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Ecological modernisation and policy learning in Hong Kong

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Abstract

Whilst ecological modernisation theory emphasizes the potential for modern societies to recognize and respond to their environmental impacts by finding new ways of governing environment–economy relations, concepts of policy learning focus on the scope for new forms of environmental policy to be generated within and transferred between different contexts. Within this paper we explore the conceptual and practical linkages between the two areas of debate – a hitherto neglected area in the literature – and we set this discussion in the context of environmental policy-making in Hong Kong. We suggest that the practical relevance of the concepts of ecological modernisation and policy learning depends upon the presence of a reflexive society with rational, responsive institutions. While many theorists assume that such institutions exist, our analysis of policies for water and air quality management in Hong Kong highlights the need for theories to consider the embeddedness of existing institutions and the significance of the capacities for, and the barriers to, change more fully. We find that capacities for some forms of ecological modernisation and policy learning do exist in Hong Kong. However, we argue that the nature of these capacities often limits the potential for change to those local environmental problems that can be addressed through more technically and economically viable forms of policy intervention and that can be easily accommodated within existing political and economic structures. We also conclude that the capacities for ecological modernisation and policy learning that are needed if Hong Kong is to tackle the effects of the trans-boundary environmental problems that it is increasingly encountering have yet to emerge.
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1. Introduction

Theories of ecological modernisation (EM) have sought to explain the ways in which modern societies are responding to an increased awareness of, and anxiety about, the ecological risks associated with industrialism (Huber, 1985; Giddens, 1991; Beck, 1991, 1995; Lash et al., 1996; Christoff, 1996). The theory has also been developed as a way of analyzing emergent policy discourses (Hajer, 1995) and as a theoretical basis from which various policy prescriptions can be brought forward to encourage a shift toward more environmentally benign modes of industrial

development (Huber, 1985; Jänicke et al., 1989; Simonis, 1989; Mol, 1995; Gouldson and Murphy, 1997). In each case, EM is centrally concerned with the relationship between industrial development and the environment and with social capacities to recognize and respond to existing and emergent environmental problems.

Theories of ecological modernisation therefore see a central role for institutional learning – i.e. where societies draw upon their reflexive capabilities to critically evaluate their foundations and their external consequences and to develop new institutions that mediate the relationship between environment and economy more effectively. In the case of EM, such processes of institutional learning relate particularly to the capacity for environmental policy reform. In this paper we will link theories of EM with an examination of the processes of policy learning in the

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environmental sphere in Hong Kong. The rationale for this approach is both conceptual and practical.

Conceptually, the paper has two main objectives. First, it seeks to explore the links between EM and the largely separate literature on policy learning. Despite their apparent similarities, these links have not been elaborated substantially elsewhere. The paper therefore addresses questions surrounding the processes, levels and forms of policy learning and the extent to which they influence environment and economy relations. Second, it seeks to adopt a more critical approach to the study of EM and policy learning by emphasizing the significance of the capacities for and the barriers to change. In particular, it explores how the nature and the extent of these capacities shape the potential for environmental policy reform in contexts where new, more complex environmental problems are emerging.

More practically, the paper seeks to respond to the criticism that EM has been too narrow in its focus by exploring its relevance in an Asian context. As has been recognised previously, essentially western discussions of EM need to be adapted to fit with the Asian context (Hills and Welford, 2002; Sonnenfeld and Mol, 2006) and we begin to do this by focusing on the extent to which predominantly western theories and debates are relevant in Hong Kong. Obviously, Hong Kong possesses some unique features which mean that an empirical analysis based on its experiences cannot be representative of the region more broadly. However, as a regional financial and trading centre which markets itself as Asia's world city and which has extensive links into China and elsewhere in the region, we contend that Hong Kong is an interesting place to start examining the explanatory value of the theories of EM and policy learning in an Asian context.

The paper is structured in the following way. First, there is a conceptual discussion and literature review. This offers an overview of the different dimensions and interpretations of EM before offering a fuller review of the existing body of research on policy learning. Second, conceptual issues relating to EM and policy learning are addressed in the Hong Kong context with particular reference to key issues relating to the management of air and water quality. Finally, conclusions are drawn which relate both to the theoretical discussions on EM and policy learning and to the associated policies and practices in Hong Kong.

2. Conceptual discussion: ecological modernisation and policy learning

2.1. Ecological modernisation and its critics

Theories of EM have tried to conceptualise and understand environment-informed institutional transformations and dynamics (Hajer, 1995; Jänicke et al., 1989; Mol, 2001; Gouldson and Murphy, 1997; Murphy and Gouldson, 2000). Mol and Sonnenfeld (2000) argue that theories of EM developed in three main stages. The first, covering the early to mid-1980s and located firmly in a European context, emphasized the role of technological innovation in environmental reform, a critical attitude towards the bureaucratic state, and a positive attitude to the role of market actors and dynamics. The second, from the late 1980s to mid-1990s, downplayed technological innovation, adopted a more balanced view on the roles of the state and market, and focused more attention on the institutional and cultural dynamics of ecological modernisation. The third, since the mid-1990s has seen a progressive broadening in its theoretical and geographical frontiers to include the ecological transformation of consumption and ecological modernisation outside Europe, particularly Asia (Mol and Sonnenfeld, 2000; Revell, 2003).

