

Draft

**Rethinking Key Assumptions in Natural Resources Management: Drawing Lessons
from the Case of Water¹**

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FIRST AND PROVISIONAL DRAFT

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(Comments welcome)

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1. Introduction

There are several challenges confronting natural resources management in the early Twenty-First century. Some of them include how local people cope with and respond to rapid technologies, dynamic ecosystems, capital flows and competing forms of governance. In an increasingly globalised world, these factors link rural livelihoods with economic, political and environmental regimes constructed across multiple sites. They also increase the uncertainty confronting local people as they make and sustain their livelihoods.

In this paper, I argue that uncertainty is emerging as central to issues concerning natural resources management to which local institutions constantly respond. However, mainstream theoretical and policy perspectives in natural resources management have not adequately understood the nexus between institutions and uncertainty. They have instead based their assumptions on the notion of a predictable world with knowable calculus. Institutions and local communities have been conceived in static ways, leading to a lack of appreciation of how theory and policy might be better equipped to capture how institutional arrangements deal with the various uncertainties impinging on rural livelihoods. By drawing on lessons from the water sector, the paper demonstrates why it is important to take uncertainty seriously and what failure to do so could lead to. The paper begins by exploring three different types of uncertainties and their accompanying institutional settings (Section 2). Section 3 then goes on to discuss the challenges that these new perspectives throw up for natural resources management. The uncertainty framework is then illustrated by drawing lessons from the case of water in Section 4 where specific reference is made to ethnographic material on water in Kutch, western India. Section 5 explores how different theoretical approaches handle the institutions and uncertainty nexus. I distinguish between mainstream and emerging views. The former refers to those theoretical approaches which have been very influential on policy, namely New Institutional Economics (NIE) and Common Property Theory (CPT). The latter refers to a diverse range of perspectives from the social and natural sciences, including sociology, anthropology, new ecology and legal pluralism. The paper ends with implications for policy and practice.

2. Understanding Uncertainty

There is a growing awareness of the numerous risks, uncertainties and indeterminacies that characterise the natural and social worlds that we inhabit and within which institutions are located and operate. By uncertainty, I refer to situations characterised by indeterminacies. Unlike risk, the probabilities are impossible to calculate. What are the implications of these uncertainties and risks for rural livelihoods in many parts of the developing? By drawing on ideas developed in Mehta et al, 1999, let me now highlight three types of uncertainties which seem to be of significance to rural people.

Ecological Uncertainty

Environments have usually been understood in terms of being stable and in natural balance. Any shifts are seen to change this balance. However, new understandings in ecology have challenged the ideas of stability and balance in nature (e.g. Zimmerer, 1994; Scoones, 1994). Ecosystems are increasingly seen to be characterised by variability and unpredictability, with non-equilibrium dynamics often being the norm. An appreciation of such *ecological uncertainties* calls for a re-thinking of conventional methods of natural resources management. Thus, notions such as carrying capacity, scarcity and fixed territorial boundaries may not be appropriate in local natural resources management and issues such as livelihood diversification emerge as key.

Livelihood Uncertainty

Natural resources management has tended to focus on the local level and has ignored the unpredictable nature of the ecological, economic and social worlds within which we live and the uncertainties they create for local livelihoods. Rapid and unexpected environmental change can cause hazards such as droughts, floods and pollution and affect people's natural environment and their livelihood strategies. In an increasingly globalised world, economic systems, too, are in a constant state of flux with global capital flows affecting the livelihoods of local cultivators and determining the future of their products. The social world is also characterised by complexity. Social actors are heterogeneous and the communities they constitute are conflictual and power-ridden. The heterogeneity in the social world is often mirrored in the various institutional arrangements governing natural resources management. Resources are often managed by conflicting institutional arrangements, ranging from locally situated ones to those that are globally created. They can be either formal or informal in nature.

While a considerable literature has drawn attention to how rural people adapt their livelihoods and institutional arrangements to respond to seasonal-related risks (e.g. Davies, 1996; Chambers, 1989; Scoones, 1994; Richards, 1989), little is known of how rural people deal with several new kinds of uncertainties affecting livelihoods that arise due to globalisation. Therefore new understandings of how people and institutions cope with these livelihood uncertainties are required.

Knowledge Uncertainty

Uncertainty in knowledge results out of the partial and incomplete nature of different kinds of knowledges. It is increasingly acknowledged that both lay and scientific knowledge perspectives are plural, partial, contingent, situated and contested (e.g. Funtowicz and Ravetz, 1993; Wynne, 1990; Harding, 1987). Scientific knowledge is not always able to predict the outcomes of its experiments or results, for example as recent debates around genetically modified food indicate. Science similarly is often framed by certain political and institutional biases that support certain interests over others. Similarly, indigenous knowledge is located within certain institutional settings. The focus

on knowledge uncertainties helps to appreciate the multiple meanings and viewpoints that different people attach to natural resources and their plural and partial nature. Recognition of the incomplete nature of knowledge, also allows the opening up of spaces for hitherto “subjugated knowledges” of marginalised people (Foucault 1980).

3. Rethinking Key Assumptions in Natural Resources Management

Taking uncertainty seriously calls for a rethinking of certain key assumptions in natural resources management as summarised in Table 1. In Section 6 I will discuss how mainstream thinking has tended to focus on local areas, bounded communities and institutions as rules. By contrast, emerging views seek to break down dichotomies between global/local and informal/formal. Emerging views are also placing diversity and conflict up front by seeing institutions as part of a constant process of negotiation. Institutions are not seen in functionalist and managerialist ways but instead as the products of social and political practices.

