The Deliberative Scientist – Democratizing Scientific Practice in Forest Management[1]

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Abstract.

Scientific expertise appears increasingly at odd with practices of democratic governance. This paper critically reviews the foundations of science in environmental management, and outlines a program of democratic organization of scientific practice. I identify various problematic ways through which the dominant, empiricist approach to scientific practice undermines deliberative democratic processes of environmental management. These are – a) overly empirical epistemological focus separating facts from values, and b) bureaucratization and professionalization of science without accountability links with the citizen groups. Taking an example of forestry practice in Nepal, I will show how such an approach to science has undermined the possibility of democratic deliberation in environmental governance. In order to address such problems, I propose a *deliberative scientist* approach which does not reject the role of expert inquiry, but requires the inquiry process to be democratically regulated by those who are to bear the consequences. Rejecting extreme post-modern argument for the end of science, I take a reconstructionist approach drawing on the works of Dewey, Habermas, Bourdieu and other related strands. I will show that such an approach is inevitable given the need to ensure democratic accountability of expert-citizen links in the context of complex and cross-scale nature of environmental governance.

1. Introduction

Nepal became the world's first country to enact a progressive forest legislation allowing local communities to take full control of government forest patches under community forestry program.

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The forest act 1993 allows local communities to organize as Community Forest User Groups (CFUGs) to manage accessible patches of forest areas, and envisions a facilitative role for the forest officials of the government forest department. This signifies a gradual but significant shifts in the roles and relationships between foresters and villagers with regard to the management of forests, away from the earlier practice of centralized management of forests by forest bureaucrats, whose main role was to guard forest areas against local people. By 2005, there are about fifteen thousand CFUGs nationally, managing over a million hectares of forest areas, bringing about one third of the country's population under CFUG system. This participatory model of forest governance is now much heralded for its reported success on generating local livelihood benefits as well as reversing earlier trends of forest degradation. But amidst this success, closer analyses have started to raise concerns on consistency of the impact on both livelihoods and ecological sustainability. Central to these concerns is the ways through which forest bureaucrats and local forest users negotiate knowledge and political power pertaining to the management of forest areas. Consider a case below:

> In a CFUG with a pole stage Sal (a noted timber species) forest, recently foresters advised the group to undertake cutting/thinning of trees so that the remaining Sal trees would grow faster. But this advice was at odd with the aspirations of the local forest users. Because of easy road access to Kathmandu valley, many of the smallholders in the area have started to cultivate vegetables such as beans, cucumber and others as cash crops, which need small supporting sticks. Before a CFUG was organized, the forest was de facto open access and the farmers could collect sticks for their vegetables without any restrictions. But after the establishment of the CFUG, the local leaders and the forestry staff developed a forest management plan which prescribes clearing all bushes in the Sal forest. When the bushes were cleared, the forest became a clean monoculture of Sal trees as per the wishes of the forest officials. But the majority of the land poor farmers who were trying to maximize production through cash crops had no supply of small sticks from the forest. On average, each household needs about 1000 sticks per year. While the majority of the forest users wanted a shrubby forest so that they could get the needed sticks, the official advice of the foresters had to be obeyed. The forest is fast being converted into a clean and timber sized stand, creating shortages of the bean sticks.

The example demonstrates that, despite the rhetoric of decentralization and participatory governance, there is a continuing tension between the foresters and local people. The problem centrally hinges around the relationship between practitioners of science and ordinary citizens while designing forestry practices. The scientific advice of foresters in the above case, couched in the bureaucratic structure of Nepal Forest Department, arguably does not appear congruent with the two stated goals of community forestry – contribution to local livelihoods and ecological sustainability. Indeed, such a techno-bureaucratic closure in policy debate is commonly reported (Pokharel and Ojha 2005) in Nepal. Such a techno-rational domination of governance process, informed by the positivist, empiricist epistemology of science, is indeed a key concern in the field of environmental governance (Backstrand 2004).

While a positivist, scientistic science was a necessary ideal in 15th and 16th century Europe to liberate social and political processes from religious myths and the church (Fischer 1998), its

journey through European Enlightenment, colonialism and more recently to development has eventually met with great resistance. The colonial expansion was made possible through scientific discoveries, and in fact the whole attempt of science was focussed on expanding the capability of western colonists to have access to the non-western world (such as the transport industries). The development "industry" of the post-colonial world also draws its legitimacy from the need to promote modernization and technological advancement rooted in the spirit of Enlightenment. When environmental concerns were annexed to development in the eighties, the role of science took a new turn to promote western notions of environmentalism (such as wilderness, protected areas), thus ignoring non-western ways of understanding nature in the developing world (Guha 1989). The present day forestry administration, with centralized structures of forest management, is a good example of how these western notions of science and environmentalism have been embedded in the day to practices of forest governance (Peluso 1992).

