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INSTITUTIONAL STRUCTURES AND PARTICIPATION

Comparative Case Studies from India

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Abstract: While participatory design in IS has found increasing acceptance, the role of participation in social arena has been lively debated in recent years. Development projects in the third world based on “western” assumptions have elicited sharp critiques, with consequent policy shift towards involving the poor people and local communities in these endeavours. In India, policies and programs aimed at reclamation of degraded lands, a priority thrust area which is directly linked to poverty alleviation, are typically controlled by central, state and local government bureaucracies, with little involvement, until recently, of the affected people. Some of these programs have attempted to use Geographic Information Systems (GIS) to model alternative development possibilities, and to then prepare action plans based on scientific knowledge for field implementation. These initiatives too have generally been bereft of end-user involvement. On the other hand, land development has been successfully carried out at several places in the country through community initiatives alone by harnessing indigenous knowledge. In this paper, we briefly present the continuum of participatory development through analysis of two contrasting case studies. The analysis leads to the challenge of integrating local knowledge within governmental institutional frameworks that can facilitate the larger spread of land reclamation efforts.

Keywords: Participatory development, information systems, community mobilization, degraded lands, GIS, structuration theory.

1 INTRODUCTION

End-user participation in design, development, and use of Information systems (IS) has now a reasonably well established tradition, having been promoted since the 1960s by a number of researchers and IS practitioners in

the West, particularly in Scandinavia, USA and the UK (Ehn, 1993, Butler and Fitzgerald, 2001). Evolution of the ETHIC methodology is an illuminating example of this trend (Mumford, 1993). Participatory design (PD) has evoked varying and diverse trajectories in different societies impinging as it does on the “questions of democracy, power and control at the workplace” (Ehn, 1993: p.41). Many other contemporary disciplines, such as education, architecture and economics, have also embraced participatory approaches (Schuler and Namioka, 1993), the basic motivation being “people who are affected by a decision or event should have an opportunity to influence it” (ibid.: p.xii). In the last Participatory Design Conference in Malmo (2002), the emerging consensus was that participation should be viewed in broader contexts (outside of Western organizations), and should be analyzed within a broader process perspective that emphasizes the dynamic and political nature of participation.

Another domain of participation has emerged since about 1980s in the field of development studies involving third world countries, in which the involvement of end-user (i.e. the ultimate beneficiary of development efforts) is now increasingly being recognized as crucial to the success of such initiatives. We bring together ideas from these two domains of participation (i.e. IS and development studies) to examine the use of Geographic Information Systems (GIS) for land management in the overall context of rural development in India. We do so by presenting two contrasting case studies aimed at reclamation of degraded lands, viz. (i) community-driven without the use of GIS/computer technologies, and (ii) GIS-based (generally without end-user or community involvement). The primary aim of this comparison is to analyze the role of people’s participation to develop implications for GIS-based approaches aimed at alleviating the crucial problem of land management.

However, there are at least three points of departure in our analysis with respect to the use of PD in IS, viz. (i) the ‘system’ development is embedded within broader economic and social development processes; (ii) end-users are not the traditional workforce of a typical organization, but subsume governments at central, district-, sub-district levels, as well as individual farmers and local communities that have deep stakes in the objective of development i.e. land use; (iii) while the role and importance of PD has been emphasized and reported in the mainstream IS research for at least over three decades, the import and significance of this approach has percolated relatively recently into the GIS literature (e.g. Craig et al., 2002).

The rest of the paper is structured as follows: In section 2, a theoretical perspective for analyzing the empirical findings, reported in section 3, is developed. The context of introducing use of GIS to the vexed problem of putting degraded lands to productive use in India is also provided along with

the outcome of relevant research efforts in the past in this section. The analysis is taken up in section 4, while some concluding remarks to situate participation within land development efforts and the use of GIS are made in Section 5.

2 THEORETICAL FRAMEWORK

In this section, we first briefly discuss the evolution of people's participation in development projects. This leads to a discussion on how structuration theory can be drawn upon to examine the relationship between development and participation using the concepts of structure and agency. This linking provides the conceptual basis for our analysis.

