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Environmental Policy & Regulation – is it necessary?

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*“Thus far, with rough and all-unable pen,
Our bending author hath purs’d the story;
In little room confining mighty men,
Mangling by starts the full course of their glory.”*
William Shakespeare, *Henry V*, (1599).

Abstract

Over the last half a century the environment has emerged as one of the most controversial and rapidly growing areas of public policy and regulation. Since the rise of the green movement in the 1960s, the need for such policy and the impact of regulations have been hotly debated. Just when it appeared that some consensus was emerging, Lomborg’s book, *The Skeptical Environmentalist*, gained prominence by arguing that the risks were not as serious as everyone had assumed and that government interventions were either unnecessary, ineffective, or had a detrimental effect by misdirecting resources. This paper takes up the challenge posed by Lomborg using case studies from Australia, the USA, and UK, as well as some of the international assessments of the situation. Overall it is argued that even if knowledge is imperfect or uncertain, it is still a good strategy to treat environmental risks as real and serious. Further, the recognition of, and response to, environmental risk is very much influenced by the limitations placed on the state by reflexive modernisation and the prevailing discourses of governmentality. Finally, while some interventions have gone astray, many have had some positive impact and provide a useful foundation for further changes that would help achieve sustainable development.

Introduction

Are governments doing enough to protect the environment and achieve sustainable development or have they already done too much? This is the question that I would like to address because it ultimately deals with the future of human society and the planet. In order to tackle such a profound topic in such a small space this paper is divided into a series of four summaries of research that build upon each other. The first section reviews the nature of environmental risks, outlining the key incidents and ongoing hazards, as well as the international policy responses that they catalysed. Section two takes up the sceptics’ challenge that questions the seriousness of these risks to derive a strategy for decision-making in an environment of uncertain knowledge and competing claims. Having established a path for action, section three then considers the way that national responses have been shaped by reflexive institutional development trajectories and the prevailing discourses of governmentality. The final section assesses the outcomes of the policy making and regulation processes using four methods: meeting the goals set, tracking changes to key environmental quality indicators, overcoming resistance, and redirecting the flow of resources. International data, as well as examples from the USA, UK and

Australia, are used to support the argument that the risks should be treated as serious and, while progress has been made, not enough has been done.

Rising international risk & response

Environmental risks have arisen in two forms: incidents and ongoing hazards. The recurrence of major environmental incidents has often acted as a catalyst for policy change. The Great London Smog of 1952 contributed to the deaths of some 2,000 people and forced the creation of the UK Clean Air Act in 1956. In 1969 the Cuyahoga river became so polluted that it caught fire. This was one of the incidents that encouraged the creation of the US Environmental Protection Agency in 1970. Plans to dam the Franklin river in Tasmania led to mass protests around Australia and the Commonwealth eventually intervened to prevent the project by passing the World Heritage Act in 1983. When the Union Carbide plant in Bhopal, India, released toxic chemicals that killed 3,500 people and injured 15,000 others in 1984, regulation of the chemical industry in the USA was tightened. The explosion of the Chernobyl nuclear power station in the Ukraine in 1986 sent a plume of radioactive material across Europe, affecting the health of 50-100,000 people. It also resulted in a cutback in nuclear power programs across much of Europe and North America (Paehlke 1995).

In terms of ongoing hazards, Rachael Carson warned about the excessive use of pesticides like DDT in her 1961 book *Silent Spring* and the US eventually began banning such substances in 1972. Paul Ehrlich (1969) argued that the world could not sustain the ever-growing number of people in *The Population Bomb*, a concern that became a key point of policy debate at the 1972 UN Stockholm conference on the Human Environment. In the same year the Club of Rome published *The Limits to Growth* (Meadows, et al. 1972) suggesting that we might be approaching the limit of the ability of the environment to cope with increased resource use and waste. Further, by the 1980s the scientific community was concerned about global hazards such as deforestation, the loss of biodiversity, land degradation, toxic waste, trans-boundary pollution, the thinning of the ozone layer, and climate change. These drew a series of international responses, such as the *World Heritage Treaty* 1972 to protect high conservation value areas, the *Montreal Protocol* 1987 to protect the ozone layer, the *Framework Convention on Climate Change* 1992, and the *Biodiversity Convention* 1992. Several new institutions were established to assess both the risks and responses, including the UN Environment Program (UNEP) (established in 1973) and the World Commission on Environment and Development (1983-87). These were followed by the Inter-Governmental Panel on Climate Change (established in 1988), the Global Environment Facility (1990), and the UN Commission on Sustainable Development (1992) (Elliott 1998).