By the eighties, a wave of critical reflections over science and modernity had started. Some have argued for complete withdrawal from what remains science now, which is for them nothing but one dominant way of knowing (Latour 1987). In the larger terrain of epistemological debate, post-structuralism emerged to declare the "end of reason", authorship, and representation (Rosenau 1991). This approach holds that knowledge is nothing but what a powerful speaks (Foucault 1988), and as such, science is an enterprise of experts rather than an objective procedure of representing truth (Lyotard 1993). Science has thus been trapped into the highly unproductive debate between the defenders of modernism and post-modernism. The middle ground is often less attractive for dramatists and politically ambitious scholars. But if one is committed to find a pragmatic resolution of environmental management problems, the middle position should be the main focus of the inquiry and innovation. Indeed, such a position should be regarded as the third way, for which I seek to explore some foundations in this paper.

By explicating further the case of Nepal community forestry in the light of wider debate on science-democracy, this article seeks to critique the ways through which scientific practice alienates ordinary citizens in the sphere of policy deliberation, and suggest a deliberative scientific approach to reconcile citizen and scientist perspectives. I would argue that a dialectical interaction between the scientists and ordinary citizens in a mutually accountable way could help redress the issue. This reconstructive approach allows science as a more focussed inquiry by professionals, but with clear accountability links with the larger political community.

2. Science and democratic governance – conceptualizing the debate

Although what constitutes science and scientistic method have been a matter of constant debate, the dominant mode of science is what is referred to as logical positivism and empiricism, which seek to develop predictive generalizations through falsification or verification of hypothesis, by collecting "objective" facts. This experimental-analytical approach to science employed in the physical world has been expanded to the normative-political spheres, leading to what Habermas calls "overscientization" of social and political problems (Habermas 1987). Since the normative issues are not always amenable to objectivist analysis of empirical data, such scientific inquiry sought to "settle rather than stimulate" the policy debates (Fischer 1998). Fisher argues that the

empirical focus does not contribute much to policy deliberations. This approach separates facts from values – conducting empirical research independent of its normative context or implications. Under this approach, scientists are instructed to assume neutrality, and limit the scope of investigation at the level of facts, independent of values. But scientific truth is not merely a result of experiment but also include interpretations and beliefs (Fischer 1998). Facts depend upon underlying assumptions and meanings (Fischer 1998) but within the dominant scientific paradigm, normative and political issues are handled through techno-rational and administrative means. In the opening CFUG case, foresters defined the criteria of a good forest from their positivist epistemological stance, and then prescribed particular ways of cutting.

Over the course of two hundred years since Enlightenment, the positivist scientific outlook became doxic (doxa means internalized schemes of perceptions, thought and habituated action) and entrenched in the realms of thinking and action within the scientific community, as well as the powerful groups who nurture it. This has largely taken the form of what Bourdieu calls symbolic violence (Bourdieu 1991: 170) – a situation when one group (scientists) enjoys undue political privileges without the recognition (or resistance) by the other (ordinary people). Since colonialists required timber for shipbuilding and railway construction, two important prerequisites for colonial expansion, the forest science became timber oriented and centrally governed over the 19th century. This doxa was instituted into the forestry education around the developing world, and until today, this scientific doxa is manifested in timber oriented control of forest ecosystems, centralization of forest resource management, and a strong sense of hierarchy and bureaucratic ordering of foresters in government organizations (Shivaramakrishnan 2000). This means that scientific practice is unquestionably accepted as superior by many other cultures of knowing which sustained, and is still sustaining, many (traditional) human societies without the use of science.

Since the eighties, the neoliberal framework of governance has confined citizen political participation to choosing leaders who will in turn choose scientists to choose objective solutions of the public (and environmental) problems. Under such a regime of governance, political questions are thus increasingly subjugated to the objective and scientistic analysis. This western, liberal legacy is being imported to the developing world under the banners of democracy, development and environmental conservation. This has led to a tendency for the scientific community to claim autonomy from political society, which, as Dewey argues, runs the risk of pursuing their own interests and problems rather than the problems of ordinary people they should serve (Dewey 1916/1966). That the emergence and acceptance of the field of scientific practice as relatively autonomous means that scientists are distinctively differentiated from the ordinary people, with the result that the latter are disempowered in practical discourses of political issues (Cortner 2000). And when scientific practice is integrated with the bureaucratic administration, an authoritative power-knowledge nexus is created which minimizes the space for political agency of the ordinary people, who may at times organize social movements against such "policy professionalism" (Torgerson 1997). Farmers in the CUFG case do not show such dissent openly, and indeed, they are forced to comply with a regime of forest cutting which does not serve their needs. Moreover, as the neoliberal global order is rolling the state back (with increasingly less role of the public institutions in the economy) to give space to those who can invest in creative businesses, science has gone increasingly under the control of commercial giants (as is evident in the growing private investment in bio-medical and pharmaceutical research these days).

