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Disaster, Development and Governance: Reflections on the 'Lessons' of Bhopal

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ABSTRACT

The paper firstly uses the case study of the Bhopal gas disaster to understand why many scholars and activists seek alternatives to 'big' development. Secondly, it critically examines the claims that have been made in this regard in the literature in political ecology, science and technology studies and environmental governance, and in doing so, articulates a framework of questions for the next generation of research and advocacy.

KEY WORDS

Bhopal, development, democracy, disaster, environmental governance, political ecology, science and technology studies.

For many environmentalists in the third world, the dystopia of the industrial accident in Bhopal symbolises a historic reversal of the Hobbesian spectre of the original state of nature.Indeed, Bhopal represents a new condition of constant war, or, to paraphrase the sociologist Ulrich Beck, a historically new phenomenon in which risk is not only socially produced, but brings with it an unaccountable possibility of destroying all life (Beck 1992). Moreover, the sheer fact of such disasters conveys a sense of technics out of control, of environmental instability stemming from an unrealised modernist utopia.

Bhopal shook, by the very root, the assumptions underlying most genres of development theory promoted during the past six decades.[1] Occurring, as it did, at a time when there was already considerable doubt about the developmental project as it was practised in the third world, the disaster served to reinforce the growing sense, among several environmental and social justice advocates, that

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poverty eradication and economic emancipation needed more nuanced and context-specific paradigms. Sheila Jasanoff's introduction to this special issue, wherein she argues that 'Development is a flat word for a world of contradictions', captures the essence of such thinking. A similar sentiment was expressed in a statement of shared concern signed by prominent Indian scholars and activists in the second Citizen's Report on the State of India's Environment, which was issued a year after the Bhopal accident:

> What sort of development do we want?' World geopolitics may demand that we follow the 'technological imperative'. Justice demands that we follow the 'national imperative'… It will call for the development of a people's science that harmonises the principles of traditional knowledge with modern science to serve the complex human needs in a sustainable manner…This scenario definitely does not mean that India ought to turn its back to global technological advancement. But its imagination and its ingenuity will lie in making appropriate choices (CSE 1985: 396).

During the two decades that have elapsed since the Bhopal disaster, there have been several attempts, in India and elsewhere, to rise to the challenge posed by the above quoted statement. Indeed, as the articles by Sivaramakrishnan, Thompson, Kline and Appfel-Margin in this issue show, there have been a number of exemplary instances of 'alternative' developmental strategies, matched by 'positive' changes in state bureaucracies. They span a large gamut of sectors, ranging from agro-forestry (Chambers, Saxena and Shah 1989; Jeffery and Sundar 1999; Poffenberger and McGean 1996; Saxena 1997) to freshwater (Farrington, Turton and James 1999; Agrawal and Narain 1997; Phadke 2002). Far from being isolated instances, these examples, at least according to their protagonists, demonstrate the feasibility of ecologically sustainable as well as socially equitable governance hybrids. It can therefore be argued that there is considerable empirical basis for responding to Jasanoff's challenge that 'It is time to invent more discursively open-ended concepts around which to crystallise our dreams and projects of human betterment'.

The purpose of this paper is to contribute to the tentative steps underway in this direction. It has two parts. At the outset, it sets up a brief case study of the Bhopal gas disaster, with the object of identifying precisely how a single event captured the public imagination and challenged well entrenched theories of development, democracy and science and technology policy. Put differently, the first section seeks to use a case study to understand how 'big' development is problematic and why many, including most of the authors of this special issue, seek alternative frameworks to approach the question of how to better the human condition.

The thrust of the second section is markedly different. At the broadest level, it attempts to explore the characteristics of the 'alternatives' to conventional

development theory. Rather than provide an answer, it seeks to raise and probe a series of questions about the claims that have been made in this regard in both the academic as well as the advocacy and activist literatures on what might be dubbed 'environmental governance'. To this end, it examines introspectively two inter-disciplinary hybrids – Political Ecology and Science and Technology Studies – that have hitherto proceeded along parallel paths. In doing so, it aims to articulate a framework within which these hitherto distinct fields of inquiry can be creatively amalgamated to help develop the next generation of questions for research and advocacy.

A. THE CASE: 'LESSONS' FROM THE BHOPAL GAS DISASTER

The Union Carbide Company entered India within a few years after being founded in 1898. It soon became an important player in the chemical industry, manufacturing products for use by consumers ranging from the domestic to the industrial and the military. A year before the Bhopal accident, the sales of its Indian subsidiary, Union Carbide India Limited (UCIL), amounted to $180 million (Dembo et al. 1990: 12–21).[2]

The company systematically marketed itself in India as a harbinger of progress and prosperity. An excellent example is an advertisement it circulated widely during the 1960s (Figure 1). The poster showed modern industries and historic monuments co-existing in the background, with peasants ploughing a field with oxen in the foreground. Dominating the scene was a hand holding a laboratory flask. Out of it oozed a chemical that flowed down to the earth that was being ploughed. The caption beneath the picture read:

> Science helps build a new India
>
> Oxen working the fields … the eternal river Ganges … jewelled elephants on parade. Today these symbols of ancient India exist side by side with a new sight – modern industry … But India needs the technical knowledge of the western world … working with Indian engineers and technicians, Union Carbide recently made available its vast scientific resources to help build a major chemical and plastics plant … Throughout the free world, Union Carbide has been actively engaged in building plants for the manufacture of chemicals, plastics, carbons, gases and metals. The people of Union Carbide welcome the opportunity to use their knowledge and skills in partnership with the citizens of so many great countries.

