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IFPRI Discussion Paper 01944

June 2020

Securing the Commons in India

Mapping Polycentric Governance

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ABSTRACT

Common pool land and water resources in India play vital, but often overlooked, roles in livelihoods and ecosystem services. These resources are subject to the authority of various government departments and are often managed in ways that result in uncertain tenure for the people who depend on these resources for fodder, fuel, water, and other products. An Indian NGO, the Foundation for Ecological Security (FES), has developed a process for “commoning”—assisting communities to secure the commons by forming inclusive local institutions to manage the resources, and to work with different government departments to gain stronger rights to the commons. This paper applies polycentricity theory to examine the institutional arrangements that govern the commons in FES sites in Andhra Pradesh and Karnataka states and assesses relationships that may affect commons management. It draws on key informant interviews and village-level social network mapping exercises (Net-mapping) to show the complex flows of resources, information, and influence related to the commons among habitation-level organizations, local government, resource agencies, the rural employment guarantee program (MGNREGA), and NGOs. This paper discusses the potential of this methodology as a diagnostic tool to help understand community perceptions of the role of various stakeholders in overall governance of the commons, and can provide guidance for interventions to help communities to strengthen their tenure on the commons and management of those resources.

Keywords: Network mapping, commons, governance, India

ACKNOWLEDGMENTS

This work was undertaken as part of, and funded by, the CGIAR Research Program on Policies, Institutions, and Markets (PIM) led by the International Food Policy Research Institute (IFPRI). PIM is in turn supported by the CGIAR Fund Donors. This paper has not gone through IFPRI's standard peer review procedure. The opinions expressed here belong to the authors, and do not necessarily reflect those of PIM, IFPRI, or CGIAR. The authors wish to thank the research participants in the study communities. Thanks to Shivanyaa Rawat at FES for her helpful review and data cross-checks.

1. INTRODUCTION

Common pool land and water resources in India play essential roles in livelihoods and ecosystem services. Government authority regarding these resources is spread across different departments and the resources are often managed (or neglected) in ways that result in uncertain tenure for the people who depend on these resources for fodder, fuel, water, and other goods and services. Such uncertain tenure can pose problems for these local communities to actively maintain and sustainably manage such commons. Unlike private property or government-recognized forms of common property, local land and water commons in India are usually formally “owned” by the state but managed collectively by state agencies and/or local user groups. Research indicates that secure tenure on the commons is facilitated by recognized rights to use and manage the resources (or at least that local institutions are not challenged by authorities), as well as effective management institutions to maintain the resource and allocate its benefits among the collective rights-holders (Ostrom 1990). An Indian NGO, the Foundation for Ecological Security (FES), has developed a process for “commoning”—assisting communities to secure the commons by forming inclusive local institutions to manage the resources, and to work with different government departments to gain stronger rights to the commons.

While most local land commons are formally vested with the Forestry or Revenue Departments, panchayats (local governments) have management rights and responsibilities, and state water and watershed management agencies, and forest, water, or watershed management committees at the habitation (sub-village) level all play a role. In addition to the institutions usually associated with the commons, programs from the National Bank for Agriculture and Rural Development (NABARD) and the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) can provide significant resources (including finance, labor, and participatory planning processes) for improving the condition of the commons. Effectively tapping into these resources requires coordination among local forest or watershed communities and management committees at the habitation level, panchayats at the village level, and government line agencies at the block (subdistrict) and district levels. Thus, land and water

commons, such as forests, grazing land, tanks, and aquifers, are enmeshed in complex systems of relationships that affect security of rights to common pool resources.

This paper applies polycentricity theory (V. Ostrom et al. 1961; E. Ostrom 2005; Carlisle and Gruby 2017; Thiel et al. 2019) to examine the institutional arrangements that govern commons in four FES sites in two states in south India, Andhra Pradesh and Karnataka. A polycentric approach offers a way to understand the complex patterns of relationships that may affect the governance and security of resources in situations involving multiple resources, communities, government agencies, and government programs. In his early definition, Vincent Ostrom (1999, p.57) referred to polycentricity as an order “where many elements are capable of making mutual adjustments for ordering their relationships with one another within a general system of rules where each element acts with independence of other elements.”

As a concept, polycentric governance goes beyond considering the layers or nested levels of hierarchical decision making centers, and involves multiple, semi-autonomous, decision centers, shared interests and needs, and formal or informal mechanisms for cooperation, coordination, conflict resolution, competition, and information sharing (V. Ostrom et al. 1961; E. Ostrom 2009; Carlisle and Gruby 2017). It looks at the interaction between actors at different levels of governance, both nested and cross-sectoral, and thereby contributes to a more nuanced understanding of the variation in governance of common-pool resources (Nagendra and Ostrom 2012). Polycentric governance can help explain the dynamics of multiple resources and organizations involved in commons, the factors affecting how well such systems function, and ways in which their performance might be improved. Carlisle and Gruby (2017) identify two key attributes of a polycentric governance system:

- (i) multiple, overlapping decision-making centers with some degree of autonomy;
- (ii) choosing to act in ways that take account of others through processes of cooperation, competition, conflict, and conflict resolution.

Polycentricity thus provides a way to talk about institutions that span boundaries and different actors: state, civil society, market and private actors. This can encompass different scales of resource

management, multiple levels of government, and different sectors and resources. Analysis of polycentric governance can look at the complementarities and tradeoffs between these. A main contribution of this paper is to also reflect on the multiplicity of agency and scales, when dealing with a mosaic of commons as opposed to a single shared resource (Nagendra and Ostrom 2012). While nested levels of governance have received more attention in the commons literature, in this case, the agencies involved are more overlapping than hierarchical.

The methodology for identifying the polycentric nature of the commons in this study includes key informant interviews with a range of government actors at district, block (sub-district), and habitation level, as well as participatory trend line and social network mapping, Net-mapping (Schiffer and Hauck 2010), exercises with local communities in four habitations. The results reveal the extent of community knowledge of various actors and agencies affecting the commons, and the complex flows of resources, information, and influence related to the commons.

The methodology discussed here is being developed as a diagnostic tool and guide for interventions to help communities strengthen their tenure on the commons and their role in the management of those resources. The Net-mapping exercise can serve as a baseline, to see whether local-level commons institutions are active, and whether community leaders know of the various agencies that can help (or hinder) local efforts on the commons. FES or other external actors can then strengthen the capacity of the local institutions, and help to identify relevant government agencies that have authority, information, or other resources vital to governance of the commons. Net-mapping exercises after the intervention could then show whether there have been gains in communities' knowledge of the relevant institutions and increases in the flows of information and resources among state and local institutions. Ultimately, this approach can help communities to gain stronger external recognition and internal regulation to secure tenure on the commons.