The apparent multiplication of incidents and hazards led to calls for a less piecemeal and better-coordinated policy approach that would integrate the environment with other areas of public policy. The first move emerged from the 1972 Stockholm

Conference that established UNEP. In 1980 UNEP jointly published the *World Conservation Strategy* (with the International Union for the Conservation of Nature (IUCN) and the World-Wide Fund for Nature (WWF)) that included a call for the more careful use of the environment to achieve social goals under the rubric of sustainable development. This idea appealed to world governments that had been increasingly concerned about the anti-industrial development rhetoric emerging from the green movement. In 1983 the World Commission on Environment and Development was established and spent four years travelling the globe investigating the technical, economic, social, political and ecological dimensions of risks that had been produced by conventional development trajectories. The Commission's final report *Our Common Future* (1990), systematically catalogued the range of risks, defined sustainable development as the appropriate policy response, and sketched out a framework for an international strategy of implementation. As a result, the Rio Earth Summit was held in 1992 where the majority of the 180 world leaders in attendance signed up to *Agenda 21* that committed them to sustainable development as a policy goal. Reviews of progress towards this goal conducted for the Rio+5 (1997) UN Special General Assembly meeting in New York, and the Rio+10 (2002) UN conference in Johannesburg, indicated that the results were disappointing.

The sceptics challenge

Although a consensus had begun to emerge on the seriousness of the risks and the need for a policy response, there remained a small number of vocal critics within the scientific, business and political communities. Many of these were viewed with suspicion because of their links to highly polluting industries, the fossil fuels sector, or the financial markets, that tended to benefit most from environmental damage and had the most to lose from further regulation. The publication of Lomborg's (2001) book *The Skeptical Environmentalist*, however, changed the nature of the debate. Lomborg was an academic statistician without links to business who conducted a reanalysis of the existing official data. His conclusion was that the risks had been overstated, the world was not in such bad shape, and on some indicators things were actually getting better. Further, he argued that the many resources could be better spent on doing something about what he saw as more pressing problems, such as poverty and disease. Even when he agreed that there was a risk of significant climate change Lomborg argued that it would cost more to avoid further global warming than to simply pay for remedial action.

The debate catalysed by Lomborg's book was international, fierce, and prominent in the popular media. The financial press immediately used his analysis to attack the environmental movement, undermine scientists on whose research the international responses had been based, and argue for reductions in environmental policy and regulation (Tribe 2003; *The Economist* 2003, 2002; Baker 2002). The scientific community, on the other hand, responded to Lomborg's analysis in some detail and my research indicates that the majority were at pains to point out the errors in his analysis. Lovejoy (2002) argued that Lomborg has understated the loss of

biodiversity because he misapplied measurements of species extinction rates. Holdren (2002) suggested that on the energy production issue Lomborg did not discuss the impacts of fossil fuel use but focussed instead on optimistic estimates of available reserves. Schneider (2002) took Lomborg to task on climate change because of his selective use of high cost estimates and low temperature scenarios in the available modelling. Bongaarts (2002) pointed out that Lomborg's explanation of the link between population growth and resource use is simplistic and misses many of the complexities of development and increasing demand. These kinds of specific technical criticism were supported by many other scientists (see for example Fisher 2002; Simberloff 2002; etc.).

My own analysis suggests that Lomborg's argument is based on a number of dubious premises (Howes 2005). First, he claims that we should mistrust the best available scientific evidence because the claims of some environmentalists have been inaccurate. Second, he argues that our understanding of risks such as soil erosion is based on short-term trends or small-scale European studies, therefore they cannot be trusted. (This will surprise many Australian and US farmers who have suffered from large-scale losses of topsoil.) Third, he suggests that shifting pollution between media (eg. turning acid vapours into sludge) should be counted as an improvement. This neglects the fact that pollutants are still being released into the environment and often wind-up contaminating water supplies. Finally, he proposes that the loss of forests have been more than offset by tree plantations. The fact that mono-cultures of trees do not support the same level of biodiversity as a mature forest ecosystem appears to have escaped him.

