



Securing the Commons in India: Mapping Polycentric Governance

RESEARCH ARTICLE

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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, 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 the different government departments to gain stronger rights to the commons. This study examines how the polycentric governance of natural resource commons shapes the ability of communities to do effective commoning, with particular reference to appropriation and provisioning rules. Using participatory network-mapping in FES sites in Andhra Pradesh and Karnataka states, we identify the constellation of actors involved in the commons, the relationships among them, and community knowledge of these arrangements. The results reveal the complex flows of resources, information, and authority related to commons, with programs and agencies across different sectors, offering different opportunities and requirements, for commons management. The Net-maps show linkages that are present, and others that are missing or not well-understood, Net-mapping helps assess the extent of community understanding of the polycentric governance of the commons, and can help identify opportunities to strengthen participatory processes for planning and implementation.

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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. Resources are often managed (or neglected) in ways that result in uncertain tenure for the people who depend on them for fodder, fuel, water, and other goods and services. Local land and water commons in India are usually formally “owned” by the state but in practice are managed collectively through the activities of various state agencies and local user groups. Uncertain tenure and ambiguous and uncoordinated spread of authority across different institutions can pose problems for these local communities to actively maintain and sustainably manage such commons.

Polycentricity theory is valuable in helping examine complex institutional arrangements that govern commons in India and beyond. Polycentric governance 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; Thiel et al. 2019). 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. Using a polycentricity lens can help illuminate and disentangle the different roles, actors, and modes of governance on the ground, from multiple actors’ perspectives.

India’s land and water commons, such as forests, grazing land, tanks, and aquifers, are enmeshed in complex systems of relationships that affect security of rights and consequent governance arrangements. Communities may not be able to fully secure their rights to commons or govern resources effectively without having a good picture of the actors involved in governing the commons. The NGO Foundation for Ecological Security (FES) is working on an approach to “commoning” in India. This emphasizes action by customary commoners to improve governance of existing commons, or reassert rights over traditional commons that have been encroached by local people, outsiders, or state agencies.

Commoning is seen as a process of organizing for the commons: local communities collectively recreating and reclaiming the commons on which they depend (Linebaugh 2008; Fournier 2013; Bollier and Helfrich 2015). The use of a verb reflects on the reproduction and management of the commons requiring continuous stakeholder engagement and local initiative (FES 2016, Sandström et al. 2017). Like

decentralization, commoning shifts responsibilities and activity from the state to communities. A key difference lies in the source of initiative: whereas decentralization is often initiated by the state, commoning requires agency of the communities. Local initiative is 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.

But commoning does not necessarily imply “going it alone”. FES aims to catalyze commoning by assisting communities to form or strengthen inclusive local institutions for resource management, and to work with the different government departments and agencies to gain stronger rights to the commons in practice in a way that strengthens polycentric linkages (FES 2016). Activities for commoning have included reclaiming former commons that had been taken for individual use, and utilizing opportunities created by policies that enabled increased local authority over forest and grazing land and water resources, as well as programs that provided resources for improving commons and livelihoods that depend on them. Getting a local perspective on institutional arrangements can reflect both the realities of how polycentric governance of commons takes place, and show how much communities do or do not know about institutional arrangements and actors that affect them, along with their own role in commons governance.

Two key aspects of governing the commons relate to appropriation and provision. Appropriation relates to the allocation of units of the resource flows among users (or exclusion of potential users); provision relates to creating, maintaining, or improving the productive capacities of a resource (Ostrom, Gardner and Walker 1994). These two are closely linked, because the resources available for appropriation depend on the effectiveness of provisioning. Rules related to appropriation or provisioning prescribe what actions are required, prohibited, or permitted, along with provisions for monitoring and sanctioning if rules are broken (Crawford and Ostrom 1995). Thus, effective commoning requires engagement with both appropriation and provision.

This study addresses the research question: how do different configurations and history of the polycentric governance of natural resource commons shape the ability of communities to do effective commoning? While there are many ways to define effective commoning, we focus on effectiveness in terms of asserting rights and governing the commons, particularly in terms of appropriation and provision rules. To address this, we identify the constellation of actors involved in the commons, the relationships among them, key changes over time, and community knowledge of these arrangements. We conducted key informant interviews with a range of government actors at

district, block, and habitation level and carried out network mapping exercises with local communities to examine the institutional arrangements that govern commons and map polycentric governance in four FES sites in two states in south India: Andhra Pradesh and Karnataka.

The results reveal the complex flows of resources, information, and authority related to commons and the extent of community knowledge of various actors and agencies affecting commons governance. They shed light on how the institutions involved in management of a single resource are cross-sectoral, an idea that is not sufficiently explored in the polycentricity literature which has mostly focused on the multiple levels of governance in a single sector (e.g. forests).

The paper is organized as follows: In the next section, we provide a brief overview of commons management in India, focusing on how a polycentric approach helps in understanding the complexity of systems and relationships that govern land and water commons, including the security of rights to these commons. We then discuss the study methodology including a description of network mapping and the case study sites. In the results section, we map polycentric governance of commons in Andhra Pradesh and Karnataka states, both from an officials' perspective and from the perspectives of the four case study communities. This maps the diverse relationships that exist and opportunities for improvement. In the discussion section, we show how comparisons between cases reveal patterns, including how appropriation and provision rules help to regulate the usage, production, and protection of commons. The final section discusses policy implications and next steps for research and action.