2.1 Participation in Rural Development

Since the 1980s, a dominant critique of development initiated in the third world arose from the failure of its models enunciated, propagated, and implemented as per first world perspectives, including bilateral/multilateral aid agencies. This "impasse in development" (Kothari, 2002: p.35), has led to debates about the need to rethink development. Some of the criticisms that have triggered this rethinking are briefly discussed.

Harry S. Truman's (former US President) vision, expressed in 1949, was of poor countries becoming 'developed' by 'replicating' the economic models of 'advanced' societies, based on the application of capital, science and technology (Escobar, 1995: p.4). Escobar questions such 'invention' of development (ibid.: p.24) as an attempt by the first world to promote its strategic, geopolitical and commercial interests, leading to accentuation of poverty rather than its remission in developing countries.

The hypothesis of bilateral and multilateral organizations that aid can lead to development, especially poverty alleviation, has been closely questioned in the recent years. Despite substantial funding by donor agencies, their project-based approach has often ignored the realities of poor people and the underlying socio-cultural causes of poverty (Kothari et al., 2002). A top-down philosophy, bereft of stakeholder representation, has permeated the design and implementation of these development projects. As McGee (2002, p.93) argues, development organizations have typically perceived such projects "somewhere from outside its [project's] boundaries, and there were project beneficiaries – undifferentiated, passive recipients of its goods and services provided through the project channels ... (these were) created as a bureaucratic convenience, a manageable way of packaging assistance".

Chambers (1983) has argued that alternative development routes must be chalked out by people themselves rather than for them by outsiders. These critiques have contributed significantly “to a wave of thinking about the debate on human agency in development, which became loosely known as ‘participation’” (ibid.). The World Bank’s Learning Group on Popular Participation (later called participatory development) defined participation as a process by which people, especially disadvantaged people, influence decisions that affect them (Bhatnagar and Williams, 1992). Within this stakeholder perspective, the focus of participatory processes is to improve the dialogue among stakeholders, to chalk out the agenda in mutual consultation keeping in view local practices and indigenous knowledge. “This implies a process of negotiation rather than the dominance of an externally set project agenda” (Schneider and Libercier, 1995: p.30).

We thus see a clear shift towards attempts to increase participation of local communities in development policies and programs aimed at poverty alleviation and conservation of natural resources. In India, this shift is reflected in the promotion of Joint Forest Management (Kumar and Kaul, 1996), and the watershed committees (comprising officials and local people together) being made responsible to implement development programs for conservation of natural resources (Government of India, 2001).

Participation of people in IS and rural development takes place in a particular context set by governments, bureaucracies, organization structures and communities. In the following sub-section 2.2, we seek to understand the relationship between participatory processes and their context. To do so, we draw selectively upon the concept of structure and agency linkage proposed in structuration theory (Giddens, 1984).

2.2 Structure and (Participatory) Agency

Participation comes about from the knowledge and the capable agency of people attempting to support development processes, and in doing so creating the potential to reconstruct institutional structures which define, facilitate and foster development. Collective human agency, expressed as participation, has the potential to redefine existing structures and practices embedded in institutions of bureaucracy that typically implement development projects. Giddens discusses institutions as both product of and constraint on human action, where the institutional realm represents an existing framework of rules and typifications derived from a cumulative history of action and interaction. Actors’ stock of practical knowledge influence “how people communicate, enact power, and determine what behaviours to sanction and reward” (Barley and Tolbert, 1997: p.98). We

adopt a similar institutional nature of structure in this paper to examine mutual interaction between structure and participatory agency.

This institutional nature of structure is emphasized in the manner land management is organized in India. Land Development programs involve a network of government institutions like the central government ministries, scientific institutions, and district administration etc. These institutions have existed historically with a strong sense of bureaucracy, with rules and resources drawn from the British colonial rule, and later reinforced by the socialist agenda of post-independent India (Jain and Dwivedi, 1990; Saha, 1992). These institutional structures shape the manner in which GIS (and other technology development projects) are planned and implemented. In the next section, we describe the case studies that highlight some of these issues.