Environmental problems are often too complex for practically grounded social agents to perceive all important dimensions, and it will be too late at times for them to appreciate the problem and then commission a scientific inquiry. And since environmental management is essentially related to the ways various groups of people are related with each other, which is again rooted on historically shaped particular forms of institutions and the doxas of human agents involved, creating possibilities of symbolic violence, the discourse that emerges naturally from such a situation may actually be reproducing the dominant order. In other words, local knowledge and discourse may be imprisoned with immediate pressures of survival and naturalizied tendencies. In such contexts, Bourdieu defends the role of critical social science as the solvent of doxa and providing an epistemological critique to the accepted beliefs and values (primary experience) of the ordinary people (Bourdieu 1990). But this, when seen in relation to the way science has been so scientised and even bureaucratized, may create further problems of disempowerment of the ordinary people (Cortner 2000). This is especially severe in the cases of misappropriation of environmental resources by the political elites by bureaucratizing and co-opting scientific power (Peluso 1992). And if scientific practice is considered as a fully autonomous practice to guiding inquiry into moral questions, this will lead to further problems of injustice as scientific legitimacy has been unequally distributed. Even the engagement of scientist after the scope is defined by the citizen is "damaging to democracy as it creates a technocracy that yields great influence in deciding how typically broad policy goals are to be actually realized" (Cortner 2000). Tension therefore remains as to how scientific practice and citizens' ordinary knowledge can be organized in a democratic way.

The controversy over the role of science extends even to normative spheres - should science be allowed to define ethical values and moral questions of environmental management? If social agents in any field of practice operate on the basis of their own doxa, which legitimates the dominant social order (such as centralized forest control), then who is going to challenge such naturalized dispositions? Should all scientific inquiry be guided within what is perceived as a problem by the moral community (groups of citizens related to or affected by the issue)? Many of the scientific discoveries which have profound moral and political implications were actually made by the scientists on their own perception of a problem – not even problem but a desire or curiosity, without having waited for the problem of inquiry to come from the lay people. Darwin's theory of evolution is a case in point. Even the recent upsurge of research on climate change was first brought out by the scientists, which then entered into the moral-political discourse.

And if scientists are allowed to inquire into the value questions, they may settle rather than stimulate the debate (as Fisher argues). In the forestry management case above, where a lot of political questions were there regarding which species to retain and for whose benefits, the questions were 'settled' instructively by foresters. More importantly, the scientific function has been alienated from the arena of citizen deliberation in two senses – as expert discipline over and above the common sense of the ordinary people, and as the official and instructive application of it. This is true with Nepal's national policy process as well. An analysis revealed that during the democratic regime (after 1990), political leaders were guided more by 'administrative will' than by public will (as stressed in the ideal of deliberative democracy), and elected politicians tended to endorse policies drafted by the forest officials (Ojha et al. 2006). Forest policy making is thus

considered a scientific, official and professional domain outside of the sphere of public deliberation.

Lack of adequate deliberation is also in part related to the agency of the citizens. In the forest management case, the poor farmers could not voice their concerns in the design of forest management strategies. This is because of the fatalistic doxa (a deeply held belief and dispositions accepting instructions from the powerful) rooted in their agency over the course of years (in the hierarchically organized society of Nepal in terms of caste, class, gender, ethnicity, and placed based identity), and also because of low cultural capital that could have allowed them to exercise their agency in the discursive process. Just inviting them in a meeting may not be enough to trigger meaningful participation. This means that the public sphere of forest users is itself problematic. The social scientists cannot just wait until a political consensus (among the diverse groups of citizens) is reached on how a scientific inquiry is to be organized. Indeed, there is a role for critical social scientists to reveal dominating doxa and unequal distribution of capitals that prevent egalitarian debate. So I contend that the role of science is not confined to undertaking technical analysis but also critiquing existing doxa that enacts domination (although the question of science getting co-opted by powerful remains unresolved). The actual scope of scientific inquiry should be determined in the specific contexts of practical problems through dialectical interaction between scientists and ordinary people, and I do not think any general solutions can be offered on this.