2. COMMONS GOVERNANCE COMPLEXITIES IN ANDHRA PRADESH AND KARNATAKA

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 enough authority and ability to regulate appropriation to sustainable levels, or for sufficient provision to maintain, let alone restore, degraded resources. 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 (Ostrom, Gardner and Walker 1994).

Commons in rural areas of Andhra Pradesh, Karnataka, and elsewhere in India are part of a mosaic of lands: "forest" land (with or without trees), "revenue wastelands" (including lands that are not under private ownership), 'village commons' like grazing land and sacred groves, 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, savannah, 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, underscoring the need for clear appropriation rules.

Most local land commons in India are officially considered state lands under the jurisdiction of different government agencies like the Forest Department or the Revenue Department. However, local governments (panchayats) have management rights and responsibilities. State watershed management agencies and habitation (sub-village) level committees on forest, water, or watershed management all play a role as well. Historically, some of these resources were under the de facto control of community organizations, with different levels of formality and effectiveness. Provisioning through customary contributions of labor and cash through these community organizations have often declined, raising the question of where sufficient resources will come from to invest in maintenance and restoration of the commons. In addition to these 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 provisioning to improve the condition of the commons.

Further, Panchayati Raj Institutions (PRI) for local self-governance were introduced through the 73rd Constitutional Amendment, in 1992. PRIs comprise three levels: Gram Panchayat at the revenue village level or a cluster of revenue villages, Panchayat Samiti at the subdistrict level, and Zilla Parishad at the district level. A number of powers, including that of governing various types of commons, or specific aspects of the commons, are devolved to the PRI (Pal 2004; Alok 2013). In practice, this process differs by state, particularly regarding approaches to working with customary village committees and federations.

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

(JFM) or Watershed Management programs (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 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. Effectively tapping into these programs 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.

Within this multiplicity of resources and organizations, polycentricity offers tools for understanding the challenges villagers and government agencies face in securing the commons. Polycentricity helps understand 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 commoning efforts. Further conceptualizing commoning as a dynamic process of commons reproduction over time takes into consideration the role of history and social interaction in shaping local governance arrangements around commons (Sandström 2017).

Polycentric governance can help explain the dynamics of multiple organizations involved in commons, the factors affecting how such systems function, and ways in which their performance might be changed. 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 hierarchical decision-making centers. Carlisle and Gruby (2017) identify two key attributes of functional polycentricity:

- (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 provides a way to talk about institutions that span boundaries and different actors: state, civil society, market and private actors.

Given the multiplicity of actors and agencies and complexity of resources involved, concepts of polycentric governance are 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. 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 institutions in governing the commons creates, not chaos, but complexity and opportunity (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, especially in commons with multiple organizations and resources involved.

3. METHODS: MAPPING POLYCENTRICITY

This study was conducted in four habitations where FES has been working; two in Kolar District of Karnataka and one each in Anantapur and Chittoor Districts of Andhra Pradesh (*Table 1*). These contiguous districts with similar semi-arid agroecological characteristics allow us to look at differences in governance arrangements in two different states. Communities in each site are primarily dependent on agriculture, with a rich history of use of commons but different configurations of how polycentric governance

HABITATION/VILLAGE	GRAM PANCHAYAT	TALUKA/MANDAL	DISTRICT	STATE	HOUSEHOLDS IN HABITATION
Cherukoripalle	Yerramvaripalle	Srinivasapur	Kolar	Karnataka	32
M Veyalapalle	Mudimadugu	Srinivasapur	Kolar	Karnataka	46
GVP Thanda	Chammagondi	Gandlapenta	Anantapur	Andhra Pradesh	127
Vepalapalle	Gundallapalle	Thamballapalle	Chittoor	Andhra Pradesh	37

Table 1 Case Study Areas.

and community involvement in commons governance evolved. What differentiates them from other habitations is that FES has been working with them on commoning and connecting them to other relevant actors, thus it may be expected that they are more conversant with the various institutions that affect their commons.

The analysis draws primarily on network mapping (Net-mapping) and some key informant interviews, supplemented by secondary sources and knowledge accumulated as part of earlier FES work in these and other Indian communities. Fieldwork began by interviewing 10 government officials at multiple levels, including district and taluk (subdistrict) level, as well as line agencies such as the Forest Department. These key informant interviews, coupled with FES experience, helped identify the variety of organizations and institutions involved in resource management and how it differs by state, giving a view of polycentric governance from the perspective of government officials (i.e. *the view from above*). The main field activity was a participatory Net-mapping exercise that gathered 10 community members¹ in each habitation to take part in mapping the actors they see as important in commons governance (i.e. *the local view*).

Net-mapping is a tool that uses 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 diagrams sometimes used in participatory rapid appraisal to identify relevant outside organizations, Net-mapping provides a more detailed analysis of different kinds of organizations, different kinds of linkages, and strength of each organization's influence. FES used Net-mapping as a participatory activity in the four habitations to gain an understanding of community perspectives on polycentric resource governance, and to test the efficacy of the tool in understanding polycentricity for the governance of natural resources.