The paper is organized as follows: In the next section, we provide an overview of commons management in Andhra Pradesh and Karnataka, India, and discuss how a polycentric approach offers a way to understand the complexity of systems and relationships that govern land and water commons, and

how they affect the security of rights to these commons. We then discuss the study methodology, which relied on interviews with local government officials and community members, including identifying and mapping the relationships between the organizations and agencies involved in resource governance. In the results section that follows, we lay out how the four villages show diverse relationships in difficult local situations, and how Net-mapping can help identify existing relationships, gaps, and opportunities for improvement. In the discussion section, we show how comparisons between cases helps to show patterns, including how appropriation and provision rules help to regulate the usage, production, and protection of commons. The final section of the paper discusses some policy implications and next steps for research and action.

2. COMMONS MOSAICS IN ANDHRA PRADESH AND KARNATAKA

Common pool resources such as forests, pastures, ponds, and groundwater aquifers play a crucial role in rural livelihoods. Different users withdraw from a shared resource, and collective action may be required to avoid depleting or damaging the resource upon which their livelihoods depends. Cooperation among users can help ensure that the resources continue to be available, with adequate investment in providing the resource and rules to prevent excessive withdrawals and conflicts among users. However, collective action to govern commons depends on social institutions, including those that can provide secure tenure to determine who does and does not have rights to enter, withdraw, or manage the resource (Schlager and Ostrom 1992).

In many cases, including in India, governance of commons is difficult owing to insecurity, if no one has the authority and ability to regulate use to sustainable levels, or to restore degraded resources. Research on commons indicates that security of tenure in commons depends on external recognition, or at least the absence of external interference, as well as internal governance arrangements (E. Ostrom 1990; Cox et al. 2010). Institutional arrangements that affect the security of commons are particularly important in the form of provision rules governing how investments are made to create or maintain commons, as well as appropriation rules governing withdrawal (Crawford and Ostrom 1995).

Efforts to strengthen governance of commons in many countries have focused on devolution of rights and responsibilities from government agencies to local user groups, such as forest users or irrigators (Meinzen-Dick et al. 2001; Meinzen-Dick et al. 2008). In most cases, rather than complete transfer of ownership to a local organization, external agencies retain regulatory authority, creating forms of co-management, with shared control. Thus, there are two primary organizational actors, an external resource management agency and a local user group.

In India, the Panchayati Raj Institutions (PRI), for local self-governance were introduced through the 73rd Constitutional Amendment, in 1992. The introduction of PRIs formalized the devolution of a number of powers, including that of governing commons, to the Gram Panchayats and to the *Zila*

(District) and Block (sub-district) level institutions (Pal 2004; Alok 2013). In practice, this process is taking place differently in different states. There is a need to provide a transition for effective local governance in a way that recognizes community rights. These also need to work with existing informal village committees and federations.

The Foundation for Ecological Security is working on an approach to “commoning,” where the rights holders claim their rights over commons. This may involve improving governance of existing commons, or reasserting rights over traditional commons that have been encroached, by local people or outsiders. It also builds and can strengthen local communities’ “environmentality,” or their perceptions and values related to the environment, and how they see commons as vital to their life (Agrawal 2005). Rather than waiting for intervention by a specific government program, such as for community forestry or irrigation management transfer, the community itself can take the initiative. Such local initiative may be particularly important where legislation has created a framework for devolution of authority over resource governance, but agencies have been slow or ineffective in putting policies into practice. Communities may also make creative use of other available programs to improve how they manage their resources, as discussed further in this paper.

Commons in rural areas of Andhra Pradesh, Karnataka, and elsewhere in India are part of a mosaic of lands that may be officially designated as “forest” land (with or without trees), “wastelands” (not under private ownership), and water resources, such as ponds or tanks and streams interspersed with private agricultural lands. As a result, there is a need to look broadly at a range of resources, not just a single forest, grazing area, or irrigation system. Commons provide a variety of goods and services including firewood, fodder, and water for humans and livestock, as well as nutrients, water storage, and other ecosystem services that provide inputs to agriculture. These resources are often used by people from multiple local communities. Officially, commons are usually considered state lands, but under the jurisdiction of different government departments. Historically, these were usually under the de facto control of communities, although with different levels of effectiveness.

Over the last 30 or more years, there have been a number of programs to address management of the commons in India, including Joint Forest Management or Watershed Management program (Bhattacharya et al. 2010). Much of the literature looks at individual programs (e.g. Kerr 2007). This may reflect the perspective of a particular agency and those involved in implementing a particular program. However, from the perspective of villagers the situation is one of not just collective action among many resource users of a particular resource, but also a multiplicity of programs and agencies, offering different opportunities and requirements, for resources that overlap and interact, and may be shared among various communities.

Similarly, local governments must deal with a variety of specialized agencies, including those concerned with forests and water resources. Various agencies may have relevant activities, and regulatory responsibilities, including fisheries, horticulture, and minor irrigation, with staff at various levels of government (block, district, state, etc.). Within this multiplicity of resources and organizations, polycentricity and related concepts offer tools for understanding the structure of networks of individuals and organizations managing complex systems of resources, such as water, land, and ecosystems in rural areas, and the potential for improving their governance, including through active efforts at “commoning” by communities.

In mosaics of commons like large forest landscapes where rivers, catchments and other smaller commons are embedded, the issue of “boundaries” poses a challenge to polycentric governance where the natural resource can have its own geographical boundary, while institutions have different spheres of influence (Nagendra and Ostrom 2012). For example, in Nepal, conservation efforts focusing only on the local level forest patches were successful in restoring very degraded land patches, but neglecting the regional level resulted in deforestation in the larger landscape (ibid.). In that case, local communities may find difficulty in restoring larger forest landscapes. Also, while local communities usually govern forests effectively through building their own institutions, community learning, knowledge and skills are not uniformly developed within one country or mosaic of commons. This shows the value of adding another

layer of polycentricity, where it takes multiple village communities to join together on a meso level when it comes to conserving larger forest areas.

Given the multiplicity of actors and agencies and complexity of resources involved, concepts of polycentric governance thus seem highly applicable to the context of commons governance in Andhra Pradesh, Karnataka, and other parts of India. Problems and opportunities for collective action often span boundaries between communities, government agencies and jurisdictions, and may involve cooperation with civil society and private sector organizations. However, such complexity threatens to be overwhelming, giving the appearance of chaos and confusion, making it hard to understand what is happening, and what might be done. It is thus important to build on the premise that the presence of such multiple actors and institution in governing the commons create complexity rather than chaos (Berge and van Laerhoven 2011). This study elucidates these arrangements, using four case studies and proposing a methodology based on network mapping that can be used by researchers and practitioners to get a clearer picture of the complex diversity of organizations and interactions.