Table 1: Emerging views complementing and/or contrasted with mainstream views in natural resources management

Theme	Mainstream Views	Emerging Views
<i>Livelihoods and natural resources management</i>	Links between single resource and use	Multiple users; complex and diverse livelihood systems
<i>Resources</i>	Material, economic, direct use-value	Also as symbolic with meanings that are locally and historically embedded and socially constructed
<i>Community</i>	Local, specific user group, homogenous, bounded,	Multiple locations, diffuse, heterogeneous, multiple identities
<i>Power and control</i>	Transaction cost focus; elites; community leaders	Differentiated actors; conflict, bargaining, negotiation and power relations central
<i>Institutions</i>	Static, rules, managerial, functionalist, formal/informal divides	Institutions as embedded in practice; struggles over meaning; no classic formal/informal divides; interlinked with knowledge and power
<i>Governance</i>	Separated levels: international, national, local	Multi-level governance approaches; fuzzy/ messy interactions; local and global connected

Adapted from Mehta et al, 1999.

Given the way these emerging views can complement or enhance mainstream thinking, there is a need to rethink five key assumptions in natural resources management:

Livelihoods and resource management amid uncertainty

Conventional wisdom posits unidimensional links between resources and users. However, growing empirical evidence shows that livelihood strategies are usually flexible, mutable and adaptive and a particular resource is used by different users in multiple ways. People also live out their lives amidst different uncertainties and develop multiple livelihood strategies and invest in diverse institutional arrangements. Thus, issues concerning livelihood diversification emerge as key.

Resources have material and symbolic dimensions

Resources are usually measured and valued in purely material or economic terms. However, there is a growing awareness that resources need to be seen in symbolic terms, endowed with historically and culturally constructed meanings and values (Nyerges 1997; Mosse 1997). International or national agreements or processes often tend to put a use-value on resources, which allow for their appropriation or commodification. Given the various conflicting uses and meanings that resources have for different stakeholders, it is important to acknowledge how contestations over resources go hand in hand with a struggle for meaning and the power-laden processes through which this takes place.

Communities as differentiated

In recent years “community management” has emerged as key in natural resources management. However these “community-based approaches” tend to assume homogenous communities and downplay the often conflicting interests, perceptions and livelihoods that exist within or between communities. The literature on ‘epistemic communities’ shows how communities are located in multiple sites with conflicting knowledge systems and priorities in natural resources management. Thus, issues concerning power and conflict within communities emerge as key.

Institutions as sites of social interaction and negotiation

When analysed in conjunction with uncertainty, institutions are not merely rules of the game or formal organisations. Instead, they emerge as sites of social interaction, negotiation and contestation comprising heterogeneous actors having diverse goals (not all of which are material or economic). Institutions in natural resources management is not singularly purposive and cannot be easily separated from the everyday beliefs, lives and practices of people. People also resort to opportunistic behaviour by making ad hoc arrangements during times of uncertainty. The multiple institutional arrangements in natural resources management are characterised by intersecting points. There is often a marked lack of distinction between formal and informal or local and state, something that

Cleaver calls institutional bricolage (Cleaver 1998).

Power and control over resources

Traditional approaches have downplayed the dimension of power by assuming social homogeneity within communities and institutions. In classic NIE and CPR approaches, analysts have not looked at ways in which power moulds and pervades institutional arrangements and gives rise to differentiated access to and control over resources. Thus, power relations are central to the analysis of how institutions govern the commons

Contradictions in environmental governance

Environmental management is currently confronted by a series of contradictions. On the one hand, the trend towards devolution is giving rise to a surge in community-based participatory projects. But globally defined definitions can also undermine the control that local producers have over their products and resources (e.g. agreements such as TRIPS). The withdrawal of the state has led to complex forms of governance with the increasing influence of NGO actors, private corporations and TNCs. Different forms of environmental management has led to the interactions between levels emerging as very fuzzy. In such situations, we witness a simultaneous process of globalisation and localisation (Geschiere and Meyer 1998). The challenge is thus to safeguard the rights of local resource users amid the uncertainties that emerge.

4. The Case of Water

In this section I present the case of water to elaborate the uncertainty framework developed in the first half of this paper. More than most natural resources, water is key for human survival, well being and livelihoods. Yet as discussions around the recent World Water Forum have shown, from once being considered abundant, water is increasingly being seen as a 'scarce' resource, which needs to be managed judiciously. Against the backdrop of increasing scarcity, the role of institutions in mediating people's access to and control over water is central. Institutions are also important in determining how water is managed. A large body of work has documented the various institutional arrangements employed by rural people in managing their water supplies, often under conditions of water scarcity (Coward 1985; Uphoff 1992; Wade 1988). However, this work has largely failed to account for diversity within communities and complexity in both the social and ecological worlds which increase uncertainty (see section 6). Let me now explore these various uncertainties and how they relate to water.

Water and Uncertainty

Water is an excellent case to highlight the various aspects of uncertainty. Inequalities in access to and control over water combined with ethnic rivalries, nationalism and power politics have given rise to conflicts around water at the local, regional, national and global level. Questions around the management and ownership of water are also highly

contested, given rise to knowledge and other uncertainties. By drawing on illustrations from the global level and in particular from my fieldwork in western India, let me now explicitly chart links between water and uncertainty and the lessons that emerge.