Although I disagree with his analysis, I support Lomborg's right to publish his opinions and suggest that he has provided two important services to the area of environmental governance. In the first place, he has kept the environment on the policy agenda at a time when it may be neglected because of rising security and economic concerns. In the second place, he has reminded us that no claims to authority should go unchallenged. Science, the economy, and democracy all work better when there is better information freely available. Constantly challenging claims to knowledge over a long period of time helps to identify weaknesses and strengths in our understanding, identifies opportunities for improvement, and generates a better basis for decision-making. This intellectual debate and revision can, however, lead to a kind of policy paralysis in the short-term, where people have difficulty deciding between competing expert claims. I have used a version of game theory in other work that I think could be applied here to break this paralysis (Howes 2005, 1998a).

The basic proposition is that even if we cannot know for sure, we should at least behave as if environmental risks and their potential impacts are real based on two plausible premises. First, the history of the last four decades suggests that many businesses are reluctant to address the environmental risk generated by their

activities and most changes have required the prompt of state intervention. Second, even if some problems are improving, by Lomborg's own admission we are still far from achieving a satisfactory outcome with regards to human welfare and the environment. These premises support two logically valid arguments. First, either there really are serious environmental hazards associated with industrial development or there are not. Second, either the state intervenes by developing and implementing effective policies or it does not. The range of possible outcomes can then be drawn up (see Figure 1).

Figure 1: Hazard v. Response

	Real & serious environmental hazard	No real or serious environmental hazard
The state intervenes effectively	A) No cost from being mistaken.	B) Industry is forced to invest in cleaner production in the short term, with some money recouped from efficiency gains.
The state does not intervene effectively	C) Industry fails to adopt cleaner production leading to major economic, social, political and environmental costs.	D) No cost from being mistaken.

(Source: Howes 2005)

Both outcome A (real hazard and effective intervention) and D (no real hazard and no intervention) have no cost of being mistaken since actions and perceptions match (although A would still entail some compliance costs). The cost of outcome B (state intervention but no real hazard) would be minimal. Since governments have become more active in environmental regulation and policy over the last three decades, businesses in most industrialised states have spent increasing amounts of money on cleaning up their operations. By the end of the century they were spending an estimated 0.8-1.6% of GDP on environment protection (UK Dept. of Environment 2002; OECD 2000; McLennan 1999; Morgenstern, Pizer & Shih 1998; OECD 1996 & 1984; Harris 1993; US EPA 1994; US EPA 1993). It is arguable that for government intervention to be truly effective, more money will need to be invested by both the state and industry to make society sustainable.

The costs of current expenditures or any increase must be discounted (in the economic sense) for two reasons. At the microeconomic level many investments in cleaner technology can actually reduce production costs and pay for themselves

because they entail efficiency gains with less raw material use and wastage per unit of production (Suzuki & Dressel 2002; AtKisson 1999; Hawken, Lovins & Lovins 1999). A chemical plant in California, for example, spent US\$240,000 on reducing and reusing their caustic soda and hydrochloric acid waste, which resulted in raw material purchase savings of US\$2.4 million per annum and an annual 6,000 tonne reduction in waste (Porter & van der Linde 1995). Obviously not all firms will find these kinds of changes easy or inexpensive (Athansiou 1996; Cebon 1993), but the increasing number of positive case studies from around the world suggest that the money invested is often more than offset by cost savings. At the macroeconomic level, evidence has been emerging that government environmental intervention does not increase the level of unemployment (Goodstein 1999). Some studies have even suggested that it has a net stimulus on industrial economies working below full capacity by creating new industries, encouraging the development of new technology, and shifting resources away from older, more inefficient sectors (OECD 1996, 1984). In 1995, for example, it was estimated that American industry could save US \$1,200 million dollars and create 1.1 million jobs over 15 years by adopting changes that would reduce its waste by 1.3 billion tons (National Commission for Employment Policy 1995).