3. METHODS

This study was conducted in four habitations; two in the Kolar District of Karnataka and one each in Ananthapur and Chittoor Districts of Andhra Pradesh (Table 3.1). These sites were selected because they are areas where FES has been working to strengthen community management of the commons. These contiguous districts have similar agroecological characteristics but allow us to look at differences in governance arrangements in two different states.

Table 3.1: Case Study Areas

Habitation / Village	Gram Panchayat	Taluka / Mandal	District	State	Households in habitation
Cherukoripalle	Yerramvaripalle	Srinivasapur	Kolar	Karnataka	32
M Vyapalapalle	Mudimadugu	Srinivasapur	Kolar	Karnataka	46
GVP Thanda	Chammagondi	Gandlapenta	Anathapauram	Andhra Pradesh	127
Vepalapalle	Gundallapalle Panchayat	Thamballapalle	Chittoor	Andhra Pradesh	37

The analysis draws primarily on key informant interviews and network mapping, while also making use of secondary sources and knowledge accumulated as part of earlier FES work in communities. Fieldwork began by interviewing government officials at multiple levels, including district and taluk (subdistrict) level, as well as line agencies such as the Forest Department. These interviews helped identify the variety of organizations and institutions involved in resource management, and provided perspectives on resource management from the point of view of government officials. Net-mapping is a social network analysis tool that uses interviews and participatory mapping to help people understand, visualize, discuss, and improve situations in which many different actors influence outcomes (Schiffer and Hauck 2010). In contrast to simpler “Venn diagram” methods sometimes used in PRA to identify relevant outside organizations, Net-mapping provides a more detailed analysis of different kinds of organizations, different kinds of linkages, and strength of their influence. FES used Net-mapping as a participatory activity in the four habitations to gain an understanding of the efficacy of the tool in understanding polycentricity for the governance of natural resources. The first step was to visit the habitation and purposively select key informants who would be part of the Net-Mapping exercise. An

effort was made to include people who were slightly older and had seen the various transitions that the village passed through. For the same reason, people whom the FES interviewers knew to be articulate and familiar with the developments taking place in the village were also included.

However, Since FES was involved in carrying out the exercise, this posed a risk of respondents overemphasizing its influence. To reduce this bias, in a second round of Net-mapping respondents were asked to exclude FES from the equation to show other important institutions. Nevertheless, FES being a facilitator for the exercise is a limitation to the study. A total of 40 informants participated in the Net-mapping exercise in the four study sites. Efforts were made to include women in the discussions, but with relatively little success, another study limitation. This may have been due to the Net-mapping exercises taking place in the evenings, a time when women are busy with domestic responsibilities.

The discussion began with questions on the history of natural resources use in that location and how the condition of the natural resource changed over time, using a participatory rapid appraisal (PRA) trend line tool. This would identify prominent events in time, learning about the history of the village, and trying to understand how the condition of the natural resource changed through different periods, with a discussion on the reasons for these transitions.

The Net-mapping exercise began with a listing of all the institutions or players who were associated with the key natural resources in the village. These were written on sticky notes, each color-classified by whether they were government, community, or NGO. All villages covered land commons like grazing lands and village and reserve forests. One village also explored issues related to the governance of water commons such as tanks. The next step was to trace the relationships between organizations, particularly flows of information and financial resources, as well as sharing of governance authority.

A subsequent step was to ask which organizations had the most influence (a more neutral way of addressing some aspects of power). Chips, usually from one to five¹, were placed to make “influence

¹ There was some flexibility in this exercise with different communities, where some ranked from one to 10 or 1 to 15. Nevertheless, relative influence between organizations remained indicative.

towers.” This provided an opportunity for discussion, periodically asking people why they add or subtract to different stacks. This helped determine the relative importance of the various players influencing the resource system in question; and in also understanding the communities’ perceptions about the roles that these players/institutions had, and how they influenced their own interface with the resource². The proceedings from the interviews were recorded in the village level minutes book for the reference of the community. Thus, Net-mapping was used to learn about how local people saw their situation. Overall, participants said that they liked the Net-mapping exercise and seemed to enjoy the process. In contrast to more conventional ways of gathering information for Social Network Analysis, Net-mapping makes the process more like a game.

² A further step would be to ask more about the interests of each of the organizations. However, in practice by this time people had usually spent as long as they wanted for the activity, and trying to assess interests turned out to not be as productive.

4. RESULTS

Polycentric arrangements governing the commons: The view from above

Within the Indian context there are different government agencies involved in commons management, including line agencies from state government, as well as Gram Panchayats, which are elected local governments on the sub-district level. The two key line state agencies are the Forestry Department, which is a key agency for managing forest lands, and the Revenue Department, which has the authority over all lands designated as “wastelands,” commons lands not privately owned, not classified as forest, and seen as less productive lands. Panchayati Raj Institutions (PRI) are the channels for local self-governance and devolution of commons governance. Under this mechanism, PRI arrangements provide for three tier systems at district, *Mandal* (sub-district, known as *Taluka* in Karnataka), and village level, including Panchayati Raj Institution Sub-committees (PRISC) at the village or habitation level, working under the Gram Panchayat as recognized village level institutions. Yet in practice, PRIs are also influenced by state politics, thus the process of devolution is taking place differently in different states. The recognition of community rights is related to the transition to effective local governance.

The institutional organization in Andhra Pradesh and Karnataka is similar, but decentralization and roles of the Gram Panchayats in each state differ (Kumar 2009; Alok 2013). In Karnataka, devolution of management and authority to the Gram Panchayat through the PRI is given more weight, and the state put mechanisms in place to strengthen PRISCs and nest them into the Gram Panchayat. In Andhra Pradesh, while PRIs exist legally, devolution is taking place mostly outside of the PRI channel. Tensions between Gram Panchayat and the village institutions and federations, as well as lack of state involvement of the PRI, lead to bypassing Gram Panchayat. While not necessarily re-centralizing control, alternate local level institutions have been set up, including for example women’s self-help organizations and Village Watershed Committees. In Karnataka, there is more engagement of the PRI while in Andhra Pradesh mechanisms have not been set in place to transfer real authority to the Gram Panchayat. In the long term, increasing the capacity from the bottom up and having a strong local governance body might

be ideal, yet there are different ways of how this is being devolved in practice, promoting a different type of pluralism in each case.

