included in the table. We used our own judgement in developing the overall rankings. Trang Cat community was able to force the government to engage in dialogue with local residents. The government had to promise to close the landfill permanently within two years and manage the facility according to the national regulations for reducing environmental pollution. Since August 2004, the government has organized a number of meetings to persuade local residents to accept the government plan, but Trang Cat landfill remains closed since residents are still blocking the access road. Recently, the government has offered a new plan, which includes building a compost factory on the landfill site, mitigating the pollution, employing local workers in the compost factory and creating a landfill monitoring committee consisting of representatives from the community and commune officials. However, local residents have been reluctant to accept this new plan. Overall, Trang Cat can be ranked as the most effective community in terms of both what it has achieved and what it has been promised.

Table 1. Results and Effectiveness of CDR by Site

Outcome of CDR	Trang Cat	Nam Son	Hung Dong	Ha Khau
Permanent closure of the landfill	Promised	Not requested	Promised	Not requested
Stopping/reducing pollution	Achieved during closure of landfill and promised when it opens again	Some achieved and more promised	Promised	Achieved (some)
Creation of a community monitoring committee	Promised	No	No	No
Provision of monetary compensation	Some achieved and more promised	Some achieved (about 40% of amount promised)	Some achieved (about 10-20% of amount promised)	No
Construction of a compost facility at the site employing local workers	Promised	Promised	Promised	No
Improved local infrastructure	Promised	Achieved	No	No
Force government into dialogue	Achieved	Achieved	Achieved	No
Rank on effectiveness	1	2	3	4

Nam Son community was able to persuade the government to provide better infrastructure, such as upgraded inter-village roads and a new primary school, provide more compensation and, according to a local official, was able to “satisfy about 40% of what the residents requested” for compensation. Hence, Nam Son is the second most effective community. Hung Dong commune was less effective than Nam Son because, according to a local official, the government “satisfied about 10 to 20% of what the residents requested” for compensation. Finally, Ha Khau commune was the least effective because, according to a respondent from the follow-up interviews, there has been almost no change (since protests occurred in 2003 several months after the opening of the landfill) except a small reduction in pollution (smoke) from the landfill.



When asked whether they had used any measures to oppose the landfill, just over one-third (37%) of survey respondents said that they had. There was a statistically significant difference in the use of measures by site, with only 22.1% of Ha Khau residents reporting the use of measures, compared to 70.6% at Hung Dong (Table 2). In the discussion that follows, we use the terms “pressure” and “measures” interchangeably since pressure normally increases as the number of measures used increases.

The data in Table 2 classifies respondents taking measures to oppose the facility by site and by their opposition to the facility. Not surprisingly, not everyone who opposed the landfill did something about it. Only 51% of those who opposed the landfill took measures to pressure the authorities. This gap between concern and action is a common phenomenon in North America (c.f. Mansfield et al., 2001; Walsh and Warland, 1983). The percentage of non-active but opposed respondents differed significantly across the study sites, with the highest percentage present at Trang Cat and Ha Khau.

Table 2. Community pressure by site and by opposition

	<b>Nam Son</b>		<b>Trang Cat</b>		<b>Ha Khau</b>		<b>Hung Dong</b>		
	Pressure	No Pressure	Pressure	No Pressure	Pressure	No Pressure	Pressure	No Pressure	
Opposed	48 (53.9%)	41 (46.1%)	32 (33%)	65 (67.0%)	31 (41.3%)	44 (58.7%)	74 (72.5%)	28 (27.5%)	$\chi^2 = 81.361$ p = 0.000
Not Opposed	0 (0%)	10 (100%)	2 (14.3%)	12 (85.7%)	5 (5.7%)	83 (94.3%)	3 (42.9%)	4 (57.1%)	
Total	48 (48.5%)	51 (51.5%)	34 (30.6%)	77 (69.4%)	36 (22.1%)	127 (77.9%)	77 (70.6%)	32 (29.4%)	

The respondents at all of the study sites used similar measures to oppose the landfill, including writing letters to the government and media, as well as talking to community leaders, outside influential people, and landfill managers, and speaking up at village/ward meetings. At all sites, except Ha Khau, residents of the community blocked waste trucks. Almost four-fifths of the respondents who were opposed reported that they spoke to their commune leaders about their opposition to the landfill (Figure 1). Often, local residents started to oppose the facility by “talking”, especially expressing problems to their commune leaders or in the village meetings. The opposition then escalated to “writing” such as writing letters to the government and media, and then to “acting” such as blocking waste trucks. “Talking”, “Writing”, and “Acting” are a three-step strategy of opposition; when local residents were not satisfied with their opposition outcome, they would move to the next level of opposition. However, fewer people move to the next level; and fewest moved to the highest level of opposition (or claimed that they did). One follow-up respondent complained that, “we were talking a lot to the commune’s leaders, talking a lot in the village meetings and writing a lot of letters to governmental organizations, but nothing has been changed so that we had to block waste trucks”.

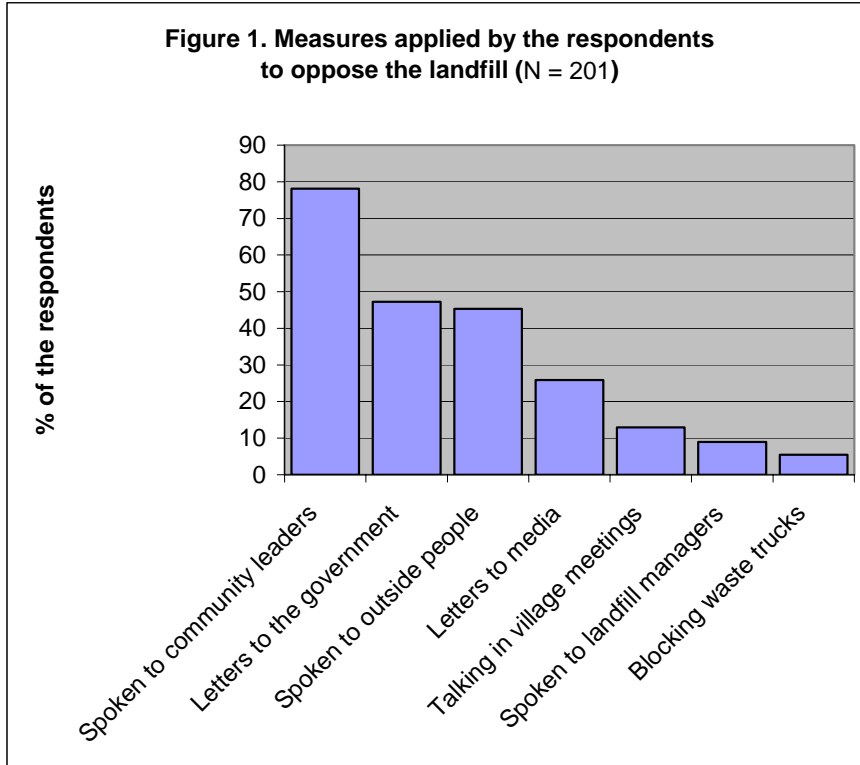


Figure 1. Measures applied by the respondents to oppose the landfill

A somewhat surprising result from Figure 1 is the very low percentage of respondents who reported that they engaged in civil disobedience by blocking trucks. For example, only 3 of the 120 respondents from Trang Cat said that they blocked trucks, but according to local officials, there were hundreds of women and elderly people who participated in blocking the waste trucks at the landfill in August 2004.

One explanation for the low numbers is that 73% of the respondents who answered the questionnaire were male while those who participated in blocking trucks were mainly women and older residents. The use of women and older residents to block waste trucks was an important strategy for opposing the facility. A commune official of Trang Cat Commune described how “during the first days of community opposition to the landfill, there were men and women participating in every event. However, after managing to release two young men from a police van, local residents used only women and older men to block the landfill”. Another very likely explanation is that Vietnam’s Law on Environmental Protection (LEP) says that local residents have the right to complain about pollution, but it does not say that they have the right to engage in civil disobedience. Therefore, blocking waste trucks might be considered as an illegal act and respondents may have been reluctant to self-identify themselves or their family members as doing anything that was possibly illegal. A respondent in Trang Cat said that, “if you conducted your survey before August 2004, before the local strike against the landfill, many more people would be willing to respond to the questions”. In other words, opposition to the landfill has become a sensitive issue, at least in Trang Cat. Even local commune leaders at Trang Cat seem to have little understanding of residents’ rights under the LEP since they asked the primary author for a copy of the LEP and national regulations on landfill siting and operations for their commune people’s committee. One of these officials said that, “we want our residents to

oppose the landfill legally, but we and our residents do not understand the main content of the LEP and national regulations on landfills”.

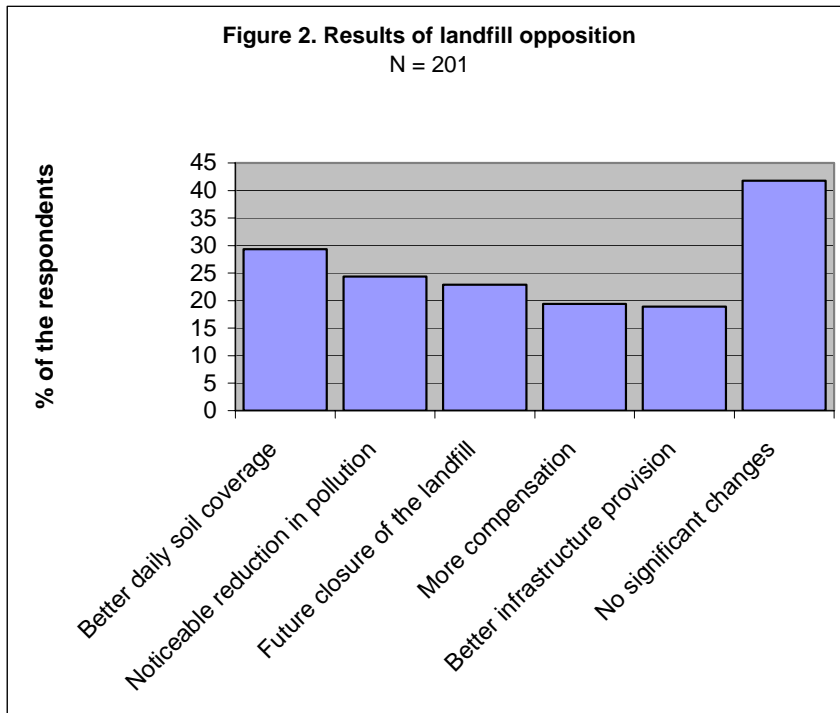


Figure 2. Results of landfill opposition

To some extent, community application of pressure on the government at the four landfills has led to noticeable improvements in landfill management, as shown in Figure 2. However, more than 40% of the respondents who took measures to oppose the landfill felt that there were no significant changes in the landfill situation as a result of their actions. The most frequently-cited change is better daily soil coverage; however, this change was noted by less than one-third of the respondents who took measures to oppose the facility.

Table 3 presents the respondents’ perception of the overall effectiveness of their activism by site and our rating of the perceived level of effectiveness (ranging from very low to medium) based on the percentage of respondents in each study community answering that a particular result had been achieved. The percentage of respondents saying that there had been specific improvements was no greater than about 60% at any site and was as low as 5% for the expectation that the landfill would be closed in the future and 8% for improvements in monetary compensation, both at Ha Khau. The percentage of respondents expressing satisfaction with the overall outcome of their efforts to oppose the landfill did not differ significantly by site and was generally low, ranging from 10% (at Nam Son) to 26% (at Ha Khau).

There were statistically significant relationships by site for respondents’ perception of improved daily soil coverage at the landfill, the future closure of the landfill, monetary compensation, and better infrastructure provision. There were no differences by site in respondents’ perception of a reduction in landfill pollution and overall perception of changes. A notable result is that residents of Nam Son are more likely than residents of other sites to feel that their actions have resulted in better infrastructure provision and improved monetary compensation. This result seems consistent with the comment by a local official that Nam Son

residents have received about 40% of what the government had promised them, more than at the other landfill sites. Hung Dong residents are least likely to feel that there is now better daily soil coverage or a noticeable reduction in pollution, although they are happier with the compensation and infrastructure improvements. At the same time, Hung Dong has the highest percentage of the respondents believing that the landfill will be closed in the near future.

Table 3. Perceived results of CDR by site\*

	<b>Nam Son</b>	<b>Trang Cat</b>	<b>Ha Khau</b>	<b>Hung Dong</b>	<b><math>\chi^2</math>, p-value</b>
Better daily soil coverage	18 (37.5%) M	14 (38.9%) M	14 (36.8%) M	13 (16.5%) L	$\chi^2 = 10.480$ p = 0.015
Noticeable reduction in pollution	14 (29.2%) L	10 (27.8%) L	11 (28.9%) L	14 (17.7%) L	$\chi^2 = 3.152$ p = 0.369
Future closure of the landfill	5 (10.4%) L	10 (27.8%) L	2 (5.3%) VL	29 (36.7%) M	$\chi^2 = 19.957$ p = 0.000
More monetary Compensation	15 (31.2%) M	4 (11.1%) L	3 (7.9%) VL	17 (21.5%) ML	$\chi^2 = 9.335$ p = 0.025
Better infrastructure provision	16 (33.3%) M	7 (19.4%) ML	5 (13.2%) L	10 (12.7%) L	$\chi^2 = 9.354$ p = 0.025
No improvements	19 (39.6%) M	17 (47.2%) M	18 (47.4%) M	30 (38.0%) M	$\chi^2 = 1.492$ p = 0.684
Satisfaction with Outcome of opposition	5 (10.4%) L	8 (22.2%) L	10 (26.3%) L	16 (20.3%) L	$\chi^2 = 3.859$ p = 0.277

\*VL=very low, L=low, ML=medium low, M=medium

Note: 0 (0%) of cells have expected value count less than 5

Surprisingly, the Trang Cat community has successfully blocked the landfill for months, but has a lower percentage of respondents than Hung Dong who believe the promise from government that the landfill will be closed. Perhaps many residents in Trang Cat do not believe that they can “win” against the government since the ‘official’ proposed closure date of the facility, when it is expected to reach is capacity, is 2020 while the official closure date is 2008 at Hung Dong. Trang Cat residents may also be discouraged by the perception that, even after many months of blocking access, the Hai Phong government is still persistent in its negotiations to keep the landfill open. One resident commented in the follow-up interviews that: “We think that we have not been successful yet. The success would come upon the government finding a new site for the city landfill and closing Trang Cat landfill”.

Some of the responses by residents about the effectiveness of their actions against the landfill seem to contradict our ‘objective’ assessment of the success of CDR in Table 1. There is no statistically significant difference among the sites in terms of perception of overall improvements, while we had expected respondents at Trang Cat to be most satisfied with the effect of their actions. The difference may be due to a lack of faith by Trang Cat residents in promised changes and their frustration with having to continue blocking trucks. One respondent noted that: “We do not know how long we will be able to block the landfill. The government is very patient. One day we may have to accept their plan as the number of residents accepting the government plan is increasing”. Another explanation is that measures taken to oppose the landfill brought both positive and negative impacts to the Trang Cat community. Several residents interviewed during the follow-up survey blamed the presence of many policemen in their community on opposition to the facility. Other respondents said that the presence of policemen negatively affected their daily businesses. One follow-up respondent said that, “I can’t stand seeing policemen wandering all day and night in our commune”. Another respondent felt even

more strongly, saying that, “I hate them (policemen) as much as I hated American soldiers before. They look at us as if we were the rebels”.

Table 4. Perceived effectiveness of individual measures applied to oppose the facility

<i>Measures</i>	<b>Effectiveness (number and % of the respondents to that question)</b>		
	Effective	Not effective	Total
Letters to the government	34 (42.5%)	46 (57.5%)	80 (100%)
Letters to media	18 (35.3%)	33 (64.7%)	51 (100%)
Spoken to community leaders	31 (29.2%)	75 (70.8%)	106 (100%)
Spoken to outside people	12 (24%)	38 (76%)	50 (100%)
Talking in the village meetings	8 (27.6%)	21 (72.4%)	29 (100%)
Blocking waste trucks	1 (11.1%)	8 (88.9%)	9 (100%)

Table 4 presents the results of the respondents’ evaluation of the effectiveness of individual measures take to oppose the landfill. None of the measures taken by local residents was considered completely effective. Interestingly, the most effective measures were perceived to be those that involve ‘writing’ followed by those that involve ‘speaking’ and finally ‘acting’. Although respondents rated the effectiveness of letters to the media as second-highest after letters to government, about two-thirds of respondents felt that appealing to the media was ineffective. Although the media plays an important role for the success of communities in fighting industrial pollution (O’Rourke, 2004; Phuong and Mol, 2004), the media seems unwilling to side with local residents in fighting against landfill pollution. Often the media reports on landfill issues only when it can no longer keep silent, such as reporting on community opposition at Nam Son landfill only after local residents blocked trucks and caused waste to pile up on the streets of Hanoi for several days. Therefore, many respondents to the survey claimed that they sent a lot of letters to media about pollution, but received no response. A Trang Cat commune official said that, “they [media] just wanted to report on the issue of local corruption, but not landfill pollution”. Probably, corruption issues were of much more interest to Vietnamese readers than the pollution issues.

O’Rourke (2004) claims that connections to influential outsiders have been seen as helpful in fighting industrial pollution in Vietnam. However, the residents of the four study sites did not feel that speaking to outsiders about their problems was very effective. Possibly, since these are generally poor communities, the residents had few influential outsiders to call upon. Their poverty and lack of access to influential outsiders could also have been a factor in each community’s choice as a site for a landfill in the first place.

Talking in the village meetings is one of the least effective measures according to local residents. In a country with the strong central government like Vietnam, villages have very little influence on the decisions of the provincial and central government. This frustration about lack of power in the village level was expressed by one respondent who said that “we talk a lot in the village meetings, but nothing has been changed”.

## 5.2 Distance decay of CDR measures

Did the use of measures decline by distance from the landfill site? Since taking action against the landfill requires an investment of time and effort, it might be expected that those who are closest to the landfill and experiencing the most severe impacts would be more likely to apply pressure on the government and the facility managers. Looking at all four sites together, there is a statistically significant decline in the application of measures by distance from the landfills (see Table 5).

Table 5. Distance decay of pressure by site

	<b>0-500m</b>	<b>501- 1000m</b>	<b>1001-1500m</b>	<b>&gt; 1500m</b>	<b><math>\chi^2</math>, p-value</b>
<b>NAM SON</b>					
Pressure	10 (83.3%)	18 (62.1%)	17 (53.1%)	3 (9.4%)	$\chi^2 = 27.705$ p = 0.000
No Pressure	2 (16.7%)	11 (37.9%)	15 (46.9%)	29 (90.6%)	
<b>HA KHAU</b>					
Pressure	19 (59.4%)	9 (22.0%)	3 (10.7%)	6 (6.6%)	$\chi^2 = 43.991$ p = 0.000
No Pressure	13 (40.6%)	32 (78.0%)	25 (89.3%)	85 (93.4%)	
<b>Trang Cat</b>					
Pressure	14 (38.9%)*		17 (28.8%)	4 (16.7%)	$\chi^2 = 3.445$ p=0.179
No Pressure	22 (61.1%)		42 (71.2%)	24 (83.3%)	
<b>Hung Dong</b>					
Pressure	32 (76.2%)	24 (66.7%)	8 (57.1%)	13 (68.4%)	$\chi^2 = 2.036$ p = 0.565
No Pressure	10 (23.8%)	12 (33.3%)	6 (42.9%)	6 (31.6%)	
<b>Four Sites Combined</b>					
Pressure	66 (66.7%)	64 (47.4%)	45 (33.8%)	26 (15.7%)	$\chi^2 = 77.038$ p = 0.000
No Pressure	31 (33.3%)	71 (52.6%)	88 (66.2%)	140 (84.3%)	

\*distance categories were combined in order to meet the assumptions of the  $\chi^2$  test.

However, the distance decay effect is not present for all sites. Ha Khau and Nam Son exhibit distance decay, but Trang Cat and Hung Dong do not. These differences are hard to explain.

The hypothesis that those who are experiencing the greatest impacts from pollution are more likely to pressure the government turns out not to be relevant, except for Ha Khau, since at the other three sites, almost all residents report experiencing impacts, regardless of their distance from the landfill (see Table 6). Only at Ha Khau do application of pressure and experienced impacts decline with distance from the landfill. Another possible explanation for the differences in measures applied is that social cohesion might be particularly high in Trang Cat and Hung Dong and high social cohesion could mean that residents are more likely to support their neighbours in taking action, regardless of where they live in the community. However, as will be shown later, social cohesion is low in Trang Cat and relatively high in Hung Dong.

Table 6. Distance decay of experienced impacts by site

<b>Site</b>	<b>0-500m</b>	<b>501-1000m</b>	<b>1001-1500m</b>	<b>&gt; 1500m</b>	<b><math>\chi^2</math>, p-value</b>
Nam Son	12 (100%)	29 (100%)	32 (100%)	30 (88.2%)	No decay
Trang Cat	7 (100%)	29 (100%)	58 (98.3%)	22 (91.7%)	No decay
Ha Khau	30 (93.8%)	26 (68.4%)	15 (60.0%)	17 (20.5%)	Decay present $\chi^2 = 59.571$ p = 0.000
Hung Dong	45 (97.8%)	36 (92.3%)	14 (100%)	18 (94.7%)	No decay

### 5.3 CDR and socio-economic characteristics

Application of chi-square tests to check for relationships between the number of respondents who had applied measures to oppose the landfill and their social and economic characteristics

reveals a relationship between occupation and community pressure, but not between pressure and either income or education (Table 7).

Table 7. Community pressure and socio-economic characteristics of respondents

		Pressure	No Pressure	$\chi^2$ , p-value
<b>Occupation</b>	Farmers	151 (77.8%)	169 (53.5%)	$\chi^2 = 30.500$ p = 0.000
	Non-farmers	43 (22.2%)	147 (46.5%)	
<b>Education</b>	Primary	11 (6.7%)	27 (10.5%)	$\chi^2 = 5.265$ p = 0.153
	Basic	76 (46.6%)	95 (37.1%)	
	Secondary	62 (30.8%)	102 (39.8%)	
	University	14 (8.6%)	32 (12.5%)	
<b>Income</b>	Low	85 (64.4%)	151 (64.3%)	$\chi^2 = 1.722$ p = 0.423
	Medium	34 (25.8%)	69 (29.4%)	
	High	13 (9.8%)	15 (6.4%)	

Farmers applied more pressure than non-farmers, likely because landfill pollution into the surrounding farmland can have a negative impact on their livelihoods. One follow-up respondent at Nam Son landfill claimed that “we [the villager farmers] believe that the landfill pollution has an effect on reducing our agricultural productivity”. This may explain why, in Ha Khau commune where the majority of residents are non-farmers, the amount of pressure applied was lowest among the four sites.

#### 5.4 CDR and social cohesion

We measured social cohesion on a variety of different dimensions, including the strength of networks, trust, reciprocity, sense of unity and attachment to the neighborhood. In general, the measures of social cohesion used for this study point to the presence of high to very high levels of social cohesion at the four sites. In response to the question of whether a resident participates in any social networks, most respondents (86.8%) said that they participated in at least one social network in the commune. Respondents are members of 2.79 networks, on average. Respondents at Ha Khau (mean = 2.53), Nam Son (mean = 2.63) and Trang Cat (mean = 2.66) participate in the smallest number of social networks. Respondents at Hung Dong (mean = 3.47) participate in a significantly higher number of networks than do respondents at other three sites (for  $\alpha = 0.005$ , based on a post-hoc comparison to all three sites using the Games-Howell statistic). The three most frequent groups that the respondents and their families participated in are the Vietnam Women’s Union, the Farmers Association and the Youth Union (Figure 4). Although participation in networks is high, the importance of these networks for fighting landfill pollution is questionable. When asked directly about whether the networks had been helpful in opposing the landfill, only 10% of the respondents said “yes”. Perhaps this is because the five most popular networks shown in Figure 3 are not totally voluntary; the government strongly encourages people to participate in them. Also, they are controlled by the state, making it difficult for local leaders of the networks to side with residents in opposing a public facility.

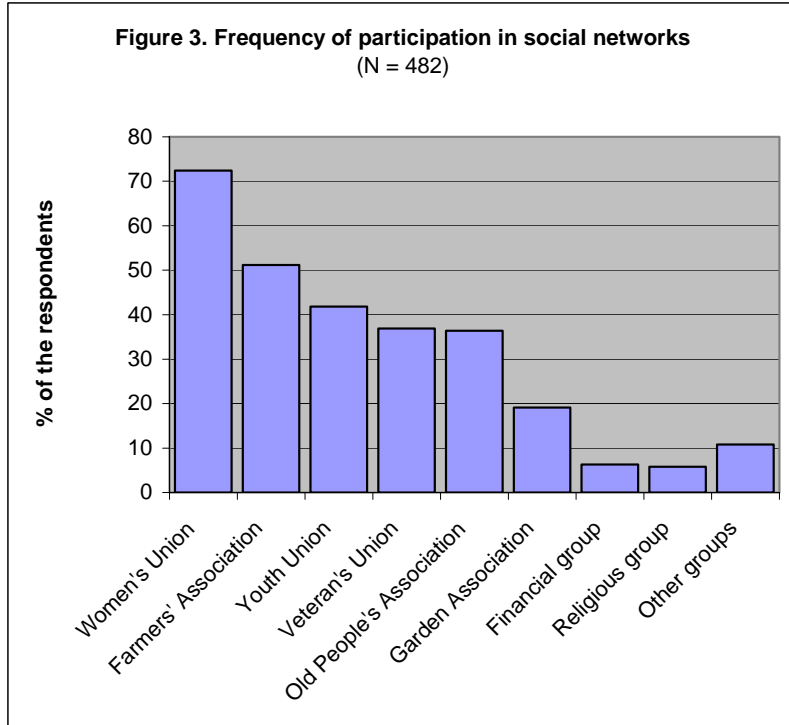


Figure 3. Frequency of participation in social networks

Sense of attachment to place was stronger than any other measure of social cohesion, with 96% of respondents indicating that they felt an attachment to their community (see Table 8). Some exceptions to the high levels of social cohesion were found in the measures of reciprocity, which ranged from extremely low (only 7% of respondents would seek help from their neighbours in looking after their children) to moderately high (63% of respondents would be able to count on their relatives for financial help and 60% could rely on relatives for child care). The higher level of reciprocity with relatives lends evidence to the importance of family networks in Vietnamese villages. Perhaps surprisingly, a larger percentage of respondents said that they could rely more on social network members than on their neighbours for both financial help and child care. This could be due to the presence of existing programs for financial assistance and child care within one or more of the networks. Commune officials at the study sites admitted that members of social networks such as the Women's Union, Farmers' Association and Youth Union find it easier to obtain a bank loan than a person who did not participate in any social network. For several measures of social cohesion, there were no statistically significant differences by site. These included: the presence of close friends in the community, trust in social network members, reliance on close friends for financial or child care help, and reliance on social network members for financial help.

Surprisingly, the lowest level of trust and perceived unity in the community was found in Trang Cat – the community that we had judged to be most effective in CDR. A possible explanation is that at the time of the survey, the situation in Trang Cat was tense: some women were still camping at the landfill and blocking waste trucks; and a number of policemen were present in the commune. Both officials and residents at Trang Cat agreed that opposition to the landfill caused some division within their community. Another divisive activity may be the ongoing negotiations with the city over a plan to re-open the landfill. According to a commune official at Trang Cat, the new proposal by the Hai Phong People's Committee to construct a



compost plant at the site and introduce other compensatory and mitigation measures in return for re-opening the site "... seems promising to the local residents and many residents want to accept the plan". However, a number of residents doubted the plan. A respondent in the follow-up interview said that "we did not think that the plan could reduce the pollution and the plant would be operated as usual".