At the bottom of this poster was what turned out to be a prophetic statement: 'Union Carbide: A Hand in Things to Come'.

Science helps build a new India

Oxen working the fields . . . the eternal river Ganges . . . jeweled elephants on parade. Today these symbols of ancient India exist side by side with a new sight—modern industry. India has developed bold new plans to build its economy and bring the promise of a bright future to its more than 400,000,000 people. ▶ But India needs the technical knowledge of the western world. For example, working with Indian engineers and technicians, Union Carbide recently made available its vast scientific resources to help build a major chemicals and plastics plant near Bombay. ▶ Throughout the free world, Union Carbide has been actively engaged in building plants for the manufacture of chemicals, plastics, carbons, gases, and metals. The people of Union Carbide welcome the opportunity to use their knowledge and skills in partnership with the citizens of so many great countries.

A HAND IN THINGS TO COME

UNION CARBIDE

WRITE *for booklet S-9 "The Exciting Universe of Union Carbide," which tells how research in the fields of carbons, chemicals, gases, metals, plastics and nuclear energy keeps bringing new wonders into your life.*
Union Carbide Corporation, 270 Park Avenue, New York 17, N. Y.

FIGURE 1. Union Carbide poster, 1960s.

Union Carbide's Bhopal plant was established in 1969 to manufacture pesticides and herbicides. The design of the plant ignored safety concerns that had been raised and addressed at similar facilities elsewhere in the world. Worse, some of the standard safety devices deployed in other sister plants, were not deployed in Bhopal. Besides, the plant was not maintained and operated at the required level of efficiency. Moreover, there was no emergency evacuation procedure. The community living near the plant had not even been educated about the alarm system. The danger alarm resembled a nearby factory's shift change hooter, and on a number of occasions when the alarm went off accidentally, many workers had actually rushed toward that factory (CSE 1985: 207–8, 215–16).

Partially as a result of such poor safety conditions, the majority of engineers who had been hired when the plant was commissioned had quit by December 1984, resulting in a great reduction in operator strength. The resignation of qualified engineers also resulted in the company forcing under-qualified and underpaid workers to operate highly complicated and risk-ridden technological systems (CSE 1985: 216; Chouhan et al., 1994: 23–38; 55–60).

The labour force protested on a number of occasions, seeking adequate training and working conditions. Their protests also drew attention to the abysmal safety record of the plant (Chouhan et al. 1994: 35). On November 24, 1978, for example, the Alpha-Naphtol storage area had a huge fire which took 10 hours to control. Again, on December 26, 1981, the plant operator Mohammad Ashraf was killed as a result of a phosgene gas leak. In January 1982, another phosgene leak caused severe injuries to 28 people. On April 22, 1982, three electrical operators were severely burned while working on a control system panel, and on October 5 of the same year, methyl isocyanate (MIC) escaped from a broken valve and seriously affected four workers besides causing irritation to several residents nearby. Two similar incidents were reported in 1983 (CSE 1985: 216).

The company's response to the protests was to use strong-arm tactics to dispel what it saw as worker unrest (Dembo et al. 1990). In addition to the protesting workers and the litany of accidents that plagued the plant, an internal investigation in May 1982 by a team of three Carbide experts had raised a number of important safety concerns. It had found, among other things, that the tank relief valve could not contain a runaway reaction, that many pressure gauges were defective, that valve leakages were endemic and that there was no water spray system for fire protection or vapour dispersal in the MIC operating or storage area. Moreover, a number of articles in the local press had carried predictions of an impending disaster (CSE 1985: 216).

Union Carbide, however, chose to ignore such warnings. Instead, it ensured that it enjoyed the favour of the key politicians in Bhopal. The relatives of a number of powerful ministers and bureaucrats were either employed by the company or had received illegal favours from it. For example, the company's

legal adviser at the time of the gas leak was an important leader of the ruling Congress (I) party and its public relations officer was a nephew of a former education minister of the state. The chief minister himself was facing a court case over claims that he had personally received favours from the company, and his wife had received the company's hospitality during visits to the U.S. in 1983 and 1984. Moreover, the company's plush guesthouse had been placed at the disposal of the Congress party for its 1983 convention (CSE 1985: 216).

In the aftermath of the catastrophic accident of December 1984, Union Carbide focused primarily on its corporate interests – economic recovery and profitability. It thus insured itself against take-over attempts by buying back its stock, retiring its bonds and paying off part of its loans. It divested a number of its businesses, including the consumer products division, in the process insuring itself against consumer boycotts (Lepkowski 1994: 29–30). It also offered its top officers a total of $28 million in so-called 'golden parachutes', bringing in a new leadership, which did not mentally bear the burden of the gas disaster and its consequences, and which therefore, could focus on its core job of returning the company to the black (Lepkowski 1994). These measures had their desired effect, as the following sentence in Union Carbide's annual report of 1989 testifies: 'The year 1988 was the best in the 71 year history of Union Carbide, with a record $4.88 earnings per share which included the year-end charge of 43 cents a share related to the resolution of the Bhopal litigation' (Union Carbide Annual Report, 1988). En route to such a profitable resolution, the company employed a variety of strategies, including political lobbying and greenwashing.[3]

If the proximate cause of the Bhopal disaster was corporate negligence and corruption, the event was framed by a wider hubris – the seemingly unquestioned acceptance of the claims advanced on behalf of 'big development'. Mainstream Indian politicians had been extremely receptive to the messages expressed in the company's commercials, such as the advertising poster described at the beginning of this section. Indeed, the Indian government sought to woo companies such as Union Carbide as part of its commitment to the Green Revolution strategy of effecting agricultural growth. Moreover, even as the plant began to accumulate a dubious accident history and as its workers protested and petitioned for more safe practices, a state labour minister, Tara Singh Viyogi, contended that the factory was 'not a stone which I could lift and place elsewhere. The factory has its ties with the entire country. And it is not a fact that the plant is posing a major danger to Bhopal or that there is any such possibility' (CSE 1985: 216).