Let me now summarize the problem of scientific practice in the opening case of forestry management. The forester as a holder of scientific knowledge prescribed timber oriented silvicultural practices drawing on both scientific and bureaucratic legitimacy. Indeed, the foresters' autonomy is guaranteed by attaching forest science to the bureaucracy and providing necessary legal power to issue binding instructions to the local forest user groups. Forest regulations and contracts say that technical advice given to the communities is binding on the communities. In addition, only the government foresters are considered the legitimate providers of forestry knowledge. If CFUGs receive technical forest advice from any non-government service providers, they have to eventually get endorsed by the government foresters. This is in part because the non-government forestry profession is not adequately professionalized, and in part, because the dominant position of the forest officials in the field of forest governance tends to reproduce their own domination. In medical science, even the non-government medical practitioners are considered legitimate providers of knowledge to a significant degree. But forestry presents a case of professionalization within bureaucratic boundaries, thus dividing official knowledge from un-official. Although the forester as a scientific practitioner is at the same time a "political actor whose actions have consequences for the integrity of democratic as well as ecological processes" (Cortner 2000), his/her position is privileged in deliberating over norms of silvicultural treatments of forest. The next section will identify a deliberative perspective of science to address such issues.

3. Towards a deliberative scientific approach in environmental management

The preceding discussion has discussed two crucial questions. Do we need expert inquiry? If yes how do we organize it in a democratic way? My discussion has sought to develop a "yes" to the first question for two reasons. First, social agents on the ground may not perceive the problem (at

least the magnitude which the problem warrants). Second, even when they perceive it, social agents on the ground cannot rigorously test the alternative factual and value questions. But when scientific practice is allowed an autonomous pursuit – without critical links to those who have to bear the consequences – it will create at least two important problems – a) lack of an accountability link between scientists and the users of science, and b) disempowerment of the people by highly technical and sophisticated modes of scientific inquiry. When this happens, this may lead to a situation where political questions of environmental decision-making are either controlled by scientific experts (Backstrand 2004) or by few powerful groups. So the second question is more fundamental – how do we organize scientific practice in a way that enriches the ordinary practice and at the same time is organized in a democratic way?

In a nutshell, I would argue that a dialcetical communication between the scientists and ordinary citizens in mutually accountable way can help resolve the issue. The sphere of scientific inquiry should be within the control of a political community, but with a possibility of critiquing each others' values. For instance, in the CFUG case above, the foresters job of technical assessment of forest should have been scoped by the users of the forest. If farmers had given a political autonomy to decide the forestry operations, they would have engaged the forestry practitioners to estimate the yields of small sticks and identify the needed forestry operations. But growing vegetables is also a doxic practice, shaped historically in the field of farming, and there is still a room for external social scientists to challenge this doxa (through only in an interactive way). For instance, economists and business specialists could analyze the profitability of vegetable growing in relation to other competing options, and prescribe the most profitable ones, but still the normative question remains – what best satisfies the farmers may not just be the revenue but a proper match of the household institution, traditional knowledge, available inputs, land type and so on with the type of farming, and this complex relation can hardly be modelled by an external scientist without dialectical interaction with the concerned farmers. This points to the inevitability of deliberation and cooperation in inquiry.

I propose that deliberative scientific practice is inevitable on moral, epistemological and technical grounds. On moral ground, as Habermas argues, it is crucial to meet the criterion of deliberative legitimacy while constituting the norms of environmental management. On epistemological ground, as pragmatists argue, there is an inevitable need for the division of labor between ordinary people and scientists (though with a continuous dialectical communication link) in order to find a solution that enhances social justice and ecological sustainability. On technical grounds, as complexity theorists argue, two aspects are crucial. First, deliberation between scientists and citizens is inevitable in dealing with issues of multiple scales and the co-production and exchange of environmental utilities. Second, there is an inevitable need for social learning in the attempts to identify appropriate governance arrangements in complex and dynamic contexts that characterize environmental management situations. I briefly outline these aspects of deliberative scientific practice.