Mol and Sonnenfeld (2000) also identify five transformations that are addressed in the EM literature: the changing role of science and technology (both as a cause of and potential cure for environmental problems); the increasing importance of market dynamics and economic agents; transformations in the role of the nation state and the emergence of more centralised, flexible and consensual styles of governance; modifications in the position, role and ideology of social movements; and changing discursive practices and emerging new ideologies in which the neglect of environment and counter-positioning of economy and environment are no longer seen as tenable positions. At their heart, then, theories of EM are centrally concerned with the relationship between environment and economy, and with the ways in which this relationship might be governed and mediated in new and improved ways.

Not surprisingly, theories of EM have their supporters and their critics. Hajer (1996) contends that EM can be interpreted either optimistically as 'institutional learning' or pessimistically as a 'technocratic project'. The central belief of the interpretation of EM as institutional learning is that rational, responsive institutions can adapt and that this adaptation can produce meaningful change compatible with the goals of ecological modernisation. The more pessimistic interpretation of EM as a 'technocratic project', holds that it is likely to provide nothing more than a temporary resolution to the longer-term structural conflict between environment and economy. Most notably, this is because it focuses on the industrial but not the capitalist aspects of environment-economy interactions (Spaargaren and Mol, 1991). This essentially structuralist interpretation of EM resonates with a range of other criticisms. For example, EM has been criticized for only emphasizing those changes that are politically, economically and technologically viable and for being essentially silent on issues of social justice and society–nature relations (Fisher and Freudenberg, 2001; Gouldson and Murphy, 1997). It has also been criticized for being limited in its geographical relevance as it is based on values and assumptions which are seen by many to be peculiarly Northern European (Sonnenfeld and Mol, 2006) and because developed countries attempts at EM often serve to relocate the problems to industrializing and developing countries (Pepper, 1998).

While these criticisms may mean that EM falls short of (particularly strong) interpretations of sustainable development (see also Langhelle, 2000), it is suggested here that despite its limitations, EM succeeds in setting out an agenda for reform that, within a framework of capitalistic industrial modernity, could promote a more rational, proactive and integrated approach to environmental protection. However, whilst we accept that EM usefully sets out an agenda for reform, we also argue that theories of EM have only rarely examined the institutional capacities that need to be in place before such reforms can be made. This argument reflects the view that EM tends to under-emphasize the extent to which modern societies and the institutions that they depend upon are locked-in to existing approaches that are sometimes deeply embedded and resistant to change.

The extent and significance of institutional embeddedness have been extensively studied within different branches of sociological, economic and political theory (see Granovetter, 1985; Douglas, 1986; Perrow, 1986; North, 1990; March and Olsen, 1996; Simon, 1997). These theories question both the rationality and the responsiveness of organisations and institutions and therefore have relevance to broader debates on the reflexivity of modern societies. Whilst many theorists have tended to overlook such issues, as Fisher and Freudenberg (2001) note, Jänicke (1990; 1995) has explored these issues and their relevance to EM from a political economy perspective. Through his theory of state failure, Jänicke (1990) argues that whatever the potential benefits for society at large, many of the actors that benefit from the structure of existing institutions are likely to resist calls for change. He argues that this leads to widespread inertia and to tendencies for governments to adopt reactive rather than proactive policies. Consequently, he highlights a tendency for policy to evolve as a response to significant crises rather than rational appraisal and strategic thought.

Through their work on the capacities for environmental policy reform, Jänicke and Weidner (1995) also suggest that policy learning depends upon (a) levels of awareness and concern on an environmental issue, (b) the presence, strength and strategies of proponents for/opponents to new environmental policies, (c) the presence of suitable institutions and the absence of inertia within these institutions, and (d) the availability of solutions that are technically, politically and economically viable. By implication, this analysis highlights the potential for environmental policy change to be precluded where one or more of these preconditions are absent.

Together, Jänicke's (1990) work on state failure and Jänicke and Weidner's (1995) work on the capacities for environmental policy reform suggest that the degree of institutional embeddedness and the significance of various barriers to change are significant factors shaping the potential for EM to deliver meaningful policy change. Although many of these issues tend to be over-looked or under-emphasized within the wider literature on EM, it may be

that other bodies of literature are better at illuminating the processes of and the preconditions for policy change. With this in mind, we now examine theories of policy learning and their relevance to debates on EM.

2.2. Policy learning and the capacity for policy reform

Reflecting the institutional perspectives outlined above (c.f. Simon, 1997), it is widely accepted that policy-making takes place under conditions of bounded rationality as individuals and organisations have a limited capacity to access, process, assimilate and apply information. Furthermore, as decisions are often highly complex and their consequences uncertain, errors are frequently made and hence there are always opportunities for policy learning (Busenberg, 2001).

Policy learning has been defined as "a process in which knowledge about policies, administrative arrangements, institutions etc in one time and/or place is used in the development of policies, administrative arrangements and institutions in another time and/or place" (Dolowitz and Marsh, 1996, p. 343). Policy learning therefore relates not only to particular policies but also to the institutions which shape a society's understanding of environmental issues and which guide the formulation, implementation, impact and evaluation of environmental policies. Policy learning can therefore relate to issues, ideas, ideologies, institutions, standards, instruments, styles and so on (Dolowitz and Marsh, 1996; Dolowitz, 2003).

Like the broader literature on EM, the literature on policy learning focuses on the prospects for 'better' environmental policies to emerge. It suggests that policy learning can take place at the local, regional, national or international scales and that it can influence an individual, an organisation or a domestic or international network. It can also be either endogenous with lessons learnt within a region, or exogenous, with experiences transferred between places. It can also come in a number of forms. As Glasbergen (1996) notes, policy learning can be technical (based on a technocratic search for more effective forms of intervention), conceptual (based on a period of reflection and the redefinition of assumptions, goals and strategies) or social (based on more open and responsive communication and the promotion of shared responsibilities).