Such a mindset also informed the attitudes of the business community, both in India and the Western world. For example, the *Wall Street Journal* on December 10, 1984, editorialised that:

> economic progress is not without its risks. The saving grace is that the benefits outweigh the costs. As a Georgia Tech doctor told the New York Times, 'Of those people killed, half would not have been alive today if it weren't for that plant and the modern health standards made possible by the wide use of pesticides'. We don't need cost-benefit analyses to know the truth of that. Simple observation shows that life is better for today's middle-class Indian than it was for 19th-century rajahs.

The editorial went on to add that 'how the new prime minister deals with this incident will tell much about India's prospects for further development'. In a sentence reminiscent of the aforementioned Union Carbide advertisement, it declared: 'Indians need technology. Calcutta-style scenes of human deprivation can be replaced as fast as the country imports the benefits of the West's industrial revolution and market economics'. As it turned out, such advice was heeded by the Rajiv Gandhi government, which began to articulate a new open market economic policy. Moreover, several leading Indian businessmen, including the then Indian ambassador to the U.S., Nani Palkivala, lobbied for the early settlement of the court cases in order to attract foreign capital (Chouhan et al. 1994: 125).

The victims of the Bhopal Gas disaster, however, did not share the unabashed optimism toward 'big development' held by the *Wall Street Journal* and the leading Indian politicians and businessmen like Palkivala. In direct contrast to the rationale expressed in the Journal's December 10 editorial, one gas victim remarked:

> the cost of our lives cannot be replaced by Carbide or by the government. We are Indians. We value our *pyar, muhabbat* and those who have departed. We are not like the smart Americans who think in this scientific way. The man here will mourn for the rest of his life. No one can replace his dead relatives.[4]

Again, another survivor declared angrily:

> There is a volcano that is erupting in us. These multinational companies – remove them from our Bharat, and then from the world. Companies like this, which kill us. This is the age of progress. We are proud of the many advances that are taking place. But this does not mean that we go so ahead of science that a gas like MIC crushes us totally. There is no difference between an insect killer and a mankind killer. In the manner in which pesticides kill insects, they kill human beings too. Scientific progress may give us gold, it may give us diamonds. But of what use is this if we die when attempting to use it? We don't want gold. We don't want diamonds. We want our Bharat. Bharat is heaven. If we can't make more progress, let us make less progress.[5]

To return to the introduction, Bhopal was iconic because the sheer scale of the catastrophe forced sentiments such as these, expressed by people like a slum dweller in a small city in the centre of India, to be taken seriously. The disaster raised three distinct questions about the project of 'big development', which had been hitherto unquestioned for five decades. It drew attention to the asymmetric inequities built into the very structure of the project. Next, it questioned the premises of the hubris underlying the idea of development. Last, but by no means the least, it raised doubts about the compatibility of 'big development' with true democracy. If democracy implies effective participation, gaining enlightened understanding and exercising final control over the agenda, as scholars of democratic theory such as Robert Dahl assert (Dahl 1998: 38), the victims of the disaster are justified in arguing, as they did, that the process of bringing development to the city of Bhopal was at the expense of democracy. Indeed, the Union Carbide plant in Bhopal was sanctioned and commissioned with no local public participation, whatsoever. The local people were never informed about the threat that the plant potentially posed and therefore had no enlightened understanding of what was in store for them. Moreover, given that the decision to build the plant was taken by bureaucrats, politicians and business people, neither local residents, nor the external labour force that migrated to partake of the job opportunities that the plant provided, exercised any control over the final decision making on any substantive issue – be it siting or safety.

B. WIDER QUESTIONS

These three 'lessons' of Bhopal – the structural inequities, the hubris, and the lack of democracy – have, as argued in the introduction, led to the articulation of several alternatives to the idea of 'big development' and the search for new approaches to social and economic emancipation. This section will take a hard, critical look at three such literatures: a) critiques of development; b) the promotion of frameworks of 'environmental' governance; and c) civil mobilisation and social change. The purpose of these commentaries is to go beyond the 'first generation' response to events such as Bhopal, and identify more nuanced, and social- and policy-relevant approaches to scholarship on democracy, development and governance.

Critiques of Development

Motivated often by the urge to provide solidarity to social movements combating everything from large dams to biotechnology, a great deal of scholarly attention has focused, during the past two and half decades, on critically deconstructing

the idea of 'development'. The resultant literature, spanning a range of methodologies and approaches, has had considerable impact. Specifically, it has provided social movements discursive power to contest the claims of governments and multilateral aid agencies (e.g., Escobar 1995; Sachs 1997; Norgaard 1994).

It is important to recognise however that the genealogy of development is far too complex to be fully explained by Cold War politics or understood just in terms of Foucaultian 'governmentality'. Many of the early schools of political economy and 'development', such as Cameralism, for example, had their origins in emancipatory enlightenment visions, such as the German *Bildung*. Some of these perspectives continue to linger to this day, as recent research on the idea of the *ethical economy* in the German historical school and other work on European and Japanese traditions, illustrates (e.g., Koslowski 1997; Koslowski 1995; Murakami 1996; Duncan 1996). Again, recent studies of the professional scientists of late British Imperialism shows them as motivated by Fabian Socialist visions of colonial and post-colonial development. As one poem of the period put it: 'Young men, in your pride make haste – the wrong to right, the bond to free, and plant a garden in the waste….' Regardless of their roots in imperial expansion, and their subsequent limitations and failings, the late colonial developmental endeavours were conceived of as projects of emancipation, as indeed were the grandiose schemes initiated by post-colonial leaders such as Nehru and Nyerere (Rajan 2003 forthcoming).