The maximum cost is therefore outcome C where the state does not intervene effectively, there is a serious hazard, and industry does not perceive a benefit in changing to cleaner production methods. This outcome generates a set of severe problems that include substantial economic costs, such as: increased insurance premiums against environmental damage claims, greater clean up charges and compensation pay outs after accidents, and higher health care premiums because of illnesses caused by pollution. Some of these costs have already become apparent (UNEP 2002; IPCC 2001). On top of these economic costs are the negative social impacts, political costs, and ecological harm.

We could take this analysis one step further and assign probabilities to each of the outcomes in figure 1. If there is a 50:50 (or equal) chance that the hazards are real and a 50:50 chance that government intervention will be effective, all four outcomes would have a probability of 25% (i.e. 50% for the reality of hazard multiplied by 50% for the chosen response). Given the review of the data presented, however, it would be reasonable to assert that there is a greater than 50% probability that environmental hazards are real. Further, the persistence of risks despite several decades of concerted environmental policy and regulation suggests that there is a greater than 50% chance of governments not intervening effectively. The probability of outcome C is therefore greater than 25% (the odds of each factor multiplied together) while the odds for outcome B (effective intervention but no real hazard) would be less than 25%. Hence the most probable outcome is that we will incur the maximum costs of outcome C unless there is a renewed effort by the state to take effective action. This analysis supports major changes in the way we address environmental risks and that governments are not doing enough.

Based on this line of reasoning, if humanity adopts a risk management strategy to minimise the maximum costs associated with industrial development, it would be reasonable to accept the need for effective state regulation, policy making and implementation. Further, it would be reasonable to demand changes that will increase the effectiveness of these interventions. This is the case even if we are faced with contradictory constructions of environmental risk by a range of different experts.

Shaping national responses

While the uncertainty created by Lomborg's challenge might encourage policy paralysis in the short-term, environmental governance has continued to develop across the global, national, and local political domains. International responses to environmental risks have tracked domestic changes and I would argue that these are influenced by two key factors. First, variations between national responses indicated the differing impact of reflexive modernisation trajectories on the state's ability to address new political agendas by reorganising its institutions. Second, subsequent switching between different kinds of regulatory tools indicate changes in the prevailing discourses of governmentality at each stage of policy formulation or implementation. While some readers may not agree with this theoretical framework, after reviewing a broad range of approaches across the political spectrum (examples can be found in Eckersley 2004, 1992; Hay 2002; Dryzek & Schlosberg 1998; Dryzek 1997) they are the ones that best fit the empirical data that I have collected over the last decade.

On the first point, Beck (1992) argued that the process of modernisation started to become reflexive (i.e. undermine itself and bring its key institutions into doubt) at some point in the mid-20th century. This occurred when the risks generated by industry grew to a point where they began to threaten the ecosystems and environmental services on which humanity depends. Beck (1992) argues that people began to fight over the distribution of these risks and this usurped the traditional class struggle over the distribution of wealth as the basic political dynamic. One example would be the rise of the environmental justice movement in the USA where residents of poorer communities have fought the siting of hazardous waste dumps in their suburbs. (Some theorists disagree with this analysis but limited space does not allow me to go into the debate. For a useful cross-section of key criticisms, together with Beck's response, see Adam, et al. 2000). Beck (1992) suggests that the institutions of governance designed in the 19th century did not have the capacity to deal with late 20th century risks. How do you insure against a nuclear war or the thinning of the ozone layer, for example? According to Beck (1992), this perceived inability to respond effectively led to the rise of a sub-politics of protest (the rapidly growing green movement and the rise of so-called 'anti-globalisation' protests around the world could be taken as examples). Such a model offers a plausible explanation for the problematic responses of the international community outlined in the previous

section, but it has even more significance for the national and sub-national levels of governance (Howes 2001).