Policy learning can also take place in a number of ways. For example, learning may take place through formal, 'evidence-based' processes in government, or it may take place through informal, 'discursively-based' processes in broader social networks. In relation to the former, in many settings a great deal of emphasis has been placed on the need for 'evidence-based policy' which can improve the performance, the accountability and hence perhaps the legitimacy of government. Thus, the importance of formal policy evaluations has been stressed, which, as Sanderson (2002) notes, reflects the continuing influence of 'modernist' faith in progress informed by reason. As such, it relates closely to aspects of ecological modernisation discussed above.

However, in many settings the 'evidence' in question is likely to be contested. When the public sees government as having no privileged access to truth or objectivity (Giddens, 1994; Yearley, 1991) and formal evaluations as resting on many questionable conventions, a space is opened up for discursively defining what constitutes successful policy (see Gouldson et al., 2007). In such contexts, policy learning may be based not on the formal evaluations of government but on the informal evaluations of a wider range of actors and on the associated discursive struggles. This relates to Glasbergen's (1996) distinction between technical and social modes of learning.

With regard to the drivers of policy learning, Tews et al. (2003) emphasize the importance of three key points (see also Dolowitz and Marsh, 1996; Jordan et al., 2003). First, with regard to international networks, they suggest that supranational organisations such as the UN or the OECD can facilitate policy learning, as can bilateral or multilateral linkages between state and non-state actors in different contexts. Second, they argue that the outcomes of such interactions are likely to be shaped by national institutions and capacities for change. Indeed, as Busenberg (2000) argues, the scope for learning can depend upon the extent to which institutional structures, procedures and customs both facilitate and constrain the search for and the adoption of new forms of policy. And third, Tews et al. (2003) suggest that the scope for policy learning depends upon the nature of the issue in question. In this respect, it is clear that some problems are easily solved and others, particularly those of a systemic or structural nature, are not. The consequence of this is that policy change is more possible where capacities for policy reform are well developed, where the problem to be addressed is more tractable and where reforms can be more easily assimilated into existing systems and structures.

This last point raises the prospect of path-dependencies in the learning process, and this in turn means that policy is likely to evolve on the basis of 'punctuated equilibria' where long periods of gradual, incremental change are interspersed with short periods of more sudden, more radical change. Such periods of more rapid change may be triggered by external shocks, rapid periods of institutional change, an accumulation of pressure or by what Busenberg (2001) terms 'focusing events' that concentrate public and political attention on a particular policy issue.

It is apparent then that policy learning can come in a range of forms, be based on a range of processes and be driven by a range of factors all of which vary from setting to setting. This means that broader theories of policy learning need to be considered. Based on a review of the wider literature, Jordan et al. (2003) note the influence of three particular approaches:

– *Ideas dominant approaches:* These are based upon the view that ideas and beliefs – and the associated cognitive or discursive struggles lead to policy change. Actors and coalitions therefore compete to become powerful – these struggles normally lead only to a fine-tuning of policy, but occasional crises create opportunities for more substantial changes.
– *Settings dominant approaches:* These argue that the potential of ideas and the availability of different options are constrained by the institutional and especially the political context for decision making. This can mean that incrementalism and path dependencies emerge – except perhaps where external shocks or major policy failures demand a more fundamental shake up of the system.
– *Chaos dominant approaches:* These see policy processes as being unstable, preferences as unclear, conditions as uncertain and information as incomplete. Following Kingdon (1984), there are a number of streams (of policy problems which demand attention, of generic policy options which might merit adoption and of politics where actors compete for influence) which co-exist and which occasionally coincide to create opportunities for change. Complexity, contingency and chance are therefore features of the process, and opportunist policy entrepreneurs have a role.

As with the broader literature on EM, the debate on policy learning adopts a relatively optimistic approach by focusing on the prospects for 'better' policies to emerge under different conditions. However, it goes further than the debate on EM by proposing a range of theories or perspectives on how policy learning might take place – indeed these theories can be seen as illuminating the processes through which EM might be achieved. The literature on policy learning also offers a more nuanced approach by specifying different forms of learning – ranging from narrow technical forms of learning to much broader forms of social learning. However, like the literature on EM, the debate on policy learning considers the barriers to change mostly by implication by examining the preconditions for rather than the barriers to change. Thus, it is possible to conclude that debates on EM can be usefully informed by related debates on policy learning but that both would benefit from a more balanced view not only of the prospects for but also of the barriers to change. To further develop such an approach, we now apply theoretical insights from both literatures to an analysis of evolutions in environmental policy in Hong Kong.

3. Hong Kong: environmental and institutional context

Hong Kong is located on the southwest coast of China, on the eastern side of the Pearl River estuary adjoining Guangdong Province. It is a Special Administrative Region (SAR) of the People's Republic of China, extending over an area of 1100 km^2. It has a population of 6.9 million (end 2006), and under the 'one country – two systems', it enjoys a high degree of autonomy in domestic policy matters and its capitalist system within China is protected until 2047 (Hills and Roberts, 2001).

The nature and scale of Hong Kong's environmental problems have been extensively reported in the literature (Hills and Barron, 1997; Hills et al., 2004). These include badly polluted marine waters, poor air quality, widespread and serious noise pollution, and an increasingly serious solid waste disposal problem. Barron and Steinbrecher's (1999) study of sustainability indicators for Hong Kong concluded that the SAR is becoming less rather than more sustainable.