Table 8. Measures of social cohesion by site and overall

	Nam Son	Trang Cat	Ha Khau	Hung Dong	$\chi^2$ ; p-value	Four Sites combined
<b>Presence of relatives and close friends in the village</b>						
Relatives	88(91.7%)	50(78.1%)	78(43.3%)	85(94.4%)	$\chi^2=110.033$ $p=0.000$	78%
Close Friends	85(78.7%)	82(68.3%)	131(64.2%)	84(68.9%)	$\chi^2=6.957$ $p=0.073$	69%
<b>Trust</b>						
Trust in community members VILLAGERS?	50(82.0%)	21(38.9%)	63(79.7%)	47(87.0%)	$\chi^2=41.574$ $p=0.000$	73%
Trust in relatives	65 (98.5%)	39 (72.2%)	88 (93.6%)	71 (94.7%)	$\chi^2=29.791$ $p=0.000$	91%
Trust in close friends	62(98.4%)	36 (66.7%)	97 (99%)	68 (90.7%)	$\chi^2=49.335$ $p=0.000$	91%
Trust trust in neighbors	58 (90.6%)	35 (67.3%)	96 (90.6%)	56 (80.0%)	$\chi^2=17.020$ $p=0.001$	84%
Trust in network members	33 (82.5%)	42 (91.3%)	72 (92.3%)	50 (92.6%)	$\chi^2=3.535$ $p=0.316$	90%
<b>Reciprocity</b>						
Financial help from relatives	72 (66.7%)	89 (74.2%)	107 (52.5%)	78 (64.5%)	$\chi^2=16.768$ $p=0.001$	63%
Child care help from relatives	81 (75.0%)	81 (67.5%)	100 (49.0%)	73 (59.3%)	$\chi^2=23.249$ $p=0.000$	60%
Financial help from close friends	53 (49.1%)	56(46.7%)	92 (45.1%)	68 (55.3%)	$\chi^2=3.388$ $p=0.336$	49%
Child care help from close friends	55 (50.9%)	64 (53.5%)	112 (54.9%)	55 (44.7%)	$\chi^2=7.628$ $p=0.108$	34%
Financial help from social network members	27 (25.0%)	37 (30.8%)	51 (25.0%)	24 (19.5%)	$\chi^2=4.148$ $p=0.246$	25%
Child care help from social network members	11 (10.2%)	22(18.3%)	20 (9.8%)	33 (26.8%)	$\chi^2=20.177$ $p=0.000$	16%
Financial help from neighbours	7 (6.5%)	24 (20.0%)	14 (6.9%)	21 (17.1%)	$\chi^2=18.622$ $p=0.000$	12%
Child care help from neighbors	3 (2.8%)	17 (14.2%)	3 (1.5%)	13 (10.6%)	$\chi^2=25.959$ $p=0.000$	7%
<b>Unity and sense of attachment</b>						
Unity	81 (88.0%)	35 (47.9%)	86 (57.3%)	74 (87.1%)	$\chi^2=53.232$ $p = 0.000$	70%
Attachment	87 (100%)	52 (86.7%)	87 (96.7%)	76 (98.7%)	50% of expected cells less than 5	96%

Like Trang Cat, Ha Khau appears to have relatively low levels of social cohesion. Respondents from Ha Khau have the fewest relatives in their community. Reciprocity on four measures is lowest, or close to lowest in Ha Khau. Perceived community unity is also relatively low. The low sense of unity may be due to the lack of dense family networks in the community. This conclusion is consistent with the claim made by Dalton et al. (2002) that family ties are a

central part of social capital in Vietnam. The low unity may also be due to the distinct division of occupations in the community.

Unlike Trang Cat, we had judged Ha Khau to have been the least successful with CDR. The results from the survey also suggested that Ha Khau had been least effective in a number of ways. Ha Khau had the fewest residents who applied measures to oppose the landfill and Ha Khau residents who took action were least satisfied with the outcome of several of those actions. Therefore, in contrast to Trang Cat, CDR at Ha Khau has not been as effective even though the two communities have similar low levels of social cohesion.

As noted at the beginning of this section, almost all respondents at the four study sites expressed a strong sense of attachment to their communities. It was not possible to use a chi-squared test for identifying statistically significant differences in attachment by site because of the very small percentage of respondents who felt no attachment.

### **5.5 CDR, social cohesion and decision-making**

During the interviews with experts and officials, community pressure was found to be influential in environmental decision-making. Upon being asked about the role of CDR, all officials and experts at the national and provincial levels admitted that community opposition was important for bringing the problems of local communities to the attention of higher levels of government. A DoNRE official said that, “our staff is lacking personnel. Thus, we cannot cover everything related to the environment in our province. If there were no community opposition to the landfill, we would never know about the problem”. Another DoNRE official said that, “the [provincial] people’s committee has to focus more on economic development and key economic indicators rather than on environmental protection. Strong community opposition to pollution is a good way to let the government know what is happening in the locality”. Similarly, a key informant commented that, “Community opposition to polluting facilities is now occurring everywhere in our country. Opposition to waste disposal facilities like Trang Cat landfill in Hai Phong or Nam Son landfill in Hanoi has become a widespread concern in the country. Policy-makers cannot keep silent, they have to respond quickly”.

CDR seems to be able to influence decision-making processes by facilitating and improving the implementation of national regulations. Similar to other developing countries, environmental agencies in Vietnam are facing many challenges from other governmental organizations in design and implementation of environmental regulations (O’Rourke, 2004; Tang et al., 2005). Community actions help strengthen the position of the environmental department in municipalities. A DoNRE official admitted that, “we can conduct regular inspections on pollution only once or twice a year. However, if we receive complaint letters from communities, we can conduct additional inspections”. He further added that, “communities to some extent help improve the quality of implementing laws because they want to see an actual reduction in pollution, not something written on documents like this or that is under the national environmental standards”. In a country like Vietnam where most municipal leaders are thinking of economic growth and of meeting economic targets set by the national or provincial government, environmental inspections of polluting facilities might improperly be understood as measures to prevent “development”. Another DoNRE official commented that “We often face criticism from other departments for our ‘active’ inspection. These departments imply that the DoNRE, at times, is slowing down industrial production”. Thus, CDR helps keep the balance of power between departments in the government.

Social cohesion was also found to have an influence on environmental decision-making. DoNRE and URENCO officials in all four study sites felt that social cohesion provided communities with more power to bargain with polluting facilities and a bigger voice with the provincial and national governments. Social cohesion has provided local residents with more confidence and solidarity in fighting against pollution, as reflected by a comment from a

commune official at Trang Cat who said that, “the police can arrest one person, but cannot arrest the whole village”.

Environmental policies in Vietnam are lacking, overlapping and not meeting the demand for social and economic development of the country (CPV, 1998). A MoNRE official admitted the weakness of the environmental polices by saying that, “our [environmental] policies respond very slowly compared to the fast growing economy of the country”; and he added, “the [MoNRE] minister says that our policy designers often design those policies that are easily implemented by governmental organizations, but not easily accepted by our citizens”. Clearly, one of the major weaknesses of environmental policies in Vietnam is the lack of public participation in both policy design and implementation. Public participation is difficult to realize in many developing countries where officials are not interested in encouraging representational democracy (Tosun, 2000). Public participation also requires considerable time, money, and an appropriate approach to be effective (Timothy, 1999; Tosun, 2000), so that it is not a high priority for bureaucrats. Social cohesion may facilitate participation processes (Rydin & Pennington, 2000) and allow local residents to have a bigger voice in calling for their rights to participate in environmental decision-making.

## 6. CONCLUSION

CDR consists of steps taken by local communities to deal with their environmental problems and is characterized by an escalating strategy of “talking”, “writing” and “acting” in opposition to the polluting facility. It involves a dynamic process developed from residents’ attitude toward the polluting facility to their actions against the facility. However, CDR in the context of landfills is different from that in the context of industrial pollution. While community opposition to industrial pollution has received much attention from the media (Roodman, 1999; O’Rourke, 2004; Phuong and Mol, 2004; Thanh Tra, 2006), community opposition to landfills has relied less on media support. Reasons for this include the sensitivity of landfill issues and the strict control of media by the government. Nor was speaking to influential outsiders felt to be very helpful. Thus, the effectiveness of CDR in dealing with landfill problems mainly depends on communities’ internal capacity, especially social cohesion.

Few residents felt that the measures they had taken to oppose the landfill were effective. In particular, there was very little support expressed for the effectiveness of blocking truck access to the landfill. Despite the lack of support, blocking access appears to have forced the government into negotiating with the three communities that used this measure. Two of the communities, Hung Dong and Nam Son, were sufficiently satisfied with the negotiations that they stopped blocking access, even though they only received 20% to 40% of what they had asked for. O’Rourke (2004) suggests that one of the limitations of CDR in Vietnam is that even limited victories can appease residents’ anger and have a demobilizing effect among those opposing a facility. On the other hand, residents of Trang Cat have continued to block access even though they have been able to extract more concessions from the government than were offered at the other landfill sites. Although Trang Cat, was found to have relatively low levels of social cohesion, it is possible that the pervasiveness of the pollution, (as suggested by Kousis (1999) in his study of community mobilization in Europe), is what is driving the continued blockade. The livelihoods of the farmers in Trang Cat are particularly sensitive to leachate leakages from a landfill because of their reliance on aquaculture production.

While family networks were important for local residents in dealing with landfill pollution, social networks did not appear to have as important a role because they are not truly voluntary networks and are controlled by the state. With the exception of Trang Cat, the link between social cohesion and effectiveness of CDR seems to be positive. Ha Khau had low cohesion and

low effectiveness. Nam Son and Hung Dong had relatively high cohesion and were more effective in their use of CDR than Ha Khau.

One might expect that rich communities opposing the polluting facility would be more active and effective than poor communities or communities with low education levels (Hettige et al., 1996). This study found no relationship between wealth or education and the likelihood that an individual would take measures to oppose the landfill. On the other hand, there was a statistically significant relationship between occupation of the respondents and community pressure. Farmers appeared to oppose the polluting facility much more vigorously than the non-farmer respondents, probably because landfill pollution puts their livelihoods at risk.

CDR appears to play a role in implementation of environmental regulations. It influences environmental decision-making processes by making decision-makers at the provincial and national levels aware of local problems. Since the Vietnamese authorities are currently focused more on economic development than environmental protection, CDR can help balance the power between the environmental department and other departments in the government. However, fighting the landfill may also divide the community (e.g., Trang Cat community), especially when the government is very patient.

One policy implication of this research is that more formal mechanisms are needed to involve the public in siting and operations of noxious facilities. The proposal by the city government in Hai Phong to introduce a community monitoring committee at the landfill is one step in this direction. Public involvement in siting may result in the delay of a project, but could help to avoid the cost of community opposition in the future.

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# ANALYSIS OF PUBLIC PARTICIPATION AND EIA - EXAMPLE IN THE MAINLAND CHINA

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## Abstracts

This article deals with the investigation to the 186 government listed and approved EIA papers of construction projects and to their public participation-relevant parts in south China area, and it also analyzes the operation of public participation and EIA in practice and probes into the research orientation of improving public participation.

**Key words:** public participation, operation, government responsibility, public recourse mechanism, citizen's society

## 中国内地公众参与 EIA 实证分析

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## 摘要

本文对中国华南地区分别通过政府环境审批的 186 份建设项目的环境影响报告书及其“公众参与篇章”进行考察，分析公众参与 EIA 在实践中的操作，探讨完善公众参与的研究方向。

关键词：公众参与、操作、政府职责、公众诉求、公民社会

## 1. 前言

《中华人民共和国环境影响评价法》（2003 年 9 月 1 日起执行）鼓励有关单位、专家和公众以适当方式参与环境影响评价（EIA）。为推进和规范环境影响评价活动中的公众参与，国家环境保护总局颁布《环境影响评价公众参与暂行办法》（2006. 3. 18. 起执行），对应当征求公众意见的建设项目做出在环境影响报告书中需编制公众参与篇章的规定，同时明确了环境保护行政主管部门在审批或者重新审核建设项目环境影响报告书过程，不得受理环境影响报告书中没有编制公众参与篇章的报告书。至此，公众参与 EIA 成为国家环境保护行政审批程序的重要依据。所谓公众参与，指的是群众参与政府公共决策的权利（潘岳，2004）。本文对 2003 年以来中国华南地区分别通过各级政府环境审批，同意立项的 186 份建设项目环境影响报告书及其“公众参与篇章”进行了考察，分析公众参与 EIA 在实践中的操作，探讨完善公众参与制度的研究方向。

## 1 研究方法

考察《中华人民共和国环境影响评价法》（2003.9.1.）执行至2007年6月期间，分别获得各级政府环保部门审批同意立项的186份建设项目环境影响报告书及其“公众参与篇章”，对公众参与EIA的实践情况进行分析。本文考察的建设项目环境影响报告书，均是建设单位委托具备环境影响评价资质的专业人员编制。其中，81份报告书的编制时间是在《环境影响评价公众参与暂行办法》（2006.3.18.）执行之前；104份报告书是在《环境影响评价公众参与暂行办法》（2006.3.18.）执行之后。考察内容：公众参与EIA依据、建设项目污染源类型、环境影响范围、发布环境信息方式、公众参与EIA时间段、公众参与方式、公众参与的代表性、公众对建设项目接受程度、公众诉求、建设单位对公众意见反馈情况、政府部门对公众意见反馈情况。考察中的建设项目，几乎包括了国民经济建设的所有行业，如交通运输、水利工程、电力、金属冶炼（钢铁）、煤炭、陶瓷制造、烟草、化工（成品油及液态化工品库、化学药品原药制造、塑料、树脂合成、涂料化工、原油加工及石油加工、医药研究与试验发展）、玻璃制品、服装制衣、纺织印染、水泥制造、食品、饲料加工、仓储业、油品码头、天然气输送工程、地铁建设、基础设施（道路建筑等）、房地产开发与经营、电子元器件（印制电路板制造）、水上运输业、成品油库、造纸、垃圾填埋、医疗废物处置、市政工程、基础设施、环保工程、区域开发、旅游度假区、工业园规划等；项目投资规模，分别为50万/项目至1312亿元/项目人民币（含500万美圆/项目至4.8亿美圆/项目）；建设项目污染源类型主要为，工业废水、废气、固废、废气、噪声、生活污水、水土流失、非污染生态等；依据建设项目类型和污染状况，项目环境影响的范围各异，如项目周围河段、河道、江河等（最短1.0km，最长16.0km）、建设项目、工程沿线（80km<sup>2</sup>）（陆域最大范围200km<sup>2</sup>）、项目周围海域（最大范围652km<sup>2</sup>）、流域（最长29.5km）、区域开发（陆域范围1.4km<sup>2</sup>—30km<sup>2</sup>不等）、影响人口最少0.2万人，最大16.11万人。

## 3. 分析公众参与EIA的操作

### 3.1 公众参与EIA的依据

《环境影响评价公众参与暂行办法》（国家环境保护总局，2006年3月18日）是编制环境影响报告书公众参与篇章的主要依据，在该法规执行之前编制的环境影响报告书公众参与依据有《中华人民共和国环境影响评价法》（2003.9.1.起执行）和《建设项目环境保护管理条例》（中华人民共和国国务院令第253号1998年11月29日）等。在186份建设项目环境影响报告书中，有180份报告书编制了公众参与篇章，见表2.1-1。

表 2.1-1 公众参与EIA的依据

法律法规	《环境影响评价公众参与暂行办法》颁布前编制的报告书 (76份报告书)	《环境影响评价公众参与暂行办法》颁布后编制的报告书 (104份报告书)
无依据（未表述）	45份，占59%	25份，占24%
《建设项目环境保护管理条例》	31份，占41%	4份，占3.8%



《环境影响评价公众参与暂行办法》	/	65 份, 占 62.5%
《环境影响评价公众参与暂行办法》和《建设项目环境保护管理条例》	/	4 份, 占 3.8%
《环境影响评价技术导则——公众参与》(征求意见稿)	/	9 份, 占 8.7%

迄今,《环境影响评价公众参与暂行办法》是中国公众参与 EIA 规范最全面的一个行政法规。主要内容有:“国家鼓励公众参与环境影响评价活动”;“按照国家规定应当征求公众意见的建设项目,其环境影响报告书中没有公众参与篇章的,环境保护行政主管部门不得受理”;“应当在座谈会或者论证会召开 7 日前,将座谈会或者论证会的时间、地点、主要议题等事项,书面通知有关单位和个人”;“应当在举行听证会的 10 日前,在该建设项目可能影响范围内的公共媒体或者采用其他公众可知悉的方式,公告听证会的时间、地点、听证事项和报名办法”;“专项规划的编制机关应当认真考虑有关单位、专家和公众对环境影响报告书草案的意见,并应当在报送审查的环境影响报告书中附具对意见采纳或者不采纳的说明”;“土地利用的有关规划、区域、流域、海域的建设、开发利用规划的编制机关,在组织进行规划环境影响评价的过程中,可以参照本办法征求公众意见”。我国至今没有颁布公众参与 EIA 的技术性规范或导则。

公众参与 EIA,是国家现行法律法规中环境影响报告书行政审查的程序规定,法规对公众参与 EIA 的操作规定比较宽泛。因此,有少数环境影响报告书编制者,采用《关于加强国际金融组织贷款建设项目环境影响评价管理工作的通知》(1993 年 6 月 21 日国家环保局、国家计委、财政部、中国人民银行发布)<sup>52</sup>和《环境影响评价技术导则——公众参与》(征求意见稿)<sup>53</sup>以及“世界银行环评规则”作为编制公众参与篇章的技术依据,这类“规定”或“导则”对认识理解公众参与 EIA 起到一定的借鉴作用。

### 3.2 公众获得信息方式和参与 EIA 的时间段

考察发现,《环境影响评价公众参与暂行办法》(2006 年 3 月 18 日)执行之前编制的环境影响报告书,对公众参与活动均未注意到需向公众发布建设项目环境影响信息的操作。

《环境影响评价公众参与暂行办法》(2006 年 3 月 18 日)执行以后编制的环境影响报告书反映,公众获得建设项目环境信息的机会有了较大改善。

《环境影响评价公众参与暂行办法》(2006 年 3 月 18 日)执行之前编制的 76 份报告书,在编制报告书的初始阶段向公众咨询对拟定建设项目的意见和环境保护要求——初级参与,没有向公众公开报告书的简本。初期参与,而不是全过程地完整了解建设项目选址、可能的环境影响范围、危害程度以及环境保护措施等信息,容易造成公众处在对建设项目被动知情和信息不对称状态。公众在获得完整信息情况下才能激励积极参与。《环境影响评价公众参与暂行办法》(2006 年 3 月 18 日)执行之后编制的 104 份报告书,公众获得环境信息机会增加,公众在初级参与的情况下有机会通过对环境影响报告书简本继续获得建设项目环境保护信息,从而有机会全面认识和判断环境影响状况,促进公众积极参与。

### 3.3 公众参与方式和公众诉求的有效性

<sup>52</sup> 该文规定了“公众参与是环境影响的重要组成部分,报告书应设专门章节予以表述,使可能受影响的公众或社会团体的利益得到考虑和补偿”。

<sup>53</sup> 在《中华人民共和国环境影响评价法》(2003.9.1.起执行)颁布以后出现的由中国环境科研单位研究编制的内部征求意见稿,但至今未正式出版(非正式文件);

中国内地公众参与的大多数文献，“公众”概念包含了专家。《环境影响评价法》和《环境影响评价公众参与暂行办法》将“公众”与专家区分，“公众”指“公民、法人或者其他组织的代表”，“公众”是与需要征求意见的“有关单位、专家”平等的独立主体。180份环境影响报告书的公众参与篇章内容反映，公众对建设项目的意愿和诉求主要通过“问卷”表达，占99%。公众参与EIA方式是对建设项目周围群众进行问卷调查，其中部分项目辅助伴随“走访”、“座谈”、“咨询”、“实地参观”等方式。操作上，问卷调查方法没有统一的技术规范。普遍存在问卷问题的设计随意性大，向公众传递信息不完全，甚至问题设计存在诱导倾向；问卷发放随意性较大，每个项目不论环境影响范围大小，发放数量和参与人数大多不超过100人（个别项目公众参与人数超过250-400人）；问卷结果一般没有采用统计学方法进行严格数据处理，甚至出现明显的错误。在没有技术规范条件下，公众参与方法和调查结果难以重复和验证，影响调查结果的科学性和可信度。

### 3.4 对公众意见的反馈情况

考察发现，存在公众反对意见的建设项目主要分布在房地产、液体储库建设、基础设施、金属加工、电厂设备改造、皮革制造、水利工程等行业，按照建设项目社会经济属性本文将其分为“公益性项目”和“经营性项目”两大类。其中，公益性项目，主要为基础设施建设（垃圾填埋、公路交通、地铁等）；公益性项目以外的项目为经营性项目。见表2.4-1。

总体看，存在公众反对意见的项目中公益性项目较经营性项目少。《环境影响评价公众参与暂行办法》（2006年3月18日）执行以前编制的报告书，向公众反馈环境保护措施的建设单位只占17.1%；对公众意见没有反馈的建设单位占86.8%（可能存在报告书表述疏漏情况）。由于《环境影响评价公众参与暂行办法》规定建设单位须向提出意见的公众反馈意见，该法规执行之后编制的报告书，向公众反馈环境保护措施的建设单位提高到50.0%。数字显示，向公众反馈意见的建设单位比率并不高。本文针对“存在公众反对意见的建设项目”进行统计，《环境影响评价公众参与暂行办法》（2006年3月18日）执行前，对公众意见没有反馈的建设单位达到83%；《环境影响评价公众参与暂行办法》（2006年3月18日）执行以后下降到24%；同时，公众对建设项目反对意见的程度也有所下降。公众诉求，主要集中在“解决就业”、“征地拆迁”、“污染事故渔业损失补偿”等。见表2.4-2。

表 2.4-1 存在公众反对意见的建设项目

编制环境影响报告书时间	公益性项目	经营性项目
执行《环境影响评价公众参与暂行办法》之前的建设项目(49个)	公益性项目占总数24%，平均反对率7.6%/项	经营性项目占总数76%，平均反对率9.0%/项
执行《环境影响评价公众参与暂行办法》之后的建设项目(45个)	公益性项目占总数18%，平均反对率8.1%/项	经营性项目占总数60%，平均反对率6.37%/项

表 2.4-2 建设单位没有向公众反馈意见的情况

存在公众反对意见的建设项目数量	公众参与方式	被调查公众反对程度(%)	建设单位没有反馈意见的	被调查公众的诉求	建设单位对公众意见处理情况
占《环境影响评价公众参与暂行办法》执行之前编制报告书的64.5%(49份)	问卷	反对率0.8-29%，平均6.88%/项(282.18/41)	占83%	征地拆迁、对居住环境的影响、经济补偿	无处理措施
占《环境影响评价公众参与暂行办法》执行之后编制报告书的35.5%(16份)	问卷	反对率0.82-17%	占24%	解决就业、征地拆迁、污染	绝大多数没有提及处理

制报告书的 43.3%(45 份)		平均 8.3%/项 (67.02/8)		事故渔业损失 补偿	措施
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### 3.5 公众参与 EIA 操作小结

《环境影响评价法》对建设项目和规划环境影响评价进行公众参与只作出法律上的原则规定,《环境影响评价公众参与暂行办法》对公众参与 EIA 作出环境行政审批程序的规定。但是,《环境影响评价公众参与暂行办法》是环境保护部门行政法规,规范性差,强制性不够,法律效力低以及部门管理偏好等,实践中公众参与 EIA 操作方式多样化。如,环境信息公开、公众参与时间、参与范围、参与方式、参与内容、公众意见反馈、公众权益保障等在操作上多样化,反映了人们对公众参与认识上和观念上的混乱。现实中,法律规定的公众参与、建设单位和政府部门的行政行为缺乏法律效力。“使得有关公众参与的法律规定仅在形式上满足了公众参与的需求,但在实践中无法操作”(汪劲)。

表 2.5-1 公众参与 EIA 概况

公众参与 EIA 运作	公众参与 EIA (执行《环境影响评价公众参与暂行办法》之前)	公众参与 EIA (执行《环境影响评价公众参与暂行办法》之后)	点评
编制“公众参与篇章”情况	82 份报告中编制“公众参与篇章”76 篇,执行率 92.7%;	104 份报告中编制“公众参与篇章”104 篇,执行率 100%;	《环境影响评价公众参与暂行办法》对审批环境影响报告书有约束力。
公众参与 EIA 依据	表述依据《建设项目环境保护管理条例》占 38.2%;	表述依据《环境影响评价公众参与暂行办法》占 66.3%;	主要依据《环境影响评价公众参与暂行办法》,但缺失公众参与的技术导则。
发布环境信息方式	报告书均未表述公众以何种方式获得环境信息。	“报纸”36.5% ; “网站”56.7% ; “布告”32.7% ; (前三项伴随两种以上方式 21.2%) ; 未表述 3.8%。	执行《环境影响评价公众参与暂行办法》之后,建设单位重视了环境信息公开的操作。
公众参与 EIA 时间段	被调查公众,100% 在编制报告书初始阶段参与。	被调查公众,62.5% 为初始参与。其中有 37.5% 初始参与和报告书简本参与。	公众参与越早越好,建设单位公开“报告书简本”有利于公众获得完整的环境信息。
公众参与方式	“问卷”98.7% (其中伴随“走访”17.3%、“座谈”8%、“听证”1.3%) ; “走访”1.3% ;	“问卷”100%。其中伴随“走访”7.7%、“座谈”4.8%、“咨询”0.96% , “实地参观”0.96% ;	99% 公众通过“问卷”方式参与 EIA。
公众对建设项目接受程度	公众对建设项目反对程度 0.8-29%, 平均 6.88%/项目	公众对建设项目反对程度 0.82-17%, 平均 8.3%/项目	统计数字只针对“存在反对意见的建设项目”
公众意见是否得到反馈	建设单位向提出意见的公众反馈“是”13.2% , “否”86.8% ; (可能存在报告书疏漏表述的情况)	建设单位向提出意见的公众反馈“是”60.6% , “否”39.4% ; (可能存在报告书疏漏表述的情况)	执行《环境影响评价公众参与暂行办法》后,建设单位对公众意见反馈率提高。
建设单位对公众意见的处理情况	17.1% 的建设单位对公众意见采取措施,没有反馈处理措施的建设单位占 82.9%。	50.0 % 的建设单位对公众意见采取措施,没有反馈处理措施的建设单位占 50.0 %。	处理措施:“落实三废处理”、“加强环保”、“减轻扰民影响”、“落实补偿”、“提高补偿金”、“解决就业”、“采纳合理建议”等。
政府部门对公众意见的反馈情况	报告书中没有体现。	报告书中没有体现。政府对个别项目“公众参与篇章”提出须“扩大调查范围和补充调查”等审批意见。	省和国家环保部门一般在政府网站公示环境影响报告书的审批结果。

## 4 完善公众参与的研究方向

党中央提出和倡导用科学发展观建设和谐社会，为政府环境保护工作提出了一个如何执政为民，如何进行环境制度创新和环境保护部门勤政的严肃问题。公众参与 EIA 是中国环境制度创新的一个重大契机，其深远意义将超越环境管理领域自身的改革和制度建设。

### 4.1 保护公众的权利是政府职责

《环境影响评价法》作出对涉及公众环境权益的规划和建设项目须进行公众参与的规定，《环境影响评价公众参与暂行办法》进一步将公众参与的行政审批程序具体化，两项法规却没有涉及公众参与的权利规范，没有确立公众参与的法律地位和不对建设单位环境行为作出约束性规定，是现行法律规定的瑕疵。实践中，公众往往处于弱势，公众意见在政府行政审批活动中是公众权益与利益集团博弈的过程，尊重和保护人民群众的基本权利是环境制度建设的根本。现行环境行政审批，对建设单位和政府自身环境决策行为没有约束作用，不能发挥利益协调、矛盾调处和环境权益保障机制。各级政府环境保护部门代表政府履行环境保护职责，公众参与须强化民主法治的监督机制。公众能否顺利参与社会环境监督之中，取决于政府制度的安排，公众参与机制的完善有待公众环境权利的根本落实，只有公众的环境权受到足够的尊重和保护，环境保护才有可能成为社会行为。

### 4.2 建立公众诉求机制

本文所考察的环境影响报告书中，存在公众反对意见的有 94 个建设项目，其中大多数建设单位没有依法向公众反馈意见和处理措施，全部都通过了政府审批。公众诉求在行政审批过程没有得到足够的重视，公众诉求和对建设项目的反对意见将遗留在规划和建设项目的建设过程，可能成为潜在的环境冲突。《环境影响评价公众参与暂行办法》使公众参与 EIA 成为规划和建设项目环境保护行政审批的法定程序，但是，现行法规没有建立公众利益表达机制，法规没有界定按照什么程序，由谁来判断公众的利益以及如何界定“公共利益”，或以什么形式解决“公共利益”边界争议，保护公众利益需要有法律规定的可操作的具体程序。公众参与 EIA 的意见对建设单位环境决策没有约束性，公众意见没有法律程序上的正义规定，公众意见更难以进入政府决策程序。

### 4.3 建立政府、市场、公民三方合作机制

现行法规，未就公众参与的具体时间期限作出规定，如环境影响报告书简本评论期限，不利于公众充分的表达意见；未就环境信息公开具体化，不利于公众获得环境信息；未就公众参与方式，如问卷等调查方式作出具体规范，不利于科学判断“大多数人”的利益。这些问题需要采用科学的方法处理。公众参与 EIA 不单纯是技术性问题。在当今中国资源匮乏，人口膨胀，生产和消费方式落后形势下，环境保护是公民环境利益和资源环境公平配置问题。规划和建设项目环境审批制度是以行政手段处理资源环境配置，规划和建设项目的环境保护关系到公共利益。环境审批制度，需从精英参与模式向公共选择模式转变。公众参与 EIA 是环境事务公共选择过程，也是政治伦理问题。环境影响评价制度，需要从传统的技术评价机制向公共政策系统表达机制转变。人民群众参与环境事务决策，可以补充环境保护问题由政府决策和市场决策的不足，从而建立起一个政府、市场、公民三方合作的机制。通过公民自由参与环境保护决策体现以人为本，逐步建立人与人及人与自然的和谐发展，实现社会经济的可持续发展。

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# NORTH EAST NEW TERRITORIES LANDFILL EXTENSION – PUBLIC COMMUNICATION EVENTS

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## Abstract

Hong Kong has been relying on three strategic landfills, with a total capacity in the order of 140Mm<sup>3</sup>, for waste disposal. With the increased in waste disposal rate, the landfills will have their capacity run out in the mid 2010s.