Consider three states: the USA, UK, and Australia. All have a common historical root, a similar level of development, related political cultures, and comparable social institutions. Despite this common ground, seemingly minor variants in their political system dating back to the 18th and 19th centuries have directed them down noticeably different trajectories of environmental governance. The US is a federation with a constitution that grants broad powers to the federal level of government and guarantees certain rights for the citizens. It also has a legalistic political culture and a highly active civil society (Dryzek, et. al 2003; Landy, et. al 1994; Murchison 1994). As a result, it was the first of the three states to create a national Environmental Protection Agency, and adopted stricter regulations with higher levels of enforcement. The UK, on the other hand, was a unitary state (until recently), with a more secretive policy making culture, and a tendency to collaborate with industry. It was reluctant to create an Environment Agency until the mid-1990s and often only adopted strict regulations when pushed to do so by EU directives (Dryzek, et. al 2003; Hawke 2002; Garner 2000). Australia is a much more decentralised polity and environmental regulation has been largely left to the sub-national levels of government (Toyne 1994). It has recently attempted to adopt a more cooperative approach with ministers from different levels of government agreeing on key environmental measures through the Environment Protection and Heritage Council, while implementation is left to State government agencies. In terms of the sub-politics of protest, the electoral system allows green candidates to enter most Australian parliaments but this is virtually impossible in the USA and UK. American environmentalists, however, make far more use of the courts to challenge both business and the state because of their more open legal system, something that is not so easy in Australia and the UK. Finally, UK environmentalists have the option of appealing to the EU parliament or courts, a supra-national option not available to the USA or Australia (Howes 2005). So both the politics and sub-politics of responding to environmental risk has been shaped by historical institutional developments in the reflexive modernisation process.

The second point (that responses go through different phases that depend on the prevailing discourses of governmentality) emerges from the legacy of Foucault (1991, 1990). In his analysis of governance, society is a network of force relations between dominant and subordinate individuals with associated discourses. Each discourse is like a localised, interactive ideology that encourages both people to accept the legitimacy of the relation and gives the dominant person strategic information that supports their power over the subordinate. These discourses and force relations form a network that is constantly changing, sometimes clashing to undermine an institution, and sometimes reinforcing to build or expand an institution. (Foucault also has his share of critics and readers can find examples in Newton (1998), Diamond, et al. (1988) and Poster (1984)) A particular kind of discourse associated

with the state is governmentality that guides the mentality of both the governed and those doing the governing. It encourages citizens to accept the legitimacy, authority, actions, and decisions of the state. It also encourages state bureaucrats to address issues by breaking them down into smaller tasks and trying to normalise the situation by disciplining behaviour that is categorised as deviating from the defined norm (Miller & Rose 1993). This approach is readily apparent in the state's acknowledgment of, and response to, environmental risks (Lupton 1999; Rutherford 1994; Stratford 1994).

Again, consider the responses of the USA, UK and Australia during three different phases of public policy governmentality. Up to the mid-1970s the discourses of Keynesian economics and administrative rationalism predominated (Dryzek 1997; Paehlke & Torgerson 1990). This encouraged the rise in regulations (although with some reluctance in the UK) and the uptake of environmental impact assessment procedures. In all three countries the state and the experts employed by the state were seen to be a large part of the solution to environmental risks. It was assumed that they could rationally analyse the problem, find solutions, and impose them on industry. By the early 1980s, however, the prevailing governmentality had shifted to economic rationalist and neo-liberal discourses (Dryzek, et. al 2003; Eckersley 1995; Pusey 1991). Now the state was seen as part of the problem and regulation was denounced as interference in the workings of the market. Each of the three governments therefore shifted their emphasis away from regulations, attempted to reduce the size of the state, and deployed more economic incentives (such as tradeable pollution permits) (Howes 2005). Lomborg's work could be viewed as one of the residual manifestations of this phase of neo-liberalism.

A third phase of governmentality emerged in the late 1980s and early 1990s (that shared some similarities with Keynesianism) and sought to constructively engage stakeholders in policy development. In Europe this was given the label of ecological modernisation and 'Third Way' politics because it sought a path between the extremes total state control and complete free-market capitalism (Curran 2001; Mol & Spaargaren 2000; Giddens 1998; Christoff 1996; Hajer 1995). Under this discourse the state took on the role of a facilitator to inform and consult with the community, help industry ecologically modernise, and establish public-private partnerships to achieve community goals. It was under this discourse that national and international sustainable development policies were created. The US had the President's Council on Sustainable Development (1996), the UK Government (1994) released *Sustainable Development: the UK Strategy*, and the Commonwealth Department of Environment (ESD Steering Committee 1992) released the *National Strategy for Sustainable Development*. Each was the product of extensive public consultation by committees of representatives from business, government, labour, and the green movement. In compliance with the preceding governmentalities, they shied away from blaming industry for environmental risks, saw regulations as best being limited to a safety net function, noted some concerns about possible negative impacts of state intervention

on the economy, and proposed various government support programs to help industry become sustainable.