It follows that the social and ecological failure of the developmental visions of the twentieth century demands more than critical deconstruction. Crucially, it poses very difficult but important questions that demand systematic empirical and analytical reconstruction. What, for example can a 'green' political economy look like? What does it mean to follow Karl Polanyi's lead and attempt to re-embed economy in society and nature?[6] Answers to such questions need to be sought in a sustained recovery of lost and buried ideas and in a vibrant interdisciplinary exchange between the disciplines of history, economics and the environmental sciences.

Environmental Governance

Concomitant with the critique of development, and in response to large scale environmental destruction with the Bhopal gas disaster as an ever present backdrop, a variety of actors ranging from grass-roots and non-governmental organisations in countries such as India, to international foundations, have, during the past two decades, begun to envisage alternatives to 'big development'. In doing so, they have, firstly, attempted to strengthen state capacity in sectors where it has traditionally been absent and catalyse systems of transpar-

ency and accountability. Secondly, they have funded non governmental organisations (NGOs) under a variety of labels, including 'asset building', 'community and resource development', and 'sustainable development' (see, e.g. the web site of the Ford Foundation – www.fordfound.org). These programs have tended to promote the erection of governance frameworks wherein decision making power is democratic and where possible, devolved to local contexts and institutions. Such programs have also concomitantly attempted to create 'locally relevant' technologies, knowledge systems, and resource management and conflict resolution frameworks.

Underlying such an approach, which, recently, has also been promoted under the rubric 'environmental governance', is a particular vision of social and economic development in the third world that is characterised by three broad attributes: a) ecological viability and sustainability, b) social equity, and c) democracy and public accountability. Over the past decade, this vision has been translated into a number of 'success' stories across Asia, Africa and Latin America. *Joint Forest Management* in India, discussed by Sivaramakrishnan in this issue, and *Campfire* in Mozambique, to take two examples, are, for many in the global environmental community today, potent blueprints for an ecologically sustainable and socially equitable new world order. The range of institutions now that – at least rhetorically – seek to replicate such models range span everything from local NGOs to organisations such as the US AID and the World Bank Group.

It is important to note here that despite the widespread resonance of the idea of environmental governance and the ostensibly visible success stories in locales in several regions of the world, this new paradigm is far from displacing conventional models of socio-economic development in the third world. In addition to the political obstacles that inevitably come in the way of implementing institutional and paradigmatic change on a large scale, reformers also need to contend with expert communities with long histories of entrenched practices. Indeed, in much of the developing world, the actual decision making on how to govern and manage natural and renewable energy resources rests with cadres of professionally trained technical officers – foresters and civil, mechanical and electrical engineers who staff the forestry and public works departments and the electricity boards. As several recent studies have shown, members of these professional communities are literally indoctrinated in definite values that inform their outlook to national development, and are acculturated into technocracies which think of themselves as *uniquely* qualified to be able to make decisions in the areas of their expertise (Whitcombe 1972; Gilmartin 1994; Rajan 1998). Given such deep-rooted belief systems, it is by no means easy to effect a transformation in the decision-making processes in resource management and development technocracies.

Yet another factor that mitigates against the successful adoption of the environmental governance approach is that there is, as yet, no clear articulation of the paradigm in a manner that seems to offer a cross-sectoral alternative to mainstream developmental policy – in the detailed and principled manner needed to convince upper level decision makers in state bureaucracies and technocracies. While successful cases are useful, they are not a substitute for a well laid out paradigmatic approach that defines environmental governance ostensibly, identifies its underlying normative principles, clarifies exactly what the key-words, such as 'democracy', and 'sustainability' mean operationally, and lays down criteria to measure the success of developmental schemes that embrace the environmental governance model. Equally important is an analysis of what it takes to re-tool state expert communities and institutionalise a new set of practices and procedures in state bureaucracies and technocracies. Moreover, it is important to discover what is entailed in scaling up technological and institutional design that has been successful in micro contexts to larger arenas, or to transfer successful models across cultural divisions. Last, but by no means the least, it is important to address the question of conflict resolution: how, in the process of engendering paradigmatic change and institutionalising environmental governance are the inevitable political conflicts to be negotiated at various levels of state bureaucracies and technocracies?

Even though the environmental governance approach has not been adopted widely in terms of state developmental policies, it is minimally available as a broad tool-kit that can be used to assemble a new paradigm. It is noteworthy however that little systemic attention has been paid to developing parallel strategies to tackle risk and disasters. This relative inattention is particularly glaring given the repeated recurrence of large natural and industrial calamities (e.g., Bhopal, Chernobyl, Hurricane Mitch, the Orissa Super Cyclone, the El Salvador and Gujarat Earthquakes) and the increased persistence of chronic risks, such as those caused by urban air pollution in the cities of developing countries. Yet, it is hard not to notice the potential relevance, to disasters, of the 'success' stories consequent to the adoption of the environmental governance model in the management of the resource commons. Recent social scientific scholarship has produced considerable evidence to argue that disasters are consequences of the social production of vulnerability (Oliver-Smith 1996; Oliver Smith and Hoffman 1999; Hoffman and Oliver-Smith 2002). It follows that the key to mitigating disasters lies in reducing social vulnerability. This, in turn, often implies the building of state adaptive capacity, improving community participation and control, the creation of new forms of adaptive expertise among the state and the civil society, the ensuring of public accountability, and better and more effective communication between the various stakeholders. These attributes, however, are the very same as those articulated in defining the