To maintain continuity of waste disposal, the Environmental Protection Department of the HKSAR Government commissioned a study in February 2005 to investigate the feasibility of extending the North East New Territories (NENT) Landfill. The existing NENT Landfill, located at Ta Kwu Ling near the northern boundary of Hong Kong, has a capacity of 35Mm<sup>3</sup>. The proposed extension is targeted to provide new landfill space of 20Mm<sup>3</sup>.

A vital task under the feasibility study is to carry out an Environmental Impact Assessment (EIA) in accordance with the Environmental Impact Assessment Ordinance (EIAO), Laws of Hong Kong. Under the EIAO framework, the EIA Report will need to be exhibited to the public before its endorsement. Instead of leaving until such a statutory exhibition stage for involving the public, the NENT Landfill Extension project has adopted a proactive approach to involve the public at various stages during the course of the EIA and feasibility study. Various tools and technologies have been adopted in the EIA process for assessment of impacts, formulation of mitigation measures, and presenting findings / proposals.

This Paper will present how the public involvement exercise has been strategised, including early identification of project stakeholders, proactive arrangement of public communication meetings and site-visits to enable fuller appreciation of stakeholders' views, presentation of study process / findings to members of the public to solicit their early comments and views. In addition, 3D visualization technology for enhancing reader-friendliness of the study findings has been adopted in this Study.

## 1. BACKGROUND

At present, over 6 million tonnes of waste are disposed of at the three strategic landfills in Hong Kong each year. These three landfills, located in remote parts of the New Territories, include:

<u>Landfill</u>	<u>Location</u>	<u>Approximate Capacity</u>	<u>Year in which operation commenced</u>
West New Territories (WENT)	Nim Wan	61 Mm <sup>3</sup>	1993
South East New Territories (SENT)	Tseung Kwan O	43 Mm <sup>3</sup>	1994
North East New Territories (NENT)	Ta Kwu Ling	35 Mm <sup>3</sup>	1995

Hong Kong, like many developed places, has seen its economic growth entailing an upward trend in wasteloads; in particular, municipal wasteloads have been increasing at an average of about three per cent per year since 1986. Under such a substantial growth rate in wasteloads, Hong Kong will run out of landfill space far earlier than expected. If waste levels continue to increase at current trend, the three existing landfills would last only until mid next decade.

To tackle the problem, new landfill capacity must be identified. The Environmental Protection Department (EPD) of the HKSAR Government therefore commissioned a study in 2000 on the Extension of Existing Landfills and Identification of Potential New Waste Disposal Sites. Amongst the recommendations of this territory-wide study is an extension of the existing NENT Landfill, with a target capacity of about 20 Mm<sup>3</sup>. EPD further commissioned a feasibility study in February 2005 for the NENT Landfill Extension, with the following key tasks: formulation and evaluation of layout options for the landfill extension; detailed EIA study; and conceptual design of landfill facilities.

## **2.DESCRPTIONS OF THE NENT LANDFILL EXTENSION**

The proposed Extension, with an extent of about 70 ha, is located immediately east of the existing NENT Landfill. A large proportion of the Extension area is in fact the stockpiling and borrows area of the existing landfill. The general topography at/around the Extension site shows that it is generally in the form of a bowl bounded by Robin's Nest and Wo Keng Shan. The proposed Extension is in the same region as 20 numbers of local villages in Ta Kwu Ling District as well as 4 villages in Sha Tau Kok District. Owing to perceptions such as declining property prices, health threats, and air, water and noise pollution imposed on the local communities, the siting of the proposed Extension generates concerns amongst the local villagers.

## **3. STRATEGIC PUBLIC INVOLVEMENT EXERCISE**

To foster community support and general consensus on the proposed landfill extension, continuous public involvement was implemented under the Study. A proactive approach was adopted to involve the public at various stages during the course of the feasibility and EIA study.

The objectives of the public involvement exercise are :

- To promulgate to the public on the general waste problem in Hong Kong, and the need of landfill space for waste disposal.
- To conduct site visits to existing landfills and restored landfills to introduce the modern landfill technologies to meet the stringent environmental standards in Hong Kong.
- To clarify the misunderstanding/ misperception and concerns on the landfill extension project so as to solicit support from green groups, local villagers and the general public.
- To provide appropriate forums to report study progress / interim findings of EIA to members of the public and to solicit their early comments and views as part of the Continuous Public Involvement.
- To adopt 3-dimensional visualization technology for enhancing reader-friendliness of the study findings and prepare 3-dimensional virtual reality modeling language to illustrate the details and outcome of the EIA.

#### **4 PUBLIC COMMUNICATION EVENTS FOR THE NENT LANDFILL EXTENSION**

To meet the objectives of the public involvement exercise, numerous public communication events including meetings, site visits, road shows and education programme had been conducted during the course of the Study. They are summarized in the table below.

<b>Public Communication Events</b>	<b>Total Number of Events</b>
Meetings with Green Groups, Rural Committees, Village Representative and District Council	20
Site Visit to existing landfills	3
School Education Programme in Tai Po and North District	40
Road Shows (e.g. Panel Display in Schools and Environmental Resource Centres)	41

Meetings with Green Groups, Village Representative and District Council were planned to synchronise with the programme of the main tasks of the feasibility study. This strategic communication plan include three stages as highlighted below :

- Stage 1 – introduction of the NENT Landfill Extension Project, the scope of EIA study, and initial exchange of views on environmental and other related issues;
- Stage 2 – presentation of preliminary layout options together with intermediate study assessment / findings, and exchange of views at a finer level of details;
- Stage 3 – presentation of comprehensive study assessment / findings and preliminary conclusion for further exchange of views.

To cultivate open-mindedness and constructive interaction during the public involvement process, these meetings / dialogues with various stakeholders and parties were arranged on an informal basis. Concerns from stakeholders / parties were then taken into account when developing the landfill extension layout. For instance, the landfill extension boundary had been setback to protect the nearby ecologically sensitive stream (Lin Ma Hang Stream) resulting in a reduction of total landfilling capacity. It is believed that a win-win solution to the project come from listening to others, including those with different perspectives, and engaging in meaningful, timely and frank dialogues.

Apart from the meaningful meetings / dialogues, site visits to existing landfills had also been conducted. Stakeholders including World Wild Fund for Nature, The Conservancy Association, Friends of the Earth, Sha Tau Kok Rural Committee and Village Representatives participated in a half-day visit to the NENT Landfill and the Restored Shuen Wan Landfill at Tai Po. Strenuous efforts were taken to explain that the existing landfills have been incorporated with state-of-the-art waste management technologies such as liner system, leachate collection & treatment system, and landfill gas management system. The aim of the site visit is to put forward the message that "Our landfills have served the community well."

In addition to the above, education programme / exhibitions had also been launched to echo the "Policy Framework" in achieving the targets on waste reduction and prevention. The content and focus of School Education Programme and Road Shows are to present the strategy and measures to address the municipal solid waste problem in Hong Kong, which include the waste management needs on new landfill spaces.



## **5. OTHER PUBLIC COMMUNICATION INITIATIVES**

Besides the specific communications with stakeholders / concerned parties, a website specifically for the NENT Landfill Extension Project ([www.nent-ext.com](http://www.nent-ext.com)) was launched in August 2005. It serves as a communication channel for the public in general, supplementing the public communication tasks described above. The Project Website exhibits the background materials as well as intermediate study assessment / findings for the Project, including an introductory description of this Study, general descriptions on how well the existing landfills have served the community, the environmental performance of the existing NENT Landfill, the need for extension and the programme of the Study.

The website is continually updated along with the latest public communication programme as well as intermediate study assessment / findings.

## **6. 3-DIMENSIONAL VISUALISATION MODEL**

Another effective communication tool is the adoption of a Geographical Information System (GIS) model to facilitate visualization of scientific assessments / findings. The GIS Model for the NENT Landfill Extension covered an area of 2,000 ha, so as to encompass all the locations for which various stakeholders expressed concerns.

As a main component of the GIS model, a 3-dimensional digital terrain model (DTM) was created based on map data from the Lands Department of HKSAR Government, which includes topographic maps overlaid with orthorectified aerial photos for photorealistic display. Background information including graves, the Tong To Shan Archaeological Site, ecological sensitive Lin Ma Hang Stream, village boundaries and landfill layout were then added to the model.

Engineering and environmental findings were then imported into the 3-D model in Virtual Reality Modeling Language (VRML) format. These include groundwater level, borehole data, surface drainage catchments, landfill restoration profile, odour assessment results, and construction noise impact assessment results, etc. The above data are presented and mapped with photorealistic mappings and shaded in different colours for easy visualization in the models. During the public communication meetings, features in the 3-D models were converted into images and animation fly paths. Stakeholders could easily understand and grasp the key information of the project through the interactive presentation.

A vital task under the feasibility study is to carry out an Environmental Impact Assessment (EIA) in accordance with the Environmental Impact Assessment Ordinance (EIAO). Under the EIAO framework, the EIA Report will need to be exhibited to the public before its endorsement. To facilitate reader-friendly public involvement in the EIA process, a 3-D presentation package in VRML format was formulated for the EIA. The VRML model also include 3-D visualisations of the major findings of the EIA report, including baseline environmental information, the environmental situations with or without the project, key mitigated and unmitigated environmental impacts, and key recommended environmental mitigation measures so that the public can understand the project and the associated environmental issues.

Since the models are generated in VRML format, which is a standard file format for representing 3-D interactive graphics in the World Wide Web, it could be readily browsed through a general Internet browser with suitable plug-in installed. The 3-D EIA was successfully launched in the EPD website under the EIAO framework during the 30 days public inspection period. After then, it was launched in the project website, for continuously updating during the life of the project.

## **7. CONCLUSION & ACKNOWLEDGEMENT**

Public consultation is particularly important for project involving waste management facilities, in view of the public concerns and environmental sensitiveness involved. In the case of the NENT Landfill Extension project, efforts on public communication between stakeholders / concerned parties and the feasibility study team since the very early stages have provided valuable feedback to the study team members, and have enabled the project to be better perceived and accepted.

The project website and the 3-D visualization model constitute a powerful and useful tool to enable effective communications with stakeholders and concerned parties. In particular, an interactive platform is provided to enable professionals, non-professionals and the public to navigate the 3-D model to better understand the environmental information of the landfill extension project.

The NENT Landfill Extension is the first public works project in Hong Kong that has taken a proactive approach to implement the concept of 3-D EIA under the EIAO framework. It is anticipated that the experience gained will serve as useful reference for future projects that involve a strong element of public sensitiveness.

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# STRUCTURAL MODEL OF RISK PERCEPTION ON LANDFILL SITE FOR MUNICIPAL SOLID WASTE

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## Abstract

Landfill site is an essential disposal facility for waste management, however, associated with uncertain risks and public protests. In Japan, this problem is aggravated due to acute shortage of land for industrial waste disposal. In order to improve the public acceptability for the landfills, practical use of risk communication is necessary. This calls for analysis concerning to psychological aspect about the structure of risk perception. Thus, this study attempts to analyze the factors relevant to the acceptance and risk perception of landfill site for Municipal solid waste) through the questionnaire survey.

1000 residents living in Okayama city, Kurashiki city, and Yoshinaga city in the Okayama prefecture were selected by systematic random sampling from the telephone directory, and investigated by the mailing method. To measure the factors relevant to the acceptance and risk perception of landfill site, the authors designed the question addressing this issue like the trust in local government, disposal technology, knowledge of chemical substances, social characteristics of the inhabitants etc. Questions were answered by 7 point Likert scale. Initially, the scales relevant to acceptance of landfill site and risk perception were constructed through the factor analysis, subsequently; structural model was developed through Structural Equation Modeling.

The result showed that the factors which influence the acceptance of landfill site were 'Risk perception' and 'Trust in technology and standard'. The factors which influence the risk perception were and 'Trust in technology and standard' and 'Trust in response to accident'. And 'Trust in technology and standard', 'Trust in response to accident' and 'Trust in sincerity to citizens' were in covariant relationship.

## 1. INTRODUCTION

In Japan, municipal solid waste generated more than 50 million tons per year, up most 80% of that were incinerated, and 7.3 million tons of ash and non-combustible wastes disposed in landfill site with leachate control. Landfill site is an essential disposal facility for waste management, however, associated with uncertain risks and public protests. Just like other regions in the world, in Japan, waste treatment and disposal facility is not irrelevant to NIMBY Syndromes, especially; shortage of landfill site is serious problem of local government. In order to improve the public acceptability for the landfills, practical use of risk communication is necessary. This calls for analysis concerning to psychological aspect about the structure of risk perception.

Study of risk perception has been conducted by many researchers, as a result, it is widely agreed that trust is a key factor influencing people's perceptions of risk.(Ex. Slovic 1993, 1997, Kasperson 1992). In Japan, by case study of landfill site for high level radioactive waste, Tanaka (1998) stated that main factors of public acceptance were 'concern and care' and 'Information disclosure', 'Communication with citizens', 'Compensation in case of accident', and 'Risk management ability'.

Thus, this study aims to analyze the factors relevant to the acceptance and risk perception of landfill site for municipal solid waste focusing public trust, and to construct the structural model to understand the relationship of these factors generally.

## 2. METHODOLOGY

### 2.1 Data

Our case study is conducted in Okayama prefecture, the western part of Japan. Yoshinaga Town, Kurashiki City and Okayama City has selected as research area (Figure 1). Table 1 shows basic data, and Table 2 shows historical background of waste management of each cities. Okayama city is central area in Okayama prefecture, characterized by high economic activity in commercial area around central station. Kurashiki City is industrial area, characterized by high productive activity of heavy industry and textile industry. Yoshinaga city is rural area, characterized by low economic activity dependent on agriculture. And in Yoshinaga city, public conflict concerning siting plan of landfill site for industrial waste has occurred in 1994 – 1998.

One thousand residents living in 3 cities were selected by systematic random sampling from the telephone directory, and investigated by the mailing method. The number of valid responses was 423. Of those, sex distribution was Male 70.4% and Female 28.3%, Age distribution was as follows: 0-29 1.4%, 30-39 3.3%, 40-49 13.0%, 50-59 25.5%, 60-69 30.0%, over70 23.6%. Sex and age distribution showed no significant differences among 3 cities.

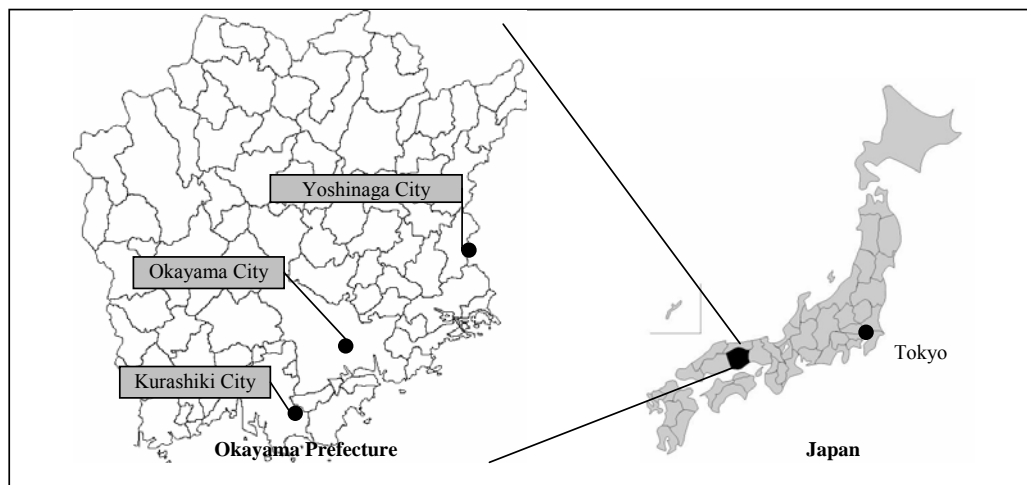


Figure 1. Location of research area

Table 1. Basic Data of Research Area

Research Area	population※	number of households ※	size of household	Necessary sample number
Okayama City	626,534	244,010	2.57	96
Yoshinaga Town	5,288	1,690	3.13	91
Kurashiki City	430,239	152,510	2.82	96

※1 : national population census 2000

Table 2. Historical background of waste management in research area

<p><b>Yoshinaga City</b> In 1994, joint public-private venture has submitted a development plan of industrial waste landfill site to Yoshinaga city government. And then, resident's group has started a campaign against the proposed plan, and that movement spread all over the town. On September 16th, a referendum was held about whether to accept the landfill site, about 90 percent of voters rejected it. As a result, Government of Okayama prefecture has decided to take measures to refuse a construction license for landfill site. Developer has appealed against a decision of Okayama pref. to national government, but the Ministry of Health and Welfare uphold a decision of Okayama pref. government.</p> <p><b>Kurashiki City</b> In 2004, JFE(Steel company) had build a Incineration plant which treat simultaneously municipal waste and industrial waste . The JFE's new system was the first of its kind in Japan. This plan has received no major protest by residents. And, in kurashiki city, there is no major protest against waste management facility over the past ten years.</p> <p><b>Okayama City</b> In 2001, Incineration plant has rebuilt in East area, but this work has received no major protest by residents. And, in okayama city, there is no major protest against waste management facility over the past ten years.</p>
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## 2.2 Item of Questionnaire

Table 3 shows items of questionnaire. The acceptance of landfill site was measured by two question (“Can you accept the landfill site near your residence?” and “Can you accept the waste generated in other area?”). Risk perception was measured by 2 questions, viz., a possibility of leak accident in controlled landfill site and a seriousness of environmental pollution caused due to the accident. To measure the factors relevant to the acceptance and risk perception of landfill site, we designed the question addressing this issue like Sense of ‘Necessity’, ‘Benefit’, ‘Trust in technology and standard’, ‘Trust in local government’, and ‘Knowledge of chemical substances.’. Additionally, to understand the risk perception level of waste management facility, the questionnaire included perception of necessity and safety of several risk factors (ex. nuclear power plant, tobacco, and so on). Questions were answered by 7 point Likert scale.

Table3. Items of Questionnaire

□ : Reference Number

Acceptance	Q302	Can you accept the siting of municipal waste landfill site near your residence?
	Q305	Can you accept the waste generated in other area?
Risk Perception	Q601	Do you think a possibility of leak accident in landfill site is high?
	Q602	Do you think it seem more likely that the serious pollution of soil and ground water caused by the breakage of the liner of landfill?
Necessity	Q210	Do you think the land fill site is essential facility?
Benefit [5]	Q708	Do you want to use welfare provisions (ex. pool ) attached waste treatment facility?
Trust in technology and standard	Q603	Do you think that landfill needs only to meet national standard under the construction?
	Q604	Do you think that landfill can be controlled safely if the current technology is applied to the landfill?
Trust in local government	Q701R	Do you fear whether you get compensation, if the environmental pollution is occurred by the waste treatment facility?
	Q702R	Do you fear whether city conceal information intentionally if the accident in waste treatme?
	Q703	Do you think city make an effort to disclose information properly?
	Q705	Do you think city reflect on views (opinions) of residents in management of waste treatment facility?
	Q706	Do you leave the waste treatment facility without fearing if city management it?
Knowledge of chemical substances, [6]	Q901	Do you think chemical substances can be divided in two categories: hazardous one and safe one?
	Q902	Do you think the chemical substance's risk can be reduced to zero?
	Q903	Do you think hazard of chemical substance is well understood scientifically?
	Q904	Do you think you are safe if you take carcinogen below the regulated dose?
Comparison with another risk factor (Necessity and Safety)	Nuclear power plant, automobile factory, tobacco, pesticide, electromagnetic wave of cell-phone, exhaust gas from diesel automobile, food additive, genetically-modified food	
Individual attribute	age•sex•civil status•occupation•family size•distance to waste treatment site	

### 2.3 Statistic Analysis

At first, to remove biased sample, we compared 3 city data and individual attribute by nonparametric multiple comparison, and selected data for modelling analysis. Second, we validate the construction of the latent variables using factor analysis. Third, we build and test the theoretical model with latent variables using the structural equation model.

## 3. RESULTS

### 3.1 Comparison of 3 City's Data

Fig 1 shows comparison of perception of 'Necessity' and 'Safety' of waste management facility and other risk factors. Perception of necessity of waste management facilities were highest comparing other risk factors in Okayama city and Kurashiki city, meanwhile, necessity of automobile factory was highest in Yoshinaga city. Perception of safety of industrial waste management facilities were in the same range of nuclear power plant in Okayama city and Kurashiki city. On other hand, in Yoshinaga city, perceptions of safety of industrial waste management facilities were lower than nuclear power plant. Overall, perceptions of safety of municipal waste management facilities were higher than industrial waste, and incinerator was higher than landfill site.

We examine the statistical differences of 3 cities by one-way analysis of variance and nonparametric multiple comparison ( $p < .05$ ). As a result, Yoshinaga city data shows significant

difference compared to other city on several questionnaire items (Q302, Q305, Q601, Q602, Q603, Q604, Q904, Q701, Q702, Q703, Q705, Q706). Mean of these items showed that Yoshinaga citizens have a negative image to waste management (facility, technology, and standard), and local government. This study aims to develop a general model of acceptance and risk perception, thus, we remove Yoshinaga city data from modelling analysis

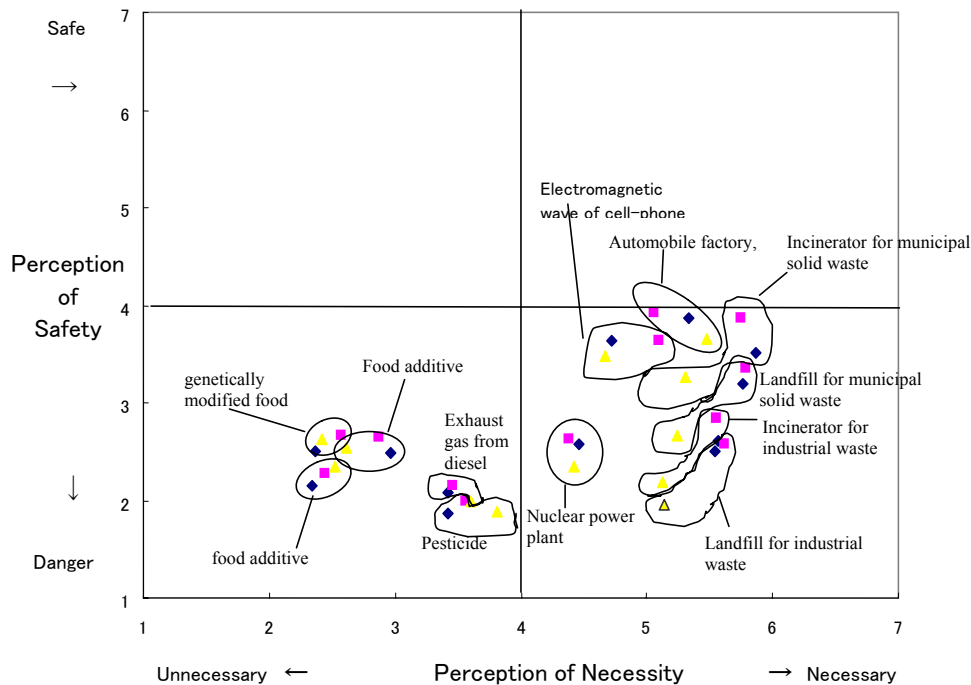


Figure2 Perceptions of ‘Necessity’ and ‘Safety’ of risk factors

### 3.2 Validation of Latent Variables by Factor Analysis

To clarify the relevant variables of acceptance and risk perception, we examined correlation between acceptance or risk perception and other questionnaire items. As a result, necessity (Q210), benefit (Q708) and Knowledge of chemical substance (Q901-903) shows no significant correlation with acceptance and risk perception, so we left out these items from factor analysis.

Using remaining items, we undertook explanatory factor analysis to fix the latent variables for structural equation modelling, employed principal factor method with promax rotation. Table 4 shows five factors extracted by factor analysis. Factor 1 was named as ‘Acceptance’, Factor 2 as ‘Risk perception’, Factor 3 as ‘Trust in technology and standard’, Factor 4 as ‘Trust in response to accident’, Factor 5 as ‘Trust in sincerity to citizens’. On the questionnaire design stage, Q904 was set upped as ‘Knowledge of chemical substances’, but it loaded to ‘Trust in technology and standard’. And ‘Trust in local government’ was separated to ‘Trust in response to accident’ and ‘Trust in sincerity to citizens’. Using these 5 factors as latent variables, we performed structural equation modelling.

Table 4. Factor Analysis for Identification of Latent Variables

Rotated component matrix					
Component	Component				
	1	2	3	4	5
Q302	<b>.840</b>	7.550E-02	-5.856E-02	.106	-1.986E-02
Q305	<b>.920</b>	-5.744E-02	5.873E-02	-9.133E-02	1.888E-02
Q601	2.556E-02	<b>.910</b>	-6.029E-03	-3.031E-02	-1.669E-02
Q602	-1.730E-02	<b>.942</b>	-1.714E-02	3.096E-02	-1.077E-03
Q603	-1.843E-03	8.597E-02	<b>.856</b>	-2.161E-02	.109
Q604	2.913E-03	7.198E-03	<b>.896</b>	-2.814E-02	8.211E-03
Q904	1.098E-02	-.132	<b>.628</b>	8.413E-02	-.144
Q701	-1.396E-03	3.083E-02	2.714E-02	<b>.982</b>	-.102
Q702	2.594E-03	-3.885E-02	-9.386E-03	<b>.841</b>	.157
Q703	2.971E-02	-3.576E-02	-6.790E-03	7.682E-02	<b>.846</b>
Q705	4.245E-02	-3.203E-02	-5.299E-02	-9.302E-02	<b>.963</b>
Q706	-8.214E-02	5.778E-02	4.612E-02	4.029E-02	<b>.778</b>

Extraction Method: Principal factor method

Rotation Method: Promax rotation

Boldface values indicate items loading most heavily on each factor.

### 3.3 Structural Equation Modelling with Latent Variables

Structural equation modelling was used to analyse the relationship of ‘acceptance’, ‘risk perception’, and other latent variables. At first, we developed the starting model (model 1) using ‘Acceptance’ and ‘Risk perception’ as endogenous variable, it was hypothesized that (1) ‘Acceptance’ depended on ‘Risk perception’, ‘Trust in technology and standard’, ‘Trust in response to accident’, and ‘Trust in sincerity to citizens’, (2) ‘Risk perception’ depended on ‘Trust in technology and standard’, ‘Trust in response to accident’ and ‘Trust in sincerity to citizens’, (3) ‘Trust in technology and standard’, ‘Trust in response to accident’ and ‘Trust in sincerity to citizens’ were in covariant relationship. Model 1 was tested on Okayama city and Kurashiki city data, and proved to fit, indicating that model 1 was a plausible causal model of the observed data ( $\chi^2=59.617$ ,  $df=4$ ,  $p=.058$ ,  $RMSEA=0.034$ ). But some of paths were insignificant, we left out the path which was a lowest level of significance, and proved to fit over and over again until all path coefficients became significant. In this process, we left out the path from ‘Trust in response to accident’ at first time (Model 2), the path from ‘Trust in local government’ to ‘Acceptance’ at second time (Model 3), the path from ‘Trust in local government’ to ‘Risk perception’ at third time (Model 4). Table 5 shows estimated path coefficients and t-value of Model 1 and Model 4. All path of Model 4 were significant, and based on Goodness-of-fit indicators (Table 6), we adopt model 4 as the final model. Figure 3 shows path diagram of Model 4 (standardised solution). In this model, (1) ‘Acceptance’ depended on ‘Risk perception’ and ‘Trust in technology and standard’ in comparable level, (2) ‘Risk perception’ depended on ‘Trust in technology and standard’ and ‘Trust in response to accident’ in comparable level, and (3) ‘Trust in technology and standard’, ‘Trust in response to accident’ and ‘Trust in sincerity to citizens’ were in covariant relationship.