The exercise began with participants listing all the institutions or players who are associated with the key natural resources in the village. These were written on sticky notes, color-coded as 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. Next, participants were asked to trace the relationships between organizations, particularly flows of governance authority (which relates to appropriation), information and financial resources (which is especially important in provisioning). Each community could identify additional types of flows as important. Next, participants ranked which organizations had the most influence (a more neutral way of addressing some aspects of power). Chips were stacked to make

“influence towers.”² This helped identify the relative importance of the various players influencing the resource system in question; and understand the communities' perceptions about the roles that these players/institutions had, and how they influenced their own interface with the resource—a further indication of effective commoning.

FES' facilitation of the exercise risked respondents overemphasizing its influence. To reduce this bias, particular emphasis was given to identifying the influence of institutions besides FES. The proceedings from the exercise were recorded in the village level minutes book for the reference of the community. Overall, participants seemed to enjoy the process, which seemed more like a game than conventional data collection.

The case study reports were written by FES field staff who participated in the data collection. This included a researcher from the studies team and the FES field staff who had been working in the village. Case study reports draw on the discussion in the village and FES' knowledge of the site (see Meinzen-Dick et al. 2020 for more detailed discussion of each case).

4. RESULTS

POLYCENTRIC ARRANGEMENTS GOVERNING THE COMMONS: THE VIEW FROM ABOVE

Figure 1 shows a generic view of many of the actors involved in governance of commons in India. The black and white rings represent nested administrative levels, from the habitation (social village), to the revenue village (a group of habitations), to the block³ (subdistricts constituting a group of revenue villages), to the district level (which encompasses a few blocks), and so on. From the bottom-up, village institutions (represented in small grey circles) like Village Forest Management Committees, Tree Grower's Cooperative Societies (TGCS), Village Watershed Committees (VWCs), etc., are formed by the village communities, often with support from local NGOs or government agencies to manage a particular local resource.

Village institutions from 50–70 or so villages may come together to form federations that work either on a larger landscape level, such as a larger patch of forest, catchment area or watershed, or sometimes on the block administrative level (FES 2016). They are mostly formed by communities, with help from NGOs, especially as a means to get recognized water and land rights and tenure from the district government, but they are not officially recognized governance units.

Gram Panchayats may encompass one or more revenue villages. They are legally mandated under the Panchayati Raj Institutions (PRI) for a range of self-governance, including management of certain commons and formulation of

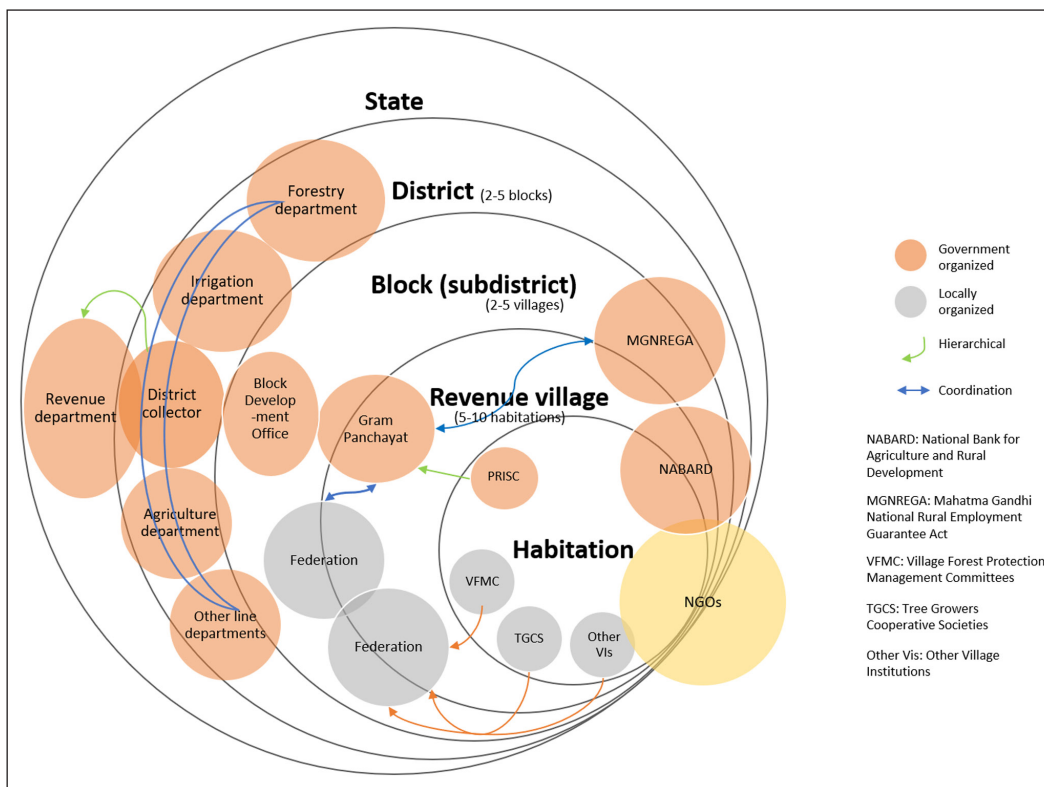


Figure 1 Polycentric governance of natural resources in India. Source: Illustrated by authors.

development plans such as public works. Panchayati Raj Institution Sub-Committees (PRISC) are recognized village level institutions at the village or habitation level, working under the Gram Panchayat. While some PRISC deal with commons, Gram Panchayats often coordinate and work with existing informal village institutions and federations, with overlapping membership and leadership.