Lessons from the Natural Resource Commons		**Relevance for Disasters**
Definition and Characteristics: What, exactly, is the meaning of environmental governance?	*Institutionalisation and the Politics of Expertise:* What is entailed in institutionalising environmental governance?	*Transferring successful models to disaster management:* What is entailed?
Definition: If the concept is defined ostensibly, what relationships – between the economy, state, society, nature, science and technology – does it refer to? Should the concept be set up as a point of departure, or in opposition to another conception of development – in what does this departure entail?	*Institutional Prerequisites (State):* What incentives do state bureaucracies and technocracies need to adopt alternative frameworks such as environmental governance? What does it take to change the core beliefs of state officials – on the meaning of social and economic development?	
Normative Principles: What are the normative principles and organisational assumptions underlying environmental governance? What is the precise cash value of key words (e.g., 'sustainability', 'accountability', and 'democracy') that tend to be offered in definitions of the paradigm?	*Conditions for transfer of expertise:* To what extent can 'successful' examples of environmental governance be attributed to contextual, cultural factors? What, exactly, is entailed in transferring such hybrids from one milieu to another? What, precisely, is entailed in scaling up frameworks of technological and institutional design appropriate to micro contexts, to larger, regional scales? – e.g., What does it mean to translate the 'success' of a micro 'people's' dam in providing for the freshwater needs of a small rural community, to either to a wider ecological entity, such as an entire watershed, or to a wider social or political administrative entity, such as a district, or a county or a state?	Given that most examples of successes in environmental governance occur within the context of the management of natural resource commons, what does it mean to translate the lessons of the successes in these domains to other sectors where the environmental governance framework is potentially relevant? What, in particular, are the lessons for policy in the arena of natural and industrial disasters?
Criteria: What, exactly, are the criteria for measuring the 'success' of programs that seek to promote environmental governance? Do societies need to satisfy certain initial conditions (e.g., a certain social structure, or education level, or ownership of resources), for such developmental hybrids to be 'successes'?	*Conflict Resolution:* How, in the process of attempting to institutionalise environmental governance, are practical political interests; at local, regional, national, and international levels, negotiated? Are there political limits to what can or can not be achieved?	

FIGURE 2. Institutionalising Environmental Governance: Issues and Questions

environmental governance framework in the natural resource sector. There is therefore considerable potential to explore the relevance of the one for the other.

The emergent paradigm of environmental governance, thus, potentially offers a way to address Sheila Jasanoff's rhetorical question with which this paper began. The realisation of this potential, however, depends upon an answer to a basic question: 'What are the underlying attributes that make the model of environmental governance a success or a failure?' Since the theoretical tools of the environmental governance paradigm stem from the inter-disciplinary hybrid called Political Ecology, it will be useful first to examine the premises of that discipline.

Political Ecology

If the genealogy of conventional development theory has roots in classical political economy, the search for an end to the unemployment crisis in Britain and Europe following the First World War, and the spirit of reconstruction following the Second World War, the roots of the environmental governance idea lie, at least in part, in the articulation, by civil society organisations, of the correlation between environmental destruction and economic and social vulnerability. Indeed, sentiments such as expressed by Jasanoff and the Centre for Science and Environment at the start of this paper, have, during the last twenty years, resonated across the seas, in Asia, Africa as well as Latin America. In a nutshell, they reflect a widely held view, at least in the aforementioned community, that development and modernisation ought to be somehow redefined so that they are sustainable, equitable, accountable, and democratic (Sachs 1997; Norgaard 1994). Over the past fifteen years, these assumptions have driven the research agenda of the disciplinary hybrid called political ecology.

Although the discipline has its roots in a long tradition of research into human societal and cultural adaptation, a tradition that began in the late nineteenth century with the work of Vidal de la Blache and Friedrich Ratzel, and which culminated in the body of work called *Cultural Ecology* in the 1960s and '70s (Greenberg and Park 1994; Bennett 1976; Ellen 1989), most recent work in the genre has tended to examine the political economic and institutional basis of environmental crises (Wolf 1982; Watts 1983; Bryant and Bailey 1997; Rocheleau, Thomas-Slater and Wangari 1996). Over the past two decades, this body of research has resulted in powerful new frameworks within which to approach the idea of 'alternative' or 'locally relevant' development. This work has collectively altered the way most scholars, policy advocates, and international developmental agencies look at environmental problems in the third world.

The literature has, in brief, produced five broad genres:

1. Broad-brush critiques of conventional developmental policy, including critiques of:
   i. the assumptions underlying Neoclassical economics (Norgaard 1994; Singh 1976; Singh 1996);
   ii. the idea of third world development (Sachs 1997, Escobar 1995; Apfell-Marglin and Marglin 1990; Arndt 1987; Hobart 1993; Kothari 1993); and
   iii. globalisation (Beck 1997; Menzel 1998; Bauman 1998; Mander and Goldsmith 1996; Burbach, Núnez and Kagarlitsky 1997; Eichengreen 1996).