Table 5 Estimates of t model parameters

From	To	Model 1			Model 4		
		estimates	t-value	$\rho$	estimates	t-value	$\rho$
Regression weight							
	Risk perception ----> Acceptance	.467	4.545	***	.467	4.655	***
Trust in technology and standard ---->	Acceptance	-.289	-4.190	***	-.282	-4.645	0.001
Trust in response to accident ---->	Acceptance	-.013	-.151	.880	-	-	-
Trust in sincerity to citizens ---->	Acceptance	.024	.255	.799	-	-	-
Trust in technology and standard ---->	Risk perception	-.121	-2.646	.008	-0.129	-3.188	***
Trust in response to accident ---->	Risk perception	-.177	-3.028	.002	-0.189	-3.666	***
Trust in sincerity to citizens ---->	Risk perception	-.027	-.418	.676	-	-	-
	Acceptance ----> Q0302	1.000	-.151		0.745	6.663	***
	Acceptance ----> Q0305	.745	6.666	***	1		
	Risk perception ----> Q0601	1.000			1		
	Risk perception ----> Q0602	.742	9.278	***	0.745	9.302	***
Trust in technology and standard ---->	Q0603	1.000			1		
Trust in technology and standard ---->	Q0604	.969	11.879	***	0.971	11.884	***
Trust in response to accident ---->	Q0701	1.000	-2.646		1		
Trust in response to accident ---->	Q0702	1.404	-3.028	***	1.392	9.032	***
Trust in sincerity to citizens ---->	Q0703	1.000	-.418		1		
Trust in sincerity to citizens ---->	Q0705	.915	4.545	***	0.888	13.167	***
Trust in sincerity to citizens ---->	Q0706	.887	-4.190	***	0.916	15.095	***
Trust in technology and standard ---->	Q0904	.389	.255	***	0.39	6.578	***
Covariances							
	Trust in sincerity <--> Trust in technology and standard	.656	6.064	***	0.655	6.069	***
	Trust in response to accident <--> Trust in sincerity	.499	5.195	***	0.503	5.572	***
	Trust in response to accident <--> Trust in technology and standard	.302	3.547	***	0.305	3.576	***

Table 6 Comparison of Goodness-of-fit measures for the 4 model

Goodnes-of-fit measures	Model 4	Model 2	Model 3	Model 4
$\chi^2$	59.617	59.639	59.683	59.847
Degrees of freedom	44	45	46	47
Probability level	.058	.071	.085	.099
RMSEA: Root Mean Square error of Approximation	0.034	0.032	0.031	0.029
GFI : Goodness of Fit Index	.971	.970	.970	.970
AGFI: Adjusted Goodness of Fit Index	.948	.949	.950	.951
RMR: Root Mean square Residual	.064	.064	.064	.064
AIC: Akaike's Information Criterion	127.617	125.639	123.683	121.847

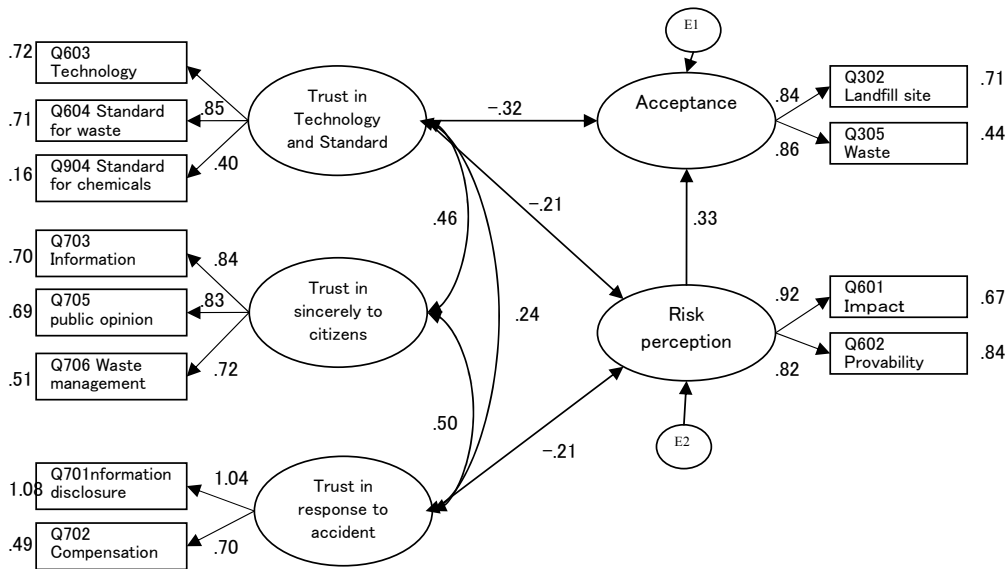


Figure 3 Path diagram of the estimated model (Standardised Solution)

#### 4. DISCUSSION AND CONCLUSIONS

The result of questionnaire survey, mean of Yoshinaga city data shows significant differences with other city data, thus it was revealed that Yoshinaga citizens have a relatively negative image to waste management facilities and technology, and to local governments. We guess this was because a public conflict occurred in Yoshinaga city in 1994-1998. In that case, conflict was caused by developing of landfill site planned by joint public-private venture, and negative information concerning on landfill site has spread among citizens by opposition campaign (ex. “environmental standard cannot be completely trusted.”, “Landfill site is very risky.”). Because of such a background, it is expected that Yoshinaga citizens perceive the siting problem seriously as own problem.

The result of Structural Equation Modelling indicates that the model has an acceptable fit to data. All loadings are statistically significant, thus supporting the theoretical basis for assignment of indicators for each latent variable. The model parameters showed ‘Risk perception’ and ‘Trust in technology and standard’ were determinant of citizen’s behavioural intentions to accept the landfill site in comparable level, and ‘Trust in technology and standard’ and ‘Trust in response to accident’ were determinant of citizen’s risk perception of landfill site in comparable level. Wildavsky stated that the great struggles over the perceived dangers of technology in our time are essentially about trust and distrust of social institutions. Result of our study affirms the importance of education concerning on technology of risk management, and the necessity of monitoring system in landfill site. It was considered information disclosure and compensation systems on environmental pollution accidents were also important.

Meanwhile, our model shows ‘Trust in sincerity to citizens’ was in covariant relationship with ‘Trust in technology and standard’ and ‘Trust in response to accident’. This means, in our model, trust in sincerely to citizens has an indirect effect to risk perception. In this regard, the National Research Council notes that “openness is the surest policy”. Result of our study affirms the importance of daily communication between citizens and local government, open-door policy

providing public access to all information, and performance reports about waste management.

In this study, we designed questionnaire items without siting process. Though, in our earlier survey conducted on actual conflict case, the fairness of siting process was a main factor of acceptance of landfill site. Because fairness of siting process is expected to have a direct effect to trust in local government, we are planning to analyse this aspect in next survey.

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# RISK PERCEPTION, COMMUNICATION AND MANAGEMENT: A CASE STUDY OF FOSU LAGOON, GHANA.

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## Abstract

As with all the worlds' ecosystems, the Fosu Lagoon in Ghana-West Africa is challenged by anthropogenic inputs. In 2006, it was added to the list of water bodies with dead zones as a result of pollution. Informal enterprises such as vehicle repair (garages), fish smoking outlets and the siting of a district hospital located close to the Lagoon have been linked to the pollution of the Lagoon. Efforts to relocate some of these enterprises have brought about conflicts. While risk assessment continues to drive most environmental management decisions, it is important to look at the dissemination of scientific information and the need to empower the people to bring their local knowledge into the assessment process. This paper examines fish consumption and risk perception of fishermen in the Fosu Lagoon. A survey of 120 fishermen was used to evaluate environmental risks posed by pollution and to determine their level of knowledge about these risks. The fishermen were found to have strong beliefs and specific knowledge about fishing stock and pollution impacts as well as high levels of confidence in their assessments. About 80% of the fishermen choose the garage as the worst source of pollution. However, they placed little trust in scientific information regardless of its potential value. These findings indicate that risk communication aimed at utilizing local knowledge in combination with strong scientific support would enhance the environmental management decision-making process.

**Key words:** *dead zone, pollution, risk perception, Fosu Lagoon, fishermen*

## 1. INTRODUCTION

Ghana is one of the countries bordering the Atlantic Ocean on the west coast of Africa. The country is located between latitudes 5° N and 11° N and longitudes 1° E and 3° W and has a surface area of 238 539 km<sup>2</sup>. The coastline of Ghana stretches approximately 550km long, has 40 000 ha surface area and has about 90 lagoons and estuaries [1]. Communities along these lagoons depend on them for their fish and fisheries resources. As with all of the World's ecosystems, these lagoons are challenged by anthropogenic inputs. Among these lagoons is the Fosu Lagoon at Cape Coast, in the Central Region of Ghana (5° 7'N, 1° 6'W). In 2006, it was added to the list of water bodies with dead zones [2] as a result of pollution which doubles oxygen deficiency. Although the Fosu Lagoon plays a significant role in the livelihood and culture of the people in Cape Coast, it is only recently that scientists and the government have begun to study and draw up restoration programs for it.

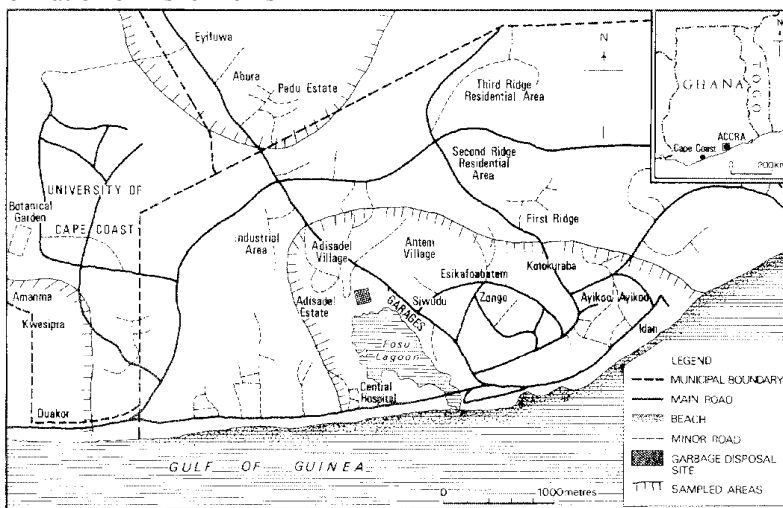
Most of these recent studies have looked mainly at the types and sources of contaminants in the Fosu Lagoon and their impact on the different types of fish found in the lagoon. However, there is very little study on the impact of the environmental deterioration in the lagoon on the people who depend on the lagoon for their livelihood. Drains from Bakaano, the District Hospital, Aquarium, Siwdu, Adisadel Village, and OLA enter the lagoon. The lagoon is further polluted by waste from garages, palm kernel oil extractors and free-range defecation in the lagoon's catchments areas. While risk assessment continues to drive most environmental management decisions, it is important to look at the dissemination of scientific information and

the need to empower the people to bring their local knowledge into the assessment process. This paper examines fish consumption and risk perception of fishermen in the Fosu Lagoon-Ghana. People must perceive a risk first before they can respond to environmental hazards. How do these fishermen perceive risk in relation to eating fish from a polluted lagoon? What level of knowledge do these fishermen have that may influence their decisions about eating fish from the lagoon?

## 2. METHODOLOGY

### 2.1. The study site and sample

Siwudu, a village at the northeastern end of the Fosu Lagoon and a prominent area noted for lagoon fishing and fish smoking was selected for the study (Figure 1). The study consisted of two phases; in-depth interviews and a survey questionnaire. Twenty fishermen with knowledge about the history and fishing in the lagoon were interviewed. Access to these fishermen was gained through the help of the chief fisherman. Open-ended questions were used to gather information on fishermen's



Source: Survey of Ghana.

Figure 1. Cape Coast Municipal area showing the Fosu lagoon and surrounding communities

perceptions, beliefs and knowledge about the risk of eating contaminated fish, behavior related to fish consumption, and past experiences and exposure to other risks. The information gleaned from the interviews was used to help develop the questionnaire used in the phase two of the study. The self-administered questionnaires included closed and open-ended questions related to how often respondents fished in the lagoon, fishermen's knowledge and concern about the health impacts arising from eating fish from the lagoon, how they found out about pollution in the lagoon, fishermen's knowledge about different types of pollutants/contaminants and their responses to information about the pollution. Several open-ended questions allowed participants to express their opinions about the Municipal Assembly (Management body) activities and

personal beliefs about contamination in the Fosu Lagoon. A total of 120 fishermen completed the survey out of 132 fishermen approached. Survey was conducted in December 2006 – January, 2007. Survey responses were compiled and analyzed using statistical package for social scientists (SPSS Version 12).

### 3. RESULTS

#### 3.1. Demographics

Of the 132 questionnaires given out to the fishermen, 120 were completed and collected and 12 questionnaires were discarded because they were incomplete. The response rate was 91%. Age ranged from 21 to 68 years (Table 1). Most of the fishermen 104 (86%) were Fante (indigenous people of Cape Coast) and 16 (14%) were Hausa/Frafra from Northern Ghana (Table 1). All fishermen were males (males usually fish in the lagoon and women sell the fish) and residents of communities surrounding the lagoon; Bakaano, Aquarium, Siwdu, Adisadel Village and OLA.

Table 1. Selected Demographics of Fishermen (N=120)

Age (years)	(%)	No of fishermen
21-30	17.5	21
31-40	30	36
41-50	40.8	49
51-60	7.5	9
61-70	4.2	5
Ethnicity		
Fante	87	104
Hausa/Frafra	13	16
Education		
No formal education	18	22
Basic/Primary	52	62
Middle/Trade	30	36

The highest level of education was middle or trade school. Education did not influence participant's daily fish consumption, rather all the groups had high percent of it's' members eating fish daily (Table 2). Eating fish daily may support the supposition that participants are potentially exposed to a higher risk of eating polluted fish. More educated fishermen may be more likely to understand the pollution and its implications on eating the fish from the lagoon.

Table 2. Percent Fishermen Consuming Fish Daily by Education and Ethnicity

Education and Ethnicity	No of Respondents	% Consuming fish daily
No formal education	22	100.0
Basic/primary	62	90.3
Middle/trade	36	100.0
Fante	104	94.2
Hausa/Frafra	16	100.0

### 3.2. Fishing Behavior and Potential Exposure

All the fishermen indicated that they ate some of their catch, gave some out as gifts to friends and family and sold most of it for income. Over 60% of fishermen said they preferred to eat larger fish than smaller fish of a given species, and 40% preferred to sell the larger fish for additional income rather than eat it. All the fishermen ate fish whole and used more than one cooking method with most fish either fried or smoked. Interestingly cleaning of fish among these fishermen entails removing scales, operculum and guts only (Figure 2). The skin and bones of the fish which may contain the majority of the fat and contaminants in the fish are consumed. This finding indicates that the cleaning process used may increase the risk of toxic exposure for these fishermen when eating polluted fish.



Figure 2. A Picture showing cleaned fish ready for eating

### 3.3. Risk Perception

All the fishermen responded yes to the question of whether fish from the lagoon were safe to eat. Despite hearing warnings about the polluted lagoon and seeing the pollution in the lagoon, all the fishermen said they received no information about health risks from eating the fish from any source. They felt that despite the filth in the lagoon, the fish still tasted good like it did in the past and thus was safe for consumption. Fishermen thought the fish were safer than the water and a frequent comment justifying this was that the fish do not feed on the filth but on microscopic organisms in the water and on the roots of the mangrove trees found in the lagoon area. Fishermen believed that if the pollution in the lagoon was a more serious health threat, they and their families would have experienced the effect. The fishermen have also been found to rely on sensory detection such as fish eye colour to assess whether fish is safe to eat or not. This may be a false indication of whether fish is polluted or not. Fishermen identified the following as the main sources of pollution in the lagoon: “flying toilet” (people defecate into black plastic bags and throw them into the lagoon); metal pieces from the garages; and waste water from the surrounding residential area. Among these sources, 80% of the fishermen choose the garages as the worst source of pollution. The most frequent reason given was that the metal pieces sometimes destroy their fishing nets and hurt their feet (Figure 3).



Figure 3. A Picture showing waste from the garage that gets into the lagoon

### 3.4. Fishermen Knowledge and Beliefs

Fishermen draw upon a wealth of information to guide their fishing practices. This specialized knowledge was developed overtime based on informal education and personal experience. Fishermen had substantive knowledge about the lagoon, and had built a lifetime familiarity with the water after engaging in fishing as both economic and traditional activity for several years. Understanding how to fish was an essential component of fishermen's applied knowledge. Overall, participants were disappointed with the quality of fishing in the lagoon and blamed it on the supposed wrong siting of the garages and the district hospital. They also blamed the government for the poor sanitation facilities in the communities surrounding the lagoon which is the underlying cause of indiscriminate defecation and dumping in the lagoon. They felt the gods of the lagoon were against them as described by one of the participants: "I think the gods are against us, people are not respecting the gods, they throw all kinds of filth into the lagoon, they fish 24 hours a day. When I was growing up there was no night fishing in the lagoon, which is the time the gods get to play with their children, people of today do not respect that privacy..." Another participant added: "when I was growing up, the chief priest and his elders would sprinkle mashed yam and boiled eggs in the lagoon every Tuesday as part of tradition, all these have stopped, the gods are not happy with us, how can they feed us with fish, that is why we are not catching fish these days like we used to do." The few knowledgeable fishermen understood conditions that affected fishing quality such as the cutting down of mangrove trees in the lagoon. They mentioned that the roots served as good habitat for young fish to grow and believed the young fish stayed there to feed and escape from predators. They also talked about fish kills occurring anytime there were no rains and the water became foul and greenish in colour. Once again, they attributed it just to people not treating the water well rather than reduced dissolved oxygen resulting from the high organic matter deposited into the lagoon.

### 3.5. Management and Conflict of Interest

Participants showed concern for the government's initiative towards restoration of the Fosu Lagoon. They complained about a new bridge which was built across the lagoon to replace an old and weak one. They were displeased with the authorities for not asking for their input when building the bridge because to them the technology used was inappropriate and the bridge holds



back sand in the lagoon after the seasonal movement of water from the sea to the lagoon. Participants linked this to the incidence of invasive aquatic species that have taken over the lagoon (figure 4) and reduction in fish yield as well as fish species. It is possible that the accumulated sand mixes up with the rich organic material in the lagoon and creates a favorable medium for these invasive plants.



Figure 4. A Picture showing the Fosuo lagoon covered with water lettuce and other invasive aquatic plants

#### 4. DISSCUSSION

Perceived risk among the fishermen was low because they thought they could accurately assess the safety of fish. Previous research on risk perceptions of sport fish consumption [3] [4] [5] and [6] has also found low perceived risk of fish consumption among anglers. In this study, taboos and cultural practices were found to contribute significantly to the management and conservation of fisheries in the lagoon, for example, fishing at night was considered a taboo because that is the time the gods come out to play with their children. Also, because people tend to make risk judgments based on what they believe to be true, the participants had great confidence in what they already knew and found it difficult to accept new information. This indicates that more education is required to help the fishermen understand better the conditions in the lagoon and the implication to their health. The findings also indicate that, there is the need for additional formal management of the physical and chemical environment of the lagoon to ensure the health of both the lagoon and its resources especially the fisheries.

In Ghana there are no set standards or health advisories for fish consumption from polluted waters. There is no guidance as to how much fish one can eat or what ways one can prepare fish to reduce exposure to contaminants that may be found in fish. In Ghana as well as in many other developing countries, environmental control mechanisms are still weak owing principally to under funding and understaffing of the environmental protection agencies (EPA), as well as a lack of political will to take action against polluters in the industrial sector [7]. Environmental Impact Assessments (EIA) are generally required only for new large and medium-scale projects. This does not apply to the numerous small-scale projects which impact the environment as well.

Studies of some polluting effects of small-scale industrial production in the central region of Ghana reported a wide range of negative environmental effects caused by small scale industries such as direct discharge of effluents into water bodies as well as tree cutting [8]. [7] Also reported that the small-scale vehicle repair enterprises (garages), fish smoking and retail trade all had negative environmental implications. The participants in this study reported that the garages were the source of the worst pollutants. The garages located in an industrial area at

Siwdu (Figure 1) are close to the lagoon and comprised of: auto mechanics, blacksmiths, electricians, sprayers, welders, vulcanisers, upholstery, radiator repairers and scrap metal dealers. Waste from the garages range from metal pieces to dirty oil (Figure 3). Several studies have linked the garage to the pollution of the lagoon [9] [10]. Studies in other parts of the world have shown that waste oil in water systems imposes an unusually high oxygen demand and has a substantial and long run adverse effect on the re-aeration of water bodies. [11] reported that oxygen demand of a ton of mineral oil is equivalent to that of the daily sewage generated by 40,000 persons They further suggest that waste oil contains carcinogenic substances though the evidence is as yet incontrovertible. It is of little surprise that the Fosu lagoon was added to the world's water bodies with "dead zones" in 2006 looking at the vast amount of waste that enters it in recent times.

Two distinct areas were identified to be a major source of anthropogenic load of both heavy metals and PAH in the Fosu lagoon; the garage in the northeastern sector of the lagoon inputs Cd, Ni and PAH while the residential area in the northern sector is responsible for high loads of manganese (Mn) and its associated PAH compounds [12]. This is in line with the results of this study, 80% selected the garages as the major source of pollution in the lagoon. As stated earlier in the results, participants observed a reduction in the number of fish species found in the lagoon. [13] Explained that the anoxic and low dissolved oxygen conditions attributable to organic pollution may be the principal factors that accounted for low species diversity of benthic macro fauna in the Fosu lagoon.

The findings of this study show that the fishermen believe eating fish from the lagoon is safe. However, scientific evidence indicates that the possibility that fish caught from the lagoon may contain elevated levels of heavy metals is high because these metals could move from the sediments up the food chain. Thus, eating fish from the lagoon may have serious health implications. It is surprising that efforts by the government to re-locate these garages have failed because they have refused to move to new places provided for them with excuses that it is too far from the center of business activities in the city. However, people working in the garages may also stand to risk from eating the fish that their activities are impacting.

The government is concerned about the invasion of the lagoon by water lettuce because it harbors the mosquitoes responsible for elephantiasis. The EPA, Cape Coast Municipality Assembly (CCMA), and Oguaa Traditional Council were assigned the responsibility to: remove the sand bar between the sea and the lagoon, reconstruct the bridge across the lagoon and dredge the lagoon all in an effort to control the mosquitoes (health reasons) and develop Fosu lagoon into a leisure complex [14]. However for the survey respondents, this is not their priority, they depend on the lagoon for food and income and that is where their interest is directed. To them, the siting of a leisure place on the lagoon is an unwanted facility, and infringes on their rights to maintain the traditional significance of the lagoon. The lagoon is very important in the lives of the people especially during their annual festival "Afahye". The "Omanhen" (chief) will cast a net and the amount of fish caught they believe is an indication of what the gods have for the people throughout the year. If the net catches lots of fish, then they anticipate bumper harvest in the year if not then there will be little fish. In recent years, this ceremony has yielded very few fish and participants associated it with the gods being angry with them rather than the effect of pollution in the lagoon.

## 5. CONCLUSIONS

Fishing is a means of survival for the study population and as such, it is difficult to convince the people that it may be a risk to their health. Therefore, it would be worthwhile to develop strategies that will encourage them to recognize and accept the potential risk that may be associated with eating polluted fish, and then to change their behavior for example, fish

preparation, in order to diminish this risk. The value of fishermen' understanding of the environment and fishing practices may not be enough to help reduce their exposure to the risks of eating polluted fish. Therefore, designing educational programs based on the importance of tradition, experience, and scientific information may be an appropriate intervention for these participants. There is the need for additional formal management of the physical and chemical environment of the lagoon to ensure sustainability of the fisheries. Decision-making about managing the lagoon and its resources should involve these fishermen because they may have alternative knowledge and perspectives based on their locally developed practices of resource use that they can contribute to enhance management of the Fosu Lagoon.

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# CHALLENGES IN SITING OF AVIATION FUEL FACILITIES IN HONG KONG

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## Abstract

Siting of locally unwanted facilities is never an easy job in Hong Kong. It can be a never-ending and resource-drilling job to deal with the evolving challenges in the siting process. The challenges may make the siting pendulously or going back to square one. Siting of the permanent aviation fuel facility (PAFF) in Hong Kong is one of the typical examples reveals various challenges that may be faced in siting of a locally unwanted facility. Albeit the Hong Kong's PAFF is now under construction and has apparently overcome some planning hurdles such as permissions/approvals under the Town Planning Ordinance and Environmental Impact Assessment Ordinance, its history can be dated back to more than 15 years ago when the site was commenced to search. During the history of siting and planning of the PAFF, apart from the evolving technical issues such as swinging of the focused environmental issues and perceived risk, the expectation and requirements of the public on participating in the planning (and decision) of major projects or locally unwanted facilities have also been tremendously increased. The received challenges on the PAFF nearly covered all walks of life, including local residents, neighboring facilities (may also be LULU), district council, legislative council, green groups, business sectors, and more unusual, the courts. PAFF may be one of the few projects that was subject to judicial review (JR) and was challenged up to the Court of Final Appeal. This paper is to review the siting and planning history of the PAFF and the challenges faced in planning this locally unwanted facility, with a view to share an observation about the surging demand and importance of public participation in the planning of locally unwanted facilities.

## 1. INTRODUCTION

Most if not all of the major projects, to certain extent, are locally unwanted because of the NIMBY (*Not In My Backyard*) syndrome. Siting and planning of locally unwanted facilities were never and will never be an easy job. However, the job of balancing various factors such as needs of the society and the sustainable development cannot be avoided. Whilst siting and planning of locally unwanted facilities will usually involve a number of technical issues which require scientific data and professional judgement to resolve, non-technical issues, particularly the public participation and consultation, should not be overlooked. The expectation and requirements of the public on participating in the planning and to certain extent, the decision, of major projects or locally unwanted facilities have been tremendously increased in the past decades. Most Environmental Impact Assessment (EIA) systems may now have, prior to the decision, provided consultation and public participation after publication of the EIA report, however, it is a growing trend that the public consultation and participation shall be integral to the EIA study and shall be made as early and continuously as possible in order to meet the increasing public demand and expectation.

The history of siting and planning of the PAFF, as a locally unwanted facility, in Hong Kong has testified the growing demand and importance of public participation in the planning and EIA processes in the past decades. The purpose of this paper is to review the siting and planning history of the PAFF and the challenges experienced with a view to share an observation about the public participation process in the planning of locally unwanted facilities.

## 2. BACKGROUND

The Hong Kong International Airport is one of the busiest<sup>54</sup> airports (and awarded as the best airport) in the world and is important to the economy of Hong Kong. Adequate and secured supply of aviation fuel is one of the essences for the Airport's operation. Provision of strategic storage(s) of adequate aviation fuel to meet the forecasted demand is vital to the Airport and hence to the Hong Kong's economy. Whilst there are some provisions, such as on-Airport aviation fuel storage tanks, West Quay at the Airport and Aviation Fuel Receiving Facility at Sha Chau, to store and supply aviation fuel for the Airport's operation, their total throughput capacity will not be enough to meet the forecasted demand of the Airport by around 2009. To this end, a Permanent Aviation Fuel Facility (PAFF) is planned by the Airport Authority to meet the forecasted demand from around 2009 to the planning horizon of 2040.



The Hong Kong International Airport



On-Airport Aviation Fuel Storage

### 2.1 Site Search In 1990s

According to the information provided in the PAFF's EIA report, the need for determining a "permanent" option for supplying aviation fuel was established as early as around 1990/1991 when a new Hong Kong International Airport at Chek Lap Kok, Lantau had been planned for opening in around 1997 to cater for the economic need. Site search for the PAFF, which included aviation fuel storage depot and aviation fuel vessel berths, was then started. In around 1992, after consultation with the Government, 13 sites were identified for further investigation. In between 1992 to 1994, further investigation of the identified sites revealed that none of the sites were considered suitable due to various factors including safety/risk concern, environmental factor, landuse incompatibility and engineering practicality, etc.



13 Identified Sites for Further Investigation

<sup>54</sup> Website of Hong Kong International Airport, <http://www.hongkongairport.com/eng/index.html>

## 2.2 Interim Solution In Around 1995

By 1994, as a permanent site for PAFF could not be identified, a temporary solution was worked out. The temporary solution was to have an Aviation Fuel Receiving Facility (AFRF) just off Sha Chau. Compared with the PAFF, the Sha Chau AFRF does not have aviation fuel storage depot and its berths are of smaller scale catering only for the small dedicated vessels (5,000dwt) transhipped from the Tsing Yi depot. Large overseas ocean-going aviation fuel vessels (20,000 to 70,000dwt) cannot berth at the Sha Chau AFRF. The logistic operation under this interim solution is firstly to ship the aviation fuel from overseas refineries using large ocean-going vessels (20,000 to 70,000dwt) to the Tsing Yi depot for unloading, storage, settlement and quality control, and then (subject to quality check) to tranship the aviation fuel using the small dedicated vessels (5,000dwt) to the Sha Chau AFRF, and then from there, to pump the aviation fuel to the Chek Lap Kok Airport via the submarine fuel pipelines.