An important factor in this complex is the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), a social protection program introduced in 2005 to ensure the availability of at least 100 days of labor income for every Indian. The objective of the MGNREGA program is to improve livelihoods, and, secondarily, to build assets. Works built through local labor can include construction of roads and schools, land development activities, and construction of water storage or harvesting on common and private land. Thus, it can also be utilized as a source of resources for investing in commons especially labor-intensive work. Fischer and Ali (2019) find that MGNREGA provided local institutions and governing bodies like panchayats with considerable resources and powers, which also lead to improved environmental governance along with development outcomes. While the scheme is viewed primarily as a safety net, the rural poor also value the individual and collective assets constructed through MGNREGA (such as trenches, irrigation canals, etc.) for their livelihood development, including improved water availability, soil quality and yields (Godfrey-Wood and Flower 2016).

Gram Panchayats, as local governments, set the priorities for MGNREGA works, while state agencies advise on technical feasibility projects to be designed and implemented with local participation (Fischer and Ali 2019). This also means that implementation varies by panchayat and as power dynamics and local relations between stakeholders play a key role in shaping outcomes. Water resources activities are a priority under MGNREGA, particularly labor-intensive earthworks that can increase water storage, which thereby create new opportunities for securing and restoring commons. Thus, there is a need for strong local habitation and village institutions that are recognized and given authority to manage resources to interact with and send proposals and requests to Gram Panchayat in order to secure and benefit from such funds for enhancement of commons and livelihoods.

Non-governmental organizations (NGOs) also have a convening or capacity-building role. For example, in some cases, FES works with NABARD to provide more concentrated assistance to particular areas. Also, inclusive organizations in rural habitations, whose formation has been supported by FES, form

closely connected social networks with influence. As an example, the Andhra Pradesh Mutually Aided Cooperatives Societies Act of 1995 enabled Tree Growers Cooperative Societies (TGCS) to be established and gain rights to use revenue “wastelands,” that are part of many rural lands in India under the jurisdiction of the Revenue Department. Various programs and guidelines have supported watershed development involving local communities. For land under the Forest Department, policies for joint forest management enable village level committees to obtain rights to manage land for rehabilitation of degraded forests. Some small-scale water resources come under the authority of PRI, while others may be under the Department of Minor Irrigation. Policies, and the legal framework thus creates opportunities for co-management and commoning.

In governing large and relatively complex common pool resources like forests, grazing lands and tanks, it is important to recognize that several players with varying degrees of clout and sometimes conflicting interests come together in order influence the nature and outcomes of such governance. Each of these players works at different spatial and temporal scales; while some of them have evolved from amidst the communities and have come to pursue interests of these communities, others have been constituted as part of legal or constitutional provisions. Some, such as NABARD are primarily responsible for providing funding to various initiatives that support village institutions. Village Watershed Committees and PRISCs play a more hands-on role in the governance of natural resources. Some others like FES by virtue of their proximity with community level institutions and due to the aggregated experience of many years, play the role of facilitators, information-providers and that of social mobilization.

Polycentric arrangements governing the commons: The local view

The following subsections discuss results of stakeholders’ Net-mapping for the four villages. For each village, a narrative of the history of the use and governance of the commons is relayed, followed by the Net-mapping exercise outcomes. In the Net-mapping diagrams, shape shows the type of organization: squares represent community institutions, diamonds represent government, and circles represent NGOs.

Arrows in different colors show linkages, including planning, funding, capacity building, information sharing, authorization of access rights, and social mobilization. The size of the organization shows the influence given to the organization in the eyes of local community members. Influence was measured on a scale from one to five, one to 10 or one to 15 depending on the actors each community identified, while relative influence was calculated as a fraction of the most influential organization for each case. As shown in the Net-maps, a variety of institutions are involved in governing commons in the study area, illustrating the polycentric nature of commons governance.

Cherukoripalle, Karnataka

The village has a patch of grazing land and a tank, both of which are seen as commons by the community. The Net-mapping exercise focused on the grazing land, which is managed by the village with boundaries demarcated by the Revenue Department.

History of Using Commons

The participants felt that while in the past there were systems to take care of the grazing lands, those systems have been gradually eroded, resulting in land degradation. However, with the formation of the PRISC, aided by the Karnataka Panchayati Raj Act, there has been some improvement in the health of these grazing lands.

Discussions with the community brought to light their changing environmentality, changing perceptions and values related to the environment, in relation to grazing land. In the 1980's the grazing lands were in good health. This was attributed to regular rainfall and to the fact that most of the households had substantial numbers of livestock, which kept them invested in the maintenance of the grazing land. Therefore, while the members of this community were allowed to take their animals to graze or to collect firewood, there were clear and strict restrictions on the felling of trees and on managing fires, which limited the number of fires in the grazing land. All this happened with unwritten yet enforced regulations; on the basis of a general understanding evolved among the members of the community. Inter-

village coordination was also strong; therefore, there were only a few instances of people from the neighboring villages entering this particular grazing land. By the 1990s, the green cover on the grazing lands had declined owing, in the view of the community, to a decline in rainfall. They also attributed this trend to an increase in the demand for firewood, leading to a higher felling of trees. However, neighboring villages still respected the boundaries of this grazing land.

By the 2000s, when FES made its entry into the village, the rate at which trees were being felled had increased significantly. While FES undertook re-vegetation activities on the grazing land, the community felt that doing so would increase the occurrence of monkeys in and around the village, and therefore did not involve itself in the activity with enthusiasm. It is evident that perceptions among the people regarding the natural resource play a big role in the success (or failure) of a conservation initiative. However, the village realized the importance of preventing fires in the grazing lands, and evolved mechanisms, including monitoring systems, to prevent them. With help from FES, the community undertook a number of activities aimed at the development of the grazing land, including soil and moisture conservation and re-vegetation, and also evolved mechanisms to retain the benefits of such interventions, such as restricting grazing in newly planted areas.

However, the inter-village coordination, which had come to define the success of much of the conservation efforts in the past, seems to have been eroded by this time. As a result, fires were frequently set off by people from other villages, resulting in heavy loss of biomass. Around this time, the community got access to clean cooking technology through FES and government, resulting in some reduction in the exploitation of the grazing land for firewood. Despite these measures, in the view of the community, there has been a decline in the general health of the grazing lands due to a decline in rainfall. Currently, the composition of the cattle has changed with more emphasis on crossbreds and buffaloes, both of which depend heavily on cut and carry systems, bringing fodder to livestock rather than letting them graze in fields.

The community also alluded to the lack of support from the government as an explanation for their inability to develop these commons. While MGNREGA does support such initiatives, it does not

seem to interest this community as, in their view, the wages offered under the program are inadequate and delayed. However, one of the fallouts of the degradation of the grazing lands, along with the degradation of the tank in the village and the general decline in agriculture, has been to force many households to migrate. The participants reported that the rate of migration in the village had increased notably over the decades.