   In doing so, they have provided a nuanced, historicised understanding of the origins and continuance of state developmental policies.
2. Detailed case studies of the politics and dynamics of resource management in specific local contexts (Peluso 1992; Blaikie 1985; Scott 1976; Donahue and Johnston 1998; Durham 1979).
3. Studies that have drawn out the material and ideological underpinnings of state developmental policies; deconstructed the cultural assumptions underlying 'scientific' resource management agendas during the various colonial contexts throughout the third world, and traced the continuance of such policies to the post colonial world (Leach and Mearns 1996; Fairhead and Leach 1996).
4. Studies that have systematically traced the global flows of wealth and the origins of third world debt, and, in doing so, have especially focused on how the transfer of natural resources and of the appropriation of local knowledges and technologies serve this end (Drayton 2000; Naylor 1999).
5. Studies that seek to demonstrate the viability of the proposed new hybrids, especially in the sectors of forestry and fresh water (Jeffery and Sundar 1999; Poffenberger and McGean 1996; Farrington, Turton and James 1999; Agrawal and Narain 1997).

It is this body of research that has, perhaps more than anything else, led to the coinage of a range of keywords that articulate the environmental governance paradigm – terms such as 'sustainable development', 'reflexive modernisation' and 'democratic technics'. It has also resulted, simultaneously, in the development of practical 'alternatives', designed with considerations such as ecological sustainability and social equity foremost in mind. Such 'alternatives' have ranged from specific 'appropriate' technologies, such as, for example, the solar cooker, to complex hybrids involving intermediate technologies and institutional and governance structures, such as the much heralded Joint Forest

Management and sustainable watershed development programs in India. (Farrington et al. 1999, Phadke 2002).

Despite successes in particular sectors and local contexts, protagonists of political ecology have, in recent times, begun to lament that the 'lessons' afforded by their work have largely not been learnt by state agencies in developing countries, and in case, that they do not, as yet, form the bedrock of state policy. One example of such a sentiment is the following quote from a paper by the geographer, Piers Blaikie, who writes in the context of a comparative analysis of state policies concerning Himalayan deforestation in China and India (Blaikie 2000):

> How has this new knowledge been received by state bureaucracies and official policy making in the region? After all, if this research is to be taken seriously, even if not accepted as the new environmental narrative, it has far-reaching policy implications. If this provisional truth talked to power, one might expect to see … A refocusing of development efforts away from narrow notions of sustainable natural capital and resource base (important though this must continue to be) to sustainable livelihoods which encompasses other capitals on which livelihoods draw upon and create too – social, financial, human and infrastructural capital. In short, a re-framing of the environmental to the social might have been expected from this reversal of view in international research… None of these adaptations have been attempted by state policy making bodies.

Blaikie goes on to ask: 'Why have states disregarded this new narrative?' His answer, which resonates among several other scholars is: 'The reasons are political and in both India and China concern the maintenance of state control over people and their resources'. In essence, Blaikie's answer is a restatement of what may be described as the 'use-abuse' model for understanding science and developmental policy in the third world – the corruption, capture and control of the state by global and local elites. However, although there is considerable truth in such an analysis, the approach conceals as much as it reveals. Missing are at least two important factors that may help explain the reasons why developing countries do not, as a matter of course, 'see the light', and adopt the environmental governance paradigms of the kind advocated by Blaike.

Firstly, conventional models of state development, even if flawed, are well defined and articulated bodies of theory and practice (Cowen and Shenton 1996; Arndt 1989; Black 1991). Their assumptions are well understood, their terms of reference clear, and their overall goals transmitted without ambiguity down the hierarchy of bureaucratic structures. In contrast, environmental governance paradigms, for all their profound insights, lack a coherent body of developmental theory which systematically characterises their underlying assumptions and principles. This is not to say that environmental governance is theoretically unfounded. Rather, the underlying principles are found scattered among several bodies of literature and presented on a piecemeal basis, often in response to

particular issues and crises. For example, while there are several publications laying out the values promoted by community forestry, water and renewable energy programs and of 'success-stories' in particular local contexts in different parts of the world, there is little by way of a systematic and comparative characterisation of what they share in common. As a result state officials and experts often do not grasp the more 'global' relevance of environmental governance for public policy on development.

Secondly, although a great deal of the research in political ecology (and especially the pioneering work of Blaikie), has focused on the politics of expertise, the underlying analysis has tended to black-box it within the use-abuse model alluded to earlier. The politics of expertise is thus understood principally in terms of the agendas of capital and of elite agents who control the making and enforcement of state policies. Underlying such an approach is a tacit, if not explicit, acceptance of Whewellian philosophy, which posits that science is a pure and culturally impenetrable activity, and that therefore, the socially observed 'corruption' of scientific agendas must, by course, have an external source, be it capital, or those who have captured and control the state. Missing here is an acceptance of the possibility that the boundaries between knowledge making and society may not be as watertight as assumed in the scientific realist, anti-realist (positivistic), and some Marxist philosophical traditions, and therefore, that cultural assumptions might, tacitly and unconsciously, enter into the equation when scientists frame environmental problems and validate their theories. The failure of state agencies, such as the Indian foresters in Blaikie's afore-quoted study, to accept 'provisional truth' and translate it to 'power' may well lie as much in deep-rooted and principled convictions as political recalcitrance. To summarise, without discounting the importance of overt politics in the dynamics of the adoption of environmental governance strategies, it is worth exploring the cultural politics underlying the attitudes of state bureaucracies and scientific expertise. Here, the disciplinary hybrid called 'Science and Technology Studies' comes in handy.