The domestic response to rising concerns about environmental risks indicates a number of interesting features. First, there was a clear nexus between national and international developments in the understanding of, and responses to, the risks. Second, different historical trajectories of institutional development had a significant impact on the shape of the response to these risks and the impacts of reflexive modernisation. Third, different phases of policy and regulatory responses were very much guided by overlapping or competing discourses of governmentality, with different kinds prevailing at different times. Finally, *The Skeptical Environmentalist* is simply a manifestation of one of these discourses (neo-liberalism) and the debate it sparked is indicative of a clash of discourses.

Assessing the outcome

Given the contested nature of the policy domain, developing a definitive analysis of the impacts of the risks and responses is challenging. In other work I have suggested using a range of methods to give a composite picture, including: meeting the goals set, monitoring changes in key environmental quality indicators, overcoming resistance to enforcement, and redirecting the flow of resources (raw materials, money, labour and knowledge) through society (Howes 2005, 1998b). I will briefly run through each of these in turn.

In terms of meeting the goals set, more than a decade after agreeing to sustainable development as an overall policy goal internationally, and developing national strategies for its attainment, no country has achieved ecological sustainability. This was the conclusion of a study by Prescott-Allen (2001) undertaken in conjunction with the International Development Research Centre, the International Union for the Conservation of Nature, the International Institute for Environment and Development, the United Nations Food and Agricultural Organisation, and the United Nations Environment Program. The disappointing result applies to the USA, UK and Australia, although all three scored quite well in terms of social wellbeing. A study by the OECD (2000) that reviewed progress by all industrialised countries over the period 1993-2000 came to a similar conclusion, although some improvements were noted. The same general result also applies to individual legislation. The US Water Pollution Control Act 1972, for example, set the goal of making all surface waters fishable and swimmable by 1985, a target that has still not been met. This method, however, tends to understate the effectiveness of environmental initiatives. It is simply unrealistic to expect that the rather ambitious goals set can be met with so few resources and over a relatively short period of time. Remember that only 2% or less of GDP is spent on environment protection in developed countries, that the oldest environment agency (the US EPA) only dates back to 1970, and that most laws have emerged since then. Environmental risks, on the other hand, have been systematically building as an integral part of development since the industrial

revolution. So the lack of goal achievement may have much to do with underestimating the scale of the problem and lack of resources, making the goals set overly ambitious.

In terms of improvements in key environmental quality indicators, most of the industrialised world has seen reductions in some key pollutants over the last few decades (OECD 2000). The USA, UK, and Australia have all seen reductions in levels sulphur dioxide, atmospheric lead, carbon monoxide, photochemical smog, and airborne particulate matter. All three have also moved to ban hazardous substances such as asbestos and DDT, and all have reported some improvement in surface water quality. On top of this, all have taken some action to rehabilitate contaminated land, protected threatened species, and expanded conservation areas. All of this has been achieved despite substantial economic growth. (See: UK Government 2002, 1994, 1990; Environment Australia 2001; Browner 1996a; 1996b; US EPA 1994; UK Local Government Management Board 1997; US Government 1992; Habicht 1990; Reilly 1990; and Ettlin 1990.) This data suggests that the interventions have worked very well, but the information is highly selective and doesn't take into account the overall impact of shifting high-polluting industries to developing states. For these reasons this method tends to overstate the effectiveness of environmental policy and regulation.