3 CASE DESCRIPTION

India has been called a biomass-based civilization (Gadgil, 1993) with a majority of rural population in the country subsisting primarily on resources produced or gathered from the land, for example fuelwood and fodder. Therefore, 'health' of land is closely linked to poverty mitigation and subsistence. Degradation of land has been caused by a variety of socio-economic-cultural reasons such as increasing human and cattle population, diversion of land in fragile eco-systems for other uses, indiscriminate deforestation, etc. Consequently, of the total land mass of the country, more than 40% "has productivity much below its potential" (Gadgil, 1993: p.168), making development of degraded lands a key concern of governmental programs. These efforts, whether supported from internal resources or by external donor agencies, have spawned, until recently, a bureaucratic, top-down approach, with minimum involvement of the local communities.

Globalization processes have escalated previously 'local' environmental concerns to a global stage, and the need for more wide spread use of information and communication technologies including GIS to address these concerns has become part of numerous international debates and accords such as the Agenda 21. The use of GIS is also being increasingly mandated in most externally-aided projects pertaining to the natural resource sector in India, for example in forestry management.

3.1 GIS for Land Management in India

India has attempted use of GIS in the management of wastelands since the early 90s. What distinguishes GIS from other systems like Computer Aided Design (CAD), and Database Management Systems (DBMS) is its

ability to integrate geo-referenced data layers through operations like spatial search and overlay etc. to present the “original data in different ways and from different perspectives” (Aronoff, 1995: p.40). One of the first GIS initiatives was taken by the Ministry of Environment and Forests (MoEF) in 1991 through pilot projects in 10 districts, launched in collaboration with country’s leading scientific institutions to explore whether land development programs could be designed on a more holistic, scientific basis by using the modelling power of GIS. These projects evoked several research studies, which concluded that full potential of technology had not been realized by the MoEF mainly due to socio-cultural rather than technical reasons. These studies also underscored lack of end-user participation. (Hutchinson and Toledano, 1993; Sahay, 1998; Sahay and Walsham, 1997; Walsham and Sahay, 1999; Walsham, 2000). Implementation of these projects was reported to have a strong technical focus, and the key motive for participating scientists was to have the opportunity to engage in research involving ‘latest’ technologies, the subsequent social acceptance and use of these systems in the field being accorded secondary importance (Sahay and Walsham, 1997, p.432).

Subsequently in 1993, GIS was sought to be institutionalized on a wider scale in reclamation of degraded lands under the Integrated Mission for Sustainable Development (IMSD), which we report in this paper. IMSD is jointly administered by the Department of Space, central government ministries, select scientific institutions and district administrations. GIS application software and database were typically developed for each district by one of the nominated scientific institutions, and then transferred to the district headquarters to help prepare land development action plans by using GIS. The scientific departments also developed user-friendly shells which “lay users who are not familiar with UNIX, GIS and remote sensing can use ...” (Dasgupta et al., 2000: p.32).

3.2 Empirical Work

For the present study, data was collected through semi-structured interviews conducted during February, April-May 2002, in two separate sites where land development projects were being implemented. The first site, located in Alwar district of Rajasthan state, concerns a land development effort realized through people’s own initiative, without positive external support and without the use of GIS. The second site is a concerned District X (a pseudonym) that fell under the purview of the IMSD program, to develop action plans for land reclamation using GIS. In all, 24 participants were interviewed (14 in Alwar area, and 10 in IMSD district including four scientists from concerned remote sensing institutions).

These discussions were supplemented by the study of available material, and hands-on demonstration of GIS work at the IMSD district headquarters. The reason for selection of these two sites, disparate as these were in the philosophy and nature of work taken up, was the adoption of different models of participation and knowledge systems. In Alwar, water harvesting structures were constructed by the community without using computer technology. In the case of IMSD district, development plans, including location of such structures, were prepared by scientists using GIS. The aim of the interviews and analysis of secondary material was to broadly understand the usefulness of GIS in supporting development processes. We now discuss these two cases in some detail.