a. Deliberative legitimacy of environmental norms

Science has a potential to contribute to both policy and practice. Much of the policy domain which defines the boundaries of practice is a sort of discursive/communicative arena, in the sense that

policy norms result from a discursive response to a problem. Given this nature of policy process, how different groups and individuals draw on various kinds of knowledge in debating policy norm becomes crucial. As Habermas argues, "just those action norms are valid to which all possibly affected persons could agree as participants in rational discourses" (p107). Such a discursive nature of policy making is widely referred to as deliberation, which is a conscious exercise of communicative competence by social agents to understand, negotiate and transform human relations. It is a "social process" involving communication of reasons, arguments, rhetoric, humour, emotion, testimony, story-telling, and gossip (Dryzek 2000: 1). Deliberation rules out self-governance and individuality but recognizes the transformative potential of collective engagement (Dryzek 2000: 1). Such communicative practices do not just make governance possible but provides rationality for legitimate exercise of restraint through collectively constituted norms. This challenges the dominant practice of technical expert crafting of environmental policy, and requires science to contribute to practical policy deliberation. In the community forestry case above, the norm of forest thinning that is applied does not emerge from the discursive participation of all concerned, and indeed those most affected were left out of the discussion entirely. If there was open deliberation among the diverse groups of forest users, a different norm could be developed, with morally superior outcomes (benefiting the resource poor farmers) and hence the legitimacy of the norms themselves.

b. The division of labor

It is not likely that the lay public will be able to resolve all the environmental knowledge problems they face. The substantive depth of information needed before a policy decision is made requires knowledge of scientists, on top of the ordinary knowledge of the citizens (Sabatier 1991). And it is also not likely that a policy question can be fully relegated to scientific resolution. What is important is that concerned groups of people or citizens deliberate to define the scope of the problem and expert inquiry, and develop judgements on the type of expert they need. Then the role of the expert can be: a) gathering information and analysis, b) maintaining critical communication with the concerned groups of citizens, and c) critiquing the doxa of ordinary people that limits moral inquiry.

Absolute dependence on, and romanticization of, local knowledge is also problematic (Sillitoe 1998), as local knowledge is inscribed within the day to day pressures of livelihoods and the larger socio-political structure that shape learning. If discursive knowledge is just a thin tip of a thick doxa (Crossley 2003; Hayward 2004) which naturalizes social agents into particular sets of practices, then there is a role for critical social science to trigger self-reflexivity among the ordinary people at all stages of the inquiry. Here the role of science can be broadened to include the praxis of external epistemological critique (using the methods of science to challenge practical doxa) to trigger re-thinking of accepted assumptions in the practice of natural resource governance. But the challenges remain as to how an external expert engages critically and at the same time within the democratic control of the people being critiqued. But the Nepal case of community forestry indicates that those who are taking the position of scientists (foresters) are themselves the victims of timber-oriented forestry doxa, whereas the land poor farmers have to some extent responded to changing contexts of livelihoods, and adjusted forest harvesting techniques (harvesting bushes).

Under deliberative scientific approach, the purpose of scientific inquiry should be to "improve the quality of policy argumentation in public deliberation" (Fischer 1998). As Fischer argues, the shift from positivism involves turning from proof or verification to discursive and contextual inquiry so as to provide a normative framing without rejecting the empirical aspect. And knowledge is augmented through the "dialectical clash of competing interpretations" (Fisher 1998). Through processes of deliberation, possibility exists for citizens and experts to reach a consensus concerning what will be taken as "valid explanation" of the problem (Fischer 1998). The role of experts in the public organizations is therefore to manage on-going processes of deliberation and education rather than making and implementing decisions (Reich 1990). The Nepal case of forest harvesting does not indicate dialectical clash between local forest users and foresters. It is only the foresters as experts who have prescribed what is best.

Bohaman's synthesis of Deweyan pragmatism and critical social science provides further insights into how scientists and ordinary people should relate to each other in the process of inquiry. He argues for a social control of scientific practice as autonomous practice of scientists can lead to technocratic rule (Bohman 1999). He identifies the role of expert inquiry in the process of democracy, which can be democratic under two conditions – a) it must establish free and open interchange between experts and the lay public, and b) discover ways of resolving recurrent cooperative conflicts about the nature and distribution of social knowledge. For him, two features of science are relevant for democracy – disciplined discussion and experimentation. If inquiry is organized in a cooperative way, then Bohman sees a possibility of knowledge thus being owned socially. This would also create a possibility of combining depth (of scientists) and breadth (of ordinary people) dimensions of knowledge in the governance of natural resources. In the CFUG case, foresters do not see a need to engage in cooperative inquiry with the villagers as regards how best forest can be managed for the benefits of local users, and local users are also not in a position to force the latter to do so.