Water and Ecological Uncertainty

Water scarcity is usually portrayed in blanket and absolute terms, obscuring its variable nature. Unlike other environmental resources such as forests and coal, water is a renewable resource, which mean that its availability is constantly subjected to variation depending on its state in the hydrological cycle. Not only is its state variable (e.g. fluid, solid or gas) but it is also variable across time and space, depending on factors such as climate, season and temperature. These are the *biophysical* and *ecological* attributes determining water availability. Water scarcity also has *temporal* and *cyclical* dimensions (Mehta 2000). In arid and semi-arid regions, water scarcity is temporal and linked to rainfall patterns which are variable and erratic. Water availability is thus characterised by tremendous uncertainty, due to its contingency on factors such as rainfall, vegetation and grass cover. Water scarcity is rarely something that is constant and permanent. Periods with dearth are usually interspersed by periods of abundance. This is because water supplies become abundant under favourable seasonable and climatic conditions and it is crucial that institutions display flexibility in both periods of abundance and dearth. Taking ecological uncertainties seriously means rethinking essentialised and absolute notions of scarcity.²

Water and Livelihood Uncertainty

Water is essential for the creation of sustainable livelihoods. Agriculture and industry depend on water. Water is also required for domestic consumption such as drinking, washing and cooking. The unpredictable nature of the social, economic, political and ecological worlds can influence people's access to water, having implications for their livelihood security. Increasingly, global forces are dictating how local water systems should be run and managed. The emerging globalisation of water is leading to an increase in the privatisation of water services, having social, political and economic consequences. In Bolivia, for example, the recent privatisation of water services and the involvement of foreign firms has ignited massive political protest (Palast 2000). It is claimed that deregulation in the water sector can potentially enhance people's access to water and create efficient water services (Serageldin in Petrella, 2000). However, it can increase people's livelihood uncertainty or at least in the short-term lead to a decline in poor people's access to water. For example, in the UK people disconnected from water for

² Scarcity is of course key in CPR debates. Robert Wade (1988) and Steven Lawry (1990) argue that collective action is likely to occur when the resource base is scarce. While this is true the reverse might also be the case. Studies in resource-abundant societies demonstrate that co-operation in natural resources management might be the norm rather than the exception (cf. TISS.). In such cases, the social variables that make up a society emerge as key. As David Mosse (1997) has shown in an analysis of tanks in South India, social variables including culture, history and society are of tremendous importance in determining whether or not institutions enhancing co-operation evolve or not. In this sense, restricting the analyses merely to ecological variables such as scarcity might be misleading.

non-payment escalated after deregulation in the 1990s (Barlow, 1999). Thus, the globalisation of water has the potential to have far-reaching impacts on local livelihoods.

Complexity in the social world also determines people's access to water and has implications for how they make and sustain their livelihoods. Geopolitical and regional conflicts can alter local people's access to water (e.g. riparian disputes between countries can end up denying a community access to a part of a river basin, having a tremendous implication for the livelihoods of those living along the river bank). Caste wars over water in India villages are not uncommon. The heterogeneous nature of community means that those with power and clout will determine how water is managed, used and for whose benefits. These issues will be elaborated in the next section.

Water and Knowledge Uncertainty

Water is a multi-faceted resource and can be viewed in many different ways. Depending on the disciplinary perspective, it can be understood either in hydrological, economic, cultural or sociological terms. These different perspectives increase knowledge uncertainties regarding how water should be managed. Debates in water resources management are highly contested and polarised. For example, until recently dominant views have tended to favour large dams and large-scale interventions (e.g. British Dam Society 1999; Biswas and El Habr 1993). Dominant views tend to view river basins largely in economic terms and cost-benefit analyses are employed to identify and measure the costs or projects emerging out of projects such as dams. However, a growing constituency argues that such perspectives tend to have adverse environmental consequences and high human costs. They also critique dominant models such as cost-benefit analyses for failing to capture intangible issues such as socio-cultural identity and geographical space and wellbeing (cf. The Cornerhouse 1998; Mehta and Srinivasan, 1999). Recent more localised perspectives are calling for alternative ways to view river basins and their resources, e.g. the Curitiba declaration of dam-affected peoples.

Scientists involved in water resources management employ highly sophisticated models ranging from social cost benefit approaches, to risk assessment and early warning procedures to understand catchments and watersheds and draw upon a variety of disciplines ranging from hydrology to engineering and economics. These plural perspectives are often influenced by power and politics, given the growing importance of international and corporate and national interests in water. However, the growing influence of localised perspectives concerning water and how it should be managed (for example, calls for rainwater harvesting in India) indicate the emergence of several hitherto subjugated perspectives in the water sector. These are firm indications of the co-existence of partial and plural perspectives in the water sector.

5. Rethinking key assumptions in the water sector : The case of Kutch, India

Let me now demonstrate out how these uncertainties prompt us to reassess key assumptions in water resources management. I draw on the framework elaborated in Section 4 by using the case of water in Kutch, India.

Kutch district is located within the crescent-shaped peninsula in state of Gujarat in western India. In official discourse, Kutch is considered drought-prone, with droughts taking place every specify 2-3 years.³ Overexploitation of the aquifers has led to a sinking water table. The groundwater table sinks at a rate of one metre per year. Rainfed agriculture and animal husbandry are the chief occupations in Kutch, although settled agriculture initially did not have the same importance that it has today. The livestock economy has always been one of the most important sources of livelihood for the people of Kutch. Kutch has an arid to semi-arid type of climate. Temperature ranges from 45 degrees centigrade in the summer to two degrees in winter. Humidity and evapotranspiration are high throughout the year. Rainfall is erratic and variable and averages about 350 to 370mm. There is high regional variation, ranging from 440 in southern Kutch to 338 mm in western Kutch (Raju 10: 1995). It only rains a few days a year, (15 on an average) with significant intra-district variations. Kutch's panacea is made out to be the Sardar Sarovar Project (SSP), a large controversial dam under construction on the Narmada River in Gujarat State. If completed, the planned 163-metre dam is intended to bring water to 30 million people and irrigate 1.8 million hectares of land (Raj 1991: 11). I have shown elsewhere that contrary to decades of promises, Kutch will not benefit significantly from the project (Mehta 1998). As it stands, less than 2 per cent of Kutch's area will benefit from the project. No work has started as yet on the proposed canal.