The Relevance of Science and Technology Studies (STS)

Although the disciplinary hybrid of STS has largely been constructed in response to issues in the Western world, some of the central insights it has provided are extremely relevant to the problem of environmental governance in third world contexts. Foremost is the idea of co-production – that the making of scientific knowledge and the design of technological artefacts, on the one hand, and the legitimisation of political institutions, on the other, evolve in mutually sustaining ways. Building on a wide intellectual toolkit, ranging from post-Kuhnian analytical philosophy to social construction of technology (SCOT); actor-network Theory (ANT) and cultural and gender studies of science and technology, the idea of co-production offers a simple, but important insight (Jasanoff,

Markle, Petersen and Pinch 1995). It argues, in essence, that although the distinction between the contexts of discovery and justification, advocated by philosophers such as Hans Reichenbach and Karl Popper as one of many analytical tools to help define the scientific method (Reichenbach 1938 Popper 1959), is logically valid, it is, in the real world, and especially in contexts in which scientifically trained technological practitioners such as foresters, soil scientists and civil engineers actually practise, almost impossible to apply.

The reason, quite simply, is that scientists and engineers, for all their commitment to the rigours of method, are, ultimately, members of society at large. Although most members of state technical expert communities do, more often than not, follow inductive and deductive reasoning in drawing their inferences, and, in doing so, follow the scientific method, the manner in which they frame practical problems in the real world tends, in many instances, to obscure as much as relieve. As Michael Stocking has argued in his analysis of soil erosion in Africa:

> Scientists are just one set of actors in the 'soil erosion game', a game in which it is advantageous (a) not to admit you do not know the answer; (b) to make unverifiable assumptions, so that if your answers provide bad advice, blame does not attach to the professionals; and (c) to exaggerate the seriousness of the process in order to gain kudos, prestige, power, influence, and of course, further work. In short, soil erosion 'facts' may be as hidebound with bias, error, and prejudice as the outpourings of social science. (Stocking 1996: 141).

Another excellent case that makes the same point is Fairhead and Leach's landmark study, *Misreading the African Landscape* (Fairhead and Leach 1996).

The upshot of this insight for the problem of environmental governance is that the reasons why state experts advocate and tenaciously hold on to particular ways of visualising development – and by corollary, resist attempts at inculcating alternative ways of problem framing and resolution – are far more complex than political capture, as advocated by the use-abuse theory prevalent in political ecology. Here, it is useful to invoke the insight of the philosopher, Ludwig Wittgenstein who, in rejecting the logical-positivist framework that he had previously constructed in *Tractatus*, argued that 'to imagine a language means to imagine a form of life' (Wittgenstein 1997: 8e). It follows that changing the perceptions and attitudes of state bureaucracies and experts on the nature and substance of developmental goals and environmental problems, involves much more than 'showing the light', and hoping that tentative truths translate naturally to political power. Rather, it involves: a) clearly articulating the values and principles underlying the alternative 'forms of life' being advocated by protagonists of environmental governance; b) developing methods and institutions of persuasion so that these forms of life are accepted; and c) exploring how such alternative forms of life can be rendered mobile – or, to put it differently, transferred from one context or sector to another.

The Articulation Question

In his pioneering analysis, the media theorist, Marshall McLuhan proposed four 'laws', 'in analogical proportion to each other', which, he argued, would help throw light on the impact of new artefacts on society (McLuhan 1977):

- What does it enhance?
- What does it obsolesce?
- What does it retrieve that has been obsolesced earlier?
- What does it flip into when pushed to the limits of its potential?

Although McLuhan proposed these questions in the context of new media technologies, it is instructive to pose the very same questions of the 'alternative' strategies of development such as proposed by the environmental governance framework. This line of inquiry seeks answers to the following question: what, exactly, do keywords such as democracy, transparency, accountability, ecological viability and 'sustainability', used in the articulation of the environmental justice paradigm, mean? What do they enhance, obsolesce, retrieve, and 'flip into' when pushed to their limits?

Further, the articulation of the environmental governance program demands answers to two more questions:

1. What criteria of measuring 'success' are provided by such keywords? Moreover, what kinds of institutional arrangements between 'local' (e.g. farmers and coffee growers) and 'non-local' actors (e.g. states, NGOs, and international agencies), make for 'successful' hybrids?
2. How, exactly, is 'best practice' defined? How can reflective knowledge making and technological design combine social consensus with ecological viability in a manner that enable us to talk meaningfully about 'best practices' as alternatives to established state developmental models?

Answers to these questions need to be sought in two distinct domains. Firstly, there is the need for a systematic study of the normative values underpinning the literature relevant to the environmental governance paradigm (e.g., Baland and Platteau 1996; Berge and Stenseth 1999; Berkes 1989; Bromley 1992; Bromley 1999; Buck 1998; Dahlman 1980; Keohane and Ostrom 1995; Libecap 1989; Loehman and Kilgour 1998; McCay and Acheson 1987; Ostrom 1990; Platteau 2000; Young 1997; Sen 1999; Sen 1992). Secondly, it is equally important to examine concrete cases of environmental governance in action, with the object of identifying the constellations of values that underlie them.

The Institutionalisation Question

The development of methods and institutions of persuasion demands an understanding of the following issues:

(i) The construction of existing state expertise: where (class and social status and identity) are the various state experts 'coming from'? What are the politics of the epistemic communities and networks of practice that generate their belief systems and attitudes to development and governance?

(ii) What is entailed in inscribing multiple and diverse world views into the design of alternative resource management hybrids? How do community perceptions of knowledge get reconciled with those produced by institutionalised science? How, further, can this question be addressed within wider societal dynamics relating to factors such as gender, class or race?

(iii) What does it take to persuade state professionals to adopt new hybrids such as environmental governance? What sets of incentives or strategies does such persuasion entail?

While answers to question (i) lie, by necessity, in specific cultural contexts, questions (ii) and (iii) can constructively be approached by engaging in a comparative analysis of the dynamics of 'successful' environmental governance hybrids.