After the EIA study and the Gazettal procedures, etc., the Sha Chau AFRF has been in operation since 1998. However, the Gazettal had stipulated that once the PAFF became operational, the Sha Chau AFRF should only be used as an emergency back up. As surrounding waters of the Sha Chau and Lung Kwu Chau are frequented by the Chinese White Dolphin (which was designated and gazetted as Marine Park in 1996), green groups have expressed grave concerns on the Sha Chau option.



Tsing Yi Oil Depot



Sha Chau AFRF

## 2.3 Refined Option In Around 2000

As the Sha Chau AFRF was an interim solution only, search for a permanent site for the PAFF continued. In around 1998, further investigation was done on some sites, including those sites located south of Ma Wan Channel identified previously and at Sha Chau (by upgrading the Sha Chau AFRF to a permanent facility), but they were ruled out having regard to various technical factors such as environment (e.g. Marine Park) and engineering (e.g. inadequate water depth).

In around 2000, three previously identified potential sites located at north of Lantau Island, viz. Sham Shui Kok, Tuen Mun West and Tuen Mun Area 38, were revisited after conducting an updated study of the Ma Wan Channel Hazard Assessment to address the risk concern associated with passage of ocean-going aviation fuel tankers through the Ma Wan Channel. Having considered various technical factors such as sizable reclamation would be required for the sites of Sham Shui Kok and Tuen Mun West whilst



Tuen Mun Area 38

already reclaimed land earmarked for special industry were readily available at Tuen Mun Area 38, the Tuen Mun Area 38 site was determined as the preferred option for further detailed

investigation, including Environmental Impact Assessment (EIA) study.

### 3. BRIEF PROJECT DESCRIPTION OF PAFF

Having determined that Tuen Mun Area 38 is preferred for the PAFF development after about a decade of site-searching, an EIA Study Brief was issued under the EIA Ordinance in May 2001 to the Airport Authority for proceeding with the EIA study of the PAFF at Tuen Mun Area 38. As briefed in the EIA Study Brief, major elements and requirements in the PAFF consists of the followings :-

- ♦ A tank farm with an ultimate gross tankage capacity of about 400,000 m<sup>3</sup>;
- ♦ A jetty with two berths which are able to accommodate sizable ocean-going vessels up to 60,000/80,000 dwt;
- ♦ Submarine pipelines for transferring aviation fuel from the tank farm to the Airport; and
- ♦ Miscellaneous operational facilities.



Locations of Tuen Mun Area 38, Sha Chau & Airport



PAFF

### 4. SAFEGUARDS AND CHALLENGES IN PLANNING OF PAFF

Typically for locally unwanted facilities or major projects, there are a number of safeguards, both statutory and non-statutory, public participations and challenges during planning of these facilities/projects. PAFF has got no exception. The safeguards and challenges faced in the planning of the PAFF are briefly recapitulated below.

#### 4.1 Statutory Safeguards

##### 4.1.1 EIA Ordinance

As the PAFF involves storage, transfer and transshipment of oil facility and submarine oil pipelines, it is a Designated Project and is subject to the control under the EIA Ordinance. An Environmental Permit is required for its construction and operation. With the EIA Study Brief issued in May 2001, the Airport Authority submitted an EIA report for the PAFF in May 2002 applying for approval. The EIA report was approved and the EP for the construction and operation of the PAFF was granted in August 2002, albeit these decisions were subsequently challenged by a JR.

##### 4.1.2 Town Planning Ordinance, Building Ordinance and Dangerous Goods Ordinance, etc

Siting the PAFF at Tuen Mun Area 38 is required to make a planning application under the Town Planning Ordinance and to obtain the approval from the Town Planning Board. Building plans/design for the PAFF is required to obtain approval by the Building Department under the

Building Ordinance whilst aviation fuel as dangerous goods (Category 5 Class 2), PAFF is required to obtain the dangerous goods licence from the Fire Services Department under the Dangerous Goods Ordinance prior to its operation. Besides, the PAFF project is required to have gazettal under the Foreshore and Seabed (Reclamation) Ordinance. There are also a number of marine/shipping related ordinances, such as Pilotage Ordinance and Shipping and Port Control Ordinance, to safeguard the marine safety in Hong Kong waters.

#### 4.2 International Standards and Practices

Oil/petroleum industry is not a new industry in the world. With the knowledge and experience accumulated, numerous standards and good practice notes were published by various international organizations such as Institute of Petroleum, American Petroleum Institute and Health and Safety Executive for guiding the design, construction and operation of oil/petroleum facilities including the aviation fuel facilities.

#### 4.3 Public/Stakeholder Participation

Views of the public/stakeholders were gauged, through both statutory and non-statutory means, during planning of the PAFF. Advisory Council on the Environment, Country and Marine Parks Board and green groups were regularly consulted in the site-searching of PAFF between 1990 and 2000. When Tuen Mun Area 38 was considered as a preferred site, consultations with Tuen Mun District Council had also been made since 2001. Under the EIA Ordinance, statutory public consultations were made during the stages of preparing the EIA Study Brief (April 2001) and processing the application for EIA report approval (June/July 2002).

#### 4.4 Litigation/Judicial Review (JR)

In November 2002, within 3 months after the granting of EP for the PAFF in August 2002 under the EIA Ordinance, a PAFF's neighbour, the Shiu Wing Steel Mill which is also a heavy/special industry (and to certain extent, may also be a locally unwanted facility), lodged a JR against the decisions made under the EIA Ordinance in approving the EIA report and granting the EP. The key challenge was on a technical issue about the hazard to life assessment in the EIA report. The whole litigation lasted for about 4 years. Although the 1<sup>st</sup> court (Court of First Instance) and the 2<sup>nd</sup> court (Court of Appeal) made the judgments to dismiss the JR, the final court overturned the previous judgments and quashed the decisions of approving the EIA report and granting of EP in July 2006.



In response to the judgment of the final court (Court of Final Appeal), the Airport Authority revised and re-submitted the EIA report seeking for approval under the EIA Ordinance in late December 2006. The revised EIA report was approved and a fresh EP was granted in late May 2007. Up to date, no lodging of another JR was noted.

#### 4.5 Local and Other Challenges

As a locally unwanted facility, the PAFF was challenged by the local people of Tuen Mun through various channels. Through the statutory public inspection period of the EIA report in 2007, thousands of locals submitted comments to raise objections to the PAFF in Tuen Mun. Tuen Mun locals, through the Tuen Mun





District Council, all along raised objection to the project since around 2002. Besides, they had also made the complaints/objections through various channels and modes, such as Legislative Council, Chief Executive Office, demonstrations, petitions, media and internet.

Apart from the locals, there were also some green groups expressing concern about the impact of the project on the marine ecology, particularly the Chinese White Dolphin (CWD) noting the sea outside the Tuen Mun Area 38 is frequented by the CWD, notwithstanding the fact that the historical site search for PAFF was aiming to avoid the ecological sensitive sites and to revert the Sha Chau AFRF (located within the Marine Park) as a backup facility only.



## 5. DISCUSSION

There may be a number of observations drawn from the siting and planning history of the PAFF and the challenges experienced. Some issues are technical in nature which are important to have scientific information and professional judgment to resolve. However, it is observed that handling of non-technical issues, particularly the public consultation and expectation, has become increasingly and equally important in the past decades when planning for locally unwanted facilities or major projects. Having regard to the history of and challenges in the PAFF, an observation about the importance of early and continuous public participation is discussed below for sharing.

### 5.1 Trend of Public Participation

Most of the EIA systems currently provide some degree of public consultation or public participation prior to the decision (e.g. release of the submitted EIA report for consultation). However, it is a growing trend that public consultation and participation should be integral to EIA study with good and early engagement of public in the process. Indeed, in Hong Kong, the Environmental Protection Department has observed the trend of growing demand and expectation of the public in participating the EIA planning process and hence in around 2002, has promoted the Continuous Public Involvement (CPI) in the Hong Kong's EIA system. The CPI, stipulated in a Government's Circular promulgated in 2003, advocates that *the proponent must appreciate the importance of making use of every opportunity for early consultation (formally or informally), the consultation can start long before and early consultation is particularly important for large-scale projects where matters such as alignment, choice of site or orientation may be significant in terms of environmental impact.*

It may also warrant to note that the China Law on Evaluation of Environmental Effects (中華人民共和國環境影響評價法; came into operation in September 2003) has stipulated that *The State encourages relevant units, specialists and the public to participate in the evaluation of environmental effects in an appropriate manner.* According to the Circular "Provisional Methods of Public Participation in the EIA" promulgated by the State Environmental Protection Agency (SEPA) in February 2006, the EIA report in China shall include a chapter providing information of public participation in the EIA process. Any EIA report without the information of public participation will not be processed.

Looking back the PAFF, there were statutory public consultation process (at the stages of applying the EIA Study Brief and the EIA report approval) during the EIA process in 2001/2002 and some consultations with the Tuen Mun District Councillors prior to the submission of EIA report for approval. However, the public expectation has been increasing tremendously in the past few years. The past consultation and participation process may need to be enhanced to meet

the current demand of the public. After the approval of the EIA report in 2002, more intensive and focused consultations, together with site visits, were made with the Tuen Mun people (including residents from Area Committees, Mutual Aid Committees of various housing estates and villages, and neighbourhood users/workers of the PAFF site, etc.). Dedicated PAFF Core Group was set up under the Tuen Mun District Council to follow up the PAFF matters. Comparing the EPs issued in 2002 (subsequently quashed by the final court) and 2007 for the PAFF, the fresh EP (2007), in response to an Airport Authority's undertaking, imposed a condition requiring the setting up of a Community Liaison Group (CLG) comprising relevant stakeholders to continuously advise on and monitor the proper design, construction and operation of the PAFF. The approved EIA report (2007) of the PAFF has also included the information summarising the public/stakeholder consultation and participation activities for planning of the PAFF.

With the benefit of hindsight, if all the public participation processes conducted after 2002 were advanced and the continuous public involvement (such as the setting up of a CLG) was made, the subsequent emergence of the JR in late 2002 might be changed. Putting aside the factor of litigation, it is considered that early and continuous public participation in the siting, planning and EIA of locally unwanted facilities is vital and can likely reduce the chance of subsequent hiccups in the implementation.

## **5.2 Possible Effects and Handling of Public Participation**

Public participation, albeit perceived as non-technical, may somehow have the effect on technical matters. Looking back the siting and planning history of the PAFF, it is noted that the concerned and focused environmental issues were apparently evolving between ecology and hazard to life. At the very early stage, site-searching of the PAFF has attempted to avoid a number of sites which are sensitive to the environment/ecology. Regarding the PAFF, from the experts' perspective, storage of aviation fuel is relatively less risky than other fuels such as petrol and liquefied natural gas in the light of the properties and storage mode<sup>55</sup>. Compared with other hazardous installations worldwide, PAFF may be regarded as at the low end of risk spectrum.

In the JR, it was challenged that quantitative risk assessment was not conducted in the EIA (2002) on the instantaneous release of 100% of the tank content scenario (i.e. sudden disappearance of the whole tank wall and instantaneous release out of all stored aviation fuel). It may still be arguable whether such scenario (sudden disappearance of whole tank wall) is credible or incredible. However, from the public's perspective, scientific information may sometimes be difficult to inject into general public's mindsets. This may be particular true for hazard to life issue noting that accident is somehow unpredictable. The 911 incident happened in 2001 in USA has somehow changed the people's mindsets that incredible event could happen. Therefore, having early and continuous engagement of public in the EIA process may help the EIA practitioners to broaden the analysis and assessment from people-based perspective and to "think the unthinkable".

Whilst it is neither encouraged nor considered to achieve any win-win situation to use the courts in the planning/siting process of the locally unwanted facilities, however, respecting every citizen's civil right, JR may sometimes be unavoidable. According to the law expert, in general, the exercise of statutory powers by a public authority can be subject to JR if there is (a) unreasonable decision, or (b) unlawful process/improper procedure. Looking back the litigation

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<sup>55</sup> Flash point of aviation fuel is about 38degC and in Hong Kong, with ambient temperature below 38degC, it will be stored and handled below the flash point. Flammable range of vapour will not be generated during normal storage of aviation fuel. Under the Dangerous Goods Ordinance, aviation fuel is grouped under Category 5 Class 2 (Substances having a flash point of or exceeding 23°C but not exceeding 66°C), which is less dangerous than Class 1 substances (Substances having a flash point below 23°C) which include petrol, etc.

in PAFF, the legal challenge was on the lawfulness of the process (or procedural propriety) but not on the reasonableness of the decision. Siting of PAFF in a special industrial area (or adjacent to other locally unwanted facilities) was not considered unreasonable. As discussed above, early and continuous engagement of public is encouraged. From the experience of PAFF, to certain extent, early and continuous public participation may improve the process of planning of locally unwanted facilities if the public participation process is cautiously, fairly and transparently handled and the public opinions are carefully and sincerely considered. Similar to the SEPA's Circular on "Provisional Methods of Public Participation in the EIA", documentation of the public participation process and public views in the EIA report is encouraged.

Use of appropriate modes and tools in the public consultation and participation can facilitate the participants to better understand the projects and their impacts and to express the views frankly and objectively. Arrangement of site visits and/or use of sophisticated information visualisation tools (e.g. 3-dimensional graphic and animation) are suggested. As noted in the SEPA's Circular on "Provisional Methods of Public Participation in the EIA", public participation modes may include public opinion survey, consultation with experts, public discussion forum and conference (座談會、論証會、聽証會), etc. From the experience of PAFF, setting of a task group with public participation (e.g. Community Liaison Group, Dedicated PAFF Core Group) is also considered as a fruitful public participation mode.

## 6. CONCLUSIONS

Siting and planning of locally unwanted facilities were never and will never be an easy job. It can be a never-ending and resource-drilling job to deal with various challenges evolved in the process. The challenges may make the process pendulously or going back to square one. Regarding the PAFF, albeit it is now under construction and has apparently overcome some planning processes such as permissions/approvals under the EIAO and the Town Planning Ordinance, there is no guarantee all challenges, including litigious challenge, will stop from here.

Nevertheless, from the experience of PAFF, early and continuous public involvement, in particular with the directly affected parties, in the process of siting and planning of locally unwanted facilities is very important and may sometimes be a critical key to open the door for moving ahead of these facilities. Indeed, it is a growing trend that public participation should be integral to the EIA. Having the early and continuous public participation process in the EIA process will help improving the planning process of these facilities, early and rightly identifying the public concerns, broadening the EIA's analysis and assessment to be more people-based, and reducing the chance of subsequent hiccups in the implementation.

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# Conflict Resolution

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# COMPENSATION IN SITING HAZARDOUS FACILITIES: A CASE STUDY OF SITING A RADIOACTIVE WASTE REPOSITORY IN TAIWAN

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## Abstract

Siting locally-unwanted facilities is always a difficult job for governments. NIMBY (“Not in my backyard!”) is a phenomenon that arises when the local public opposes facilities that are perceived to be highly hazardous and risky, such as prisons, incinerators and nuclear power plants. The first solution that comes to our mind is compensation. However, much of the empirical literature argues that the use of compensation in locating highly risky projects is constrained politically by a myriad of moral and ethical concerns - residents do not appear to be willing to accept compensation when it comes to highly risky projects. Residents appear unwilling to accept the facilities because they are concerned about compensation, fairness, siting procedures, the trust in the developers, the need for the facility, personal factors, social pressure, civic duty, risk and so on. This paper takes the siting of the low-level radioactive waste repository in Wu-chiu as a case study in order to discuss the factors that affect the public’s perception of and attitudes toward the facility. According to a survey of residents, we find that compensation, the way in which the compensation is provided, fairness, the trust in the developers, siting procedures, income, and even thinking about leaving Wu-chiu, are important factors characterizing the public’s perception of and attitudes toward the facility. On the other hand, trusting in negotiators is the key way in which residents can make their decision. By comparing our case with cases in the US, Switzerland and Japan, we find that these cases are different in relation to such factors as civic duty, social pressure, and trust in the developers. Since these factors are elements of social capital, social capital is an important aspect of public opinion in relation to the NIMBY phenomenon.

## 1. INTRODUCTION

In 1995 the Taiwan Power Company (Taipower) adopted a voluntary siting process, letting local townships to be voluntary candidate in providing place for hazardous facility to be built. Those voluntary candidate sites in different township, once selected, could be awarded a variety of compensation depends on the stage of the process. In 1996, there were nine local communities applied for providing site and five were qualified; however, they all withdrew their applications in 1997 because of the social pressures drew when news media covered this event fervently. Consequently, the Taipower Company changed its policy from “voluntary siting process” to “experts’ screening and selection process and voluntary siting process simultaneously”, and then it chose Wu-chiu to be the candidate site.

In 2000 we conducted an island-wide investigation on the residents registered in Wu-chiu Township. This paper is different from other literatures in two aspects when it comes to NIMBY phenomenon, namely the special way of choosing site and the social structure of Wu-chiu, an isolated island village near mainland China but under the control of R.O.C government. Except the army lived there, there were only 30 residents truly lived there then, while most of the

residents were only registered there but lived in Taiwan, thus its social structure and NIMBY phenomenon were different from that of other towns in Taiwan. We compare the case in Wu-chiu with that in America and Switzerland, analysing why some facilities can be established while others cannot be established.

Intuitively, the way to solve the NIMBY phenomenon is to compensate residents there. As long as the level of compensation is high enough, residents would accept the facility. However, the effect of compensation varies with location. In some places the compensation institution is effective, while in other places it is inefficient and the NIMBY phenomenon is still conspicuous. We review the literatures then conclude that the factors that influence NIMBY phenomenon and the acceptance for the NIMBY facility are compensation, risk perception, siting procedures, the trust in the developers, equity, how necessary it is perceived to be that the facility be built somewhere, social pressures, civic duty, and social-economic factors. We discuss the nine factors mentioned above below:

#### A. Compensation

Shaw and Shaw (1991) proves that if the externality drew from the hazardous facility is resistable, shiftable and has private externality, then the residents can be compensated. The NIMBY phenomenon is a case in point in explaining how residents oppose to a resistable, shiftable externality that has private characteristic. Consequently, the compensation in the NIMBY cases justifies itself. Frey and Oberholzer-Gee (1996) and Frey and Oberholzer-Gee (1997) probe into the cases and find that residents with strong civic duty would view the compensation as a bribe, which is an immoral behavior to them, thus reduce their acceptance. Consequently, compensation has two effects on the acceptance for building those facilities, namely crowding-in effect and crowding-out effect.

#### B. Risk Perception

Kunreuther and Easterling (1992) discovers that compensation has a positive effect on the residents if the facility is a safer one, like incinerators and landfills, but when it comes to more dangerous facility like nuclear power plants, the effects of compensation are insignificant or might backfired.

#### C. Siting Procedures

The siting procedures today lie in between two categories, namely the hierarchical approach and the voluntary, market approach. The hierarchical approach cannot work because of violent strike held by residents, while the voluntary, market approach makes poorer and less developed area become the target for establishing NIMBY facility.

#### D. Trust

Residents' trust in those developers is essential to whether the process would go smoothly or not. Kasperson (1992) finds that distrust toward the developers results in a long and inefficient process of negotiation and raises transaction costs.



#### E. Equity

Equity has always been the focus of the residents' appeals and it has been mentioned in literatures to explain the NIMBY phenomenon for a long while (O'Hare, Sanderson, and Bacow, 1983).

#### F. Civic duty

Civic duty is the reason for an altruistic behaviour to accept the establishment of a hazardous facility that can raise the well-being of most of countrymen. Frey and Oberholzer-Gee (1996) points out that civic duty explains why some residents support the establishment of NIMBY facility even though they do not receive compensation.

#### G. Need

How necessary the facility is perceived has a lot to do with the degree of the support of the residents. When those residents think that there is no need to support the establishment of the NIMBY facility, they won't have any motivation to build it.

#### H. Social Pressure

Social pressure is particularly important for very risky projects that impose sizeable negative externalities on the residents of host community. Under huge social pressures, personal decisions of those residents are affected by the opinions of other residents in the community. Oberholzer-Gee and Kunreuther (2005) finds that personal degree of support of one resident will be affected by other residents' opinions.

#### I. Social-economic Factors

Social-economic factors include income, educational level, sex and occupation, among them income is proved to have relation with the impact of compensation (Lesbirel, 2000), while educational level, sex, occupation and other personal experiences are proved to be related to risk perception, through which those factors indirectly influence their degree of support for NIMBY facilities. By reviewing the literature mentioned above, we first use residents' degree of support as the hub of the analysis, showing the relationships between all sorts of factors that can affect the NIMBY phenomenon and compensation, and then induce the model of the factors that influence residents' degree of support.

## 2. CASE STUDY

Wu-chiu Township, a deeply-connected society, is the islands located between Kinmen and Matsu. Originally, the township, which located at the martial area and has no transportation toward outside world except the Navy ships that set off at Taichung Harbor, was a small island for fishers to catch fish at fish season temporarily, thus people lived there has no claim for the land.

We used "household" as a unit to do an island-wide survey. Since most of the residents there travelled between Taiwan and Wu-chiu Island, we not only visited and investigated residents there in person but also mailed questionnaire and telephoned the residents of Wu-chiu

who lived in Taiwan. Of all the 93 households in Wu-chiu Island, we visited 65 households, among them 52 households accepted our visit while another 13 rejected us.

## 2.1 The Hypothesis of NIMBY Phenomenon

This paper aims at the influence of compensation on the degree of supports of residents; we suggest three hypotheses to be tested:

Hypothesis 1:

Compensation raises the public support of building the facility.

Hypothesis 2:

If we do not limit the way of using the compensation, we can raise public support of building the facility.

Hypothesis 3:

Residents tend to support the facility if they are people's representative.

To test the three hypotheses mentioned above, we used related questions in questionnaire to build a dummy variable that represent whether residents support the NIMBY facilities under three different situations, namely whether there is compensation or not, whether there is limitation for the use of compensation and whether the residents are people's representative or not. This paper add residents' degree of supports under the situation that has compensation with other variables to be one data, then add residents' degree of supports under the situation that has no compensation with other variables to be another data, thus produced two data, then it combined the two data. The way of using compensation is the same as the way of dealing whether residents' are people's representative. We used Gompit model under the Probit procedure to make our regression model, trying to find possible explanatory variables.

## 2.2 Empirical Result

This paper adopts regression analysis to test the three hypothesis, see (1):

$$O = \beta_1 Dxi + \beta_2 Fi + \beta_3 Ti + \beta_4 Ni + \beta_5 SPi + \beta_6 Pi + \beta_7 Ri + \beta_8 Li + \beta_9 Ei + \beta_{10} Li + \epsilon_i \quad (1)$$

The common variables of the three models are:  $O_i$  = whether residents support or not, which is a dummy variable;  $F_i$  = degree of equity;  $T_i$  = degree of the trust in the developers;  $N_i$  = the degree of the need for the facility;  $SP_i$  = social pressure;  $P_i$  = the possibility of built LLRW facility;  $R_i$  = risk perception;  $I_i$  = income;  $E_i$  = educational level;  $L_i$  = Probability to leaving Wu-chiu and  $i$  represents the  $i$ th person. In addition to the variables the three models have in common, we still have another three variables that used separately for each model, namely  $Dxi = Dci$  = whether there is compensation or not,  $Dxi = Dui$  = whether there is limitation on how to use the compensation and  $Dxi = Dsi$  = whether those residents are representative of people or not. Each of the three variables has its own dummy variable that represents whether residents support the NIMBY facility or not.

According to the empirical result of the three models, we find that in the case of Wu-chiu, the existence of compensation and unlimited way of using it can raise the acceptance for the NIMBY facility significantly, thus hypothesis 1 and hypothesis 2 are tenable. However, residents' being the representative of people is insignificant to whether they against the NIMBY facilities or not, thus hypothesis 3 does not hold water. Hypothesis 1 matches what we have expected, that is, the provision of compensation can raise the acceptance of residents; hypothesis 2 holds water probably because when the way of using compensation is limited, the utilities it brings is limited.

Hypothesis 3 is untenable because the standpoint of the representative of people cannot be different from that of the residents. Table 1 shows the essential variables and our empirical results:

Table 1 Variables and Empirical Results of this Paper

Model	Willingness to accept facility		
	(1)	(2)	(3)
	Estimate(standard deviation)		
Independent variable			
Constant	-8.99 (1.64)**	-3.73 (1.23)**	-3.66 (0.94)**
Offer compensation (1=yes, 0=no)	0.95 (0.35)**	—	—
Offer compensation but limited the way of using (1=yes, 0=no)	—	-2.12 (0.36)**	—
Being Councilors of Wu-chiu (1=yes, 0=no)	—	—	-0.15 (0.47)
Equity ("1=very low" to "5=very high") the trust in the developers	0.88 (0.23)**	0.33 (0.21)**	0.24 (0.16)**
the need for the facility ("1=very low" to "5=very high")	0.86 (0.26)**	-0.12 (0.23)	0.31 (0.18)**
social pressure (how many % of inhabitant will accept facility)	0.004(0.0086)	0.0003(0.006)	-0.001(0.005)
risk perception ("1=very low" to "5=very high")	0.07 (0.17)	0.27 (0.16)**	0.02 (0.12)
Income (NT\$10 thousand/year)	-0.003(0.002)*	0.0001(0.002)	-0.001(0.001)
Level of education	-0.02 (0.11)	0.02 (0.08)	-0.01 (0.06)
Leaving Wu-chiu (1=yes, 0=no)	0.43 (0.41)	0.44 (0.29)**	0.12 (0.24)
Probability to built LLRW facility ("1=very low" to "5=very high")	0.14 (0.17)	0.22 (0.16)*	0.05 (0.12)
N	78	81	160
Log likelihood	-77.75	-86.77	-218.01

Note:

\*\*=significant at 95% level, \*=significant at 90% level

According to the empirical analysis of the three models, we find our results are different from those of Jenkins-Smith and Kunreuther (2005), Oberholzer-Gee and Kunreuther (2005) and Kunreuther and Easterling (1996). We shall mention the differences below:

(A). Compensation

Our investigation discovers that the provision of compensation is significant to the acceptance of building the facility there, while other factors such as fairness, authenticity, income, the possibility of expected site-establishing and whether to move away from Wu-chiu are significant to residents' degree of support, but social pressures, risk perception, and level of education are insignificant, that mean those residents would not be influenced by other people greatly; this result is different from that of the case in [Pennsylvania](#) (Oberholzer-Gee and

Kunreuther (2005) and in Switzerland (Frey and Oberholzer-Gee (1996). What is needed to pay attention is that the expected possibility of siting is a significant factor.

Residents of Wu-chiu thought that the compensation was essential, because the disposal of the low radioactive waste disposal facility was not their responsibility; their health was at risk, thus the Tai-power Company had to compensate them and to admit the damage it did to them. Although Tai-power Company granted them 150 million dollars in compensation for the Wu-chiu town office, the villagers there did not use this compensation. As a result, the utility produced from compensation for the residents did not exist.

(B). The Risk perception to the Facility

Residents of Wu-chiu thought that the disposal facility was a hazardous facility, but the case was special in Wu-chiu because the residents there did not have to shoulder the risk of the facility, since they would all move to Taiwan once the Tai-power Company set off the establishment of the facility. In our empirical result we show that the risk perception of residents toward the facility is insignificant to the acceptance of building the facility. This part is different from the results of literature.

(C). The Decision-making Procedures of Siting

Although the candidate township has applied for providing place for the establishment of the facility, residents later would opposed to it because they were not informed in the first place.

(D). The Authenticity of the Tai-power Company

The more the residents believe in the Tai-power Company, the more they will support it. Our research show that 80% of the residents there did not believe in the Tai-power Company, thus the communication between them became quite difficult. Still, the villagers there did not believe in the town representatives and the officers, thus led to the NIMBY deadlock.

(E). Equity

The fairer the procedure, the more support would get from those residents. This result agrees with that of the literatures. Residents said that they didn't think the whole procedure was fair, but they also said that they had no way but to accept it if the government really wants to do it. The only thing they want was that the government and the Tai-power Company to keep their promise of guaranteeing the rights of them.

(F). The Need for Facility

The need for the facility is insignificant in the three models, showing that it dose not influence the acceptance of building the facility from those residents.

(G). Social Pressure

The social pressures faced by the residents of Wu-chiu come from clan because villagers there have kin relationship and this characteristic can be seen in their town representative election.

(H). Civic duty

Most villagers thought that the government had ignored the infrastructure of Wu-chiu and only to think of it when there was no place to deposit radioactive waste; Wu-chiu did not have the responsibility to provide place to deposit those waste.

(I). Personal Factors

Income level has significant negative impact on the degree of the support of residents. The higher the income level of the residents, the less they want to support the siting of the facility; this result matches that of the literature. The degree of support has something to do with the nine factors, but what really influence the degree of the support of residents, such as fairness, decision-making procedure of siting and risk, are different from the results of literature.

### 3. CONCLUSION

Our research case of Wu-chiu, Oberholzer-Gee and Kunreuther (2005) which studies the case in [Pennsylvania](#) and Frey and Oberholzer-Gee (1996) which studies the case in Switzerland all probe into the NIMBY phenomenon, thus we shall compare the three cases to draw some conclusions.