Fieldwork was conducted in Merka, a village in Eastern Kutch.⁴ The village is situated in the potential command area of the SSP. It is a medium-sized village with a population of 3,463. It has been declared a 'no source' village by the state which means that existing water supplies in the village are not sufficient to provide water to its population. Water is, thus, supplied by the Gujarat Water Supply and Sewage Board either by tanker or by pipeline.

Merka is a multi-caste village. Caste is the basis for most social interactions and also plays a crucial role in local water resources management practices. Merka's castes range from the erstwhile feudal lords (*Jadejas*) to *Rjputs* (warrior castes), pastoralists (*Rabaris*, *Bharvads*) and the *Dalits* (formerly known as Harijans or "untouchables"). Sources of water comprise tanks around the village where rainwater is collected, wells with groundwater and *viridas*, holes in the riverbed. As will be demonstrated, caste relations play a key role in determining people's access to water.

³ For a discussion of the fluctuating concept of drought and how it has been politicised, see Mehta 1998.

⁴ The name has been changed for purposes of confidentiality.

Livelihoods and resource management amid uncertainty

I have argued elsewhere that scarcity conditions in Kutch are often attributed to dwindling rainfall (Mehta 1999). However, this is a myth, both in Kutch as well as in other parts of the world (cf. Falkenmark 1990). Indeed, a scrutiny of the rainfall data over the past 120 years prior to 1997 indicates that while there have been erratic variations in the quantity of rainfall, there is no evidence to suggest that precipitation rates have changed (Mehta 1999).⁵ But it is characterised by high annual variability (ibid). Thus, rainfall is largely characterised by uncertainty and can be seen to be “*regularly irregular*.” What are the institutional arrangements that deal with this uncertainty and scarcity? Livelihood strategies display a high degree of flexibility. Let me begin with dryland agriculture and then discuss pastoralism and the links between the two.

Dryland agriculture employs a wide range of risk minimisation strategies such as the spreading of land assets over different land parcels distributed over a variety of soil types. Decision-making regarding field preparation is often an innovative response to an ever-changing environment. For example, if villagers sense a lean year, they are likely to plant drought-hardy crops. If the year appears promising they invest in millet or cotton. Crop-related decisions are not just dependent on exogenous factors such as the rainfall. Personal need, practicalities and collegiality towards field neighbours are also important factors. Thus, agricultural practices are flexible responses to situations at a given time and given place. They are adaptations to the year, particular soil conditions and to highly specific contingencies arising within the social world. For example, it is usual to confer with field neighbours and collectively negotiate on crops to be grown in a particular vicinity. To borrow Paul Richard’s useful analogy, all these factors make agriculture in Kutch an ongoing performance which is a “sequential adjustment to unpredictable conditions” (Richard 1989: 41).

The same resource base is also used by herders, given that the livestock-based economy has always been one of the most important sources of livelihood in Kutch. Kutch’s semi-arid to arid type of climate encourages a vegetation of short annual grasses ideal for livestock rearing. The pastoralists are usually sedentary but during lean year’s migration is a necessity given the uncertainty of rainfall and forage availability in the village environs. Migration thus allows pastoralists to adapt to a variable and heterogeneous environment. Due to this mobility they can exploit and access different social and ecological patches across the range. One always hopes, quite literally, that the grass is greener on the other side. The institutional arrangements need to be highly flexible and adaptable and entail constant decisions and responses to “here” and now contingencies. Each site has its own set of forage opportunities and restrictions. The water situation is always different, as is the reception from the host community. Survival is only possible due to constant adaptation and ad hoc arrangements.

⁵ Data were obtained from the Gujarat Institute of Desert Ecology, Bhuj.

Migratory pastoralism is possible only due to the wide support and social networks spread out over a wide area, indicating the embeddedness of institutions in wider social structures. These social networks include kinship ties amongst other pastoralists but also reciprocal relationships with farmers that have been built with farmers over several generations. The relationship between cultivators and pastoralists, who use the same resource base, has largely been synergistic. Landowners appreciated the manure provided by the pastoralists and they were allowed to pitch camp on fallow or harvested fields during their migratory routes. Recently, however, changes in agricultural patterns have made the relationships less symbiotic, with pastoralists losing out. State policies and interventions have tended to offer agricultural subventions to cultivators and have led to the introduction of double and triple cropping. The migration of pastoralists is actively discouraged with pastoralists being fined or areas being sealed off. There are no state policies in Kutch directed towards pastoralists or for the protection of CPRs. This has led to a general lack of appreciation of the diverse ways in which different resource users use the same land and CPR resources. It has also led to a general undermining of the institutional flexibility displayed by cultivators and pastoralists as they adapt their livelihoods to deal with uncertainty and led to a general worsening of ties between the two groups.