Commencing in 1980, the legal framework and institutional infrastructure were put in place to establish a conventional command-and-control regime for the environment. Although there has been some recent experimentation with new environmental policy instruments, in general environmental policy-making in Hong Kong remains highly centralised, focused on pollution control and largely wedded to a command-and-control approach. Interestingly, a recent study of stakeholder perceptions of the environmental policy process in the SAR suggests broad support for this approach (Hills, 2005). Indeed, Hong Kong reflects many of the dimensions of the discourse of 'administrative rationalism' identified by Dryzek (1997). Environmental policy has typically been driven by a preoccupation with problem solving through a process dominated by technocratic expertise rather than by extensive public engagement of the type characteristic of jurisdictions elsewhere, particularly in Western Europe. Local institutional forms and practices are also consistent with Dryzek's model of administrative rationalism. There has been a over-riding emphasis on the role of the government's Environmental Protection Department, essentially a pollution control agency, the enforcement of regulatory policy instruments, the use of environmental impact assessment, reliance on expert advisory bodies to legitimize policy initiatives and decisions, and the use of rationalistic policy analysis techniques (Hills, 2004; Welford et al., 2006).

Institutionally, there have been some changes in recent years. A Sustainable Development Unit was set up within the government in 2001. Its influence and impact on the policy-making process has been limited mainly because it is not directly linked with any of the government bureaux tasked with responsibilities relating to sustainability, nor does it have the authority to shape policy. Hong Kong has not adopted Agenda 21 as the basis for local sustainability initiatives nor, until very recently, has it made any attempt to formulate a sustainable development strategy. This process has commenced only recently in 2004 under the auspices of the newly-established Council for Sustainable Development which serves as a high-level advisory body (CSD, 2004).

Despite various efforts since the early 1990s, little progress has been made in embedding an integrated approach to the environment or indeed to broader sustainability issues within the policy-making process. Shortcomings in the policy-making process have hampered attempts to address environmental issues in an integrated and effective way. These include the absence of a clear policy framework for the environment that extends beyond pollution control, organisational fragmentation, and the frequent absence of policy convergence within government (Hills, 1997; Hills and Barron, 1997). Furthermore, the very nature of the environmental agenda itself has undergone a transformation with attention switching from purely local problems to far more complex, cross-jurisdictional, regional issues (Hills and Welford, 2002; Welford et al., 2006). Indeed, this regional dimension is the most salient feature of the contemporary environmental policy agenda in Hong Kong.

Hong Kong's larger region comprises Macau and the neighbouring Guangdong Province, collectively known as the Pearl River Delta Region (PRDR). Economic integration with the larger Delta Region has been associated with massive inward industrial investment from Hong Kong and significant economic restructuring within the Hong Kong SAR itself. This process of restructuring has seen most of the SAR's manufacturing base relocate to the PRDR to exploit lower land and labour costs (Berger and Lester, 1997; Federation of Hong Kong Industries, 2003). From 1981–2002 manufacturing's share of Hong Kong's GDP declined from 23% to just 4.6%, and its share of total employment declined from 38% in 1982 to only 6% in 2002 (Government of the Hong Kong SAR, 2003).

This changing regional development context has given rise to growing concern in Hong Kong about the impacts of trans-boundary pollution from Guangdong Province. Initially, attention centred on threats to marine water quality in the Pearl River estuary and Hong Kong's coastal waters (Chen and Heinke, 2002; Hills et al., 1998). Subsequently, air quality problems have become a major source of concern (Commission on Strategic Development, 2000; Tung, 2004). This was triggered by several major air pollution episodes in 1998–1999. These received extensive international media coverage and were widely regarded, particularly by the business community, as a threat to Hong Kong's status as a major tourist destination, as a magnet for international talent and to its claims to be recognised as Asia's 'world city' (Hills and Welford, 2002). A government consultancy study published in 2002 (CH2M HILL (China), 2002) indicated that poor air quality at street level in Hong Kong was the result of high traffic volumes and could be controlled by independent action within the HKSAR. However, control of regional air pollution must involve both the HKSAR and the Guangdong Governments. This will present major challenges in reconciling the autonomy of the two political jurisdictions with their obligations to a shared environment (Lee, 2002).

Despite these problems, Hong Kong can demonstrate some modest successes in dealing with environmental pollution and has achieved some improvements in the overall environmental efficiency of its economy. Progress has, for example, been made in the area of air pollution with significant reductions in SO_2 and NO_x emissions. Energy consumption per unit of GDP has declined steadily since the late 1980s, although this may be associated with the decline

of manufacturing and the rise of the service economy. Rather less progress has however been made in critical areas such as solid waste management and disposal. Hong Kong is also beginning to engage with some of the broader social and institutional transformations that are regarded as key elements of EM elsewhere. This is reflected in indications of a move away from an almost total reliance on a command-and-control, end-of-pipe regulatory regime to a more broadly based mix of regulation, economic instruments and voluntary agreements (Hills and Welford, 2002). Thus, there are some early signs of modernisation and learning in the Hong Kong environmental policy process. The origins and influence of such change are exemplified through two cases that have figured prominently on Hong Kong's environmental policy agenda since the early 1990s; traffic related air pollution and urban waste water pollution. While these illustrate various dimensions of the policy learning process, they also highlight the limits of technical forms of learning within existing institutions at the local level, not least because of the emergence of more significant regional problems.