3.3 Rejuvenating a River through Indigenous Knowledge

Alwar district, a semi-arid region, lies in the north-east of Rajasthan state in Western India. The region is afflicted by severe water shortage, which has been exacerbated by recurrent droughts, and severe deforestation in recent years. 70% of the district's forests have been ravaged (Patel, 1997: pp.6-7) during the past three decades. The river Aravari had completely dried up many decades ago, primarily due to deforestation of its catchment, discarding of traditional conservation practices, encroachments, over-exploitation of natural resources etc. The main reason for abandoning traditional practices was "the new value system and enforced state control over land" (ibid.: p.7), which alienated the local communities over time. A villager stated:

Over the years, we had got used to government to do the work, since all forest and common lands were taken over by the government long back. As everyone knows, they do nothing for the poor except to give them bhashan¹. TBS woke us up to be able to take our own decisions, and you can see the results. Earlier, our womenfolk had to walk up to 2 km to fetch water, but now there is sufficient water in johads and wells through the year.

Tarun Bharat Sangh (TBS), an NGO with its origins in the University of Rajasthan, became involved in efforts to rejuvenate the river in 1985 mainly by reviving water conservation strategies using forgotten, discarded traditional practices. A small johad (johad is a semi-circular earthen water pond built along the contours of hill slopes for stopping and storing rain

¹ Lecture full of populist hyperbole

water. It has a wide base to collect runoff from tiny streams and rivulets. Since johads are made of earth, most of the construction cost is taken up by labor (Singh, undated: p.13)) was constructed by volunteers of TBS near the main tributary of the river Aravari. This improved water availability in the following months. Many villages, therefore, volunteered to build similar structures through community effort. TBS also contacted the local government functionaries to take up construction/repair of check dams in the area through government funds. The local officials expressed helplessness due to paucity of funds, but promised technical guidance if the villagers agreed to provide shramdan (voluntary labor). With assistance from government not forthcoming, the villagers, inspired by TBS, took up the work themselves, first desilting and deepening an old, abandoned johad. After the next year's monsoon, the water level stayed higher and was retained longer than in previous years. Thereafter, more than 200 johads were constructed in the catchment area. Patel, a researcher, reports (1997: p.36):

It was incredible for the villagers, because for generations, they had not witnessed such a transformation. It was further incredible that it had all been achieved due to their shramdan, and the catalytic help of TBS.

This success motivated the other villages to come forward, resulting in over 1500 water harvesting structures being repaired or newly built during 1987-94. The community movement finally realized its dream when the Aravari turned into a perennial river in 1994. This led to a reversal of migration out of this area to the neighboring Delhi in search of livelihood. Foodgrain production increased four times, milk production doubled (despite no increase in cattle population), the water table rose significantly, forest cover was augmented from 5% to 40%. Besides improving the prosperity, quality of life, there was a resurgence of flora and fauna.

It is interesting to note that the revival of Aravari was not the end of troubles for the local people. As soon as this news spread, the local and state government officials descended on the scene in 1996, claiming ownership of the river, and plantations raised by the people. The state government awarded a fishing contract for the river to an outside contractor from Jaipur. TBS staff and the villagers were harassed and warned of 'dire consequences' by the local police and politicians. It was only people's organized resistance, culminating in a satyagrah (fight for truth) in February 1997, in which thousands of people from neighboring as well as distant places participated, that finally broke the bureaucrat-politician-contractor nexus. As a result of mass resistance, which became a media event, the government allowed the

local people to be the custodians of these resources, and enjoy the benefits of their labor within communities' own arrangements (Patel, 1997).

3.4 Modeling Land Degradation: Application of Scientific Knowledge

Traditional approaches to combat land degradation in India have been implemented through various central and state ministries' schemes/projects that define degradation from sectoral perspectives driven by the respective mandate of these organizations, viz. to increase agriculture productivity, improving forest cover, augmenting employment opportunities for the rural poor, etc. An integrated approach that adopts watershed as the basic unit of land development has been largely absent until recently.