Multiple line departments also play a role in management of commons. Beyond the Forest Department and Irrigation (or Water Resources), Animal Husbandry and Agriculture Departments, Watershed Management Agency, and District Water Management Agency were all reported as playing some role in commons management at the Block or District levels in our study sites. Some small-scale water resources come under the authority of PRI, while others may be under the Department of Minor Irrigation. At the state level, two key line agencies are the Forestry Department, which manages lands designated as “forests” (whatever the remaining tree cover), and the Revenue Department, which has the authority over all lands designated as “wastelands”—common lands not privately owned, not classified as forest, and seen as less productive. Communities may legally obtain rights to forest commons from the Forest Department through JFM agreements that designate rights and responsibilities of village level committees to manage land for rehabilitation

of degraded forests, in return for rights to non-timber forest products and a share of the timber harvest. (FES, 2016). The Revenue Department’s District Collector is assigned a coordinating function across line agencies at the district level, and the Block Development Office has a similar role at the block level. In Anantapur District and Gandlapenta Block in Andhra Pradesh, this includes monthly meetings on common lands to discuss problems and share experiences. Officials interviewed attribute these meetings to FES’ interventions, raising the profile of the commons for the development agenda. In our interviews, officials from the Watershed Development and the District Water Management Agency spoke of the need for “convergence” across agencies and the need to “educate” communities about resources. The Forest Department officials we interviewed expressed concerns to protect both trees and wildlife on the forest lands, and to prevent fires. For this they have reached out to NGOs as intermediaries to the communities because “NGOs can be more effective than our way of working” (Indian Forest Service Officer).

While line departments have technical expertise and state-sanctioned authority over the commons, two other organizations that work across scales can be important as sources of funding for investment in the commons. NABARD facilitates agriculture loans with subsidy schemes for local communities, which can be used for the commons.

MGNREGA guarantees 100 days of employment per year. The objective of MGNREGA 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 labor-intensive investment in commons. Fischer and Ali (2019) find that MGNREGA provided local institutions and governing bodies like panchayats with considerable resources and powers, which also led 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 of projects to be designed and implemented with local participation (Fischer and Ali 2019). This also means that implementation varies by panchayat, 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 Panchayats to secure and benefit from such funds for enhancement of commons and livelihoods.

NGOs also have a convening or capacity-building role, which FES has used to support commoning. For example, FES works with NABARD to provide concentrated assistance for the commons in particular areas. FES has also supported development of inclusive habitation-level organizations that can claim rights to the commons using provisions of JFM. The Andhra Pradesh Mutually Aided Cooperatives Societies Act of 1995 enabled TGCS to be established and gain rights to use revenue “wastelands” under the jurisdiction of the Revenue Department. Various programs and guidelines have supported watershed development involving local communities. Policies and the legal framework thus create opportunities for commoning.

Institutional arrangements in Andhra Pradesh and Karnataka are similar, but 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 system. Tensions between Gram Panchayat and the village institutions and federations, as well as lack of state involvement of the PRI, lead to bypassing in favor of alternate local level institutions such as women’s self-help organizations and VWCs.

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 influence the nature and outcomes of such governance. Each works at different spatial and temporal scales; while some have evolved from amidst the communities and pursue community interests, others have been constituted as part of legal or constitutional provisions. Some, such as NABARD are primarily responsible for providing funding to various village initiatives. VWCs and PRISCs play a more hands-on role in the governance of natural resources. Others like FES, by virtue of their proximity with community level institutions and aggregated experience of many years, play the role of facilitators, information-providers and social mobilizers.

A polycentric institutional arrangement is evident here, as authority is not concentrated within a single hierarchy. For example, village federations do not report to Gram Panchayats and Gram Panchayats do not report to line departments. These cut across sectors, involving not only natural resource departments but also social protection and other investment agencies. While formal governance structures are established by law, village institutions are governance structures with established social connections and informal networks, some old and some more recently established (FES 2016).

POLYCENTRIC ARRANGEMENTS GOVERNING THE COMMONS: THE LOCAL VIEW

The four case study habitations managed various patches of commons, with varying degrees of dependence on them for their livelihood over time, and varying levels of governance success. We briefly summarize the narrative of the history of the use and governance of the commons, 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 different types of linkages, including planning, funding, capacity building, information sharing, authorization of access rights, and social mobilization, with the arrow going from supplier to recipient. The size of the organization shows the relative influence given to the organization in the eyes

of local community members. The Net-maps show that a variety of institutions are involved in governing commons in the study area, illustrating the polycentric nature of commons governance. **Table 2** shows that the same set of institutions had different types of involvement and relative influence as ranked by each village. For example, Revenue Department has the maximum influence in Cherukoripalle—a score of 100, after standardizing for the maximum number of chips in the influence towers, across villages. It has a medium-high influence score in M. Veyapulapalle (60 % of the maximum), and Vepullapalle land and tank (79 and 57, respectively). But Revenue Department was not even mentioned in GVP Thanda.