As can be inferred from the analysis presented by the community, the ability of the grazing lands to support the community in its needs has undergone drastic changes in the last three decades. The result has been that the way the community perceives these grazing lands and the extent to which it is willing to be invested in these lands has also been changing. The various interventions undertaken with assistance from FES and the government, in the shape of MGNREGA and other such programs, keeps the community invested in the grazing land. However, the changing aspirations, livelihood opportunities (new ones that can be pursued and the traditional ones like agriculture that have become increasingly difficult), and the changing values within the community seem to have changed the community perceptions regarding the commons.

Insights from Net-mapping

As shown in the Net-map in Figure 4.1, the Revenue Department is considered to be the most important government player in matters related to the grazing land (see Table 4.1). This department regulates the rights of the people over their grazing land, as indicated by the red line. FES seems to be the next most important institution in relation to the grazing land. From the perspective of the community members, FES brings in the funds needed for the development and upkeep of the commons; liaises with external agencies like NABARD and other government or civil society agencies to ensure the implementation of various schemes related to the same; provides the village with information and builds their capacities (blue lines) on various aspects related to the governance of the grazing land; and plays a notable role in facilitating planning (black lines) around the commons. While funds are recognized to be from NABARD, they are channeled through FES.

Since FES was involved in carrying out the study, there is a risk that this might lead respondents to overemphasize the role of FES. However, when asked *not* to include FES, the community named PRISC; both in terms of influence and in terms of contributions to the community on various accounts like information, building capacities, etc. At the village-level institution, this institution is seen to be playing an important role, notably due to Karnataka government strengthening the role of PRIs in the process of co-management. The village community itself is seen mainly as a supplier of information, as shown by pink lines. Prima facie, it seems that the community does not view itself as an important player in the governance of commons like the grazing land in this question. As the Net-map indicates, the village seems to articulate its position as a recipient of capacity and funding from external sources; rather than as a player who is active in governing the commons.

Figure 4.1. Cherukoripalle Net-map

Table 4.1. Cherukoripalle Players

Players	Category	Influence	Relative influence
Foundation for Ecological Security (FES)	NGO	5	1
Revenue Department	Government	5	1
Villagers	Community	4	0.8
Panchayati Raj Institution Sub-Committee (PRISC)	Community	4	0.8
Village Watershed Committee (VWC) Member	Community	4	0.8
National Bank for Agriculture and Rural Development (NABARD)	Government	3	0.6
Village Watershed Committee (VWC)	Community	2	0.4
Neighboring Village	Community	1	0.2

M. Veyapulapalle, Karnataka

The village has been managing about 70 acres of grazing land and a patch of forest land. The Net-mapping exercise focused on the forest land. Similar to the first case, the changing environmentality of the village community is evident here, as well as the role trust plays between the various players and agencies involved in governing commons.

History of Using Commons

As in the case of many other villages in this region, this village has a tradition of managing its commons; but has been finding that these traditions are crumbling over time. In the 1980's the community was very much invested in the maintenance of the forest land. Similar to the village community in Cherukoripalle, they had made efforts to govern the patch of forest land and had successfully engaged with neighboring villages to prevent conflicts over access, share benefits from forests and manage fires effectively. Forest fires were not nonexistent but according to the community, there were fewer fires and most of them were addressed quickly.

The Joint Forest Management program was introduced in 1990s (and revised in 2000) as a system of partnership in forest governance between the Forest Department and local communities (Patra 2015). Forest management responsibilities as well as benefits are shared, but how the program was rolled out in practices is different for each state. In this case, there were joint forest management committees with the aim to grow commercially viable trees, usually with a benefit sharing agreement, where upon the maturity of the trees, they would be harvested, and the benefits distributed. The split is usually either 60-40 where communities receive 60 percent of the benefits if the forestry department invests the funds for plantation, or 90-10 where communities receive 90 percent of the benefits if they invest the funds for tree planting. Additionally, communities have rights to use and extract non-timber resources from the forest overtime.

But unlike the first case, this community did not gradually fade. Participants reported that the community's perception towards the forest completely changed due to an incident in 2006 when the forest department "stole" the trees therein. At that time, the trees that were planted as part of the Joint Forest Management program had matured and the Forest Department had them harvested without sharing the benefits that the community was supposed to receive. This enraged the community and completely divested them of any interest in governing the forest. This is one reason that can explain the low influence of the Village Forest Committee (VFC) shown in the Net-map exercise, and the general ill health of the forest.

While this narrative is unverified from other sides, this example highlights how trust plays an important role in shaping the environmentality of communities towards various natural resources. The local systems and rules that had evolved for the upkeep of the commons were being discontinued for various reasons, including the incident with the Forestry Department, but also, over time, the community's level of dependence on commons changed, and the involvement of various governmental actors in managing the resources meant that rules imposed from the outside may have dismantled older village institutions.

Insights from Net-mapping

In this village, the Net-map (Figure 4.2) shows FES to be the most influential player; acting as an important fund provider for the village level institutions, including the Village Watershed Development Committee (VWDC), PRISC and the VFC. Although it is the institutions like NABARD that are the sources of funding, villagers see FES as the source because they are seen to be handling these funds. But surprisingly, despite the many capacity building programs that FES is involved in, it is not seen as an information provider.

If FES is taken out of the equation then the most influential community level players are the Gram Panchayat, the VWDC and the PRISC. The roles that they play in galvanizing people, disseminating information and managing funds in the process of governing commons is recognized by the community. Like the first case, PRI are supported and have authority and recognition, and this was reflected in the mapping that clarifies the picture on the ground. Both the Forest Department and the Revenue Department are seen as agencies that can grant the community rights to use the revenue wastelands and forest land respectively. Strangely NABARD, which very rarely has direct contact with the village community, is seen to be more influential than the VFC (see Table 4.2). This could be because while the community's rights over governing the revenue wastelands are well recognized, similar rights over the forest lands are not. Therefore, the level of investment that they have in the wastelands seems to be significantly higher than for forests. This is another reason that could explain the seemingly weaker influence of the VFC, which is supposed to be within the village.

As in the previous village, the villagers saw themselves as providers of information only, but receivers of everything else, including information. Their primary role in their perception, was to provide 'outsiders' with information and receive solutions from them rather than view themselves as active agents who can also come up with and contribute to solutions.