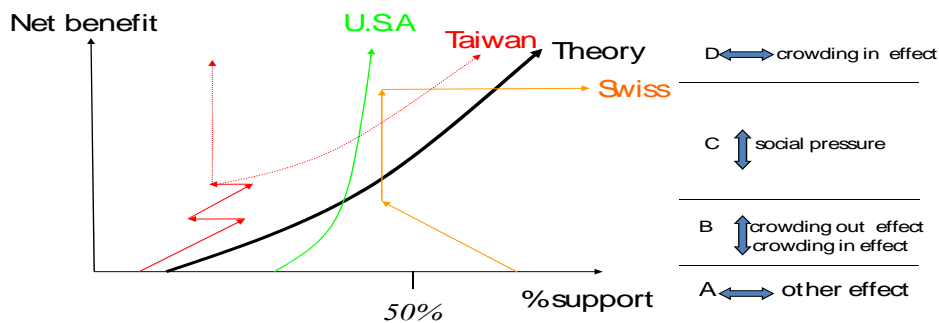


Figure 1. The Concept Model of Compensation-Acceptance in Different Countries.

Figure 1 applies the relationship chart in the case of Wolfenschiessen developed by Frey and Oberholzer-Gee (1996) which shows the relationship between compensation and the acceptance of building the facility, then adds the cases of Wu-chiu and of [Pennsylvania](#) into this chart; it shows that the expected compensation can raise the degree of the support of residents.

First, Figure 1 shows that in the case of Switzerland. The acceptance in this case falls from 50.8% to 24.6% as the level of compensation rises, and even though the compensation is raised to a certain level, the degree of the support of the residents in Switzerland still sticks in the mud. However, when the compensation is raised to a higher level, the acceptance of building the facility suddenly jumps to 60%. Second, figure 1 also shows the case in [Pennsylvania](#). In June, 1995, the government of [Pennsylvania](#) proclaimed the technical principles of choosing site, choosing the appropriate site for depositing low radioactive waste and turned the screws on the residents, forcing them to accept the facility. In December, 1997, the government of [Pennsylvania](#) investigated the willingness of the ealdorman and residents toward building facility. The research result shows that 31% of the ealdormen would support the siting and an expected 84% of the residents would against it if the complementary measures of siting remain unchanged, but when the level of compensation reaches 3 times as high as the original level, the acceptance of the ealdormen would reach from 29% to 31%. In 1998 the residents of [Pennsylvania](#) rejected the siting as expected, forcing the government to give up the plan. Oberholzer-Gee and Kunreuther (2005) suggests that the behavior of the residents is influenced by their society, and the more risky the siting plan, the more negative impact in the siting plan.

Finally, according the response of Wu-chiu's people, this research divided the process into four phases:

Phase I:

Tai-Power Company proclaimed the sitting measure, and granted 1 million dollars for Wu-chiu Township, which provided the letter of consent.

Phase II:

The villagers of Wu-chiu were informed and proclaimed that they wouldn't accept the facility.

Phase III:

The Tai-Power Company held a villagers' conference, and let the villagers there vote openly. The resolution had three points: a. against the siting; b. do not against the siting intensively if the Tai-Power Company visited Wu-chiu for investigation and c. do not against the siting of facility if the government keeps its promise. In this phase the Tai-Power Company negotiates with the villagers and enters the investigate phase, giving villagers 100million dollars.

Phase IV:

The investigation shows that the villagers rejected the siting, but said that the facility was essential for the nation, thus thought that it was of no use to against it, only to hope that the Tai-Power Company could keep its promise to care about the future life of the villagers. Below we divided the acceptance of the residents into four phases, namely A. without compensation; B. with compensation; C. alternative-conditions-to-be-negotiated; D. receive compensation and discuss them one by one:

A. Without compensation Phase

At this phase the acceptance is influenced by the risk of the facility, the decision-making procedures, the authenticity of those who site, fairness, the demand for the facility, social pressures, and civic duty. In this phase acceptance of the residents of different countries varies according to objective conditions.

B. With compensation Phase

Frey and Oberholzer-Gee (1996) think that in Switzerland the compensation would lower the civic duty and thus produce crowd-out effect. However, it remains to be discussed whether the phenomenon permeates in different countries. In Pennsylvania the degree of the support of the resident rise slightly as the level of compensation rise, while in the case of Wu-chiu shows that the provision of compensation increase utilities, thus the acceptance of the residents rises as the level of compensation rises

We think that in this phase, the compensation producing improvement effects and crowded-out effect simultaneously. Residents in different countries have different feelings toward social pressure, compensation

C. Alternatives-to-be-Negotiated Phase

At this phase the site-establisher continued to raise its level of compensation, while residents, who were under social pressures, negotiated it but being tortured with ambivalence. As a result, the level of compensation continued to rise but the acceptance of building the facility stagnated. The residents of Wolfenschiessen, struggled between social pressures and the effect of receiving bribery, was a case in point. The residents of Wu-chiu, however, were different because the exposure of their situation on news provoked their intense opposition. Those die-hard residents held strikes of all sorts to against it to the end. Their 180 degrees transformation can be explained by social pressures because their society was made up of clans.

D. Receive compensation Phase

After they balance internal and external factors, residents make their final decision. The acceptance of Pennsylvania's residents failed to reach 50%, thus the hazardous facility could not be established, while that of Switzerland was successful. The case of Wu-chiu developed itself to the previous stage because our government, under the intense pressure from mainland China, gave up their plan. We would never know how the case would develop itself if it thrives to the fourth stage.

In conclusion, unlike the case in Pennsylvania, which failed because of social pressures and the risk of the facility, as well as that in Switzerland, which was successful because of compensation, the siting process in Wu-chiu was brought to a halt because of other infeasible factors. Although we fail to observe how the case in Wu-chiu develops, we understand more

about the NIMBY phenomenon in Taiwan, that is, although the acceptance for building the facility sways, it rises as the level of compensation rises. Meanwhile, our empirical result shows that compensation is significant to the acceptance, thus we predict that if the case in Wu-chiu continue to thrive to the fourth case, it would show the result as our empirical result shows.

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# CONTESTED SITING OF A TRANSPORT FACILITY IN HONG KONG - CHALLENGES MET AND EXPERIENCE GAINED

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## Abstract

The paper presents the experience of a railway construction project in Hong Kong. A new city transport facility with territory wide benefits was generally supported, but there was an initial environmental concern about its crossing ecologically important wetlands. The paper describes the challenges that the project overcame, such as statutory requirements, public involvement and stakeholder communication, alternatives considerations, conflict resolution and mitigation. The main outcome outlined is the protection of an ecologically important valley. The experience of this project provides an important reference for current and future infrastructure facilities.

## 1. INTRODUCTION

This paper presents experience from the contested siting of a transport facility, the Lok Ma Chau Spur Line railway. The project was to benefit the Hong Kong community at large. Public consultation was conducted throughout the planning stage and the project was generally supported. However some reservations were initially expressed by conservation groups whose main concern was potential ecological impacts from the siting of the railway across an ecologically important valley. The paper outlines the challenges that the project overcame during the planning and implementation stages, eventually winning the trust and acceptance of all stakeholders. The paper concludes with a discussion of the experience that potentially provides important reference for contested infrastructure facility proposals.

It should be noted that the paper is written from the perspective of environmental impact assessment practitioners, based on information provided by the Kowloon-Canton Railway Corporation.

## 2. THE PROJECT

In 1999, the Government of the Hong Kong Special Administrative Region (HKSAR) commissioned the Kowloon-Canton Railway Corporation (KCRC) to construct the Sheung Shui to Lok Ma Chau Spur Line Project (the Spur Line). This new city transport facility, with regional significance, was to fulfil the government policy designed to :

- relieve congestion at the present East Rail crossing to the Mainland at Lo Wu;
- provide a second rail crossing into the Mainland China; and
- provide access to rail transport for the proposed Kwu Tung Strategic Development Area (SDA).



The project would also form part of an overall railway network in the HKSAR within which Hong Kong's West Rail would be connected to the Spur Line via the Northern Link.

The Spur Line links the existing East Rail system from Sheung Shui Station to a new border crossing into the Mainland at Lok Ma Chau (LMC), as shown in the Route Plan below. The project involved the construction of a 7.3km double-tracked railway line, improvement works to the existing Sheung Shui Station, provision for a potential station at Kwu Tung, and construction of the LMC Terminus with cross-boundary facilities linking via a double-deck footbridge across the Shenzhen River to a new Huanggang metro station on the Mainland side.



Figure 1. The railway alignment goes through rural areas in northern New Territories, across the ecological important Long Valley area -

*“ Long Valley is an area of predominantly agricultural freshwater wetland of about 33 hectares bounded broadly on the West and North West by the River Beas and on the East by the River Sutlej. It is a known area of high ecological value even though it has no special legal protection as a Conservation Area or the like. It is the single largest remaining area of freshwater wetland agriculture in Hong Kong and is made up of a mosaic of small plots, such as active and inactive wetland agriculture, and bloodworm ponds. The area supports a high diversity of bird species, with over 200 different species recorded, 29 of which are of conservation importance.”*

### 3. CHALLENGES

Presented below are the challenges met and experience gained through public engagement, conflict resolution, innovation, mitigation and environmental effort.

#### 3.1 Siting – Alternative Alignments

Planning of the Spur Line took place over a 10 year period. The Spur Line proposal was first presented in the Railway Development Strategy in 1993.

In 1998, a Preliminary Project Feasibility Study (PPFS) evaluated the engineering and environmental feasibility of the potential routes linking the two rail systems. The PPFS studied at grade, tunnel and viaduct routes across the ecologically sensitive Long Valley. The horizontal

rail alignment at Lok Ma Chau, proposed in 1993, was amended to meet environmental constraints, doubling up with the existing transport corridor for the Lok Ma Chau Road crossing and minimising the impacts on the fishponds within the designated Wetland Conservation Area (WCA).

To ensure that the project met the criteria of being a sustainable transport development, a number of factors were taken into consideration during the railway alignment study. These factors included present and future land use, planning of a future new town, minimisation of impacts to the environment, integration with future railways network as well as minimisation of impacts to the nearby business operators, residents and villagers. In addition, social impacts to the nearby villages and local communities due to the project were considered, such as avoidance of private land resumption as far as practicable to minimise impact on occupants; minimisation of landtake to reduce land clearance impact; and Fung Shui issues and proximity of the railway alignment to nearby ancestral graves. To support the Government's planning of a future new town to be built in the Kwu Tung area, an underground concrete box was constructed in that area to act as advance enabling work for a future railway station to serve the residents of the planned Kwu Tung new town.

After a number of possible railway alignments were set out which would satisfy both the engineering and operational railway requirements, assessment of each possible alignment was conducted based on the above-mentioned factors. As most of the land traversed by the railway alignment was agricultural, no physical constraints on or beneath the land surface was encountered allowing the alignment to remain relatively straight. As a result, the land resumed for construction of the project was kept to a minimum, thus causing less impact to nearby businesses, residents and villagers as well as the agricultural land and existing fishponds.

The original Spur Line alignment scheme was gazetted in October 1999 and was generally supported by the local communities. In response to requests and enquiries received from the public, the alignment scheme was refined and re-gazetted in April 2000 for further public consultation.

### **3.2 Long Valley – The Main Challenge**

In accordance with the HKSAR's Environmental Impact Assessment Ordinance (EIAO), the Spur Line is a Designated Project. KCRC as the Project Proponent was required to conduct an Environmental Impact Assessment (EIA) study to demonstrate that the project would be environmentally acceptable with no adverse residual impacts, and to obtain an Environmental Permit (EP) from the authority Director of Environmental Protection (DEP) before commencing construction and operation of the Spur Line.

A full EIA study was undertaken from May 1999 to June 2000. The EIA reviewed the development of a feasible rail alignment with environmental, engineering and railway design constraints being considered. These requirements defined the route across the ecologically sensitive area of Long Valley. The viaduct was proved to be the most effective option for Long Valley and an ecological compensation scheme was devised to overcome the potential adverse construction and operational impacts. The EIA also identified and quantified all the other potential environmental impacts of the railway proposal and formulated suitable mitigation measures, covering air quality, noise, water quality, waste management, contaminated land and fisheries. The EIA was confirmed by the authority to have met the requirements of the Technical Memorandum of the EIAO and passed into the statutory public consultation phase.

In the public consultation period, a number of objections were received. The main concern, largely from conservationists, was the viaduct section proposed in Long Valley, due to potential significant ecological impacts such as disturbance to birds' habitats. Key public comments were related to issues of alternative alignments and uncertainties as to the potential for

success of proposed ecological compensation measures, as highlighted in the comments from the Advisory Council on the Environment (ACE) -

- *“...the proposed central alignment had greater ecological impact on Long Valley than any of the other considered options...concern that such an alignment would bring serious ecological impacts and significant habitat fragmentation to Long Valley. Some members feel that cutting into the center of Long Valley is not acceptable. They are not fully convinced that the project proponent has exhausted all possible alignment options... To minimise the impact on Long Valley, they would prefer an alignment either running close to River Beas or to the north of the River. ”*
- *“...concerned about the lack of information on benchmark functional value... for the existing Lok Ma Chau fishponds which are proposed for compensation... some members therefore prefer ecological compensation on a "like-for-like" basis in terms of area.”*
- *“ Some members are not satisfied that the proponent has produced sufficient evidence to demonstrate that the proposed mitigation measures will work and can attain with certainty the stated ecological functionality, noting in particular ...high failure rate overseas and the lack of comparable experience in Hong Kong” ...*

The DEP declined to approve the EIA report or award an Environmental Permit. The main reasons related primarily to Long Valley were -

- *The high ecological value and high diversity of birds in the area affected by the project.*
- *The high direct environmental impact during the construction stage and the likely residual impact from the lengthy construction phase having regard to proposed mitigation measures which were unlikely to be effective or practicable.*
- *In the light of comments from the public and ACE, the Proponent had not proved the absence of other practicable or reasonable alternatives.*
- *The environmental impacts were likely to be prejudicial to the well-being of the flora, fauna or ecosystem in the areas affected.*

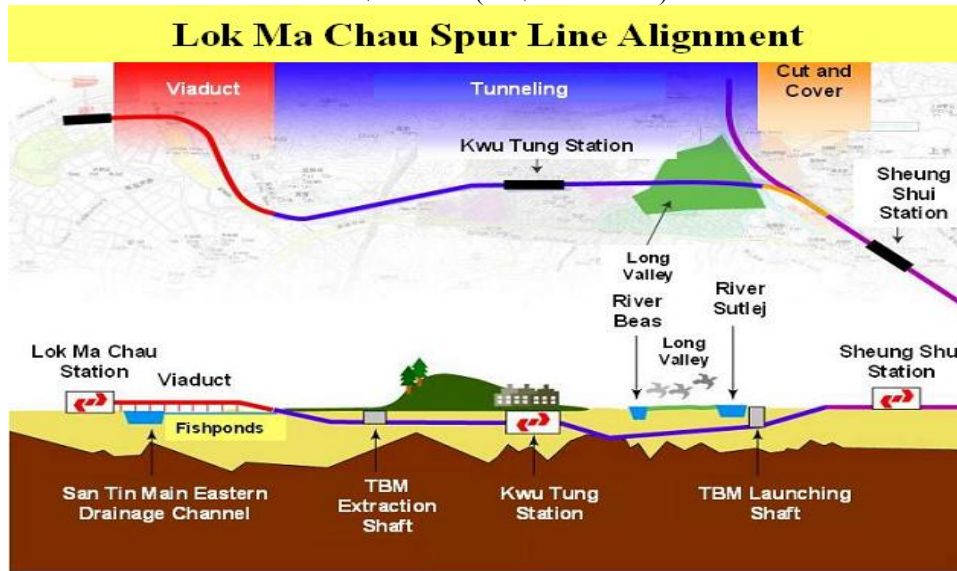
The Proponent followed the Appeal provisions enshrined in the EIAO and the Appeal Board heard the case in April 2001. The Appeal Board judgement in July 2001 upheld the DEP's decisions not to approve the EIA report and not to issue an Environmental Permit, commenting that -

*“ It became clear during the hearing that of the 7.3 kilometer line proposed the only remaining concerns are for the possible adverse environmental impacts upon Long Valley caused by the 700 meters of viaduct which cross it. Further, that the real concerns are confined to the construction phase. The residual impacts during the operational phase are likely to be small if those in the construction phase are avoided or mitigated. It is a short distance of track over an area of high ecological value.”*

Following recommendations made in the Appeal judgement, the Proponent had further dialogues with the Agriculture, Fisheries and Conservation Department and Environmental Protection Department, as well as conservation groups, on the way forward for the Spur Line project. Uncertainties about the sufficiency of information to ensure an effective ecological compensation design and management strategy, and the time required to address these doubts,

favoured selection of a tunnel below Long Valley, rather than viaduct so as to avoid any ecological impacts. The principal benefits of the tunnel option were the avoidance of adverse impacts on ecology, visual and landscape features, and the potential benefits to the new and advantageous opportunities in the overall planning of the Kwu Tung North SDA.

In response to the conservation groups' concerns, the Proponent made a commitment to adopt a tunnel construction method for the railway alignment to go beneath the Long Valley area, at an estimated additional cost of HK\$2 billion (US\$260 million).



### 3.3 Harnessing Proven Technology - Tunnel Construction

To address public concern about contamination and lowering of groundwater at Long Valley during tunnel construction works, special proven technologies were adopted. These included the use of an Earth Pressure Balance Tunnel Boring Machine with biodegradable and non-toxic foam, and the use of a ground freezing method for cross-passages, with continuous monitoring of groundwater levels during tunnelling. The tunnelling works were carried out smoothly with no impacts on Long Valley ground water, and were completed over 6 months ahead of schedule.

### 3.4 Environmental Monitoring and Audit

For such a sensitive project, it was important to ensure no unacceptable impacts and to minimize disturbance to local residents and resources, in compliance with the Environmental Permit conditions. With an established Environmental Management System, a comprehensive environmental monitoring and audit programme was conducted, particularly covering ecology and hydrology in the Long Valley area during the construction phase.

## 4. STAKEHOLDER ENGAGEMENT

As described earlier, the original Spur Line alignment scheme was adjusted and refined during the gazettal and EIAO processes, in response to comments from the public. The Proponent's commitment to the tunnel option in order to protect the ecosystem of Long Valley was a positive response to public aspiration, despite the substantial cost.

After the important issue of Long Valley was resolved, the second amended railway alignment scheme was gazetted in December 2001 and subsequently authorised by the Executive Council in June 2002.

During the construction phase, local Community Liaison Groups were formed to provide a forum for the general public to express their concerns or give their advice to the Proponent on improvements to the construction methodologies used on the project. Regular liaison meetings were held to ensure that the public was briefed in advance on the work progress and upcoming construction. A telephone hotline directly to the Proponent was also set up for the public to report their concerns or make any enquiries regarding the Spur Line construction work.

An Environmental Committee has also been established independently to monitor the performance of the mitigation measures, prior to the commencement of any construction work. The Committee consists of prominent members from local conservation groups and institutions, including the Friends of the Earth, Hong Kong Bird Watching Society, World Wide Fund for Nature Hong Kong, University of Hong Kong, and University of Science and Technology. Throughout the construction period, members of the Committee were regularly briefed on the work progress and the results of the measures taken at each construction stage to mitigate environmental impacts. Advice and suggestions from the members were fully considered and incorporated in the construction methodologies. Meetings with the members are continuing in the operational phase of the project to ensure proper management and maintenance of the mitigation measures.

It is noteworthy that the environmental performance of the project has received acclaim such as -

*“ The completion of the project is a landmark in the history of nature conservation in Hong Kong. It does not only signify that with careful planning, infrastructure building and environmental protection can go hand-in-hand, but also is a manifestation of the value of the society, the ingenuity of the engineers and the commitment of the project proponent to the conservation of natural heritage.”* (the Chairman, Advisory Council on the Environment)

## 5. IMPLICATIONS

The experience of meeting challenges in the Spur Line project provides an important reference for current and future infrastructure facilities. The following employs the conceptual framework developed by the Chinese University of Hong Kong (CUHK) on siting and community responses to locally unwanted land uses (LULU), covering the aspects of :

- Nature of LULU - needs and benefits, impacts, risks
- Planning, Siting, Conflict Resolution – multi-stakeholder process
- Community Response

The discussion is illustrated with extracts from the Spur Line EIA Appeal Board hearing.

### 5.1 Nature of LULU – Needs and Benefits

- Different public interests should be aligned to resolve conflicts and develop acceptable solutions, through understanding the perceptions of objections and proponents. The Spur Line EIA Appeal Board highlighted -

**“ There are two main matters of public interest involved. Both are important. The first is the public interest in the protection of the environment upon which the quality of life in Hong Kong will increasingly depend. The second is the public interest in ensuring**

**that major designated projects are brought to fruition in a timely and efficient manner. The time constraints put upon the Director for steps in the process and for his decisions show that the Ordinance aims to satisfy both interests. It is necessary in the implementation of the process that both should be kept in mind. This is so especially when major infrastructural projects (roads, railways, tunnels, reclamation works and the like) which may cause a variety of adverse environmental impacts are proposed.”**

## **5.2 Nature of LULU – Impacts and Risks**

- The enactment of the EIAO in 1997 has provided a legal structure to the comprehensive assessment of potential environmental and associated social impacts of designated projects, facilitating identification of environmental risks and mitigation measures. The Spur Line case in 2000 may have contributed to the subsequent initiation of a new Continuous Public Involvement (CPI) policy in 2003 for EIA studies. The EIA study process has become a useful tool to pro-actively engage the public, soliciting their views and comments, as valuable contributions to an environmentally sustainable project supported by the public.

## **5.3 Planning, Siting, Conflict Resolution – Multi-stakeholder Process**

- A multi-stakeholder engagement process (project proponent, public and interest groups, and Government authorities) based on trust, participation and equity is essential for conflict resolution at the planning and siting stage. The process should be transparent, with information accessible to and easily understood by the public. It is important that stakeholders work in partnership, to ensure effective and holistic public participation, and provision of responsive and integrated solutions.

The Spur Line case demonstrates processes of engaging the stakeholders who may initially be in opposition, developing responsive solutions to their concerns, and in the end winning their trust and acceptance of the project. The local Community Liaison Groups formed in the construction phase kept local residents well informed and satisfied, addressing their concerns face to face. The contributions from the Environmental Committee guided the successful implementation of the environmental protection measures.

- It should be noted that earliest communications and dialogues amongst stakeholders are also vital. The suggestion by the EIA Appeal Board on the communications with Government authorities in EIA process is also relevant to consultation with the public –

**“The task of ensuring that the EIA process is implemented in a certain, efficient and timely manner is not easy but ought to be achievable. The key to its success is good communication. We suggest that at all stages of the process there should be open, ready and frank communication between the Director and the proponent. Cooperation in achieving projects which are environmentally acceptable is the essence of the process...”**

*“...follows the exhibiting of the project profile and the receipt of comments from the public and ACE... drafting of the Study Brief then reflects the relevant concerns of the public and ACE. These concerns and any further matters which the Director requires to be studied should be particularized in it. Where possible the terms should be specific rather than general. The drafting is essential to what follows. ... it sets the agenda for the rest of the*

*process.... Where clarification is required this should be readily requested and helpfully provided.”*

**“ Good communications .....often resolve future problems.....avoid delay and expense later in the process.”**

#### **5.4 Community Response**

- The public needs to see commitment by proponents to address local needs and concerns. For example, in the Spur Line project the Proponent minimized landtake and impact on land occupants, attended to Fung Shui issues, provided advance enabling work for the future Kwu Tung station, extensive EM&A programme for ensuring proper implementation of environmental mitigation measures, and notably the adoption of the tunnel option at an additional, substantial financial cost in order to protect the Long Valley ecology.
- Consideration of facility alternatives and whether all alternatives are explored and fairly compared is prone to debate. From a recent CUHK community survey on LULU, it is clear that the alternatives assessment process should be transparent, with information easily understood and accessible, and rationales clearly explained to the public. The Spur Line EIA Appeal Board offered some insights into assessment of practical and reasonable alternatives -

*“ ...the primary consideration is whether applying the precautionary principle the project is environmentally acceptable. But, of many matters which must be weighed in assessing 'practical and reasonable' included are adverse impacts, engineering constraints, extra-time involved, additional cost and even government policy (accepting it as a fact). No alternative is likely to be practical if government policy will not enable it. ”*

The Spur Line case illustrated the building of public confidence in these measures, an important factor in public acceptance. For example, detailed information was provided on the reliability of the special tunnel construction method at Long Valley.

The recent CUHK community survey showed that, in order of descending importance, public ranking of tools for conflict resolution were: more public consultation channels; EM&A and safety checks; explanation of siting rationales; and compensation. It is interesting to note that proper public communication ranks highest. The benefits of public participation in environmental decision-making have been well documented, such as transparency, community empowerment, improved quality of information, better environmental governance, means for resolving disputes, enhanced company reputation and minimising of environmental risks. Public participation is gaining international prominence as a result of growing recognition that it is fundamental to moving towards sustainable development.

The potential issues and solutions to conflicts highlighted in the Spur Line project would provide a good reference case for similar contested sitings. The extent of its application to other cases would, however, be subject to careful balancing of case-specific divergent interests, such as ecological conservation, environmental protection, local community needs, construction costs, and costs to the general community (ticket fares).

## **6. CONCLUSION**

This paper has added to the bank of case studies related to contested siting. It has described a railway case and elaborated on its challenges and their resolution by employing a comprehensive

conceptual framework developed at CUHK. The synergy of proponent commitment, public participation, innovative mitigation and environmental effort have, it is claimed, exemplified how infrastructure facilities can become opportunities for long-term protection of natural resources. The project can be seen as a reference case for similar contested sitings, highlighting potential issues and solutions to conflicts. However, the extent of its application to other cases would be subject to careful balancing of case-specific divergent interests.

*Disclaimer - The views expressed in this paper are solely those of the authors and do not represent the views of the Kowloon Canton Railway Corporation.*

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# LANDFILL SITING IN VIETNAM: A FOCUS ON REGULATORY AND INSTITUTIONAL ISSUES

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## Abstract

Waste and its associated environmental problems have raised significant concerns for both the Vietnamese government and the public. Among the many methods of solid waste management, landfilling is considered the cheapest and most prevalent solution in Vietnam. In order to build landfills that meet environmental requirements, the selection of landfill location plays an important role. However, properly selecting landfill locations is a challenging task in Vietnam.

Recently in Vietnam, there has been a tendency to apply waste management technologies, regulations, and standards from developed countries. This can easily be understood as Vietnam and other developing countries still lack much experience in the field in order to develop adequate measures on their own. However, such technologies and standards from outside need to be modified to take into account the local conditions since there are significant differences between developed and developing countries in terms of waste characteristics, climate conditions, operational capacity, technical resources, financial situation, environmental awareness, and so on.

An effective institutional framework is vital for the development of a country. However, the barriers standing in the way of development in Vietnam and many other developing countries are more often institutional than technical in nature. It is even more difficult to improve and strengthen the institutional framework in Vietnam, a country currently in a transition period, as the institutional framework always changes and evolves in response to the changing economic, social, and political forces.

Besides limited financial, technical, and human resources, organizational barriers, overlapping responsibilities, inadequate coordination, top-down approaches, are some of the barriers that hinder effective landfill siting. The purpose of this research is to propose a set of practical recommendations for removing these barriers. This research provides insight into landfill siting in Vietnam with respect to regulatory and institutional factors. These issues include legal texts, landfill siting process, coordination, information sharing, and public participation. Corresponding to each issue, a number of recommendations are given for improving landfill siting in Vietnam.

Although the recommendations developed are for Viet Nam specifically, it is felt that they can be adapted for use or applied in other developing countries.

## 1. INTRODUCTION

Waste and its associated environmental problems have raised significant concerns for both the Vietnamese government and the public. Among the many methods of solid waste management, the government has paid particular attention to landfilling. This method of waste disposal is considered the cheapest and most prevalent solution in Asia and other developing countries [1]. This is embodied in the implementation of a separate set of landfill regulations on a wide array of issues from landfill siting to construction and operation. However, the regulations are not

always effectively enforced in practice. There are many reasons for this inefficiency and one of the major causes may be the lack of an effective institutional framework for solid waste management in general and in landfill siting in particular. The institutional framework in landfill siting refers primarily to the organizational structure of agencies involved as well as to other relevant issues such as legal texts related to landfill siting and the landfill siting process itself.