Resources have material and symbolic dimensions

In Hindu and village cosmology, water is considered pure and holy. It is considered to have a cleansing and purifying effect and is revered by all. Religious and caste-based institutions provide rules of purity and pollution dictating whose water can be drunk, whose should be avoided and who should fetch the water. Water is used as a metaphor to accentuate differences and social distance between the groups in the village. Declarations of difference between communities are based on whether *the other's* water can be drunk or not. Even though state-based institutions prohibit water-based discrimination, the “higher” castes still insist on discriminatory practices. However, these rules and restrictions are often bent or even totally dropped under certain circumstances. For example, during drought periods “higher” castes do not hesitate to drink water from *Dalit* wells. Thus even caste-based institutions display a certain degree of flexibility during times of drought. High caste villagers explain this in the following way: sub-terrain water is the same everywhere; it becomes differentiated only when it acquires the attributes of the user. Thus, according to village logic water in a well used by *Dalits* is not impure, but the water in a *Dalit's* house is. This perception allows for flexibility in the otherwise strict caste-based water institutions.

This discussion reveals that water as a natural resources has symbolic, cultural and spiritual dimensions and highly differentiated in its use in local contexts. Even though water is used as a metaphor to express difference, water-related rules and practices are sometimes bent and dropped. Official water resources management discourses tend to focus on the material values of water. For example, they ask that free-flowing rivers should not be allowed to flow “waste” into the sea and need to be dammed. By contrast, local people such as the *Bhils* living on the banks of the Narmada River see the river as a

goddess and a source of all creation. For them the river is home, provider and source of all strength (Baviskar, 1995). Merely viewing water through an economic lens can undermine its embeddedness in the everyday symbolic, cultural and social contexts within which people live their lives. In doing so, water is robbed of its multifaceted meanings.

Communities as differentiated

Merka's social fabric is very heterogeneous and differentiated. Caste, gender, wealth and gender are the main axes of difference. Let me briefly review their consequences for natural resources management in the village. Caste relations determine space, social interactions and also shape how water is used. Dominant castes still enjoy most control over the village's natural resources. Most of the land is under the control of the *Jadejas* and the *Rjputs*. One *Rjput* clan owns over half the irrigated land. Even though their former glory may have declined, the erstwhile feudal chiefs, the *Jadejas*, exercise de facto control over the village commons, even though these lands officially come under the jurisdiction of the state. Largely, those from the dominant castes, also tend to be the most wealthy. The village is sharply divided into two political camps. Rivalries between these two camps have led to the hindering of the efficient functioning of several water schemes in the village. In a few cases, the schemes were even destroyed due to political rivalries. What about gender? In Merka, as in most parts of South Asia, the gender-based division of labour makes women responsible for most domestic water chores. These tasks are highly naturalised. However, there is no concomitant high degree of decision-making amongst women vis-à-vis water. It is male leaders who make the major water-related decisions in the village, with state directives often by-passing women.

Formal institutional arrangements which are created by the state or by extension workers tend to neglect the differentiated nature of community. Water-directed interventions in Merka are usually directed towards and brokered by a few dominant elites, usually male leaders from the high castes. They are the ones who benefit from irrigation schemes, drought-relief programmes and other state-directed interventions. It is assumed that these leaders will speak with one voice for the whole village and that they are interested in collective benefits for all. However, the Merka case shows that there is no "collective" good such as water because there is no "collective" community. In sum, planners often assume a homogeneous village, forgetting the different goals and priorities of the different village members.

Power and control over resources

In Merka, power is key in issues concerning natural resources management. Historical and feudal legacies still prevail and accord much de facto control of natural resources to the higher castes. I have already discussed how the *Jadejas* still wield control over the village commons. They still assert their formal feudal authority to deny lower castes access to CPRs in the village. Irrigation is inextricably linked to land ownership which remains with the higher castes. Even though all in the village has access to water from tanks and wells, in reality it is the able-bodied *Jadeja* men who have the most clout at

communal water points.⁶

Traditional power structures sometimes override the more recent state-driven institutions which aim to create an equitable use of land and water resources. For example, it is the uncodified customary arrangements that tend to prevail over state tenure arrangements in land arrangements. High caste families still continue to own vast acres of land in the village despite state-introduced ceiling acts. Often formal institutional arrangements tend to reinforce the position of the traditional elites. For example, drought relief schemes encourage the rent-seeking activities of the elites. They ensure that the power status quo remains unchallenged.

Institutions as sites of social interaction and negotiation

In Merka, institutions governing water use are highly differentiated and often serve to reinforce dominant power and social relations. In some parts of the village, tanks are often the only water sources and are central to the lives of the people. They are used for bathing, drinking, watering livestock and, in some cases, irrigation. Until recently, tank management was the responsibility of the rich and powerful who would pay for their upkeep. Tank management went hand in hand with the notions of blessing and benediction. Hence, tank cleaning and management activities are considered to generate, an important form of symbolic capital (cf. Bourdieu, 1977) in the community. The gains arising out of tank management are therefore not just material but also symbolic, such as reward in the after-life and prosperity for one's descendants. By enhancing the power and status of tank benefactors, indigenous institutions thus reinforce the power and prestige of the rich and powerful in the community. In the past few decades, state-sponsored drought relief programmes have increasingly assumed responsibility for tank maintenance with the aim of drought proofing the area and eliminating water scarcity. Contrary to the popular view that these have displaced local initiatives, informal arrangements to manage tanks still exist. As and when the need arises local collections are initiated and tanks are de-silted. These activities do not proceed according to fixed rules, but instead have an ad hoc character. In practice, tanks are managed through both state and local initiatives, though the local initiatives are not openly acknowledged. In both cases, it is the rich and powerful – usually men from the higher castes – who tend to benefit due to their control over land and other resources.

Contradictions in environmental governance

There is a surge of community-based sustainable development projects in Gujarat. Watershed development is now being promoted from the Central government with donor support as a highly participatory and eco-friendly intervention. However, the Merka case cautions us that “small may not be beautiful” and that any new scheme will interact with and can also reinforce existing social and power relations, thus rendering the very goals of equity and participation as redundant.