Even when spaces are created to ensure critical communication between scientists and ordinary citizens, they are not neutral, and hence not equally accessible to all groups. Structural inequality among local people means that some are more able to invest resources and time to generate 'formal' knowledge, which they could articulate in the deliberative processes. As such, when scientific initiatives operate at the local level, when they require investment of time or local resources, they are more likely to draw the involvement of local elites. Both through immediate benefits of participation for the elite, such as status, information, stipends, or other benefits and in terms of long term policy implications of the research, this association between scientists and local elites may tend to reinforce the existing social inequality among the different groups of local people (Vernooy and McDougall 2003). It is therefore essential to envision multiple spaces of deliberation, and exploring the cultural politics of deliberative spaces (Fischer 2006) to identify avenues that suit the disadvantaged people should itself be an issue of first order (before the substantive issue) deliberative practices, which could open onto possibilities for inclusive deliberation in more substantive issues of environmental governance. In Nepal's forestry case, the resource poor farmers are less likely to articulate their concerns in front of the forest officials, and only a series of small scale meetings, with forest officials disempowering themselves, may lead to deliberative transformation of forest governance.

c. Multiple scales and the need for deliberation

The technical possibility of the simultaneous production of environmental goods at different scales and limited possibility of fully privatizing resource arenas of governance (due to public good nature) require deliberation to take place between social agents occupying positions in different scales. Here, the role of technical experts should be to stimulate deliberation, rather than prescribe cross-scale relationship. Forest degradation in Nepal's Himalayas was considered to be one of the factors responsible for floods in Bangladesh. And tropical rain forests are actually the global carbon sink. This multi-scale production possibility expands the sphere of legitimate actors in the moral discourse, and complicates the possibility of arriving at understanding. While a significant movement in decentralization and local management of environmental resources is being promoted recently, they are driven more by the instrumental purpose of "conservation" than the genuine goal of political empowerment and equity. While the need for conservation can not be denied, the way conservation is organized - by shifting burdens to locals while allowing the non-locals to have greater share of the benefits – is problematic. The conservation science has advocated centralized models, which provide little space to the local actors as regards how they want to manage such areas (Newmann 1997). Also, leaving local resources with local people without adequate linkages established to enable them to exchange the resource values does not make much benefit. Without realizing the value-in-exchange, the emphasis on devolution may actually create extra burden on the local people to take care of globally significant environmental resources. In this connection, the challenge for a deliberative scientific practitioner is to reveal the conditions and possibilities of more equitable cross-scale governance of environmental resources (Cameron and Ojha 2006), and thus facilitate equitable negotiation between scales.

d. Complexity, dynamism and need for learning

The physical complexity of the environment and the diversity of the social agents make a process of arriving at an arrangement of governance an uncertain and changing process. The socio-ecological systems are complex, non-linear, and all planned actions by humans are likely to have results beyond the planned protocol (Gunderson and Holing 2002). In such situation, not only free and open debate (in Habermasian sense) but also a process of continual inquiry is needed (Bohman 1999). This requires approaching governance as the learning process, much like Dewey's conception of democracy as cooperative inquiry. For Dewey, having learning orientation means to turn "traditional empstemological, moral and metaphysical questions into practical problems" (Bohman 1999). Pragmatic framing of social problem, for Dewey, is to emphasize ethical and political aspects of inquiry rather than epistemological (Festenstein 2001). Given the complexity of human-environmental system, the need for learning is even more crucial. As Lee (1993) argues, all environmental policies are experiments, which can be used to generate learning to act.

In the CFUG case, foresters and forest users could have first developed learning questions with respect to different aspects of uncertainty in the human-environment system. While the first step could be to identify goals of forest management (negotiating the relative priority over timber and

bean sticks), in the second step, they could have organized thinning with some experimental element – having, for instance, a plot for observing whether retaining shrubs under Sal trees really affect the growth of the Sal trees. And this does not necessarily require sophisticated measurement but even qualitative observation would suffice to deduce the effect. On social fronts, foresters and CFUG leaders could have even experimented with different techniques to reach out to the land poor farmers and empower them to voice their concerns in the deliberative spaces. Still at another level of complexity, the rapidly changing context of livelihoods – opening up of the roads, migration of male labor and eruption of violent conflict – may demand changes in strategies of forest management. Here, an element of prediction of future scenario – a job better suited to experts - is also necessary in the deliberative process. But all scientific jobs are justified to the extent that they are perceived essential by the community who has to bear the consequences.