The progress that has been made has been achieved despite concerted resistance by recalcitrant industries (method three). US steel manufacturers, for example, were able to delay and water down Clean Air Act regulations by falsely blaming job losses on the EPA and dramatically overestimating the cost of compliance (OECD 1996, 1995; NCEP 1995; Landy et. al 1994; US Department of Commerce 1985; Ford 1977; Crenson 1971). The vehicle manufacturing sector was also caught out in the 1970s when Japanese firms pointed out their vehicles were already meeting emission standards that the US industry had claimed were technologically impossible to achieve (Hoberg 1992). A large proportion of the money allocated to the Superfund program has been spent fighting legal challenges from industries that don't want to accept liability for contaminated sites (Rosenbaum 1991). In Australia, resistance from the manufacturing sector led to such liability being left out of the Ecologically Sustainable Working Group on Manufacturing (1991) recommendations, despite the objection of participating environmental groups. My research has uncovered resistance by industry to the introduction of pollution inventories in all three countries, yet the predictions of dire economic consequences have not come true. Resistance can also come from inside the state and is another manifestation of the clash of discourses of governmentality. In the early 1980s, for example, neo-liberalism encouraged the UK Thatcher government to sideline environmental concerns (Dryzek, et al. 2003). So the interventions that have been made have managed to overcome considerable reflexive resistance of the existing institutions of power within the state and business.

The fourth and final method for assessing the outcome is to consider whether the flow of resources (raw materials, money, labour, and knowledge) through society has changed. The second method (tracking key environmental indicators) demonstrated that there has been a reduction in the wastage of raw materials despite considerable increases in economic growth. In terms of money, the USA now spends 1.6% of GDP on environment protection, the UK spends 1.0% and Australia spends 0.8% (OECD 2000). Most of these expenditures have been induced in the private sector by increased regulation, and the global market for pollution abatement technology is over US\$300 billion (NAPA 1995; Underwood 1993). In terms of labour, the rise of the environment industry has seen a shift of employment from some highly polluting older industries into cleaner technology. While 38,899 jobs were lost in the US due to environmental regulation from 1970 to 1984, for example, there were 105,000 created by the water treatment construction program and a further 43,900 in pollution equipment industries in 1983 alone (OECD 1984). It was calculated in 1995 that environmental regulations had actually saved industry money in reduced raw material wastage, created 68-90,000 jobs, and added about US \$3.7 billion to GDP (NCEP 1995). Other studies are more circumspect, but suggest that interventions have shifted labour and resources between different sectors of the economy rather than acting as an overall drag on development, as is often falsely claimed by neo-liberal sceptics and recalcitrant firms (Goodstein 1999). Finally, the shift in employment has created demands for new technology and skills, both of which have altered the flow of knowledge. Further, pollution inventories in the USA, UK and Australia, have given community groups and investors information about the environmental performance of individual firms. Given the resistance of business to intervention, it is unlikely that such a redirection of resources would have occurred without these policies and regulations.

In sum, the creation of new laws, programs, agencies, and policies has not yet achieved the goals set because the scale of risk was underestimated and the resources committed to the response too small. There has been some progress on specific environmental quality indicators, and this has been achieved despite the concerted reflexive resistance of business and some parts of the state. These interventions have been able to divert the flow of resources through society, but not yet at a level necessary to achieve sustainable development.

Conclusions

Overall four main conclusions can be drawn from the data and analysis presented in this paper. First, environmental risks consist of individual incidents and ongoing hazards that threaten serious harm to humans and the environment. Second, it is an unwise risk management strategy to use uncertainty in the scientific data to stall further action because the cost if the sceptics are mistaken is too large. Third, the risks are a product of reflexive modernisation and the ability of the institutions of power such as the state and business to respond have been effected by clashing discourses of governmentality. Finally, while some progress has been made, we are

still a long way from achieving sustainable development. Given the long history of resistance to change by recalcitrant firms and some parts of the state, governments clearly have to do more to protect the environment. Structural changes are necessary to re-engage with the sub-politics of protest and restore faith in the institutions of both the state and business. One option that has been proposed is to open both up to more public participation and strategically use public-private partnerships to achieve common goals (Giddens 1998; Gunningham, et al. 1998; Hajer 1995; Beck 1992; Dryzek 1992). Such a move may do much to overcome the discursive struggles between administrative rationalism, neo-liberalism and environmentalism.

Note

This paper is a summary of the findings to be published in my forthcoming book: Howes, M. 2005. *Can Government Save the Planet? Responses to environmental risk in the USA, UK and Australia*. Allen & Unwin: Sydney.

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