Figure 4.2. M. Veyapullapalle Net-map

Table 4.2. M. Veyapullapalle Players

Players	Category	Influence	Relative influence
Foundation for Ecological Security (FES)	NGO	10	1
Gram Panchayat	Government	9	0.9
National Bank for Agriculture and Rural Development (NABARD)	Government	9	0.9
Panchayati Raj Institution Sub-Committee (PRISC)	Community	8	0.8
Village Watershed Development Committee (VWDC)	Community	8	0.8
Villagers	Community	7	0.7
Village Forest Committee (VFC)	Community	6	0.6
Revenue Department	Government	6	0.6
Forest Department	Government	6	0.6
Zilla Parishad	Government	5	0.5

Gajula Vari Palke (GVP) Thanda, Andhra Pradesh

GVP Thanda is a tribal village, which has a patch of common land called Thudumgutta that spreads across 80 acres and is a steep hillock full of boulders. It is used mainly as a grazing land, but owing to its steep and rocky nature, the communities' dependence on this patch of land has been very low. It has not been very suitable for undertaking plantation activities or other physical interventions for the same reasons. Thus, the extent of dependence on commons in this habitation is not as high as that in the villages covered above.

History of Using Commons

For almost three decades starting from the 1980s, fodder amounts in this grazing common land have been insufficient for livestock feeding. In addition, the small amount of available fodder was often lost to the almost yearly instances of forest fires, leading to severe fodder scarcity. In 2011, FES started working with the village on commoning, and the village institution was formed. Through the Tribal Development Fund that was administered by NABARD in conjunction with FES, private land development was

undertaken. Mango plantations were chosen as the appropriate intervention, and by leveraging MGNREGA, the community constructed boundary trenches in the foothills of the common land. Desiltation of the minor percolation tank near the common land was also undertaken and this led to ground water recharge and provide drinking water for livestock. The community is also making efforts towards controlling instances of fire, thus ensuring fodder security for their livestock. Thus, the community is benefitting through common land management.

Insights from Net-mapping

Like the two cases in Karnataka, FES is seen as the most influential player in this habitation (Figure 4.3 and Table 4.3). It is seen by the people as a source of funding, information and capacity building. It is also seen to be playing some role in planning activities on common lands. If FES is taken out of the equation, then the most important player is the MGNREGA Field Associate (FA). The MGNREGA “Mate” who acts as a local overseer for work under MGNREGA is also significant. It is not surprising that bodies and functionaries associated with MGNREGA hold a position of pre-eminence in this habitation. Ever since its inception, MGNREGA has played an important role in bringing government investments into rural areas and in creating lasting assets that contribute to natural resource governance. MGNREGA plays a stronger role serving as an important source of livelihood, and its projects are implemented comparatively better in Andhra Pradesh, where there is a higher level of political support for MGNREGA funds to be invested in commons management.

Another important agency in this village has been NABARD, owing to the fact that this village is one of the beneficiaries of the Tribal Development Fund. Through this project, horticulture was successfully promoted, improving the livelihoods of village households. Once again, the farmers do not view themselves as sources of capacity or knowledge; rather they see themselves as suppliers of information and as recipients of knowledge from the ‘experts’.

Figure 4.3. GVP Thanda (water tank) Net-map

Table 4.3. GVP Thanda (water tank) Players

Players	Category	Influence	Relative Influence
Foundation for Ecological Security (FES)	NGO	10	1
MGNREGA Field Associate (FA)	Government	9	0.9
National Bank for Agriculture and Rural Development (NABARD)	Government	8	0.8
Mandal Parishad Development Officer (MPDO)	Government	7	0.7
Commissionerate of Rural Development (CRD)	Government	7	0.7
Mandal Development Committee (MDC)	Community	6	0.6
Village Development Committee (VDC)	Community	6	0.6
User Group	Community	5	0.5
MGNREGA works overseer (Mate)	Community	5	0.5
Farmers	Community	5	0.5

Vepullapalle, Andhra Pradesh

In this village, both common lands surrounding the village and the village tank which are being managed by village institutions were considered for the Net-mapping exercise. A changing environmentality is evident here in a positive direction, owing to the strengthening of local village institutions and a high dependency on the resources.

History of Using Commons

During the 1980s, this patch of land was in an extremely degraded condition, with no trees or fodder. Thus, the community had faced severe fodder scarcity attributed to successive droughts and lack of proper management. In 1999 when FES entered the area, it facilitated the formation of the village institutions. The institution aimed to improve and protect the common lands close to the Pedda Errakonda village. This was about 100 acres of land, which was brought under the community's management.

The common land plot is managed by the Tree Growers' Cooperative, which is a local village or federation (cluster of villages) level institution. Through an agreement, the cooperative leases the land from the government to govern, manage and utilize it under community rules. Currently, the boundaries of this plot are clear. Its usage and management are governed by rules which are enforced by the institution on all those who use the common land. Some of these locally devised rules include prohibition of cutting down green trees and branches, allowing the collection of fallen branches only and restricting grazing in patches with new plantations to allow for growth.

Similar to the previous case in Andhra Pradesh, interventions like construction of staggered contour trenches and planting troughs have been undertaken by leveraging funds from MGNREGA. In 2000, the physical works were undertaken in the common land for soil and moisture conservation, to improve soil retention capacity and also to prevent soil erosion as well as run off from these lands. Along with this, efforts were made to prevent fires, which is one of the main threats to the vegetation in common lands. Fire lines were dug and spreading awareness among the community helped prevent and put out fires. These sustained efforts resulted in higher green cover while improving the ground water regime in the region. The village now has sufficient fodder and firewood availability. Neighboring villages also depend on this patch of land for grazing their livestock and the community is still actively managing and protecting the land.

The village tank is typical of other cascading tanks replenished by rainfall in Andhra Pradesh and Karnataka, which were built long ago and served as a source of surface water irrigation, typically for growing paddy rice. These tanks were governed by some locally evolved rules and their maintenance was carried out by the community, although maintenance systems have eroded overtime. A designated person called *neerkatti* as the regulator has been historically responsible for opening the gates of the tanks. However, if the tank is not full, the community doesn't use the water for irrigation. This important actor was not mentioned by the community during this net-mapping exercise, possibly as it was not a year of adequate rainfall, and thus the roles of *neerkattis* were not evident.

Insights from Net-mapping

Land Commons

As in the case of the other villages, FES is the most influential player in the view of this habitation. The Tree Growers' Cooperative Society (TGCS) is the second most influential institution, which is seen by the community as being the source of information and funding and as being instrumental in planning (Figure 4.4 and Table 4.4). One important difference here is that the village community is seen to be an important and influential player, unlike the other cases. In addition, the MGNREGA functionaries like the Mate, the FAs and TAs are seen to be playing an influential role in the overall governance and upkeep of commons in this habitation. This is due to the fact that MGNREGA is being leveraged effectively by FES to undertake various activities aimed at the restoration of the commons and strengthening of rural livelihoods, as well as Andhra Pradesh government investing resources in MGNREGA. The role of neighboring villages is rather small.