5. Emerging approaches and the prospects of deliberative scientific practices

Practitioners of science have been divided into various brands or approaches, and this is natural when we recognize Bourdieu's view that scientists pursue their own interests in the competing field of practice. This means that how science should be organized is actually subjected to the ways scientists choose particular approaches to knowing in relation to their perceived achievements in the scientific field. And it is also normal, as Kuhn argues, that dominant modes of scientific practice get subjected to revolutionary breaks when resistance gets intensified. I provide an example of this dynamic by situating an emerging approach to scientific practice and its challenges to the dominant modes. The emerging approach I have chosen is Adaptive Collaborative Management (ACM) – of which both strong and weak elements are identified from deliberative scientific perspective.

ACM approach is emerging through participatory action research work coordinated by the Center for International Forestry Research (CIFOR) undertaken in collaboration with a number institutions and local communities in 11 countries in Asia, Africa and Latin America. Colfer (2005) summarizes the findings of the early stages of the ACM research project, which she argues can be a possible strategy for scientists, officials and communities to work together to manage environmental resources. She recommends that any approach to understanding and facilitating change in environmental system should recognize: a) the inherent unpredictability of complex adaptive systems; b) the importance of learning in our attempts to deal with this complexity, and c) the necessity and potential of working closely with the people who act within those systems – at all levels (p 2). As such, proponents of ACM appreciate the need to be deliberative practitioners as I have laid out in the previous section.

ACM blends ideas of learning and interaction from a diverse range of theoretical ideas. It builds on Lee's (1993) idea of combining science and politics for social learning in environmental management. It draws on the understanding of the dynamic and complex nature of socio-ecological systems of (Gunderson and Holing 2002). It also draws on the field of organizational learning and learning organizations to recognize the importance of constant learning in the human interface and creating shared visions of change (Senge 1990; Argyris and Schön 1996). It emphasizes making explicit background suppositions of plans and activities, and incorporating a

monitoring process tied to the action so that learning does not just become incremental but seek to reconstruct perspectives and conceptual frames (Taylor 1998). Joint reflections and deliberations (Forester 1999) form the backdrop of the ACM process (McDougall 2001). Attempts are also made, using Fals-Borda and Rahman's (1991) conceptualization of action and knowledge, to bring learning outside the instrumental domain and engage agencies critically and politically. ACM approach seeks to address Berkes' (2004) concerns for cross-scale institutions, cross-crultural ethic and adaptive approaches. ACM also seeks to consider Bromley's (2004) plea to identify the limit of rational choice theory and identify a dynamic and interactive approach to scientific practice and environmental policy.

At the core, ACM seeks to combine two related elements – adaptive management and collaboration among the stakeholders. Adaptive management can be understood as a process of enhancing learning for improved management outcomes, by incorporating explicit learning plans into management actions. The concept of collaboration entails bounding of conflict (Ojha et al. 2003). Environmental management is essentially related to how, and the degree to which, people and groups manage diverse interests to form collaborative associations. ACM presupposes that resource management is always associated with conflicts of interests, along with opportunities to form collaborative relationships from which to address resource management and livelihood goals. In fact, since learning is not confined to one individual, and since issues of resource governance are shared in common by many, conflicts and cooperation can be seen as related, unavoidable and essential processes. Social learning through problems and opportunities is therefore the linchpin of ACM approach.

The ACM practitioners would thus approach the problem of community forest management differently from mainstream scientific practitioners. They would seek to identify different groups of stakeholders around the issue of forest management (presented in section 2), and create spaces for dialogues and negotiation. Appreciating uncertainty, they would encourage small plots of alternative forest management models for joint reflection, along with similar experimentation on institutional aspects – working with small working groups and forums of researchers and research users. They would take a value adding approach by recognizing the existing ideas and knowledge related to the problem situation. As Colfer (2005) argues, ACM proponents "take a very different approach" than taken by institutional approaches such as those of Poteete and Ostrom (2004), which she considers to be based on "acquisition and manipulation of standardised data from many different environments". ACM seeks to take a pragmatic outlook – linking global discourse with local action, and as such goes beyond the radical intellectual pursuit of political ecology. Colfer (2005a) warns that if we fail to take such adaptive and collaborative approach, "we are doomed to prolong the top down and ineffective path" which has been in practice and which we know "contributes neither to more sustainable forest management nor to more equitable human systems" (ibid, p303).