We now dive deeper into how communities mapped flows of information, funds, planning, capacity building and rules for their resources.

Cherukoripalle, Karnataka grazing land

Participants reported that in the 1980s the grazing lands were in good condition, attributed to good rainfall, unwritten but enforced regulations on tree felling and fire control, and most households keeping livestock, which kept them invested in the grazing lands. Over time, eroding community resource governance rules, weakening inter-village coordination and trust, and reduced dependence on grazing lands contributed to degradation. FES-induced conservation activities and the formation of PRISC aided improvements in health of grazing lands. MGNREGA support for such initiatives does not interest this community as, in their view, the wages offered are inadequate and delayed. Changing technology (such as hybrid cattle requiring stall feeding), aspirations, livelihoods, and urban migration have affected community dependence on commons and reduced interest in protecting grazing lands.

The Net-map in **Figure 2** shows the Revenue Department as the most influential government player in matters related to the grazing land. Even though there is only one connection between this department and the community, it regulates the rights of the people over their grazing land, (as indicated by the red arrow). FES is also very influential, providing capacity building (blue arrow) to villagers, PRISC, and the VWC, and acting as a broker to NABARD, providing them with information (pink arrow) and planning (black arrow), which is associated with NABARD providing funding to the VWC (green arrow). Consistent with Karnataka government strengthening the role of PRIs in commons management, the PRISC are also influential, recognized as both recipient and supplier of funding, information, and planning. Villagers see themselves as quite influential, including mobilizing neighboring villages.

M. Veyapulapalle, Karnataka forest land

In the 1980s the community was invested in forest

management with neighboring villages, managing fires, resolving conflicts and sharing benefits. They participated in JFM, but reported that in 2006 the Forest Department “stole” the trees—harvested them without giving the promised share to the community. This enraged the community and reduced their interest in forest governance. Eroding community-based management rules and lower dependence on commons over time also contributed to decline in forest health.

The Net-map (**Figure 3**) shows FES is seen as an important provider of funds and capacity building for the village level institutions, including PRISC and the VFC. Excluding FES, the most influential community level players are the Gram Panchayat, PRISC, and Village Watershed Development Committee (VWDC), which invests in the revenue wastelands. The roles they play in galvanizing people, disseminating information and managing funds in the process of governing commons contribute to their recognition by the community. Like the first case, PRI are supported and have authority and recognition. 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, but they are not seen as very influential, as they do not have as much on-the-ground presence.

Although NABARD rarely has direct contact with the village community, it is seen to be influential, with funding, capacity building, and planning links to the VWDC. The Village Forest Committee (VFC) is not very influential, perhaps because it was undermined by the JFM problems in 2006. The community's rights over the revenue wastelands are well recognized, whereas rights over the forest lands are not, and there is less investment in the forest lands.

Gajula Vari Palle (GVP) Thanda, Andhra Pradesh grazing land

This tribal village has 80 acres of grazing land on a steep hillock with boulders. The difficult terrain limits the productivity of this land, and the limited fodder available was often lost to fires, leading to low community dependence on these commons. In 2011 FES helped the community tap the NABARD-administered Tribal Development Fund for mango plantations, construction of boundary trenches, and de-siltation of a nearby tank to improve groundwater recharge for livestock.

FES is seen as a source of funding, information and capacity building and playing some role in planning activities on common lands (**Figure 4**). The MGNREGA Field Associate (FA) and Mate (local overseer of works) are also significant because compared to Karnataka, MGNREGA plays a stronger role as a source of livelihood, and its projects are implemented better in Andhra Pradesh, where

ACTOR	RELATIVE INFLUENCE IN EACH VILLAGE*				
	KARNATAKA		ANDHRA PRADESH		
	CHERUKORIPALLE	M. VEYAPULAPALLE	GVP THANDA	VEPULLAPALLE (LAND)	VEPULLAPALLE (TANK)
Government					
APO: Assistant Project Officer				50	
Collector - District Head					36
CRD: Commissionerate of Rural Development			70		
Forest Department		60			
Gram Panchayat		90		29	43
Irrigation Department					50
MPDO: Mandal Parishad Development Officer			70	71	29
Project Director				57	
Revenue Department	100	60		79	57
NABARD: National Bank for Agriculture and Rural Development	60	90	80		
FA: MGNREGA Field Assistant			90	36	21
Mate: MGNREGA works overseer			50	21	41
TA: MGNREGA Technical Assistant				43	
Zilla Parishad (District level PRI)		50			
NGO					
Federation				14	
FES: Foundation for Ecological Security	100	100	100	100	64
Community					
Community/Villagers/Farmers	80	70	50	86	71
MDC: Mandal Development Committee			60		
Neighboring Villages	20			70	
NTGCF: National Tree Growers' Cooperative Federation				64	
PRISC: Panchayati Raj Institution Sub-Committee	80	80			
TGCS: Tree Growers Cooperative Society				93	71
User Group			50		
VDC: Village Development Committee			60		
VFC: Village Forest Committee		60			
VWDC: Village Watershed Development Committee	40	80			
VVC: Village Watershed Committee Member	80				

Table 2 Relative influence of actors across all village Net-mapping exercises.