⁶ Due to the *ojjal* system of complete gender segregation, Jadeja women are not allowed to fetch water. It is the menfolk who are responsible for water-related tasks.

In Kutch it is still not possible to speak of the globalisation of water since it is primarily the state that is responsible for the provision of water services. However, it may be conceivable that in near future the role of NGOs and private corporations might get more prominent. Vigilance will then be required to ensure that the rights and interests of local people and water users are not undermined with the introduction of competing forms of environmental governance that these different actors are bound to introduce. Analytical work will also be required to understand the mediation between global and national forces and local institutional arrangements and the uncertainties that thus emerge.

The sections on water have elaborated the uncertainty framework presented in the first half of the paper. They show how ecological, livelihood and knowledge uncertainty necessitate a rethinking of the role of institutions, resources and people in water resources management. How have theoretical debates addressed these various challenges? The final section of the paper looks in concrete terms at different conceptual approaches tackling the institutions/ uncertainty nexus.

6) Theoretical Discussion

Mainstream Views

Most analyses in the natural resources management field have tended to draw, whether implicitly or explicitly, on approaches grounded in Common Property Resources (CPR) Theory which has links with New Institutional Economics (NIE). The works by writers such as Ostrom (1990), Bromley and Cernea (1989), Wade (1988.) and Berkes (1989.) have contributed significantly to establishing that institutions matter and that local people, as well as state governments, can successfully manage resources through property regimes varying in scale and space. They have also succeeded admirably in directing attention away from simplistic neo-Malthusian equations concerning population, resource availability and environmental degradation. They have also offered a strong theoretically informed set of factors leading to effective collective action in natural resource management. How do these approaches address the various uncertainties discussed above?

The various debates and variations within NIE and CPR approaches notwithstanding, one can safely say that the transaction cost and collective action approach are the two key areas within this very extensive literature. Both these approaches see institutions as key in eliminating uncertainty (see North 1990; Williamson 1985; Ostrom 1990). In the transaction costs approach, 'institutions' are seen as the formal rules and conventions and also include informal codes of behaviour or norms that regulate human behaviour (North 1990). These institutions serve to minimise the costs of constantly monitoring and responding to others' individually motivated behaviour (ibid) and are also efficient ways to reduce uncertainty. Common property analysts such as Ostrom (1990) tend to take their theoretical grounding from game theory and theorise how rules can be purposively crafted

to produce collective action. Institutions are seen as ‘rules of the game’ and collective action is seen as a rational option that produces results beneficial to all, whereas self-interested action would produce sub-optimal results for the collective. In such thinking, institutions regulate action to eliminate uncertainty usually in terms of people’s behaviour (e.g. the Prisoner’s Dilemma).⁷ However, many analyses are not extended to include the ecological uncertainties outlined above. In some cases, environmental uncertainty has been acknowledged. For example, Runge (1985) asks for common property institutions to be created to act as a hedge against uncertainty. These institutions should serve the purpose of including the maximum number of users, instead of being exclusive (ibid: 35). Yet, as argued, many newly created institutions might still continue to exclude several users, building on and reinforcing existing inequalities.

Similarly, the uncertainties created by global economic or environmental events, which were described above as livelihood uncertainties, have rarely been addressed even where the underlying collective action dilemma is conceptualised in terms of exogenous impacts on livelihoods, such as scarcity (cf. Wade 1988). Opportunities for seeing how local uncertainties are linked to global processes are not really taken up. Similarly, NIE approaches assume bounded and closed economic and social systems and equilibrial environmental, rather than viewing the social, economic and ecological worlds as open and constantly subject to change and uncertainty. Consequently, livelihood strategies are not viewed as variable and diverse.

There is no denying the important policy lessons that arise from these approaches. It has been to “get the institutions right” in order to stabilise or reduce uncertainty. This has meant establishing formal legal systems, fixed property regimes, fixed norms of behaviour or formalising informal institutional arrangements. Strangely enough even though CRP analyses have made very important contributions in highlighting the importance of informal institutions (e.g. Coward 1985; Wade 88; Berkes 89; Ostrom 90 etc), the resulting policy prescriptions have focused largely on purposive and formal institutions. There is the assumption that institutions can be designed or crafted (cf. Ostrom 1990) to serve certain natural resources management functions and enhance collective action. CPR theory, thus, focuses on establishing the conditions under which these institutions will work best, including clear resource boundaries, relative socio-economic homogeneity among users, sanction, rules, monitoring etc. (Ostrom, 1990; Wade, 1988) even though a wide variety of empirical cases might indicate that these conditions are not so easy to re-create or indeed, as the Kutch case shows, institutions may not be solely designed for natural resources management purposes. In a similar vein, Lawry (1990) has reviewed a wide literature in sub-Saharan Africa to conclude that establishing these local-level arrangements might be difficult, given the changing nature of village economies and social relations.

Within the water sector, a large body of work has focused on institutions. For example, early pioneering work by Coward (1985) and Uphoff (1992) highlighted the various

⁷ For an example explanation of Prisoner’s Dilemma see Wade....

strengths of indigenous systems and the fallacies committed by planners who assumed that they were working *de novo*, instead of investigating and building on existing institutional structures in water schemes. Similarly, work by authors such as Wade (1988) and Ostrom (...) has focussed on the factors that enhance collective action in irrigation systems and the conditions under which local institutions are employed to manage local water resources. Another strand of work has turned its attention to the flaws and failures of public water management systems and advocated a shift to devolve management to local farmers, thus efficiency and transferring responsibility to local resource users (Sengupta 1991; Meinzen-Dick et al, 1994). Recent global declarations on water also highlight these institutional approaches (e.g. World Water Commission 2000; Vision 21 2000).