The IMSD program seeks to use remotely sensed satellite data and GIS to prepare land resources action plan for a selected watershed. One of the agencies responsible for the implementation of IMSD is the National Remote Sensing Agency (NRSA), an elite scientific institution focusing on space research and remote sensing. A component of IMSD has been NRSA's role in development of a GIS package since 1994, and its subsequent transfer in 1996 to the IMSD district on workstations in the office of the District Rural Development Agency (DRDA). Despite the local district staff having received training in GIS, they continued to depend on NRSA for modifications, updates, technical backup and 'handholding' through periodic visits of scientists to the district to resolve difficulties experienced by staff, and to help make enhancements. Several local DRDA staff after being trained on GIS typically left either through transfers or movement to the private sector. Two of the experienced staff who have been associated with the GIS work from its inception in the DRDA are now adept at operating 'normal' procedures around the GIS. Despite this, GIS is perceived as a 'black box' by the staff, albeit capable of generating alternative scenarios to quickly prepare projects aimed at development of degraded areas, for example where to locate water harvesting structures or to suggest appropriate land use. GIS was used to help in the prioritization of possible projects to be taken up for development. The staff indicated they were comfortable using GIS to visualize different development scenarios.

During a GIS demonstration, which we witnessed, the two experienced DRDA staff mentioned that they had other primary functions assigned to them (one was a civil engineer, and the other a project economist), and could spare time for GIS work only when a new project formulation, or related activity, was called for. The overall computer related work in the district was highly compartmentalized, with different groups working in isolation with limited interaction and learning from one another. The DRDA Director

mentioned that while action plans prepared using GIS were discussed with the public, limited feedback was received. Modifications to action plans were based primarily on the criteria of 'scientific acceptability' rather than on public inputs.

The scientists noted that now the scientific institutions had formally 'adopted' specific districts to provide local support, training and hand-holding to the DRDA staff. This formalization was different from the earlier MoEF project in which the scientist involvement was primarily based on their volition. This adoption has led to a sense of greater ownership on behalf of the scientists.

4 DISCUSSION AND ANALYSIS

The two cases discussed provide contrasting but interesting examples of the nature of mediating institutions, participatory processes, and the application of knowledge. These are now discussed below.

Nature of mediating institutions: In the IMSD example, the development of GIS software in scientific institutions and its transfer to the districts is enabled primarily through bureaucratic structures, similar to the earlier MoEF attempts (Sahay and Walsham, 1997). Efforts to transfer technology to districts in the MoEF case were largely stifled because the scientists saw research into new technologies (like GIS) as their primary mandate. The scientists drew upon the notions of objectivity and superiority of science and technocrats, and were reluctant to involve the end-users in design processes. This dogmatic philosophy reflected the assumption that technological interventions using western models could be replicated to Indian conditions, based on the universality of scientific knowledge, and tended to ignore the significance of indigenous knowledge around land conservation.

Under the IMSD, the situation seems to have changed to some extent with the scientific institutions formally assuming greater 'ownership' of GIS activities in specific districts and thus transcending to some extent the earlier primary focus on technology development. As a result, institutions were seen to be providing more active technical support, and complemented ongoing efforts of district computing staff to support GIS work. Developing and providing user-friendly shells reflect further attempts to design the technology based on user capabilities. These efforts of the scientists have been reinforced by other central government initiatives requiring training programs for officials in project implementing agencies to include use of remote sensing data and GIS techniques in their curricula (Government of India, 2001). These multi-level capacity building efforts provide some

evidence of “triggers to change structure” (Sahay and Walsham, 1997: p.436) through focused managerial agency.

In the case of the Alwar project, the mediating agency was the NGO TBS, but the impetus for change was driven primarily through the efforts of the community. The community members had a direct stake in the river restoration efforts, and frustrated by the inaction of the government, they decided to take the process into their own hands. These efforts, as the case description illustrates, has had significantly positive outcomes.