Figure 4.4. Veppulapalle (land commons) Net-map

Table 4.4. Vepullapalle (land commons) Players

Land: Players	Category	Influence	Relative influence
Foundation for Ecological Security (FES)	NGO	14	1
Tree Growers Cooperative Society (TGCS)	Community	13	0.93
Community	Community	12	0.86
Revenue Department	Government	11	0.79
Mandal Parishad Development Officer (MPDO)	Government	10	0.71
National Tree Growers' Cooperative Federation (NTGCF)	Community	9	0.64
Project Director	Government	8	0.57
Assistant Project Officer	Government	7	0.50
MGNREGA Technical Assistant (TA)	Government	6	0.43
MGNREGA Field Assistant (FA)	Government	5	0.36
Gram Panchayat (GP)	Government	4	0.29
MGNREGA works overseer (Mate)	Community	3	0.21
Federation	Community	2	0.14
Neighboring villages	Community	1	0.07

Water Resources

Interestingly, the most influential player in the governance of the tank is the village community itself (see Figure 4.5 and Table 4.5). Unlike the other resources, in the case of the tank, the community sees for itself a clear role in its maintenance and governance. TGCS is perceived to be a forum for planning activities related to the maintenance of water bodies; and as a source of funding. The village community on the other hand is seen to be a source from where the plans emanate but also as a source of social galvanization. Various government agencies are also important players, as government programs result in the creation of various water bodies like cattle ponds and play an important role in the maintenance of tanks. Both the Irrigation and Revenue Departments are considered to be important sources of plans and for funds. The Gram Panchayat is responsible for managing the fishing rights in the tank, which the community has managed to keep in the realm of the commons, despite the GP attempts to auction off these rights. This however, alludes to tensions with local groups on the habitation level, and the local

distrust in Gram Panchayat in this case. It also reflects the importance of having strong local village institutions to be recognized, in order to more meaningfully nest them into processes of devolution.

Figure 4.5. Vepullapalle (water tank) Net-map

Table 4.5. Vepullapalle (water tank) Players

Players	Category	Influence	Relative Influence
Village Community	Community	10	0.71
TGCS - Tree Growers Cooperative Society	Community	10	0.71
FES - Foundation for Ecological Security	NGO	9	0.64
Revenue Department	Government	8	0.57
Irrigation Department	Government	7	0.50
Gram Panchayat	Government	6	0.43
Collector - District Head	Government	5	0.36
Mandal Development Officer (MDO)	Government	4	0.29
FA - MGNREGA Field Assistant	Government	3	0.21
Mate - MGNREGA works overseer	Community	2	0.14

5. DISCUSSION

Institutional diversity and Net-mapping

The two states of Karnataka and Andhra Pradesh have similar sets of organizations and institutions, although the Gram Panchayat have a much stronger role in Karnataka. This similarity could be taken to suggest that the institutional arrangements would be the same in both states, or that there is a single standard arrangement in all four villages, one true organizational structure. However, as shown by the Net-maps, what the village community sees is very different in each case. Even when the same organizations are involved, their relationships with communities may be configured in various ways. As evident in the last case, even within the same village, two different commons can look very different.

The village cases show how resource governance is not the prerogative of a single agency or program. Instead the security of commons is shaped by the actions of a variety of actors, who affect the ability of communities to protect commons against destructive practices and degradation and to improve the shared resources that contribute to rural livelihoods. They also indicate gaps in local knowledge and links to programs that could strengthen local claims to commons and provide resources. The Net-mapping also points to opportunities to create and strengthen decision-making centers, including habitation level organizations, participatory processes for planning and implementation, and federations combining stakeholders across wider landscapes. In most cases, villagers seem to see their role as a relatively passive one, mainly providing information and receiving all else (planning, funding, capacity building, social mobilization, etc.), suggesting the potential to increase their sense of efficacy. The exception is irrigation in a community that has acted to tap into government programs.

Net-maps can show which agencies and relationships are already important, and which not, revealing gaps or opportunities for change. Clearly community members do not know all the regulations and agencies. For instance, where Gram Panchayat are bypassed, local communities may not come to know of their roles. Some communities identified more actors than others. That can be either because these actors are not present in this context, communities do not know about these different actors, or they

do not see them as important. Net-mapping thus helps show what local communities know about the existing governance arrangements and who has influence on the ground, while serving as an indicator for the village's own capacity.

However, there are some limitations to Net-mapping. Net-mapping exercises are static, surfacing current issues and showing influence of actors and community perception in a snapshot in time. For example, in a good year of rainfall, the role of the tank manager would appear strongly. Hence, outcomes of Net-mapping depend on various factors, including the group of people carrying out the exercise as well as the timing. Another limitation is that it may only capture a limited set of actors, not necessarily all relevant though indirect actors. For example, livelihoods and governance of land and water commons are linked, thus in practice, communities need to work with actors like the agriculture departments and departments providing social security and entitlements, as this has an impact on governance of commons. Also, important private sector actors like the mining enterprise were not evident, as focus is on actors who play a role in restoration, rather than those representing tensions and negative impacts on restoration.

Provision: Investment in the commons

Each set of institutions has different appropriation rules, as well as provision rules, which affect the security of the commons. There are traditional labor contributions, Joint Forest Management programs, and watershed management programs, all of which have rules affecting how resources are provided and how they are appropriated.

Traditionally, commons and other local public goods have often been provided by communal labor, *shramadana*. This has usually occurred through autonomous local institutions. However, this is not always effective, and is now more difficult with the increase in seasonal and longer-term labor migration. Massive investments have been channeled through watershed development programs. However, these have often not been sustained, due to the lack of effective rules for maintenance or appropriation of benefits. Joint Forest Management provides a way in which communities can be involved in protecting forest areas, including reforestation, and share in the resulting benefits. However, the case related in

Veyapulapalle, Karnataka shows how such promises, if unfulfilled, can destroy the villagers' trust in the government and undermine their willingness to care for the commons.

This also reflects that over time, levels of community environmentality may change for various reasons, including for example as communities diversify away from agriculture, or due to seasonal migration or eroding trust in neighboring villages or other agencies. Thus, local communities may not take commoning initiatives with the same strength over time. Understanding and leveraging the different levels of environmentality in villages can help create effective community involvement in commons management, and local NGO initiatives assisting communities in the uptake of commoning can serve as a catalyst for better governance.

An important actor that can be leveraged for investment in Indian commons is MGNREGA, as evident in cases of Andhra Pradesh. If communities know about this and can get assistance, MGNREGA can provide important support for improving land and water resources, including the development of rules that help to protect and restore commons. One question is whether the availability of such assistance, or the ways in which it is provided, may displace local rule-making regarding maintenance and appropriation of benefits. For example, introducing extrinsic motivation in commons management (using material or economic incentives) in some cases can crowd-out existing intrinsic (or environmental) motivation to protecting commons (Agrawal et al. 2015). Conversely, participation in planning works for MGNREGA may provide an opportunity to include discussion about how the benefits from improvements may be shared, reducing the risks of capture and inequitable exclusion, as well as protecting commons against overexploitation. This reflects on Krishna's (2002) notion that while social capital (embedded in community collective action) is crucial, it is not sufficient to guarantee sustainable management of the commons, suggesting the need for capable new leaders ("agency capacity") to mobilize the potential and productivity of existing social capital.