Notwithstanding the contributions of these pioneering works, in recent years a growing number of authors has employed historical, sociological and anthropological approaches to point to some of the limitations of CPR and economic approaches to studying and promoting water-related institutions (e.g. Mosse, 1997; Mehta, 1997; Cleaver 1998; Potkanski and Adams, 1998). This work has criticised the tendency to valorise the virtues of indigenous institutional arrangements without understanding their complexity. Criticism is also leveled at the use of ahistorical and apolitical understandings of institutions, at static notions of the dynamic relationship between individuals and institutions, and at the ignoring of the overlaps between state and local institutions. The use of simplistic notions of the ‘community’ and community management has also been criticised. (cf. Li 96; Mosse 97; Leach et al 97) because it is usually conceived as bounded, homogenous, local and usually seen as a particular “user group”. This corporate view of ‘community’ has tended to neglect questions of social difference and the diverse-sometimes conflicting - interests of resource users as was demonstrated in the Kutch case.

Recent work on CPRs has acknowledged the previous neglect of heterogeneity by paying attention to differences in people’s capabilities (largely conceived in terms of their assets) and preferences (over policies and outcomes) and knowledge (conceived as access to information and belief) (e.g. Keohane and Ostrom 1995). Still this work is open to critique for neglecting the socio-cultural dimensions of beliefs and information, as well as power asymmetries. The analysis also largely focuses on whether institutions can facilitate collective action despite heterogeneity, neglecting that institutions *per se* are heterogeneous, power-ridden and exclusive, and so might reproduce patterns of resource use based on dominance and dependence as the case of tanks in Kutch show. CPR approaches have also tended to downplay the central role of power relations in natural resources management. As the Kutch case showed, power is key in determining access to and control over resources. In some case, CPR thinking can serve to reinforce existing power relations. For example, Wade (1988) emphasizes the role of elites and traditional authority in enhancing collective action and building consensus. In some cases, this approach can also help reproduce existing unequal patterns of dominance and control. Also this consensus, as the Kutch case shows, might not be a genuine one.

CRP approaches also tend to assume a non-interactive divide between formal and informal institutions. Thus, policy prescripts have tended to focus either on state-level recommendations or on local-level or informal institutions. This dichotomy has led to the creation of a formal-informal divide, and the denial of empirical evidence showing the overlaps and interrelationships between various institutional domains (e.g. conflicting tenure arrangements, or the coexistence of customary and formal law governing Merka's commons). In this "messy middle" institutional arrangement are often highly contested, beset with ambiguities and open to diverse interpretations. It is in this "messy middle" that people sustain their livelihoods and in the context of uncertainties emanating from conflicting forms of environmental governance that are increasingly confronting local livelihoods.

Emerging Views

By contrast, several other emerging views in natural resources management, including those from within anthropology, sociology and legal pluralism, have begun to explicitly address these dichotomies and this 'messiness.' It is important to note that these approaches did not emerge exclusively out of the study of natural resources management but instead through the study of how natural resources management relates to broader social, economic, legal and political processes within communities. Therefore, there has been a far less search for purposive natural resources management institutions and their exact nature (e.g. whether they exist or not) but instead a broader reflection of natural resources management practices within communities and their links with wider institutional processes.

Thus, unlike the CPR approach a growing number of anthropologists, geographers and sociologists working on natural resources management issues have shied away from viewing institutions in functionalist, managerialist and static terms. Instead, they stress the rootedness of institutions in the specifics of local history and sociality (Mosse, 1997; Mehta, 1997; Cleaver, 1998; Potanski and Adams 1998). Thus, issues concerning a wider political economy and history emerge as important and indeed the multiple understandings of institutions in everyday life.⁸ Institutions are viewed as inextricably linked with people's cultures, beliefs and life-world, something the Kutch case demonstrated.

The dichotomies between informal and formal institutions and the often messy character of institutional arrangements in everyday contexts has partially been overcome by the application of recent debates in social theory. Sociologists such as Giddens (1984) and Bourdieu (1977) have shown how structure and agency reinforce each other and have directed attention to the dynamic interplay between individuals and society in everyday

⁸ For example, what is 'efficient' for one person may not be 'efficient' for another. North (1990) does use an historical approach to argue why inefficient institutions are allowed to persist despite high transaction costs. However, there is a tendency to use deterministic models to chart a high degree of causality between efficient or 'right' institutions and culture and economics, suggesting that some countries or cultures are prone to inefficiency due to the wrong institutions.

life. Within such an approach, institutions need to be seen less in terms of fixed rules and more in terms of practices that individually consciously or unconsciously have the capacity to shape. Thus while some institutional arrangements will be reproduced by certain actions and practices, others will be subverted by actors exercising agency. Thus they will shift over time. From this perspective emerges the view that institutions need to be seen as something that people do and importance is paid to people's practices that are regularised over time. Institutions exist because people invest in them and because they are continually practiced - they also echo people's norms, rules and beliefs that are constantly re-made and shaped over time. In such perspectives formal institutions emerge as those that have been regularised over time.

When institutions are seen as social practices, as argued by a growing constituency of authors interested in natural resources management issues (Mosse 1997; Mehta 1997; Cleaver 1998; Berry 1993; Li 1996; Leach 1994; Leach et al 1997.), attention is directed to how institutions are socially differentiated. They come to be seen as sites of negotiations (Berry 1989 and 1993) and attention is paid to how people draw on a wide range of social and political institutions in order to claim or defend access to a particular resource. For example, water in Merka is claimed by virtue of belonging of a certain caste (see Section 5).