Notes: * Computed as chips for each actor as percentage of chips for highest-ranked actor.

Source: Data from Net-mapping exercises.

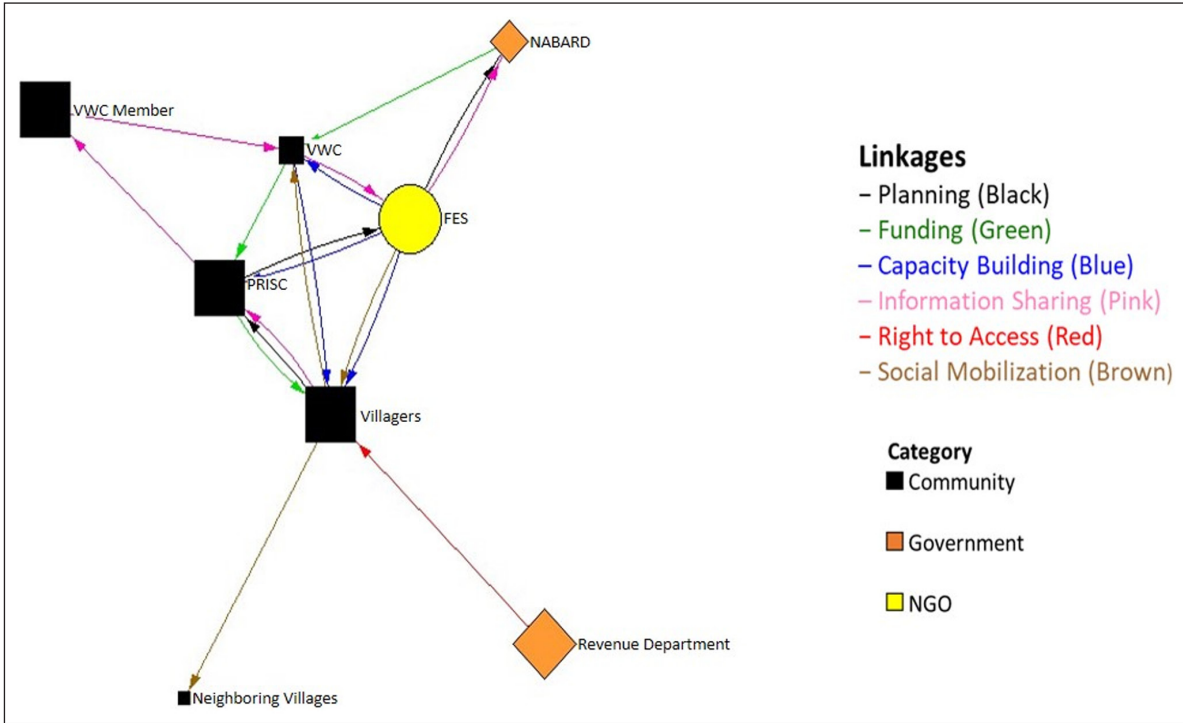


Figure 2 Cherukoripalle Net-map.