Appropriation rules for commons

Traditional village and user group institutions for land commons include various rules (and degrees of rule enforcement) concerning grazing, collection of firewood, cutting grasses, setting fires and other matters. Tank committees set rules about how water may be used for domestic water supply, livestock, or irrigation and hire *neerugattudaarudu* (tank managers) to manage shared tanks.

For state institutions, Forest Department regulations restrict use, emphasizing biodiversity and resource protection. Joint Forest Management offers a way to share benefits between communities and the Forest Department. Watershed Development Committees make plans and use funds to carry out earthworks, reforestation, and other changes. Agencies may be a source of technical expertise, as well as holding authority to govern resources, which is sometimes shared or delegated.

FES activities have pursued a “triple bottom line” of democratic social inclusion in government, better livelihoods, and sustainable resource use. FES has supported communities in claiming commons, seeking ways to improve the flows of resources such as fodder, fuel, and water, through agreeing on rules governing resource protection, provision, and extraction. For example, this may include moratoriums on grazing while tree seedlings grow and prohibitions on burning grassland. However, FES engagement with communities is not constant over the years, where depending on projects, some years include heavier involvement. This ‘ebb and flow’ of involvement also affects the process of commoning, since many communities see themselves as receivers of solutions, capacities and resources from FES and others, rather than seeing themselves and their actions of commons restoration as the solution.

Polycentricity

In terms of functional polycentricity (Carlisle and Gruby 2017), Net-mapping shows clearly that there are multiple organizations involved. Each often has substantial autonomy in how it acts, as they are in separate lines of agency and not necessarily hierarchical, like in the case of the Forest and Irrigation departments. FES activities to promote more inclusive and more active involvement of communities in

planning of MGNREGA illustrate the opportunities for strengthening habitations as centers for decision making, making increased use of the potential for autonomous action created by participatory policies. The participatory planning process also creates opportunities for panchayats and district level agencies to influence the planning and implementation of programs. Federations like TGCSs, PRISCs, or watershed development committees, provide forums for sharing experience and working together to solve problems. Differences between states in how MGNREGA, Joint Forest Management, watershed management, and other programs are carried out also show the existence of autonomy on the part of state governments and their departments, making clear that implementation is not a simple matter of “replication” but depends, among other things, on the political context.

These multiple organizations are connected by relationships of cooperation, competition, and conflict, as well as conflict resolution. Individuals and communities may compete over access to common pool resources, such as water, fodder, and fuel. Some may attempt to capture exclusive access, taking advantage of their geographic location, for example upstream location or proximity to a forest, as well as social, economic, and political power. Others may attempt to resist or evade such efforts, especially if exclusion is felt to be illegitimate or unjust. Communities can cooperate to make rules, such as those regulating withdrawal from commons and preventing fires. Conflicts, including breaking rules, may be addressed directly within and between communities, as well as by seeking support and action by authorities such as police and local government. Agencies may compete for resources, recognition, and opportunities, but they may also coordinate, choosing to act in concert such as in district level coordination. All these linkages may have crucial impacts on the extent to which tenure in commons is secure, or insecure.

In some cases, villagers seem to have little or no knowledge of relevant programs and agencies. This shows gaps, and opportunities for improving linkages. In other cases, coordination mechanisms do exist, including not only vertical linkages to higher level agencies but also horizontal linkages between communities sharing commons such as watersheds and forests. The small role and low linkages with neighboring villages in the net-mapping exercising is disconcerting, considering that landscape level

governance of commons requires that multiple villages come together in order to govern commons and address issues at the meso level. Commons can be seen as nested systems. Ponds and irrigation systems are contained within larger watersheds through which water flows. Smaller patches of forest and grazing land lie within larger mosaics of multiple land uses. Thus, other actors like neighboring villages highlighted in the Karnataka cases are important to include in efforts of conserving larger mosaics of commons.

The Net-maps show linkages that are present, and others that are missing. This can provide guidance on what could be done and how to strengthen the functionality of the polycentric systems. Linkages can be enhanced by bringing together resource users and agencies, creating forums for discussion, sharing of ideas and experience, and creation of consensus, as well as the formation of more formal federations. Considering changes in linkages involves looking at how systems are capable of change, including issues of power and outcomes, both formal and informal power.

6. CONCLUSIONS AND IMPLICATIONS

Net-mapping is a useful tool that helps us understand the community's perceptions of the role that is played by various stakeholders in the overall governance of the commons. Two points emerge very strongly; the first is that in most cases, the community does not see itself as a source of knowledge or solutions. Rather it sees itself as a passive consumer of information and plans and as an implementer of external initiatives. While further research is needed to verify this in a wider variety of cases, this suggests that communities may need mobilization to help them claim their agency.

The other point that emerges is the changing environmentality among people especially towards grazing lands and forests. Whereas earlier communities were invested in the process of governing commons, today they seem to be less and less interested in contributing to their maintenance. The reasons for this need to be understood by the stakeholders; and steps taken to address them. For no conservation or governance initiative can succeed without the participation of these communities. One key point concerns the crucial role of trust: as illustrated by the community's reaction to having forest commons "stolen," while trust takes a long time to build, it is easy to break. Part of the way forward is to try using this tool in many more villages with diverse resource conditions and use the data thus generated to inform interventions.

This approach to learning about the history of resource use and mapping relationships between the organizations involved can be useful for diagnosis of institutional arrangements: what exists and what is needed, where are the gaps and opportunities for creating better linkages. Changing connections takes effort and needs to consider the potential benefits compared to the higher transactions costs of establishing or strengthening polycentric governance arrangements.

The methodology could also be used for monitoring and evaluation, looking at whether and how perceptions have changed. Thus, work by FES seeks to equip communities to defend their commons, to understand ways to reclaim commons from encroachment and to obtain external resources that can be used to improve water storage and restore more productive and sustainable forest ecosystems on degraded

lands. Net-mapping can help strengthen their capacity to navigate a complex institutional environment. It can also be used as a monitoring and evaluation tool to see whether there have been gains in their understanding of their environment overtime. FES is also working at bridging at the district and block level, getting the different agencies talking to each other, which could also be monitored using Net-mapping. One next step is to develop this methodology as a diagnostic tool. It can be used as a baseline, to see what communities already know.

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