An effective institutional framework is vital for the development of a country. However, the barriers standing in the way of development in Vietnam and many other developing countries are more often institutional than technical in nature. With the support from international organizations, it is not too difficult to deal with technical issues such as a trained workforce or finance, whereas strengthening and assessing the institutional framework is a more difficult task since it is embedded in and related to many social and cultural issues. In this context, the institutional framework and coordination between agencies involved is also an important factor that plays a crucial role in the landfill siting process, without which the process cannot successfully be carried out. The reason for this lies in the nature of the landfill siting process itself. Landfill siting is usually the responsibility of governmental institutions since it is part of waste management. Thus, an appropriate organizational structure that includes all relevant institutions will facilitate the landfill siting process by exploiting and utilizing all available resources with respect to finance, personnel, data and information, and technology.

Alike other countries, the national institutional framework for local solid waste management in Vietnam designates the responsibility for solid waste management to the localities. There has been a tendency in Vietnam that the legislation for municipal solid waste management only specifies the municipal obligation of removing waste in order to satisfy general public hygiene standards rather than dealing with solid waste management in all of its environmental aspects. In order to achieve the latter, the legislation should provide specific objectives and standards that are suitable for financial and human resources to be available at the local level [2]. Failing to do this will cause frustration and even neglect in implementing the legislation from both municipal government agencies and the public.

The overall objective of this paper is to propose a set of practical recommendations on how to improve the landfill siting process in Vietnam with respect to the following relevant issues: siting processes, organizational structure and coordination among agencies. Based on the analyses given, an institutional framework will be proposed.

## **2. LANDFILL SITING PROCESS**

### **2.1 Current practices**

#### *2.1.1 Overall procedure*

The current procedure for landfill projects can be described as follows:

1. The People's Committee (PC) of the province/city, recognizing the need to build a new landfill serving the waste management activities of the locality, assigns the Department of Natural Resources and Environment (DONRE) and the Department of Construction (DOC) in coordination with each other to carry out the landfill project.
2. The DONRE and DOC collect data and information on the requirements of the landfill project with regard to its suitability for local conditions, such as population, waste generation and characteristics, urban development, etc., in order to determine the required size of the landfill and other basic requirements. Specifically, the DOC proposes candidate landfill sites based on urban planning projects that have been approved by the PC while the DONRE is in charge of collecting and analyzing the natural characteristics

of those candidate sites. These two key agencies work in coordination with each other to produce a report assessing and analyzing all candidate sites, and proposing the selection of the most appropriate site. The report is then submitted to the PC for approval of the site selection. In some provinces, this report is prepared by a consulting company, which should be capable of doing the work and have much experience in the field. In this case, the DONRE and DOC are responsible for reviewing and assessing the report before submitting it to the PC for approval.

3. The PC approves the landfill site based on the recommendations of the DOC and DONRE. The land used for the landfill project is then handed over to the Urban Environment Company (URENCO), which is often considered the project owner on behalf of the PC. From this step on, the URENCO is responsible to the PC for all follow-up work on the project.
4. The URENCO hires one or several consulting companies, which are capable of doing the reports on the following: EIA, Detailed Planning for the landfill project and EIA for it, Feasibility Study, and Technical Design. Each of these reports is then submitted to the respective authorized agency (the DOC or DONRE) for review. The consulting company may have to make necessary revisions or modifications after receiving feedback from the DOC and DONRE. The revised reports are then submitted to the PC for approval.

The above procedure is illustrated in Figure 1 below.

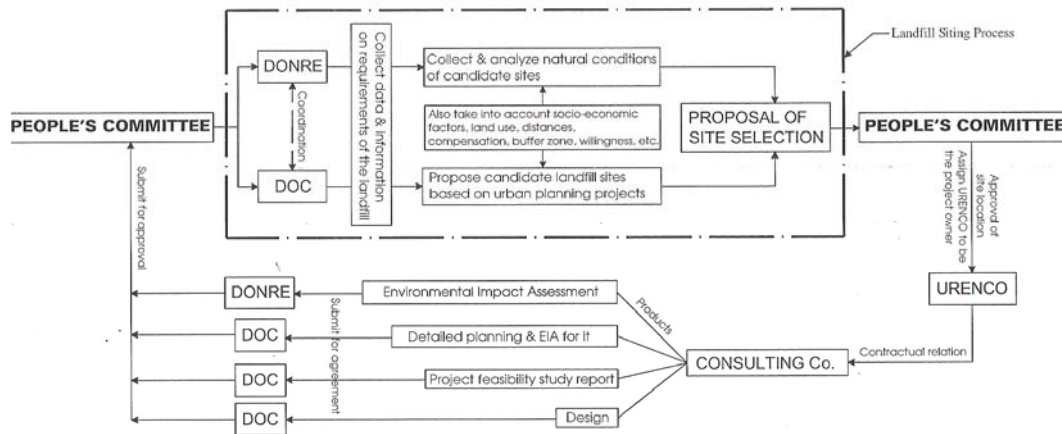


Figure 1. Current procedure of landfill project execution

### 2.1.2 Landfill siting process

Since 2001, the landfill siting process used in Viet Nam is guided by government guidelines which includes four basic steps as follows:

1. Gather information and data on the requirements of the future landfill site, such as the current waste volume and future projections.
2. Identify candidate sites based on the natural conditions of the areas (e.g. topographical, geological, hydro-geological, land use, and population distribution maps are used for analyzing the availability and suitability of the candidate sites).
3. Compare and evaluate the candidate sites identified, using technical, social, and economic factors to select the most appropriate site.
4. Set up a plan for the selected site.

## 2.2 Discussion

### 2.2.1 Subjective Assessment

The current procedure of landfill project execution appears to be appropriate and sound. However, in practice, it does not always run smoothly or is significantly influenced by external factors. One of the common problems lies in the first step of this top-down process when the PC assigns the DOC and DONRE to carry out the landfill siting report. In some cases, the key officials at the PC have already subjectively had in mind several locations that they consider as good sites for the landfill project, and therefore they may consciously or unconsciously direct the DOC and DONRE to those locations right at the beginning of the project. Such subjective ideas may then be brought into the assessment report of candidate sites as a “lodestar”, which may result in subjective or even unfair assessment in comparison among candidate sites, or missing a good location for consideration as a candidate site, and thereby leading to an influentially inappropriate selection of the most suitable site. This phenomenon in landfill siting has also been known of in many countries in a similar form as a misleading way of artificially defining study areas [3]. One way to avoid this pitfall is adopting more open landfill siting processes through employing a greater number of stakeholders.

As mentioned above, the landfill siting process is executed mostly in Step 2 of the overall procedure described above by the DONRE, DOC, and PC. It was indicated in the interviews with relevant officers that the DONRE and DOC often do not have experts in the domains of geology and hydrology. Therefore, it is impossible for them alone to effectively carry out landfill siting processes. Thus, it is suggested that consulting companies, which often have experts in various disciplines, should be involved early in the process as the ones responsible for executing landfill siting reports. In this case, the DONRE and DOC only play a role of state management in the field, providing access to data sources, financial resources, and support for those consulting companies doing the work.

### 2.2.2 Siting Process

In discussing the shortcomings of the current landfill siting process guided by the government in the new regulations, a process introduced by Rushbrook and Pugh (1999) for middle and lower income countries has been taken as a template for comparison purposes. Detailed descriptions for each step can be found in reference [4]. A diagram briefly describing the main steps in their process is given below:

The landfill siting process introduced in the Vietnamese regulations does not have the step *identifying potential areas*. This lack of an explicit and important step in the landfill siting process is likely to result in an oversight of one or more good locations that should also be considered as candidate sites. However, in practice, the step *identifying potential areas* is sometimes combined with the next step, *identifying candidate sites*, and therefore, it does not appear clearly in the process. Based on a review of 16 official reports on various landfill projects, it is observed that even when this is the case, the descriptions and analyses on the landfill siting process used to choose the landfill location in those reports are quite short and general. In many cases, they occupy only a couple of pages in the entire report and do not give detailed explanations on how the landfill location has been selected in terms of criteria used, data sources, assessment methods, and constraints. There have been very few reports that mention these issues. However, most descriptions and analyses in those reports are ambiguous and qualitative. There were rarely quantitative assessments with detailed specifications given.

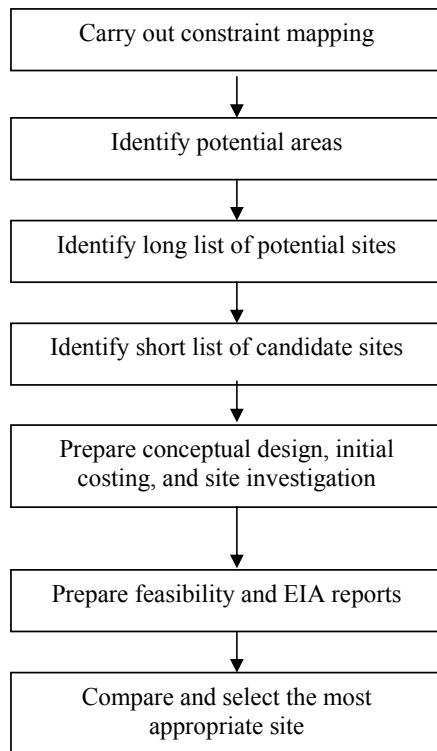


Figure 2. Landfill siting process suggested by Rushbrook and Pugh (1999)

One of the reasons the step *identifying potential areas* is missing is the fact that it is often implicitly carried out in urban planning projects conducted by national agencies, and therefore is not repeated in the landfill siting process executed at the local level. Due to the scope of this paper, this issue is not further discussed here.

In practice, it may not be too difficult to identify potential areas or free spaces for locating a landfill in a city where land use is clearly divided and distributed (e.g. agricultural, industrial and residential lands are separated with clear borders), which is often the case for new urban areas or extended cities. On the other hand, in cities where different land uses combine or interpose with each other, identifying potential areas for landfills can be a very difficult task since many exclusionary criteria may conflict with one another. In such cases, trade-offs would need to be made to find the most appropriate areas, along with sacrificing some initial objectives, not only environmental goals set out for the landfill, but also the development orientation of the whole city. Thus, *identifying potential areas* may not be a simple step, although it is the very first step in the landfill siting process where a great deal of information and data has not yet been taken into assessment. Any mistake in choosing potential areas, since it is the beginning of the process, may lead the subsequent steps in a wrong direction; or the practitioners may have to go back to this step during later phases when realizing that the study areas need to be redefined. It is noteworthy that iterative processes in siting landfills are ordinary and necessary, but they should be minimized in Vietnam, where the budget for landfill siting projects is always limited.

Comparing the process introduced by Rushbrook and Pugh (1999) and the Vietnamese process illustrated in Figure 1, it can be seen that the conceptual design, feasibility study, and EIA are part of the landfill siting process in Rushbrook and Pugh's process while they are carried out much later in the Vietnamese process, after the landfill site has already been selected. The

main purpose of incorporating the conceptual design, feasibility study and EIA into the landfill siting process is to estimate initial costs as well as to anticipate impacts on the environment of each of the candidate sites. The results of these reports are then used for comparing the candidate sites in the last step, namely *comparing and selecting the most appropriate site*, and serve as influential factors in choosing the most preferred site. A number of conceptual design alternatives for each site can also be carried out to set up a range of site suitability. This would facilitate the process of making tradeoffs between the level of design, cost and the level of environmental protection [5].

Due to the late execution of the conceptual design, feasibility study, and EIA in the Vietnamese landfill siting process, construction costs and environmental impacts have not been fully taken into consideration as criteria for selecting the site. This is obviously a void that needs to be filled. In other words, all these works need to be moved up to the earlier phases in the landfill siting process. However, these studies should be conducted with reasonable level of detail, so-called preliminary studies, only for the purpose of screening out candidate sites, because carrying out these studies in detail imposes a burden on the national and local budget. Further studies such as detailed and technical designs, detailed feasibility studies, and detailed EIAs for the chosen site can then be conducted in the later phases of the project development before the landfill is constructed.

Thus, the process introduced in government guidelines is a good starting point in improving landfill siting in Vietnam but there is still an urgent need for improving that process with additional steps and more detailed guidance, taking into account the resources and constraints of the government agencies and consultants involved [6]. McNally (2003) also discusses a systematic approach for landfill siting specifically for conditions in Vietnam. This approach should be applied to landfill siting practices in Vietnam as a useful starting point. However, further research on methods of weighting criteria and ranking candidate sites, taking into consideration local conditions, needs to be conducted in order to provide a full set of working tools for Vietnamese landfill siting practitioners.

### **2.3 Recommendations**

The following are recommendations to resolve current problems related to the landfill siting process:

- A systematic approach similar to the one introduced in McNally (2003) should be employed in landfill siting. This should include the identification of potential areas.
- Detailed guidelines on the tasks of each step in the landfill siting process should be developed taking into account economic and technical constraints.
- The conceptual design, preliminary FS, and preliminary EIA should be incorporated into the siting phase in order to identify construction costs and environmental impacts which should be included as criteria for comparing candidate sites. Further studies with greater levels of detail can be conducted in the later phases before the landfill is constructed.
- Methods of weighting criteria and ranking candidate sites, taking into consideration local conditions, should be developed and introduced in legal documents in order to provide guidance to landfill siting practitioners.
- More open landfill siting processes through employing a greater number of stakeholders should be adopted in order to reduce subjective assessment and increase alternative views in comparing candidate sites.
- Consulting companies should be responsible for carrying out the landfill project and involved as early as possible in the landfill siting process. The DONRE and DOC play a role of state management. Their responsibilities should only be giving access to data sources, providing financial resources, and supporting consulting companies in doing the work.

### 3. RESPONSIBILITIES, COORDINATION AND INFORMATION SHARING BETWEEN GOVERNMENT AGENCIES

#### 3.1 Current practices

The institutional framework and coordination between agencies play crucial roles in the landfill siting process. In Vietnam, where landfill siting is the responsibility of governmental institutions, an appropriate institutional framework that includes all relevant agencies will help facilitate the landfill siting process. Coordination and distribution of responsibility among these governmental institutions are essential in data sharing and collection, determining requirements of the landfill project, setting up criteria and constraints, screening suitable areas, assessing candidate sites, and selecting the most appropriate site.

Table 1 describes the types of data and information available at a number of main agencies at the local level. The first three agencies, the DOC, DONRE, and URENCO, are currently involved in landfill siting but the last three agencies, the DARD, HMSC, and DGM have not yet been employed.

Table 1. Local agencies and types of data available

<b>Agency</b>	<b>Data</b>
Department of Construction (DOC) – Division of Urban and Rural Planning	<ul style="list-style-type: none"> <li>▪ Land use plans</li> <li>▪ Urban development plans</li> </ul>
Department of Natural Resources and Environment (DONRE)	<ul style="list-style-type: none"> <li>▪ Environmental status – environmental parameters: air, water, and ground quality</li> </ul>
Urban Environment Company (URENCO)	<ul style="list-style-type: none"> <li>▪ Waste generation and composition</li> </ul>
Department of Agriculture and Rural Development (DARD)	<ul style="list-style-type: none"> <li>▪ Well locations (greater than 15m deep)</li> <li>▪ Future water resources plans</li> <li>▪ Hydrogeological surveys</li> <li>▪ Topographic maps</li> </ul>
Hydrometeorological Service Centre (HMSC)	<ul style="list-style-type: none"> <li>▪ Meteorological data – rainfall, temperature, wind, air and rain water quality</li> <li>▪ Record of past major storm events</li> <li>▪ Data from river monitoring stations – flow rates, temperature</li> </ul>
Department of Geology and Minerals (DGM) - Division of Geological and Mineral Resources Survey	<ul style="list-style-type: none"> <li>▪ Geological data – soil and rock type, location of faults and fractures</li> <li>▪ Groundwater data</li> </ul>

In Viet Nam, the Ministry of Construction (MOC) and the Ministry of Natural Resources and Environment (MONRE) are the two agencies that are directly involved in landfill projects at the national level. Accordingly, the DOCs and DONREs are directly responsible for carrying out landfill projects and landfill siting processes at the local level. However, the distribution of responsibility and jurisdiction between these agencies at both levels in landfill-related issues has not been clearly defined. Moreover, there are also many overlaps between them. Table 2 describes the responsibilities of the MONRE and MOC relating to landfill issues and shows the overlaps between them (the overlapping responsibilities are written in *italics*).

Table 2. Responsibilities of MONRE and MOC on landfill issues

<b><i>MONRE's responsibilities</i></b>	<b><i>MOC's responsibilities</i></b>
- Issue guidelines, regulations, and standards on waste management issues	- Issue procedures, norms, guidelines, guiding documents, and technical design standards for waste collection, transport, and treatment systems
- Draft annual and long-term waste management plans, supervising waste management activities	- Draft national strategies for solid waste management in the country
- Inspect the operation of waste treatment facilities and supervise waste management activities	- Direct and supervise urban management including waste collection, transport, treatment, and landfilling
- Appraise and approve EIAs for waste treatment projects	- Issue guiding documents, and draw up plans for the arrangements of landfill sites in urban areas and industrial zones
- Plan and allocate budgets for research and development relating to waste treatment projects	- Direct provincial and municipal DOCs in drawing up planning and plans for construction of landfills

### 3.2 Discussion

It can be seen from Table 2 that the MOC and MONRE have a number of overlapping responsibilities concerning waste management in general and landfill-related issues in particular, which causes significant confusion in practice. The overlapping responsibilities have resulted in the issuance of various and fragmented regulations on landfill-related issues by both the MONRE and MOC, several of them conflicting one another in terms of the content. As a consequence, this hinders a smooth and quick process for landfill project execution in terms of acquiring permits and approvals. More harmfully, it may create gaps in the legislation framework that some parties involved may take advantage of. It is worth noting that the issue of confusion and duplication between national and/or municipal government departments concerning waste management has also been encountered in many other developing countries, and it is often attributed to the heavy-loaded responsibilities that these agencies have to undertake for various waste management functions [7].

Lack of coordination between MOC and MONRE is another issue. There often appears to be the case that one ministry is not aware of the other's work in the same area. Thus, a mechanism for information and data sharing needs to be established not only to improve the coordination between relevant agencies but also to facilitate landfill siting processes, specifically with respect to the collection of data and information serving the process.

Since the DOCs and DONREs are the representatives of the MOC and MONRE respectively, at the local level, similar overlaps and inappropriate division of tasks exist between them as well. This ambiguity not only impedes an effective landfill siting process but also makes it difficult to find out which agency is the responsible one when something wrong occurs in the process. Furthermore, the absence of clear jurisdictions may lead to controversies, ineffectiveness, and/or inaction, undermining the political sustainability of the system [8]. An explicit division of responsibilities and well-defined roles would result in the agencies being more proactive and responsible, thereby reducing stagnation, reliance and dependence of one on the other.



In order to get the above agencies effectively and efficiently involved in the landfill siting process, an appropriate framework for their involvement is needed. Thus, a framework that includes all relevant government agencies in an official way should be set up. An *ad hoc* advisory committee for landfill siting projects may be an appropriate method as it can contribute to an independent and focused planning process. This committee is established only when necessary and dismissed when it has accomplished its tasks. Such an *ad hoc* committee should consist of various representatives from all directly relevant agencies, including the DOC, DONRE, DARD, HMSC, DGM, as well as other indirectly relevant agencies such as the Department of Planning and Investment (DPI) and Department of Finance and Pricing (DFP), which do not play a significant role in the landfill siting process but are of importance in the subsequent phases of the project development because they are responsible for all financial and economic issues related to the project. All the work on landfill siting executed by consulting companies needs to be reviewed by this committee before being submitted to the PC for approval. This committee would also be responsible for periodically reporting the progress of the project to the PC.

### **3.3 Recommendations**

The following are recommendations to address current problems related to responsibilities, coordination and information sharing in landfill siting:

- The role of each relevant agency in the landfill siting process should be well defined. The distribution of responsibilities and jurisdictions among them should be clearly mandated and overlaps should be avoided.
- Existing overlapping responsibilities between the MOC and MONRE and between the DOC and DONRE should be removed.
- *Ad hoc* advisory committees for landfill siting projects should be adopted. This committee should consist of the representatives of all relevant agencies. It should be established when necessary and dismissed when it has accomplished its tasks. The committee should be chaired by the DOC under the guidance and control of the provincial PC.

## **4. CONCLUSIONS**

Properly selecting landfill locations is a challenging task in developing countries. In Vietnam, besides limited financial, technical, and human resources, inadequate organizational structures with overlapping responsibilities, inadequate coordination, top-down approaches, noble ambitious regulations for the short term, are some of the barriers that hinder effective and efficient landfill siting. The main purpose of this paper was to propose a set of practical recommendations for removing these barriers which are illustrated in Figure 3 below. In removing them, a gradual process should be employed as most of the problems cannot be changed overnight and some changes, if implemented improperly, may not bring about the expected positive results but the reverse.

The most important prerequisite for removing current obstacles is that decision-makers at government agencies relevant to landfill siting at all levels need to be willing to make modification to existing institutional structures. In doing so, any substantial resistance or perception that the barriers are insurmountable should be removed.

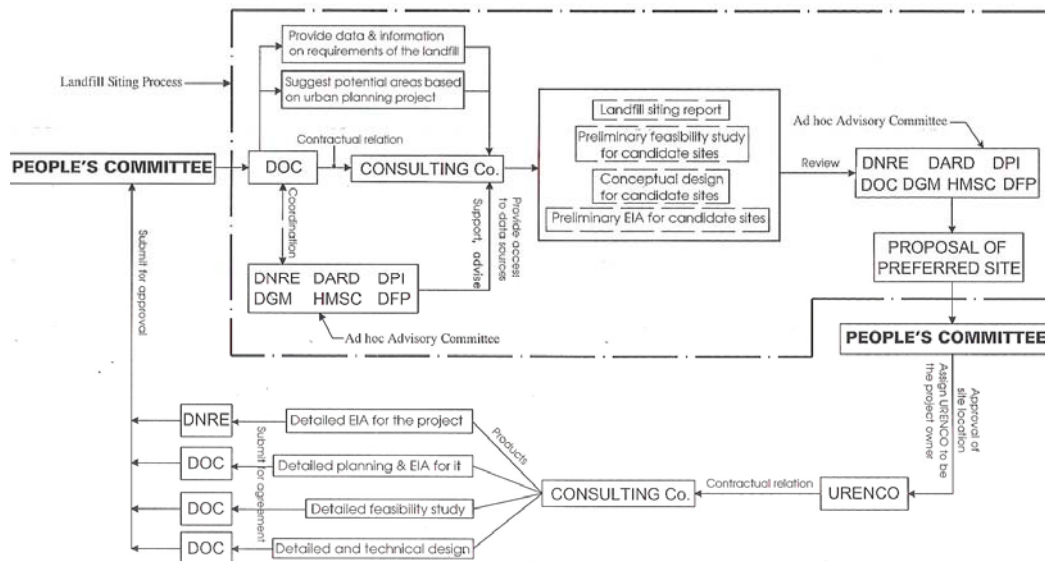


Figure 3. Recommended procedure for landfill project execution

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# **PLANNING FOR LOCALLY UNWANTED LAND USES IN HONG KONG - ROLE OF LOCAL NGOS**

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## **Abstract**

Increasingly, the conventional way of planning for “locally unwanted land uses” (LULUs) where the land use is considered in the “public interest” and decisions are made in a “scientific” manner are being challenged and there is a call for paradigm shift for a bottom-up and integrated planning approach. In the context of urban planning and community development, this paper aims to discuss the role of local NGOs in planning for LULUs. This paper argues that while it is important to facilitate the change of mindset and perspective of the general public on planning for LULUs, more urgently required is the engagement of the local stakeholders. It is suggested that the engagement process should go beyond simply providing the costs and benefits and the details of the proposal – but may take various forms with the ultimate goal to provide an informed discussion opportunity for building consensus. The paper provides a short review of some LULU cases in Hong Kong followed by the documentation of some initiatives of a local environmental NGO, the Conservancy Association, with an attempt to facilitate such an engagement process in municipal waste management. The paper concludes with an urgent call for a comprehensive planning framework for LULUs. A comprehensive strategy with early public engagement in an open and transparent manner, institutional change for empowerment of the public in the impact monitoring, provision of planning gain to compensate for the social and physical loss and proactively branding the neighbourhood for a positive image.

## **1. INTRODUCTION**

Locally and internationally there have been a lot of social resent against the siting of certain land uses that are socially sensitive. The “not in my backyard” (NIMBY) syndrome on the “locally unwanted land uses” (LULUs) has been a major concern in both town planning and community development.

People who are in opposition to the siting of the LULUs usually concern about the associated health risk, safety and security, environmental impact and quality of living, decline in property value and the adverse impact on the image of the community. They may not be opposing the need for such a facility, they however consider that the facility should be located elsewhere and argue on the “equity” of such facility being located in their neighbourhood instead of “even” distribution in other areas.

It is argued that a neutral-standing NGO may have a role to play in increasing the public awareness of the need to accommodate the LULUs. This paper aims to discuss the role of local NGOs in planning for LULUs. It first provides a short review of some LULU cases in Hong Kong. These real cases would help highlight the general concerns of the community over the siting of these facilities. Some initiatives of a local environmental NGO, the Conservancy Association, were documented. These included arranging overseas visit to some successful case examples for district councilors; providing training and exposure to staff; and organizing

certificate course for interested stakeholders. On top of these community and stakeholder education programmes was the policy advocacy on the establishment of a comprehensive waste strategy. The paper concludes with a comprehensive strategic framework for planning for LULUs in Hong Kong. It is hoped that findings of this paper would contribute to describing an Asian context for the understanding of the complexity of NIMBY and LULU phenomena as well as providing a way forward for planners and decision-makers involved.

## **2. UNDERSTANDING THE COMPLEXITY OF NIMBY AND LULU PHENOMENA**

Despite there are quite a lot of publications on the issues of NIMBY and LULU syndrome, there are little research being done in the context of Asian cities. Among the western literatures, it is commonly recognized that oppositions to LULUs usually focus on two broad categories of land use facilities (Schively, 2007; Pendall, 1999; Dear, 1992):

- *Facilities with potential environmental impacts:* landfills, hazardous waste disposal sites, incinerators, energy facilities, certain types of industrial facilities, etc.
- *Facilities associated with negative images:* drug treatment facilities, affordable housing, homeless shelters, prisons, etc.

Local people and the community at large, when in face with these LULUs, worry that such facility would lead to a degradation of community relations, negative impact on the property value and the possible threat to the environmental quality. In short, they have fear and concern that LULUs would adversely affect their quality of living (Fischel, 2001; Schively, 2007). Schively (2007: 257) also suggested that it is not uncommon to find that "...individuals active in NIMBY responses may not be representative of the community as a whole but rather represent only a vocal minority".

This paper argues that while it is important to facilitate dissemination of information and education for the change of mindset and perspective of the general public on planning for LULUs, more urgently required is the engagement of the local stakeholders. These include district councilors, neighbourhood representatives, interested NGOs and other local leaders. It is suggested that the engagement process should go beyond simply providing the costs and benefits and the details of the proposal but may take various forms with the ultimate goal to provide an informed discussion opportunity for building consensus.

## **3. SOME LOCAL INCIDENTS IN HONG KONG – A SHORT REVIEW**

In recent two decades, quite a number of LULUs met with strong local opposition. This part of the paper tries to walk through these incidents and maps out the major reasons and mechanisms of the opposition and ways to achieving community understanding and acceptance of the land uses. Selection of these cases aims to cover both categories of the LULUs as well as the availability of both primary and secondary information and data.

### **3.1 Chemical waste treatment plant**

In 1987, when the first chemical waste treatment plant was proposed to be built on Tsing Yi Island to process and dispose of the territory's increasing amount of toxic chemical wastes, groups of local residents together with their district board members showed strong opposition to the proposed development. They argued that the Island already had a considerable number of potentially hazardous installations such as oil depots and were worried that this chemical treatment plant would add potential hazard to the community. While the Government

emphasized that the plant was not considered as a potentially hazardous installation, a hazard impact assessment for the plant was carried out. It confirmed that the plant would not have real threat beyond its boundaries. Besides most public housing estates were located in the northeast of the Island would not be adversely affected by the plant in the southern side of the Island.

### **3.2 Hiv clinic**

In 1996, when a HIV clinic as part of the service of a health centre was under construction in Kowloon Bay, local residents of the adjacent residential development, Richland Garden, strongly opposed to the clinic. Protesters tried to block the site workers from entering the construction site. The opposition reached a climax in 1999 when the HIV clinic opened. Some protesters, many of whom were housewives, guarded the entrance to the health centre and “warned” the visitors to beware of what they described as the “AIDS Hospital”. Some protesters even blocked workers and patients from passing through the Richland Gardens to the health centre and erected discriminatory banners. Police were sent to ensure the safety of the workers and the patients. The Equal Opportunities Commission also stepped in and tried but failed to mediate between the residents and the victims. Subsequently, a few residents who allegedly harassed and vilified workers and patients at the health centre were prosecuted under the Disability Discrimination Ordinance.

While the response of the residents had to be blamed, the Government should also shoulder responsibility. The Office of the Commission for Administrative Complaints investigated the incident and concluded that the residents had grounds to feel aggrieved and their complaints about the failure to consult them were substantiated. The clinic had been planned since 1984 and the residents were not aware of the clinic’s expansion plan in 1993 to include services to HIV patients. The residents only heard of such HIV clinic in 1995 by chance when they learnt it from a Legislative Council candidate, and were therefore very angry about the Government’s “black box” decision.