4. Ecological modernisation and policy learning in Hong Kong?

4.1. Case 1– traffic related air pollution

Like many major cities, Hong Kong faces major air pollution problems which are largely associated with emissions from road traffic. It has long been recognised that Hong Kong faces particular problems from diesel vehicles on which it is heavily reliant (see for example Hong Kong Government, 1989). In 1999 it was estimated that diesel vehicles accounted for 30% of the total road vehicle fleet whereas in the United Kingdom the figure was 10% and in the United States 4%. Furthermore, diesel vehicles in Hong Kong accounted for 70% of total vehicle kilometres travelled, 98% of the particulates and 75% of the nitrogen oxides emissions from vehicular sources. Diesel vehicle emissions, particularly respirable suspended particulates, have given rise to public health concerns. Other concerns have also acted as policy drivers, including the problems of ensuring high standards of vehicle maintenance in the diesel fleet and limiting the use of illicit, cheap, poor quality diesel fuel smuggled in from the Chinese Mainland (Kwok, 2000).

Hong Kong's attempts to deal with the problem of diesel vehicle emissions can be traced back to the early 1990s. A policy paper published in 1992 indicated that the Government was considering the mandatory replacement of diesel engines by petrol engines in taxis, public light buses and light goods vehicles. The option of fuel switching was also raised ((PELB), 1993). However, while this option was being actively pursued by the Environmental Protection Department and its parent Planning, Environment and Lands Bureau, it was opposed elsewhere in government, primarily by the Finance Bureau, apparently because of

concerns about its possible inflationary impacts (Friends of the Earth Hong Kong, 1997; Hills and Barron, 1997).

In 1995, the Government's Advisory Council on the Environment (ACE) discussed a paper entitled "Proposal for Diesel to Petrol Scheme" (ACE, 1995). The government also conducted public consultations on proposals to phase out the use of diesel fuel for all vehicles below 4 ton in weight (Hong Kong Government, 1995). This provoked considerable resistance from taxi and light bus operators who favoured a voluntary scheme backed up by strict monitoring and enforcement action against smoky, polluting diesel vehicles. However, the Planning, Environment and Lands Bureau remained unconvinced by their arguments (PELB, 1996). Although the ACE backed the Bureau's position, the territory's Legislative Council, which had been subject to vigorous lobbying by the transport operators, refused to endorse the proposal. Kwok (2000) suggests that much of the opposition from the transport operators arose from the fact that an enforced switch to petrol would deny them access to the cheap, illicit diesel fuel being smuggled into Hong Kong and would consequently increase their operating costs.

Although the diesel to petrol switch enjoyed support in some areas of government, and among some environmental groups and academics, it floundered in the face of intense opposition from vested interests in the transport sector and because of what some saw as a lack of convincing evidence that petrol was clearly superior to diesel fuel in terms of its environmental impacts. Some commentators pointed out that this was not the key issue: 'both emit harmful pollutants... comparing their relative environmental-friendliness is misguided' (Loh, 1995): p. 21. Most political groups in fact favoured a voluntary scheme rather than mandatory proposals primarily because they were not convinced by the government's claims regarding the negative health impacts of diesel emissions.

In mid-1996, the government indicated that the entire scheme was under review. The period immediately preceding the transfer of sovereignty and administration from Britain to China on 1 July 1997 was not a particularly propitious time to pursue controversial environmental policy proposals. The local political situation was in a state of flux. From 1996 to 1999, government concentrated its attention on technical measures to control diesel emissions, including trial studies of diesel catalysts on buses and heavy goods vehicles, the use of particulate traps on light diesel vehicles, and the introduction of ultra-low sulphur diesel fuel. In addition, a one year trial of taxis fuelled by Liquefied Petroleum Gas (LPG) was completed in 1998, and a related public consultation ran from 1998–1999. This suggested broad industry and public support for the introduction of LPG taxis (ACE, 1998, 1999a).

In 1998–1999 Hong Kong experienced a number of serious air pollution episodes that attracted considerable local and international attention. Mindful of the potentially damaging economic and 'image' impacts of repeated pollution episodes, in 1999 the Government pressed ahead with

a more aggressive programme to improve air quality in Hong Kong, including the diesel emissions problem (ACE, 1999b) with the objective of reducing particulate emissions from vehicles by 80% by the end of 2005, and nitrogen oxide emissions by 30%. The main elements of the programme included adopting tighter fuel and vehicle emission standards, adopting cleaner alternatives to diesel where practicable, controlling emissions from the remaining diesels and strengthening vehicle emission inspections and enforcement activities.

As far as cleaner alternatives to diesel are concerned, the government opted to promote the use of LPG. To encourage a rapid switch of the 18,000 diesel taxis to environmentally-cleaner LPG vehicles, the government provided a one-off grant of HK$40,000 (1 HK$ = 7.8 US$) in a subsidy programme starting in 2000. In addition, LPG has not been subject to excise duty and operators of dedicated LPG filling stations have been granted sites at nil land premium. The latter measure was deemed necessary to ensure adequate provision of LPG supplies across the whole of the territory. The programme was completed at the end of 2003 by which time virtually all – about 99.8% – taxis had switched fuels. Cheap LPG prices have also helped to ensure that taxi operating costs are reduced by approximately HK$45,000 each year providing an additional strong incentive to switch away from diesel (ACE, 2000b).

In 2002, the government started to offer incentives to encourage the early replacement of the 6000 diesel light buses with LPG or electric ones. For diesel public light buses, owners were offered a one-off grant of $60,000 or $80,000 for each diesel public light bus that is replaced with an LPG or electric one, respectively. By the end of 2003, nearly 80% of newly registered public light buses were LPG fuelled. From 1999 to 2003, these and other measures (e.g., the use of catalytic converters or particulate traps on pre-Euro standard light diesel vehicles, the introduction of ultra-low sulphur diesel (ULSD) and the implementation of Euro III emission standards) contributed to a 13% reduction in particulates and a 23% reduction in nitrogen oxides levels on the street.