Despite promising signs, the idea of ACM also suffers from its preoccupations with institutional change that can be promoted through enhancing the learning of social agents. It suffers from naïve utopianism of how we should act, rather than revealing the sociological conditions of why people do not consistent with ideal expectations (and the perspective of the deliberative scientist may itself suffer from this kind of utopianism, but still my contention is that deliberative reasoning

cannot be relegated to technocratic resolution of political issues). It makes somewhat unrealistic presuppositions of cooperative, inclusive and collective spirit in environmental stakeholders. It also tends to reduce all kinds of historically entrenched collective action problems to the 'here and now' process of communication and negotiation. Although aware of the limits of extractive reductionist analyses to the actual process of political deliberation, ACM practitioners have yet to demonstrate multi-scale pragmatic inquiry processes linked to relevant dimensions of political deliberation. While ACM embraces the inevitability of complexity and dynamism as well as multi-scalar processes of environmental management, the analytical frameworks and ideas are still limited to a distant "system" viewer, rather than "lifeworld" perspectives (in Habermasian sense) of the actors engaged in the environmental management. The observing distance is evident in the commonly used distinction between forest systems and human systems – for local actors, it is "we" and the forest, not the two different "systems". From a deliberative point of view, when human systems are juxtaposed parallel to forest systems, it seems that a distant observer is trying to instrumentally approach human beings, thus violating one of the norms of deliberative governance, rather than local human beings acting to assert their intrinsic rights and dignity. But this does not mean that there is no need for more technical aspect of the analysis of both resource systems and social systems, but the question is how both analyses can be made more reflexive to the actors concerned so that any technical analysis is situated within the normative framing or values of the actors.

Many problems of environmental management are rooted in doxa and structures of society and may need to facilitate greater surprises and discontinuities rather than relying on a thin and incremental process of negotiation, learning and collaboration, on which ACM rests. ACM should not just stipulate what institutions and stakeholders should do for effective and equitable management, but also provide deeper sociological explanations of strategic manoeuvres and deception which stakeholders apply in the process of interaction, and the complex pathways of discursive and structural processes of change. In this context, there is even a need to explore more about how deliberative scientific processes take place, by scientists and ordinary people together, at different scales of environmental governance.

Conclusion

This paper has problematized empiricist scientific practice in environmental management and charted out a way of reconstruction in the context of environmental management. Over the course of two hundred years, the positivistic scientific outlook has become doxic and entrenched in the realms of thinking and action both within the scientific community, as well as the powerful groups who nurture it. Since science has always been at the hands of the powerful colonialists, development agencies and environmentalists, it has exercised a self-asserted domination against other modes of knowing. The problem has compounded when a scientific community claims autonomy from political society, especially in the dominant liberal modes of governance which endorses such claims. As a result, much of the scientific practice has become either too intellectualist, without a clearly identifiable community of political deliberation, or steered by narrow private interests (explicit or implicit). This way of scientific organization and practice has

tended to benefit the powerful and exclude the ordinary and socially marginalized groups in the process of environmental decision making.

In order to address this continuing problem of scientific practice in the context of environmental management, and also eschewing the post-modern rejection of scientific practice, I have identified four key conditions for a democratizing scientific practice – a) recognizing deliberative rationality as the moral basis of environmental norms, b) appreciating cross-scale production of environmental goods and the consequent need for deliberation among actors of the corresponding scales, c) recognition of complexity and need for continuous learning to develop rules and practices of environmental management, and d) appreciation of the need for cognitive division of labor between ordinary people and scientists to better understand and address environmental problems. In a more practical sense, a deliberative scientific approach recognizes the role of systematic/scientific inquiry, emphasizes scientific inquiry to be defined in the sphere of political deliberation, and requires scientists and ordinary people to engage in generative dialogues. It also recognizes political inequality and the need for a transformative role of scientific practice, and appreciates the need to critique the doxic assumptions of the citizens. The central thrust of the deliberative scientist is not to settle but to stimulate the debate among the actors concerning the issue.

How can we enhance deliberative scientific approach in practice? A culture of reflexivity (to see one's own doxa) and deliberation (to transform each other's doxa) underpin the process of democratic transformation of scientific practice. These are not just technical instruments but basic epistemological virtues and political ideologies. More needs to be known about various dimensions of these, including the interaction between structure and agency enacting a scientific practice, in various contexts. A provisional space for improved deliberation may be created when a practical problem is approached in a learning mode, treating policies as experiments (as Lee argues). This provides room to interact in a bounded space of conflicts and re-negotiate not only the objective data but also the entire meaning structure and perspectives, as Mezirow (1991) argues, guiding the perception of the problem. An enhanced process of deliberation is also related to timing and the periodic dissonance between "accepted knowledge" and "surprises" or apparent contradictions that emerge from practice. If the efforts of deliberation are targeted at such times and spaces of 'crises', the possibilities for change are higher. Indeed, how a deliberative approach to science can contribute to the process of democratization of environmental governance is itself an issue of deliberation at different scales of governance and discursive practices.

5. References

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