In Section 5 I demonstrated the need to incorporate the symbolic dimensions that people accord to resources which is in line with several anthropological and sociological analyses. For example, feminist scholars have argued for struggles over resources to be seen simultaneously as 'struggles over meanings' (Agarwal 1994). In this process negotiating access to resources has both material and symbolic outcomes - the latter helping women to enhance their social position within broader social networks (see also Whitehead, 1984, Guyer and Peters, 1987). The case of Merka shows how one's access to resources is also determined by one's social and institutional positioning in wider social networks, most of which are unrelated to natural resources management (e.g. how pastoralists survive during migration due to wider social networks).

There is much room for uncertainty within this understanding of institutions. The different types of uncertainties discussed in this paper invariably engender new institutional dynamics (for example, people might create new mechanisms to deal with livelihood loss arising due to global economic shifts). In turn, these new conditions will provoke new kinds of responses from natural resources users which in turn can lead to new sets of institutions and more or less regularised practices. Thus within this approach there is scope to accommodate for dynamic institutional shifts that take place at intersections between the informal and formal and the local and the global. For example, work by the sociologist Long (1994) and his collaborators has directed attention to "interfaces" between state-directed processes and local people's own projects and practices. It is during these "interfaces" that different stakeholders get to articulate their interests that power politics are played out and new institutional arrangements are created. Thus the "messy middle" between local and global processes or between the community and state is explicitly addressed - something that mainstream views poorly address.

Moreover, by investing in multiple institutions with different meanings people can cope with various kinds of ecological and livelihood uncertainties and thus keep open diverse options and opportunities that help cope with various vagaries arising due to social, political and economic factors.

Anthropologists and sociologists have also long been interested in the study of knowledge and its socially constructed nature. The vast literature on indigenous knowledge has shown how rural people's knowledge is socially situated, differentiated and changing (e.g. Hobart 1993; Van Ploeg ?; Scoones and Thompson 1994.;). This literature has been applied to natural resources management contexts to show how rural people's knowledge is rarely only about natural resources management, but instead is rooted in wider social and cultural contexts. The sociology of knowledge (e.g. Berger and Luckmann 1967) and more recently feminist critiques of science have discussed the incomplete nature of knowledge and have shown explicitly how people's perspectives on the world and their questions of it reflect their broader position in social institutions (e.g. Harding 1987; Haraway 1989). In fact, Donna Haraway's description of 'partial and plural' perspectives is a good way to express what this paper calls 'knowledge uncertainties.' Science studies have further deepened our understandings of the partial and uncertain nature of knowledge, by linking people's diverse knowledges to their social, cultural, institutional and economic situations (e.g. Latour 1995; Traweek 1988.). Thus, the dimension of power emerges as central in analysing knowledge.

Insights from legal anthropology offer ways to overcome divides between formal and informal institutional and legal arrangements governing natural resources management. Legal anthropology has come up with a dynamic and processual understanding of law and society (Merry, 1988). In work of this genre, legal rationalities are seen to be ever changing and internally differentiated and often do not fit into the neat categories of 'modern' and 'customary', 'local', 'formal' or 'informal'. Numerous studies (e.g. Moore, 1986, Starr and Collier, 1989, Lazarus-Black and Hirsch, 1994) have documented the proliferation of legal institutions that increase with growing complexity of cultural encounters. Legal pluralism has contributed to spreading the understanding that law in itself is plural and open to a variety of interpretations. These several interpretations can increase livelihood uncertainties through the processes of institutional negotiations over rights, rules and order. The different ways in which these are interpreted can increase knowledge uncertainties. Legal anthropology and legal pluralism also indicate the overlapping nature of institutions and help comprehend how interpretations are negotiated across institutional arenas. In such settings, mediation, negotiation, bargaining and power emerge as key in landscapes moulded by various kinds of uncertainties.

Conclusion

Tackling the uncertainties outlined in this paper calls for very different policy directives than those that are currently pursued in natural resources management. For example, the recognition of ecological uncertainty calls for the policy process and for interventions to embrace institutional flexibility and adaptability to cope with an ever changing

environment. Accepting livelihood uncertainty would require policy directives to encourage rather than discourage livelihood diversification and intersectoral cooperation. Attention also needs to be paid to ways in which local livelihoods can be safeguarded against the various uncertainties emerging due to globalisation and its accompanying competing forms of governance. The recognition of heterogeneity in the social work and the central role played by power, calls for the need to understand and capture multiple stakeholder interests in order to address issues concerning equity and justice. For example, lessons from legal pluralism and forum shopping can show how different actors can utilise different cross-cutting discourses in different institutional arenas as different claims and meanings are negotiated in dispute processes (Brenda-Beckmann et al 1981, 1997). At times, it might also be necessary to be “aggressively partisan” in order to promote the needs of the disempowered and those who are usually by-passed (Mehta 1997).

Accepting knowledge uncertainties means recognising the contested nature of different environmental phenomena and their effects on local people and their livelihoods. Through the recognition of plural yet partial perspectives of diverse environmental knowledges, it might be possible to refrain from privileging expert or scientific knowledge and instead opening up space for lay perspectives and also the interactions between these various perspectives. This would call for greater deliberation, participatory decision-making processes and negotiation where institutional leaning and flexibility will emerge as key. Given that various forms of old and new uncertainties are here to stay, environmental and natural resources management need to find ways to accommodate the multiple claims, perspectives, institutional arrangements and rights that mould the ways in which people use resources and make their livelihoods in everyday settings.

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