The Mobility Question

What, exactly, is involved in transferring 'successful' hybrid models across cultural, regional and spatial contexts? Again, what is entailed in transferring such hybrids from one milieu to another? How are the underlying principles of the environmental governance paradigm preserved across such contextual differences? What, precisely, is entailed in scaling up frameworks of technological and institutional design appropriate to micro areas, to larger, regional contexts? (e.g., What does it mean to translate the 'success' of a micro 'people's' dam in providing for the freshwater needs of a small rural community, to either to a wider ecological entity, such as an entire watershed, or to a wider social or political administrative entity, such as a district, or a county or a state?)

Such analysis is applicable not just to natural resource regimes but to other sectors as well – including air and water pollution, urban policy and risk and disaster management. In each case, there is a need to generate a series of empirical studies, comparatively examining the structural features of both 'success stories' and 'failures'.

Civic Mobilisation and Social Change in the age of Globalisation

Another big area of ongoing scholarly concern, as related to 'the lessons of Bhopal', is that of social movements in the context of globalisation. Here again, a number of issues desperately seek rigorous academic attention. One of these is the question of how governments and multilateral institutions reconcile environment and development with the risk societies produced by economic globalisation. How do policies, such as those on land reform or international environmental treaties, get framed? What are the politics of the epistemic communities and networks of practice that generate these agendas?

A related set of questions concerns corporations in the context of globalisation. The case of Union Carbide in Bhopal illustrates the argument made by Burston-Marsteller, an issues-management company, that: 'We should no more expect a corporation to adopt a leadership role in changing the direction of society than we should expect an automobile to fly. The corporation was simply not designed for that role' (Rajan 1999: 265). Yet, it is important to recognise that there is an unexplored grey area between the contentions in the Greenpeace book on Greenwashing and of those who argue that corporations can indeed 'go green'. Here again, there is a great need to generate a series of empirical studies.

In asking such questions, a basic concern deserves introspective thought: 'What ought to be the purpose of academic research on social movements and globalisation?' Here, a starting point is the recognition of the importance of the existing agendas in this regard – which seek either to contribute to the theory of social movements or of globalisation or to provide solidarity to social movements. However, given the dynamics of the Bhopal accident, it can be argued that more proactive questions need to be asked. How, for example, have governments and international and multilateral agencies reacted and adapted to local and transnational activist challenges? What strategic opportunities, real and potential, do civil society institutions have to get their perspectives and approaches considered and adopted in policy circles? Such questions are of tremendous importance to advocacy organisations and, if answered with adequate empirical and methodological depth, have the potential to inform strategy and help drive policy and advocacy agendas.

CONCLUSION

Answers to these three broad categories of questions (summarised differently in figure 2) will better articulate the environmental governance paradigm in the natural resource management sectors, thereby informing the next generation of funding and policy priorities, while contributing to our understanding of technology, expertise and democracy. In addition, they can help point toward strategies that help build adaptive expertise in the context of natural and industrial

disasters. It is important to note, here, that disaster management, in most parts of the third world, is characterised by missing expertise in the state (Rajan 1999; Rajan 2001 and 2002). Moreover, while the literature on disaster management is replete with specific guidelines on response and mitigation strategies, on the one hand, and an exploration of the relationship between vulnerability and disasters on the other, there is little, if any, analysis of the dynamics and politics of state expertise, and of the social factors that determine the circumstances under which attempts at the institutionalisation of effective mitigation strategies become successful. This analytical gap makes the lessons afforded by experiments in institutionalising environmental governance in the natural resource sector, all the more relevant and important.

The 'lessons' of Bhopal, then, may have their answers in the highlands of Peru, the forests of Bengal and Kenya, and perhaps even the history of rural America. It is, however, important to note that what matters is not just the content of any investigation toward this end, but its underlying orientation. One of the underlying points of this paper, apropos the aphorism attributed to Wittgenstein cited earlier, is that scholars of development, governance and democracy need to grapple with a fundamental question: 'What is *their* Form of Life?' Undoubtedly, rigorous academic scholarship in fields like political ecology and science and technology studies can be profoundly relevant in the real world. However, for this to happen, there is a need for a new generation of cutting edge research that can help provide solutions and alternatives. A feature of such research would be that it combines a sense of strategic vision, a groundedness in the real world, and a commitment to uncompromising rigour. Above all, it involves a commitment toward framing research questions in terms of real-world problems in all their multi-dimensionality, a dedication to hard empirical research, and perhaps most important, a commitment to clear thinking and jargon-free expression.

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NOTES

[1] Throughout the paper, the terms, 'big development', 'development theory' and 'development' designate state sponsored projects of social and economic emancipation involving rapid and large scale industrialisation at the core. See, e.g., Norgaard 1994, Sachs 1997 and Cowen and Shenton 1996).
[2] Unless otherwise specified 'Union Carbide', 'Union Carbide Company', and 'Carbide' in this paper refer to both the parent U.S. company and the Indian subsidiary. The parent U.S. company held 50. 9 per cent of UCIL's stock, and exercised managerial control through its Eastern Division headquartered in Hong Kong
[3] For an erudite description of the greenwashing industry and its tactics, see Rampton and Stauber 2001. For a discussion of greenwashing in the specific case of Bhopal, see Dembo et al. 1990.
[4] Personal Communication with Ravi Rajan, September 1986. The terms 'pyar, muhabbat' are Hindi and Urdu words for love.
[5] Personal Communication with Ravi Rajan, September 1986. 'Bharat' is a Hindi word for India.
[6] For an erudite discussion of the relevance of Karl Polanyi's work in this context see Baum 1996.

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