Fuel switching provides some important insights into processes of policy learning in Hong Kong. Following the failure of the diesel to petrol proposals in 1995, the government was forced to rethink its entire strategy for dealing with the problem. Ultimately it had to accept that the only way to gain the support of key stakeholders (i.e., vehicle owners/operators) was to subsidise the switching process: the new vehicles and the LPG fuel itself. However, government was able to capitalize on public concern about air quality to push through these measures. It encountered little opposition from politicians, the public or from the business sector regarding the subsidised fuel switching programme. It may also have been helped by growing public awareness of public health issues fostered by experiences with avian flu and several well-publicised studies of the health costs of air pollution in the Hong Kong SAR (Barron et al., 1995). Certainly, the use of direct subsidies

to achieve environmental policy objectives would have been inconceivable in Hong Kong in earlier decades.

Despite innovations in policy in Hong Kong and associated investments in tackling certain local air quality problems at source, the emergence of trans-boundary pollution has served to further complicate the situation. Indeed, it has become almost the conventional wisdom locally that a substantial, if not the dominant, portion of air pollution comes from such sources and consequently is outside the regulatory control of the Hong Kong authorities. However, recently published research (Lau et al., 2007) contests the view that regional (i.e., trans-boundary) sources have been the dominant source of Hong Kong's air quality problems. Analysis of 2006 data indicates that regional sources are the primary influence on Hong Kong's air quality on 136 days (36% of the time) while local sources are the principal contributor on 192 days (53% of the time). Lau et al. (2007) conclude that the government should target major local emissions sources in the power generation, land and marine transportation, and logistics sectors. In addition, they argue that the government should adopt and enforce the World Health Organisation's 2006 global air quality guidelines and devise a comprehensive energy policy. Even with such initiatives, trans-boundary pollution is likely to remain a significant element in the overall equation but the required institutional and policy framework to address these issues at the regional level has yet to evolve (Welford et al., 2006).

4.2. Case 2 – sewage treatment and water quality

The Harbour Area Treatment Scheme (HATS), formerly known as the Strategic Sewage Disposal Scheme (SSDS), was originally conceived in 1989 as a response to one of Hong Kong's most serious environmental problems: pollution of local marine waters and particularly those in Victoria Harbour. It is a comprehensive scheme for sewage collection, treatment and disposal. Its development has been driven by concerns about public health and the marine environment and by a desire to establish Hong Kong as one of the world's great cities. Victoria Harbour is the focal point of the city, with some 65% of the population living in the surrounding areas. As economic restructuring has proceeded, industrial activities in the Harbour area have declined. This has contributed to a significant reduction in discharges of toxic metals from 7000 kg per day in 1993 to 2000 kg per day in 2000. However, many other activities remain concentrated around the Harbour and domestic sewage and effluent from a variety of service activities has been discharged into the Harbour with minimal treatment and its natural absorptive capacity has long been exceeded.

The 1989 White Paper on the Environment (Hong Kong Government, 1989) set out a sewage strategy intended to provide the older metropolitan areas of Hong Kong – essentially those around the Harbour – with modern sewage treatment facilities. Traditionally, Hong Kong's

approach to dealing with sewage had been to rely on dispersion in the sea. In 1989, more than 50% of domestic sewage was discharged directly into the sea without treatment. Under the Sewage Strategy, 16 Sewerage Master Plans were formulated to enhance the effectiveness of existing facilities and to ensure the provision of a proper and adequate sewerage network to collect all sewage arising in the area covered by each plan. The SSDS programme was developed to implement the infrastructure requirements associated with the strategy.

The SSDS was originally conceived as a four stage programme to be completed by 2003. Stage I, due for completion by 1997, consisted of a deep tunnel collection system, the construction of a sewage treatment works and an interim outfall. Stage II, to be completed by 2003, consisted of a submarine oceanic outfall which was planned to discharge treated effluent into deep water beyond the limit of Hong Kong's territorial waters. Stages III and IV, also due for completion by 2003, involved the planning and construction of a collection and treatment system for the northern and western areas of Hong Kong Island ((PELB), 1993).

The SSDS Stage I works included the construction of a 23.6 km long deep tunnel system to move sewage to the sewage treatment works. After treatment, the effluent is discharged via a 1.7 km long submarine outfall to the western approach of Victoria Harbour. Construction began in 1994, and although the sewage treatment works was put into operation in 1997, delays with the deep tunnel system meant that Stage I was not fully commissioned until 2001, 4 years behind schedule (DSD, 2003).

Since the commissioning of Stage I, about 70% of the sewage entering Victoria Harbour is now chemically treated. This has resulted in a significant reduction in pollution in the eastern part of Victoria Harbour. However, if the development of Hong Kong is to proceed without threatening the water quality of the surrounding marine environment, further stages of HATS must be implemented. A 1999 Environmental Impact Assessment Study of the then SSDS recommended that further investments were needed (DSD, 2003). By that time, however, there was growing public disquiet regarding the long delays associated with the deep tunnel construction process, the cost effectiveness of the treatment system proposed and indeed, the overall cost of the scheme itself. Stage I had already involved capital expenditure of HK$8.2 billion. Furthermore, it is believed that the Chinese Government has expressed its concerns about the proposal to discharge treated sewage effluent into the South China Sea.