Participatory processes and application of knowledge: Attempts to facilitate participatory processes in IMSD are reflective of the Rapid Rural Appraisal (RRA) philosophy wherein while the project agenda is defined ‘externally’ (the scientific institutions in this case), the people (the district staff) are encouraged to participate. The involvement of the ‘end-users’ (the community members who are the land beneficiaries) is considered as not required under the IMSD. The merits of this thinking can be debated whether the community members need to understand the working of the GIS ‘black box’ to effectively participate in system design, or their point of entry could be an exposure to the outputs of GIS maps that depict the development plans which impact their land and livelihood.

In the Participatory Rural Appraisal (PRA) model, people are not seen as passive beneficiaries (Schneider and Libercier, 1995), and the development agenda, framework of participation and use of knowledge is expected to be decided in consultation with the community. However, PRA is initiated by outside ‘experts’, and the extent to which the people’s inputs are taken into account is still decided by the funding agency (e.g. bureaucracy). The Alwar example is seen to be different than the traditional PRA, as it is closer to the ideal of empowerment, wherein the people rather than the bureaucracy are driving the process. However, the efforts of the TBS cannot be discounted in facilitating these participatory processes, and contextualizing them within the framework of indigenous knowledge. The dynamics of PRA process, however, often lead to the articulation of new risks, as reflected in the conflict between the government and the local people noted at the end of the case. These risks are underscored by Mosse (1994: p.522):

[PRA techniques] have contributed significantly to the promotion of participatory development. But, while they offer new opportunities for the articulation of local knowledge ... they may also expose projects to new risks by creating public contexts and a new idiom in which dominant interests can gain legitimacy.

In Table 1 below, we summarize the two approaches to land development that emphasize the contrasting nature of implementations, outcomes and key characteristics of the two cases. A further analysis of the case emphasizes the conceptualization of participatory processes ranging from a continuum where it is defined by the external agency to one in which it is driven for and by the people. This continuum reflects different kinds of relationship between structure and agency, and different forms of rules and resources that are drawn upon to exercise agency. We conceptualize and summarize this relationship in Table 2.

Table 1. Characteristics of the two approaches used for land regeneration

Community approach – Alwar	GIS approach – IMSD
<i>Implementation based on:</i> Intensive local participation; recourse to indigenous knowledge, local practices, use of appropriate technology; focus on tree-planting and protection.	Little local participation of end-users of technology and intended beneficiaries; normative approach based on scientific methods, computer-based modelling, imported technology.
<i>Outcome:</i> Successful regeneration of Aravari; immediate improvement in quality of life.	Action plans suggesting multifarious landuse in target areas; no clear assessment of the contribution of GIS.
<i>Main features:</i> TBS plays catalyzing role; people discover forgotten pride and value of mobilizing own resources.	Long gestation for technology to propagate; project-based funding as per pre-decided cost norms.

Table 2. Continuum of Participation in Development

Mediating Agency/Nature of Participatory Agency	Structure - agency interplay	Rules and resources mediating structure-agency relationship
External		
(i) <i>Govt./external donors</i> : orthodox approach [No participation] Designed and implemented by outsiders; local communities (intended beneficiaries) not consulted about their perception of development; monitoring and evaluation conducted by project designers themselves.	Existing structures dominate with little potential for agency to make change.	Prevailing hierarchies, bureaucratic norms, donor perceptions, pre-established funding patterns, power to allocate resources, superiority of external knowledge and technology.
(ii) <i>Govt./external donors</i> : RRA approach [Institution focused participation] Intended beneficiaries consulted in meetings organized by officials/donor agency experts; move towards eliciting participation; development agenda still externally-driven; aims to obtain community feedback into project formulation.	Possibility of creation of new structures to accommodate preliminary level of participation by people.	---- do ---- + local practices and indigenous knowledge.
(iii) <i>Govt./external donors</i> : PRA approach [User focused participation] Target group encouraged to define and spell out its aspirations; however, people's inputs not the entire basis for development – power exercised by bureaucracy/politicians still a major factor; relevance of local practices and knowledge more explicitly recognized; development agenda still externally-driven; faulted by development workers for treating community as a homogenous, non-problematic entity.	New structures to facilitate community participation, empowerment emerge; homogenous identity of community.	Community, indigenous knowledge, empowerment, bureaucratic/donor perceptions.
Internal : by, of, and for the community [Active participation] Direct involvement of local communities in development; impetus may be injected by an external agency; framework of development within the community, democratic and self-sustaining; indigenous knowledge fully exploitable.	Full potential for creation of new structures. Local power equations attempted to be rearticulated.	Trust, commitment, local power politics, indigenous knowledge, community resources.