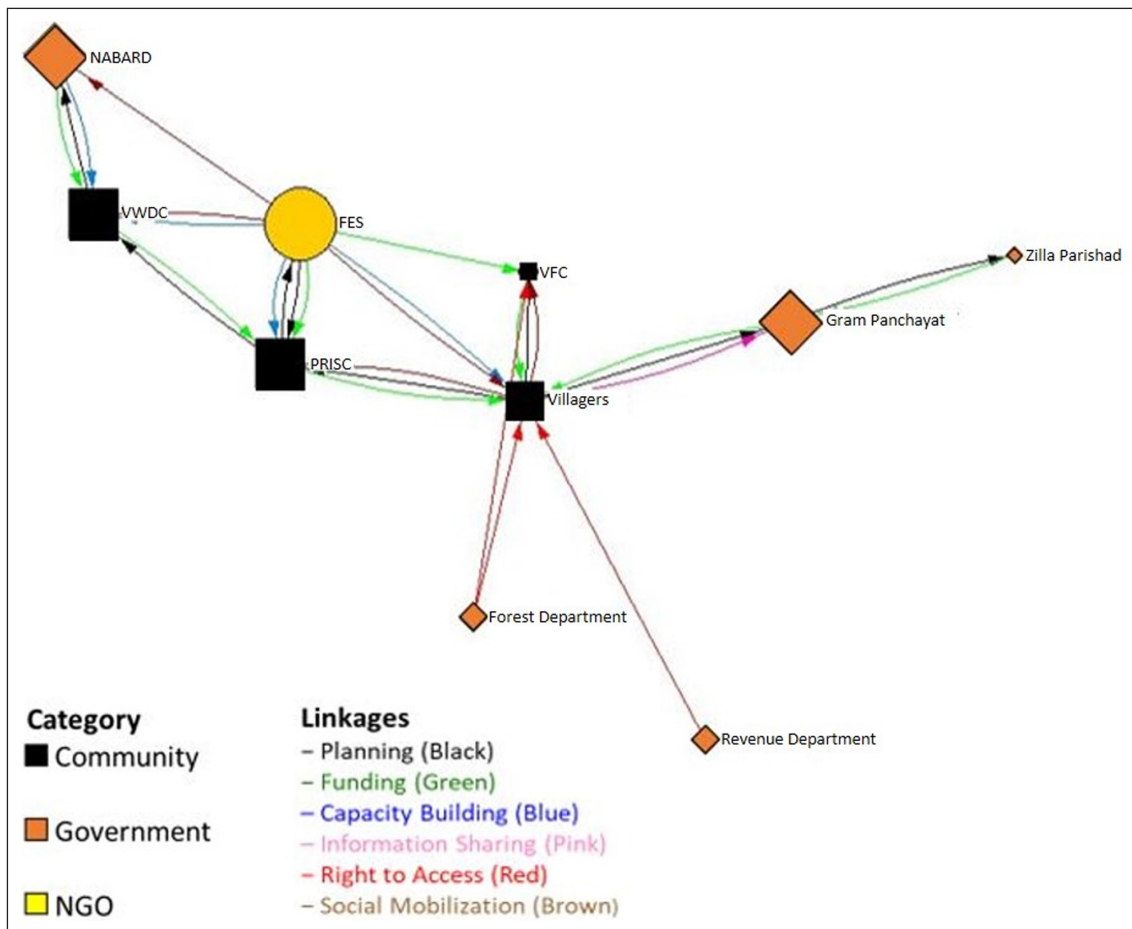


Figure 3 M. Veyapullapalle Net-map.

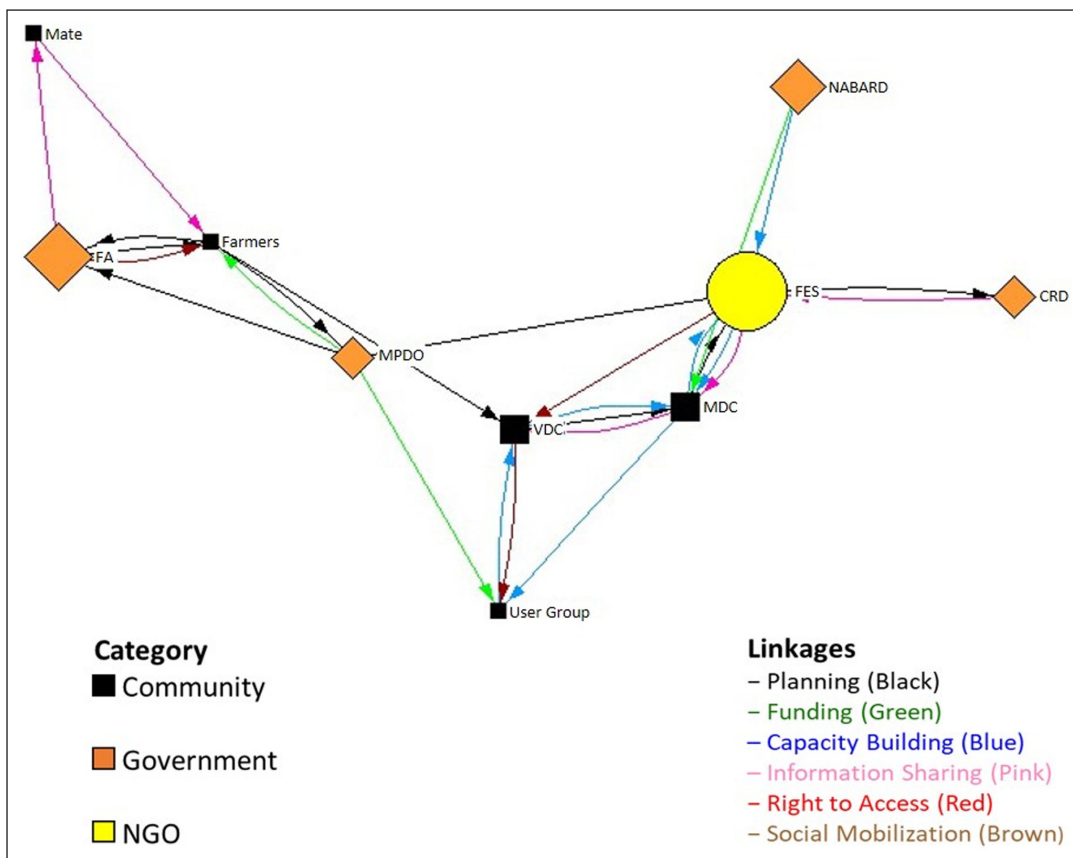


Figure 4 Gajula Vari Palle (GVP) Thanda Net-map.

there is greater political support for MGNREGA funds to be invested in commons management. NABARD is recognized as important because it is a source of capacity building as well as funds. The farmers, user groups, and Village Development Committee (VDC) and Mandal Development Committee (MDC) are not seen as very influential.