In his 1999 Policy Address, the Chief Executive of the Hong Kong SAR announced that an independent review of the SSDS would be undertaken taking into account '...both of the rate of progress (and) continuing public questions on a number of aspects of the system, including the adequacy of the treatment to be provided and its cost effectiveness' (ACE, 2000a). A fundamental principle in setting up the review was that '...(the) process should be open and participatory. The public will be given full access to all the background information prepared for the review panel. All who wish to make a submission to the review panel will be welcome to do so either in writing or verbally during a public forum. All written submissions received, including any submission which may be made by the Administration, will be forwarded to the review panel for consideration and, unless objected to by the submission proponents, will be published' (ACE, 2000a).

An International Review Panel (IRP) was subsequently appointed by the Government in 2000. The IRP recommended that consideration should be given to upgrading the treatment level to tertiary standard and discharging the effluent within Victoria Harbour. The IRP suggested four alternative plans for the further development of SSDS and the government subsequently embarked on a series of studies and trials to assess the environmental acceptability and engineering feasibility of the suggested development plans to establish the way forward for the subsequent stages of SSDS.

In 2001, the SSDS was renamed HATS. This may well have been an attempt by the government to repackage a programme which had become a something of an embarrassment. SSDS was running almost five years behind schedule. Despite substantial capital outlays the pollution problems of Victoria Harbour were still far from being solved. Furthermore, to effectively address these problems it appeared that further substantial expenditure would be required at a time when government was experiencing a serious budget deficit due to a prolonged down turn in the local economy following the Asian financial crisis of 1997–98.

The government appears to have recognised that HATS requires a new and much more open approach to the process of consultation if the public and other key stakeholders, particularly in the legislature and district councils, are to be persuaded that further large scale capital expenditure on sewage treatment is justified. The costs of providing a higher level of treatment for projected future sewage flows will be in the order of HK$20 billion for capital works and HK$1.5–1.7 billion per year in recurrent costs for operation (HATS Task Force – Environmental Protection Department, 2004).

To support this consultative process extensive outreach activities and community-based initiatives relating to HATS have been undertaken since 2000 (Government of the Hong Kong SAR, 2001b). Public workshops were held in 2002 and various documents have been made available to the public. Briefing sessions for District Councils were held in 2003. Websites were set up for both the SSDS review and subsequently for HATS (Government of the Hong Kong SAR, 2001a,b). Government launched a major public consultation exercise in 2004 to gauge public responses to its proposals leading on from the IRP Report. As the government's *Cleanharbour* website (Government of the Hong Kong SAR, 2001b) comments: '...(It) is important that the people of Hong Kong, the ultimate owners

and beneficiaries of HATS, are part of the decision making on what to build.' Furthermore: '…HATS is one of the most important environmental programmes ever undertaken and it must be implemented with the full support and confidence of the public. Community support and contribution is essential to return the water quality of Victoria Harbour to a standard commensurate with Hong Kong's status as Asia's World City.'

The fuel switching example discussed previously illustrated how the government needed to adopt an innovative policy initiative to overcome opposition to its original proposals. The case of SSDS/HATS illustrates how the government has come to recognise the importance of at least trying to carry the community with it on major environmental issues where there are a number of options and where capital outlays are very substantial irrespective of the choice that is ultimately made. HATS has developed into probably the most extensive public outreach and consultation process ever conducted in Hong Kong on a specific environmental policy issue. Interestingly, it is also one of the most technically complex and costly. Given this complexity it is doubtful whether the community *per se* is in a position to inform the policy making process in any meaningful way and so the consultation process may be as much about raising public awareness and legitimising decisions on very significant levels of infrastructural investment as about incorporating public concerns and taking better decisions.

Although Hong Kong's western marine waters have almost certainly been affected by deteriorating conditions in the Pearl River (Hills et al., 1998) brought about by rapid urbanisation and industrialization in neighbouring Guangdong Province, HATS is primarily a response to locally generated problems of ineffective sewage treatment within the Hong Kong SAR itself. In the longer-term, a comprehensive water quality strategy for the Pearl River Delta Region would clearly be a desirable development but will again be dependent upon the emergence of a cross-jurisdictional institutional structure empowered to tackle water quality issues on both sides of the boundary.

5. Discussion and conclusions

This paper has focused on the conceptual and practical linkages between theories of ecological modernisation and policy learning. It has illuminated some of these linkages by reference to environmental policy processes in Hong Kong, and each of the case studies examined has highlighted different aspects of the policy learning process.

The first case – fuel switching in the transport sector as a response to air quality concerns – illustrates how the Hong Kong government has ultimately demonstrated the ability to adapt to challenging policy situations and break out of a deadlocked situation by implementing novel policy initiatives. These initiatives, in the form of subsidies for the purchase of new vehicles and LPG fuel, represented a substantial departure from previously established and

acceptable practice. The idea of subsidizing businesses – in this case taxi and light bus owners and operators – to achieve environmental policy objectives has been anathema to successive generations of Hong Kong policy makers. This, we argue, demonstrates a willingness and ability to extend the repertoire of policy instruments available and in this particular case it has proved to be rather successful. It has brought about a substantial improvement in the environmental efficiency of the taxi fleet producing significant improvements in roadside air quality over a relatively short period. However, at least for a significant proportion of the year, these environmental benefits seem likely to be more than offset by an increase in trans-boundary air pollution from Guangdong province in southern China. The institutions and the policies needed to address such issues have yet to emerge.