Having experience in the HIV clinic in Richland Gardens, the Government embarked on a wide consultation on the proposed development of another HIV clinic in Fanling in 2000. The AIDS Foundation also conducted street survey and found that about 38% of local residents agreed to the proposed development, 26% were in opposition and 35% had no comment. It was urged that more public education would be required.

### **3.3 Aviation fuel storage depot**

In 2002, the Town Planning Board gave the approval to the Airport Authority of the development of aviation fuel storage in Tuen Mun New Town. Many local residents protested against the decision, and they were unsatisfied that the Town Planning Board ignored the objection from the Tuen Mun District Council and the safety of several hundreds of thousands of residents in the area. Local residents worried about the proposed aviation fuel storage facility being located near a power plant, a cement plant, and a steel mill, and that any accident or leakage might cause serious hazard to the area. Various attempts were made to stop this, including submission of judicial review to the Court of Final Appeal, a rezoning plan to the Town Planning Board, etc. The Court of Final Appeal ruled that the original environmental impact assessment should be rejected for not assessing the risks of a 100% aviation fuel leakage scenario and fatalities at the mill. The revised environmental impact assessment was subsequently endorsed. Subsequently, in order to ease the concern of the local residents and worker, a committee liaison group was set up to monitor the progress of the development and the safety issues that might arise. The committee liaison group comprises of local district councilors, local workers in the nearby industrial operations, and other stakeholders.

### **3.4 Discussion**

The above three local incidents signify the community's perspective on LULUs over the past decades. The short review points out that the community remains conservative about the siting of LULUs and that the government has not taken adequate steps to alleviate local people's speculation and mistrust. Conventionally, when planning for LULUs, the provision of the land use is considered in the "public interest" and many decisions are made in a "scientific" manner. For example, the location of the site is based on geographical consideration with the support from environmental impact assessment, traffic impact assessment, etc. With the mission to balancing various sectoral and community interests, little considerations are given to the local community concerns. This may cause a lot of community confrontation and will bring to general mistrust to the Government. Even if there are scientific reports justifying no significant adverse impacts to the residents, the community's perception and concern about the potential risk and hazard to health and physical safety as well as possible impact on property value, and social equity issues should not be neglected. In view of the urgency of the matter in relation to improving the well-being of the environmental quality, some initiatives were carried out by some local NGOs.

## **4. LOCAL GREEN GROUP'S INITIATIVES ON TACKLING NIMBY AND LULUS PHENOMENA**

### **4.1 Municipal waste management strategy**

Hong Kong's municipal waste problem has reached a critical stage. The traditional way of land filling has a lot of pressure on finding suitable sites and in fact, land filling will be encroaching into our country parks and therefore there is an urgent need to identify a set of pragmatic and sustainable waste strategy. "A Policy Framework for the Management of Municipal Solid Waste (2005-2014)" released in 2005 suggests that a comprehensive package of waste management from reduction, recycling to treatment will be required.

However, there is a general lack of knowledge among local community to engage in meaningful and informed discussion. The Conservancy Association (CA), the non-government environmental organisation with the longest history in Hong Kong, initiated a series of activities in early 2005 with the aim to facilitate rationalized and informed discussion among the local leaders as well as the general public. The following documents the three major activities and some observations:

#### *4.1.1 Learning Japanese Experience in Waste Separation and waste Treatment*

Hong Kong has been very conservative and reluctant in promoting sustainable waste treatment in the past years. There is a general misconception that given the limited living spaces in Hong Kong, it is impractical to implement source separation. Paradoxically, few people will consider the same reason to promote thermal waste treatment technology in Hong Kong. But several Asian countries and places have successfully implemented both source separation and introduced advanced thermal treatment plants in the community level. CA visited Japan from 9 January to 12 January 2005 to study waste treatment technologies and local recycling polices. As social engagement and participation is important in both the technology selection process and promoting recycling in the community, CA invited District Council members or their assistants to the trip and five District Council members/ assistants joined the visit. The visit changed their attitude towards waste management and treatment facilities.

The study group visited two gasification plants (the waste treatment facility of Sakata-Area in Yamagata prefecture and the Asahi Environment Center in Kawaguchi City, Saitama prefecture) and one incineration plant (Ariake Incineration Plant in Toyko). Two of the plants have “compensatory” facilities built right next to them: a sports center in the Ariake Plant and an education center with warm-swimming pools in the Asahi plant. The Ariake adopted another compensatory measure by co-generating electricity to the surrounding area, thereby lowering the electricity tariff of the community; the group members also met the community leaders of the Ariake Area to learn more about the consultation process before the facility was built. It was the community’s choice to opt for lower electricity tariff instead of other “compensatory” facilities.

After the visit, all the District Council members/assistants in the study group were positive towards the gasification and incineration facilities as the facilities were in good order, almost odorless and there was also no odour or leakage problem in waste collection vehicles. They also had a better understanding on dioxin.

The group members acknowledged that they had never thought of such standard for waste management facilities. They mentioned that no relevant information was available from the Government. They suggested the similar trips should be organized for legislators and community leaders. The members agreed that the waste problem in Hong Kong could not be solved by thermal treatment alone; the infrastructure for recycling should also be in place. But before such facilities were built, the Government should widely consult the local community and provide appropriate associated compensatory measures like those in Japan.

#### *4.1.2 Sustainable Waste Management Course*

After the study tour, it was recognized that dissemination of information on waste management was very important. As it has always been The Conservancy Association’s view that support from the community is the key to success of waste reduction and recycling programs. As representatives of the community, District Council members should shoulder the responsibility of promoting these programs, therefore a course on sustainable waste management was initiated for those who could not participate in the study visit.

Two certificate courses for DC members or their assistants were jointly organized with the Centre of Urban Planning and Environmental Management, the University of Hong Kong. About 70 participants attended the two courses in 2005.

Speakers of the courses included representatives from the Environmental Protection Department and academics specializing in waste management. Different waste treatment technologies were introduced in the courses; there were also lively discussions on how to implement source separation in the community as well as the siting process of waste treatment plants.

Through the discussion and workshop session, the worries of the participants were expressed and appropriate approach to address these worries could therefore be identified.

The course effectively dispelled irrational fear of dioxin from the participants. One participant said on behalf of her workshop members that what worried them before the course was dioxin, but they now realized that there were various ways of dioxin intake in humans such as ingestion, and inhalation was only one of them. They would take various factors into account when discussing waste management in the future and would not reject incineration as a means of waste management for its own sake.

The participants also thought that the course was an effective means of disseminating critical information to the public, political parties as well as community leaders. They recommended that similar courses be held in the future.

The evaluation of the course indicated that all participants agreed the course had increased their knowledge on waste management and would recommend the course to others. 86% of the

participants said the course was useful for their work and could facilitate future discussion on the topic.

In the planning of waste management strategy and facilities, engagement of the public and the participation of District Councilors are fundamental in the success of formulating and implementing a waste management strategy acceptable to the general public.

#### *4.1.3 Experience sharing - lessons learnt from taiwan*

Taiwan also implements a very comprehensive waste management strategy with mandatory waste separation into general waste, resource waste (recyclables) and food remains. CA sent a number of its staff to Taiwan to seek first hand experience in the planning and implementation of these measures and to understand the public's feedback. It was learnt that charges on wastes are implemented in stages. Those who do not use designated bags for the disposal of waste will be fined. In the implementation of the strategy, Taipei government organized 17 training courses for over 2100 people as the "seed" trainers who would be responsible to train other citizens. A total of 349 briefings were held with 435 local neighbourhood organizations (lei) and 36518 people attended. Besides, the Government also organized over 400 briefings for the management officers and cleaners. They also outreached to over 415 religious bodies, temples and church for the briefing. Local environmental groups and various government departments also echoed in the promotion of the waste separation.

Incinerators are also well accepted by local residents. One of the incinerators is provided with a revolving restaurant on the top and becomes a tourist attraction. This will also bring economic benefits to the local community.

## **4.2 Discussion**

The above presents some bottom-up approach by a local green group in tackling the NIMBY and LULU phenomena. It is recognized that NGOs, while politically neutral, have the necessary legitimacy to act as an agent in bridging the mistrust between the general public and the government over the planning for LULUs. However, it is also observed that without sufficient financial resources and manpower, there are only certain things that NGOs can provide for. In the case of Hong Kong, there is an urgent need to establish a comprehensive strategy in planning for LULUs. This paper concludes with an NGO's vision on the way forward.

## **5. WAY FORWARD - ESTABLISHING A COMPREHENSIVE STRATEGY IN PLANNING FOR LULUS IN HONG KONG**

Based on overseas and local experience, it is proposed that a comprehensive strategy with early public engagement will be required in the planning for LULUs.

### **5.1 Knowledge Dissemination**

Many local objections root from the lack of knowledge or information on the proposed development. It is important that the proposal should be transparent and information should be distributed at early stage through various means to facilitate informed discussion. Should there be any potential risk or hazard associated with the proposed development, adequate and user/laymen friendly information should be available for easy access by the general public. Risk communication will facilitate mutual understanding of the facts and concerns.



## **5.2 Early Engagement of the Public in an Open and Transparent Manner**

It is essential that the Government should start public engagement at early stage, and giving the public a full picture for discussion in an open and transparent manner. Perceptions from the public, though sometimes can be only psychological and ungrounded, still should be respected. Any discussion and negotiation should be kept open to avoid “black box” decision. This will enhance mutual trust towards both parties and will facilitate consensus building.

## **5.3 Empowerment of the Impact Bearers**

Having a LULU in the local neighbourhood may have a lot of concern. It is important that the community should reach a consensus for the facility and has the ownership in monitoring the development and its possible impacts. This can be built in the institutional mechanism. It is a good idea that the general public together with some professional expertise be invited to monitor the impacts, such as through participation in a monitoring/liaison committee and through real time monitoring of the uses by web cam system on-line, so that people can be assured of the safety of the development.

## **5.4 Planning Gain or Compensation**

Although siting of LULUs are in the wider public interest, it is inevitable that the local neighbourhood who receive such facility will have certain loss: socially or psychologically like image of the neighbourhood; environmentally like traffic congestion or air, water, noise pollution, etc; economically like loss in property value. It is therefore suggested that certain planning gains should be delivered as compensation to a “cost” in carrying the unwanted uses.

Compensation can be given in form of cash like reduction in tax or rates, or electricity or water bills. It can also be in kind, like the additional provision of certain community facilities for the benefits of the local residents, like heated swimming pool. Concerted efforts from different Government departments and sometimes other organizations like non government organizations or infrastructure companies will be required.

## **5.5 City Branding**

In addition to the compensation, the Government should proactively propose a new branding for the neighbourhood to turn the risk of having a LULU to a positive image. This can help building sense of pride and community solidarity, and may increase tourism and local economy. For example, having a gasification or incineration plant in the neighbourhood, the compensatory facilities, like heated swimming pool, resolving restaurant or other community facilities can be branded as landmark and enhance the overall branding or image of the neighbourhood.

Planning for LULUs is always a big challenge for town planners, policy makers and local community leaders. It is most important that early public engagement with a bottom-up approach be adopted. With the dissemination of adequate knowledge, open and transparent discussion, respect to residents and provision of planning gains for the community, it will be possible that a threat to the community can be turned into an opportunity for better and sustainable neighbourhood and it is suggested that NGOs can contribute greatly to such a paradigm shift.

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# SUSTAINABLE SUBSTATION DEVELOPMENT TO ENHANCE PUBLIC ACCEPTANCE

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## Abstract:

CLP Power Hong Kong Limited (CLP), the largest power utility company in Hong Kong, is developing transmission substations and network over its supply area to meet the need of electricity demand. The site selection for the substation is mainly directed by the government departments. Developments of certain sites involve public consultation under various ordinances. Some substations are inevitably located close to the densely populated area. Even though sites for the substation developments have been approved by Government, some of them may be objected by the local community and perceived as locally unwanted land use (LULU) sites.

The negative perceptions of the local community to substations include risk to people's health and safety, devaluation of their properties and adverse visual impact of the development. During the construction stage of the substation in rural areas, '*feng shui*' is also a common challenge encountered. Although a lot of people understand that the substation facilities are needed, they would tend to have a common attitude of 'not in my backyard'. The more serious reaction will be the formation of action groups composed of local residents to protest against the project and/or the company. When facing objections by the local community, the company may suffer from losses of the company image, escalation of project cost and delay of project completion time.

'Care for the Community' is one of the core values of CLP. The company cares about the community and develops the transmission substation in a sustainable manner that balances the interest of society, local community and the company. CLP has a versatile approach in resolving LULU challenges of the substation developments. During the planning stage, LULU concerns are mitigated by grouping the substation development with sites of other utilities and designing it in line with sustainable principles. When LULU concerns are raised during the construction stage of the development, the company adopts various strategies such as communicating with local community to resolve their concerns, developing a more pleasant outlook of the substation that could blend in with its surrounding environment or improving other public services. These strategies require plenty of persuasion and conflict resolution efforts when communicating with the local community. Often experts, support of other organizations, opinion surveys, public workshops and lengthy private meetings are required. Some successful case studies are included in this paper.

The public is becoming very sensitive to the environmental and economic effects of LULUs. Public acceptance is not certain even after implementation of those mentioned strategies and tactics. The site-selection procedures of substations are becoming longer, more expensive, bureaucratic and difficult. It is necessary to address concerns of the local residents in the long-term planning of the substation development. Building trust with the public and a positive image of the company are critical for the company in resolving the challenges.

## 1. INTRODUCTION

Hong Kong, with over 7 million people living in an area of 1,000 sq. km, is one of the most densely populated cities in the world. CLP Power Hong Kong Limited (CLP), the largest power utility company in Hong Kong, supplies electricity to Kowloon, New Territories, Lantau and most of the islands in Hong Kong through the electricity power transmission network. The company is continuously developing transmission substations and cable network over its supply area to meet the growing demands of the community for adequate and reliable electricity supplies. Due to the congested condition in Hong Kong, some developments of the electricity supply system and the associated construction works are inevitably sited close to the densely populated area.

There are comprehensive statutory procedures for the development works from land acquisition to completion of the construction works. Figure 1 shows the general statutory approvals required for a project development in Hong Kong. The site reserved for the development shall be permitted by Town Planning Board and The Lands Department. Land Grant application shall be made to the relevant District Lands Office under the Lands Department. Details of the building work shall be approved by the Buildings Department as well as the other departments such as Fire Services Department, Drainage Services Department, Water Supplies Department etc. There are also various legislations that need to be complied by the developer and civil work contractors in order to minimize the possible nuisances to the public. The process of public consultation has been included in the land acquisition and developments of certain sites.



Figure 1. General Statutory Approvals required for a Development

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## 2. CHALLENGES ENCOUNTERED

'Why not relocate the development away from us?' is the most common question heard during the communication session with the local community groups. Sometimes even though the government has accepted the proposed plant facility development on a particular site, there are objections from the local community regarding the proximity of the new development to their residences. The site is perceived as 'locally unwanted land use' (LULU) site.

Local community may raise their objection to the project development during the public consultation stage or the construction stage. The most common reaction or attitude of people to the adjacent LULU site is 'not in my backyard' (NIMBY) although most of them understand that the electricity power supply facilities are required by society. People will request the company and government to consider other alternatives for the proposed new development. The more serious reaction will be the formation of action groups comprising of local residents to protest against the government or the company. Residents may feel that they are discriminated, being overrun by authorities or the company to the detriment of the health and safety of the community. Sometimes the objection campaign may involve other external parties such as the political groups. When facing such objections from the local community, the company may suffer from losses in company image, money and project development time. When the objection is raised during the construction stage, the construction work programme may be affected and the company suffers further loss in settlement of claims from contractors.

### 3. UNDERLYING REASONS FOR OBJECTIONS

Although development of the electricity supply network offers benefits of adequate and reliable electricity supply to the region at large, it is understandable that the associated economic and environmental impacts fall mainly on its locality or immediate neighborhoods. Some residents near the site may not want to have any change to their environment and will object to any scheme that may affect their expected life style. Some people might have been frustrated by works of the company or other utility companies in the past and they would have ill-feeling to any similar work near them. Other general concerns and misconceptions about developments of CLP in the public area would be:

- permanent disfiguration of the beautiful scenery
- visual impact of the additional structure
- devaluation of the adjacent properties
- potential impacts to their building structure
- adverse impacts to environment, such as noise and heat
- perceived hazards to health and safety due to the plant facilities
- nuisances and even endangerment of safety caused by construction activities

### 4. SUSTAINABLE SUBSTATION DEVELOPMENT

CLP has been developing the transmission substation in a sustainable manner. In 2007, the company consolidates their versatile experience in the sustainable development of transmission system into an 'Environmental Design Guideline'. The framework of this Guideline (figure 2) embraces concepts of green initiatives to mitigate the potential environmental impacts from the construction and operation phases of the transmission system. The company balances the interest of the society, local community and the company through the sustainable development approach and enhances acceptance of the project development by the public.

<ul style="list-style-type: none"> <li>▪ Site Selection and Planning</li> <li>▪ Well-integrated Design</li> <li>▪ Resource Management</li> </ul>	<b>Planning</b>
<ul style="list-style-type: none"> <li>▪ Daylight and Sunlight Control</li> <li>▪ Natural Ventilation Strategy</li> <li>▪ Sustainable Landscape Design</li> <li>▪ Low Loss &amp; Low Noise Design</li> </ul>	<b>Architectural</b>
<ul style="list-style-type: none"> <li>▪ Energy efficiency Management</li> <li>▪ Renewable Energy</li> <li>▪ Water Management</li> </ul>	<b>Renewable and Recycle</b>
<ul style="list-style-type: none"> <li>▪ Reduction of Disposed Material</li> <li>▪ Containment System</li> <li>▪ Environmental Friendly materials</li> <li>▪ Green construction</li> </ul>	<b>Technical</b>
<ul style="list-style-type: none"> <li>▪ International Standards</li> </ul>	<b>Benchmark</b>

Figure 2. Framework of CLP's Environmental Design Guideline for Transmission System

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### 5. PUBLIC ACCEPTANCE

CLP upholds the core values of 'care for the community' and 'care for the environment' to its operations. With the sustainable development approach, the company is able to gain support from the public and reduces objection from the local community regarding the close proximity of the substation development to their residence during the 'planning and design' and 'construction' stages of the project development.

## 5.1 Planning and Design Stage

'Site Selection' is an important issue in the project development. Appropriate selection of site can reduce most of the LULU objection from the local community.

During the planning stage, the site of the new development can be allocated to the proximity of those of the other utilities, such as laying cables under the main traffic routes and substation building adjacent to other utility sites, such as sewage treatment plant, liquefied petroleum gas (LPG) filling station etc. Figure 3 shows a substation building which is adjacent to a LPG filling station and near some residential buildings.



Figure 3. 132 kV Substation Building adjacent to LPG Filling Station

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There will be fewer objections from neighbors as there are other utility facilities already existing. However, additional measures are often needed to mitigate risks from the adjacent developments. One example is that an additional LPG detection system and monitoring procedures are provided for the substation building which is closed to an LPG filling station.

Cable tunnel is one of the sustainable construction designs. It reduces objections from the local community by hiding the electrical facility from the view of the public. The tunnel is below the ground level and reduces much negative impact to the public and the environment. However, the tunnel development shall be justified only when the corresponding benefits exceed the extra cost due to the more complicated civil work.

Major environmentally friendly features in the project development as mentioned in the Environmental Design Guideline including natural ventilation & lighting, landscape design, renewable energy, water recycling, energy efficiency, oil-free cables and switchgear, low energy loss and low noise transformers; help to gain appreciation and acceptance from the community and the government. CLP is the first Hong Kong's power utility company to obtain the Registration in the Energy Efficiency Scheme of lighting, electrical system and air-conditioning installations for newly built substations as accredited by the Hong Kong SAR Government.

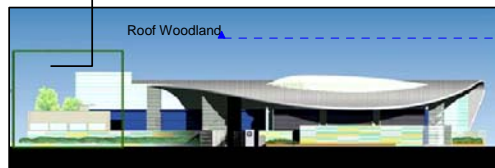
The company also endeavors to improve the environment near the electrical substation through research and development of green roof system for utility buildings in Hong Kong. A pilot project of developing woodland on the roof of the equipment building in a 132 kV Substation in the vicinity of the high rise residential buildings is being implemented. (figure 4). The roof woodland can provide values for neighbors by improving the air quality of the surrounding and the anesthetic view, hence enhancing the acceptance of the local community to the development.

With the sustainable design approach for development of our transmission system, our community will not only benefit from the secure and stable electricity supply, but also a greener and sustainable living environment. By creation of values in 'environmental friendliness' and 'sustainable', we can enhance the acceptance of our development by the local community in close proximity to their residence.



Figure 4: Woodland on Roof of Equipment Building in a 132 kV Substation in Urban Area

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## 5.2 Construction Stage

Sometimes the LULU objection is raised during the construction stage when the site of the development is confirmed or only minor adjustments can be made to its location. CLP has undertaken the following sustainable development approaches to address concerns of the local community:

- design for a more pleasant outlook of the building development
- mitigate nuisances to neighbors through the 'green' construction activities



Figure 5. 'Blend-in with Environment' of a 132 kV Substation in Urban Area

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The designer will consider the background and visual impact of the additional building structure. The façade design of the building will blend in with the environment (figure 5) so that people will not feel that their beautiful scenery is being affected.

In order to reduce the environmental impact and nuisance to neighbors throughout the construction stage of the project, Construction Management Plan, Behavioral Based Safety Observation and 5S Housekeeping Practices have been implemented on sites of CLP.

Table 1. 26 Sustainable Development Initiatives for Construction Site

1. Diversion of Upslope / Upstream Water	11. Protecting Vegetation	20. Selection and Pre-work Control on Mechanical Plant (Noise)
2. Dust Control	12. Protection of Gutter and Street Stormwater Drains	21. Emission Control of Smoke On Mechanical Plant
3. Stagnant Water	13. Protection of Site Stormwater Pits	22. Maintenance of Mechanical Plant
4. Excavation Pump Out	14. Stabilized Site Access	23. Noise Mitigation to Site Office.
5. Protected Concrete, Brick and Title Cutting	15. Drill and Blasting	24. Ultra Low Sulphur Diesel (ULSD)
6. Protection of Concrete Delivery	16. Air/Noise Environmental Management Plan	25. Percussion Piling Work
7. Protected Service Trenches	17. Sediment Controls	26. Demolition Work
8. Protected Stockpile	18. Soil and Water Management Plan	
9. Protected Wash Area	19. Selection and Pre-work Control on Mechanical Plant (Air)	
10. Protected Waste Management and Chemical Storage		

Moreover, the company has developed 26 nos. 'sustainable development' initiatives in the construction work. The objective is to devise plans to mitigate the negative impacts from different construction activities of the site to the environment. These 26 initiatives are stipulated in Table 1.

The company has received much public recognitions for achievements in the safety and environmental protection of their construction sites. The excellent performance of the construction works of the company is a strong evidence to convince the public that CLP will mitigate the nuisance from machineries and workers of the construction site to the local community.

## 6. FENG SHUI (風水)

*Feng shui* is another common concern raised by the local community for project development in the rural area. Some villagers living in the rural area believe that the civil construction work near the village would change the landscape or the underground condition. Such change will spoil the local *feng shui* and/or lead to the wrath of spirits, bringing misfortunes to people and the village. CLP aims to maintain the amicable relationship with villagers. The sustainable development strategy of the company also respects the local custom.



Figure 6. Maintain Trees Around Substation Building

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In order to maintain *feng shui* of the village, the design of some substations will blend in with the environment. Trees near the site will be maintained as much as practical (figure 6).

To alleviate misfortunes and protect themselves from the evil influences, another common way acceptable to villagers is by holding a *tun fu* ceremony (figure 7). *Tun fu* (靈符) is a group of talismans that are believed to be able to offset bad *feng shui* and protect villagers from the wrath of spirits. *Tun fu* ceremony may be requested by villagers before or after the commencement of the engineering project works. The company will settle the *tun fu* issue to calm down ill-feelings of villagers as soon as practical.



Figure 7. *tun fu* Ceremony officiated by 'Taoist' Priests

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## 7. SUCCESSFUL CASES



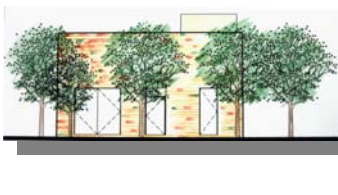

The following are some cases which CLP had encountered in the past and were settled to the satisfaction of the related parties. Long duration is required for communications with the local community especially when some external parties are involved.



## 7.1 A 132 kV Substation in New Territories near Residential Estate

Concerns raised by the objected parties	Actions by Company / Sustainable Development Features
<ul style="list-style-type: none"> <li>▪ quiet and peaceful environment may be destroyed by the low-frequency sound from the S/S</li> <li>▪ health of residents</li> <li>▪ fire hazard</li> <li>▪ noise, pollution, heavy vehicles imposed hazard to children and elders during the construction stage</li> <li>▪ machinery inside the substation will impinge substantial visual impact</li> <li>▪ proposed substation might be reduced their property value</li> </ul>	<p>CLP explained to all concerned parties during meetings and road show sessions with the local community about the sustainable development features and benefits to the environment, including:</p> <ul style="list-style-type: none"> <li>◆ low noise and low energy loss type transformers,</li> <li>◆ reliable fire services installation,</li> <li>◆ least impact to health of neighbors,</li> <li>◆ comprehensive and environmentally friendly construction management system,</li> <li>◆ outlook of the building blend in with the environment, and</li> <li>◆ landscape feature of the adjacent `rest` garden would be improved.</li> </ul> <p>The following images of the proposed substation were shown to the relevant parties during the communication sessions.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p><b>Figure 8:</b> Architectural visualization – substation rest garden</p> </div> <div style="text-align: center;">  <p><b>Figure 9:</b> Color scheme options matching adjacent building</p> </div> </div> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="text-align: center;">  <p><b>Figure 10:</b> Visual impact - from 1st floor of adjacent estate building</p> </div> <div style="text-align: center;">  <p><b>Figure 11:</b> Visual impact - from roof of adjacent estate building</p> </div> </div>

## 7.2 A Cable Tunnel in New Territories near Residential Estate

Concerns raised by the objected parties	Actions by Company / Sustainable Development Features
<ul style="list-style-type: none"> <li>▪ environmental nuisances during the future operational and maintenance period</li> <li>▪ nuisances from construction work and workers</li> <li>▪ endangerment of the public safety during the trench opening works at both construction stage and maintenance period</li> <li>▪ underground HV cable will affect the health of nearby people</li> <li>▪ alternative route could reduce cost and time for construction</li> <li>▪ laying cables under the captioned site will limit the future land use of the site</li> </ul>	<p>CLP explained to all concerned parties during meetings and road show sessions with the local community about the sustainable development features and benefits to the environment, including:</p> <ul style="list-style-type: none"> <li>◆ least impact to health and safety of neighbors,</li> <li>◆ comprehensive and environment friendly construction management system,</li> <li>◆ outlook of the tunnel outlet building blend in with the environment, and</li> <li>◆ a `rest` garden would be built.</li> </ul> <p>The following are some images of the proposed building which had been shown to the relevant parties during the negotiation sessions.</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p><b>Figure 12:</b> Architectural Visualization – Tunnel Outlet and Rest Garden</p> </div> <div style="text-align: center;">  <p><b>Figure 13:</b> Existing Condition of the Proposed Site for Tunnel Outlet</p> </div> </div> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p><b>Figure 14:</b> Visual impact – Front View of the Tunnel Outlet Building</p> </div> <div style="text-align: center;">  <p><b>Figure 15:</b> Visual impact – Outlook of the Tunnel Outlet Building</p> </div> </div>

## 8. CONCLUSION

In Hong Kong, there is rising public interest in sustainable development and environmental issues. A common challenge faced by CLP is that the local community considers the site for the power transmission plant facilities as LULU site and does not want the corresponding development to be adjacent to their homes even though they have little objection to the extension of the power supply network. Site selection procedures of substations are becoming longer, more expensive, bureaucratic and difficult. CLP adopts a sustainable development approach in the planning, design and construction of substation buildings. This approach helps to gain the

public acceptance of the site for new project development and reduces the objections from the local community.

Community development issues are becoming more important. It is necessary to address concerns of the local community in the long-term planning of the substation development. Building trust with the public and a positive image of the company through a sustainable approach to the project development is critical for the company in resolving challenges and gaining public acceptance.

CLP will need to develop skill in working with the public on controversial issues. The company shall align with the government and consider potential LULU issues in substation planning. More works such as 'less depletion of natural resources' and 'green construction method' will be needed in developing applicable sustainable development programs and measures to make substations more agreeable to the community.

### **ACKNOWLEDGEMENT**

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