5 CONCLUSION

We have conceptualized participation as a form and reflection of human agency that can be analytically viewed over four moments or levels of a continuum ranging from no participation, institution-focused, user-focused, to the participatory agenda being defined and enacted by the project beneficiaries themselves. We have described the first three levels to be mediated by governmental agencies, drawing upon institutional structures that emphasize hierarchy, a top-down philosophy, and the application of a project-based scientific knowledge. These structures tend to stifle participatory processes, or at best accept inputs from the end-users within the development framework defined by the bureaucracy. The fourth level of participation is described as being mediated 'internally' by the community members in partnership with a community-based organization, drawing upon contrasting structures reflecting trust, commitment, and respect for indigenous knowledge.

Through this analysis, we argue that the two cases provide elements of learning which together can help develop a more effective strategy to combat the larger problem of land degradation. While it is important to draw upon perspectives of local knowledge and conditions in the formulation of development projects, we must simultaneously also be concerned about the macro-problem of how learning and experiences that result can be drawn into efforts to address the complex problem of land degradation. At one level, land is a 'resource-in-use', inextricably related to people and society that use it, implying that degradation at one place and time will be situated and complex. At another level, there are patterns that repeat themselves in human-environment relations (Blaikie and Brookfield, 1987: p.16), implying some 'context-free' elements that can be 'modelled' using technologies like GIS. For example, land degradation and/or loss of vegetative cover can be predicted through modelling land use pattern and intensity of resource use.

The interesting challenge then is how to develop approaches that on one hand can take into account the capability of new technologies like GIS, which while potentially enabling the larger spread of projects, tend to come with government institutional structures that are not conducive to active participation, and to the contrary may even stifle such processes. On the other hand, initiatives like the Alwar case provide inspiration to draw upon the power of relevant local knowledge and the power of local agency. This predicament represents a dialectical relationship where one process can be seen to simultaneously both support and undermine the other. This dialectical relationship is captured neatly in Friedman's (1992: p.7) following argument:

Although an alternative development must begin locally, it cannot end there. Like it or not, the state continues to be a major player ... without the state's collaboration, the lot of the poor cannot be significantly improved.

Castells (2000) has also referred to the above predicament as being a key challenge in creating new structures of governance in contemporary civil society. Castells would argue that movements like the Alwar case can be seen to reflect a 'resistance identity' that can help to prevent the potential 'disintegration of society' (through land degradation in our case). The challenge is to examine under what conditions this resistance identity can be converted into a 'project identity' where "social actors, based on whatever cultural materials that are available to them, build their position in society and, by doing so, seek the transformation of the overall social structure". (ibid.: p.120). Castells refers us to the challenge of sustaining resistance approaches like those offered by TBS, while simultaneously redefining governmental systems to support such approaches to blossom. Castells argues (ibid.: p.121) that if such transformations do not come about, movements like TBS remain largely symbolic, with impacts limited to the local domain. While resolving this predicament is beyond the scope of this paper, its identification helps to raise at least two key questions for future empirical and theoretical work. The first concerns the challenge of developing 'hybridized knowledge' that blends indigenous and scientific knowledge. The second relates to the development of institutional frameworks within which participatory processes are nurtured to facilitate application of this knowledge for the larger good of land conservation.

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