Our second case – investments in sewerage treatment to improve water quality – is a much more challenging case than fuel switching in view of its scale, technical complexity, costs and timescale. The case reveals how the Hong Kong government responded to widespread public concerns about the costs associated with developing sewerage treatment infrastructure by opening up and engaging in consultation and deliberation. Again this represents a significant departure from well-established modes of decision making in Hong Kong. As similar engagement processes are now being pursued in connection with Hong Kong's attempts to develop a sustainable development strategy, we might conclude that these experiments with more open, inclusive approaches have catalysed broader changes in the policy process. However, consultations such as those relating to the Harbour Area Treatment Scheme should probably be seen more as an attempt to legitimize decisions on expenditure than to incorporate public concerns into the decision making process. The outcomes from this decision making process can be seen more positively. The significant investments that are being made are leading to improvements in water quality in the harbour area, which is to some degree insulated from the increases in trans-boundary pollution flowing down the Pearl River. In this case then, environmental issues have been effectively addressed through domestic policy change.

Some degree of policy learning is clearly evident in both of the cases. Our analysis of policy learning in Hong Kong based on these cases raises a series of key points about the factors that have shaped the learning processes and to the levels and forms of policy learning that have emerged.

A first key point to make is that the policy learning processes that are reflected in the two cases are largely of an endogenous nature. The critical policy debates in each case, and the ideas that have been explored and ultimately adopted, have largely been developed within Hong Kong. Although some attempt has been made to build international networks (c.f. discussions on the adoption of WHO air quality standards, the creation of an International Review Panel commissioned to steer the development of the SSDS/HATS scheme), there is little evidence

of any significant transfer of ideas from other contexts. This may be because the specific socio-political and environmental circumstances of Hong Kong preclude the transplantation of policy ideas from other contexts. However, it may also be because of the relative insignificance of the international networks that Tews et al. (2003) cite as being an important driver of policy learning.

A second key point relates to the institutionalized rationalities that have shaped the processes of policy learning within Hong Kong. As discussed above, policy-making in Hong Kong is characterized by an 'administrative rationality' (Dryzek, 1997) which has limited the degree to which government engages in broader social discourse on policy design. Policy development has been a largely technocratic affair, with the executive gathering evidence and occasionally engaging in broader social discourse to educate the public and to overcome opposition to the policy approaches that they seek to adopt. Reflecting Glasbergen's (1996) distinction between technical, conceptual and social forms of learning, through these cases Hong Kong has mostly seen technical forms of policy learning, with some limited forms of conceptual or social learning being pursued not to transform or to supplement existing institutions and approaches but instead merely to reinforce and legitimize them. This point challenges the view that policy learning is likely to take place in a neatly sequenced evolutionary way, suggesting instead that a more complex and perhaps more chaotic approach prevails.

A third and related point is that the policy learning that has emerged in both cases has been built upon a high degree of institutional continuity. Although some new institutions have emerged within Hong Kong (c.f. the Council for Sustainable Development), they lack executive powers and are mainly limited to an advisory role. This is also evident with regard to trans-boundary pollution issues. Although there is some cooperation between environmental policy-making institutions in the Pearl River Delta Region, the institutional capacities that are needed to address trans-boundary pollution from Guangdong province into Hong Kong have yet to emerge. This point clearly resonates with broader discussions on Institutional inertia and embeddedness. Furthermore, because Hong Kong is the leading source of investment into industrial development in Guangdong province, it could be argued that powerful actors in Hong Kong have a clear interest in not seeing these institutions emerge. Such a view would clearly be consistent with Jänicke's (1990) theory of state failure, and it maybe that until there are significant crises or formative events institutional capacities for addressing trans-boundary pollution will develop only slowly and incrementally.

A final key point relates to the conditions under which policy learning might take place. Here our cases provide strong support for Jänicke and Weidner's (1995) model of the capacities for environmental policy reform. As discussed in the early sections of this paper, this model suggests that policy reform is most likely where there is a sufficient level of concern on an issue, where there are strong proponents for change, where there are appropriate institutions and where there are solutions that are technically, politically and economically viable. In both of the cases discussed above, policy learning took place where those supporting change ran into significant political opposition, in the air quality case from vehicle owners and drivers, and in the water quality case from the public. The combination of significant pressure for and opposition to change led to policy learning, with the government being able to innovate to develop solutions that were technically, politically and economically viable. This point suggests that the pressures for and the barriers to change can be important factors within the settings dominant approaches outlined by Jordan et al. (2003).

Thus, based on our analysis of two cases of environmental policy learning within Hong Kong, we can conclude that endogenous, largely technical forms of policy learning have taken place, but that learning has been limited to those areas where there is pressure for change, where opposition can be appeased or circumvented and where changes can be easily accommodated within existing institutional structures. Where these conditions are not met, as is the case with regard to trans-boundary pollution, then the scope for policy learning seems to diminish.

Of course to some degree these findings reflect the specific features of Hong Kong and of the two cases selected, but in conclusion we argue that these are important observations that clearly relate to broader debates on ecological modernisation. Policy learning seems to be the mechanism through which an important, possibly even a central, aspect of EM takes place. Thus, under some conditions, policy learning can take place and this allows the benefits of EM to be realized. However, our analysis also suggests that the preconditions for policy learning are all important, that the scope for policy learning can be very limited and that the benefits of learning in one context and at one scale can be easily over-whelmed by developments in other areas and at other scales. Inertia within existing institutions, and the absence or weakness of other institutions, can severely limit the scope for policy learning and thus restrict the potential for ecological modernisation. When considering some of the more complex and less tractable issues that exist beyond the remit or the capacities of existing institutions, it seems that Hong Kong and perhaps many other contexts encounter embedded, reactive institutions that do not change until the pressure for change becomes irresistible. This is a long way from the assumption that is implicit in much of the ecological modernisation literature that learning can take place in reflexive societies with rational, responsive institutions.

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