Vepullapalle, Andhra Pradesh land commons

In contrast to the low involvement in commons in GVP and declining dependence on commons in the Karnataka sites, Vepullapalle shows strengthening of village institutions and dependence on commons. In the 1980s common lands of around 100 acres were degraded due to droughts and improper management. In 1999 FES assisted villagers to form a TGCS to lease the land and manage it under locally devised and enforced rules. In 2000 MGNREGA resources were used to invest in contour trenches and planting troughs for soil and water conservation. Fire breaks and prevention reduced fires. The village now has sufficient fodder and firewood and manages the land with neighboring villages.

As in the other Net-maps, FES is the most influential player in the view of this habitation. TGCS is also influential, seen by the community as a source of information and

funding and as instrumental in planning (*Figure 5* and *Table 2*). The Revenue Department has medium influence, despite having only one recognized link, in providing rights of access—which are shown as given to FES, and FES gives the rights to the TGCS, highlighting the brokerage role of FES. The village community is seen to be an important and influential player, with multiple linkages to the MGNREGA works overseer (Mate), FES, TGCS and the National Tree Growers’ Cooperative Federation, as well as to the Mandal (Block) Parishad Development Officer. The MGNREGA functionaries like the Mate, the FAs and TAs are seen to be playing active role in the overall governance and upkeep of commons in this habitation. This can be due to FES assisting the community to leverage MGNREGA 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 and the informal Federation are small, but recognized.

Vepullapalle, Andhra Pradesh irrigation tank

The village tank, like many others in Andhra Pradesh and Karnataka, has an earthen dam built long ago to harvest rainfall for surface irrigation, but also provides groundwater

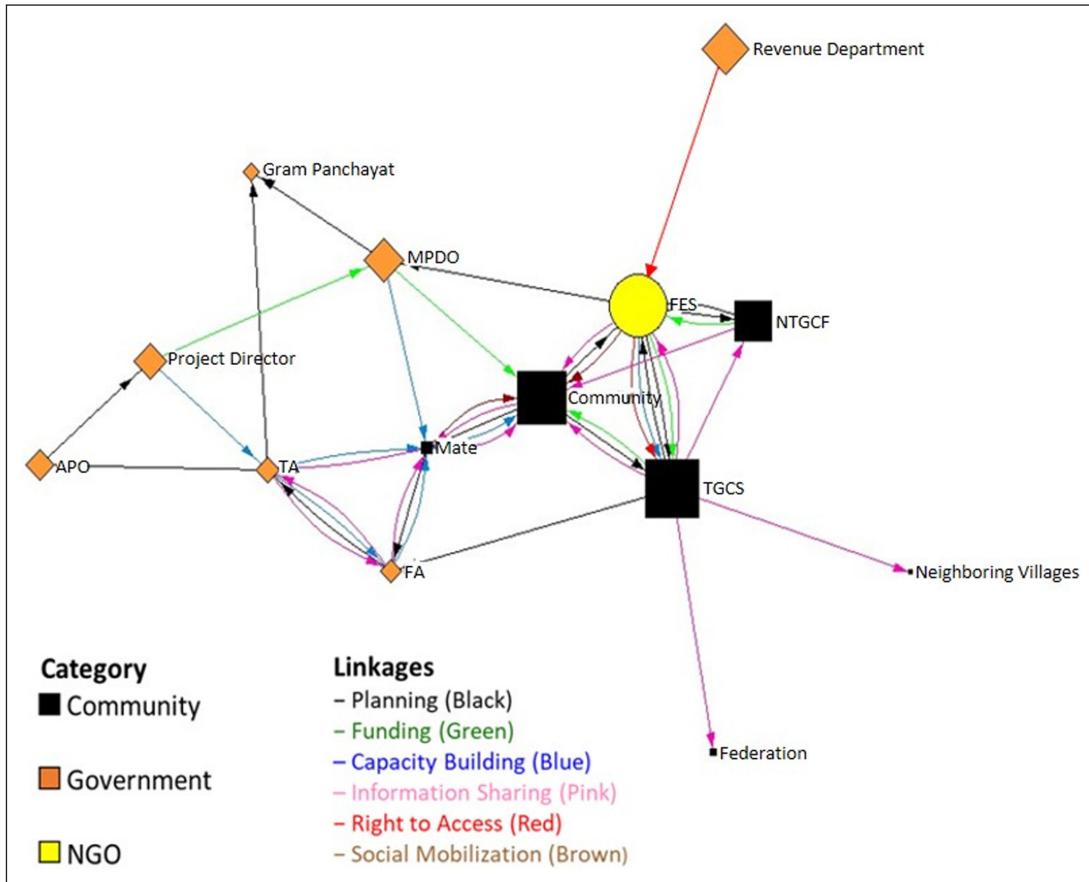


Figure 5 Veppulapalle Land Commons Net-map.

recharge. Community-based rules and governance system eroded over time, but a designated person (*neerugattudaarudu*) is still appointed for water regulation. In years of low rainfall, the tank is not used for irrigation. The Gram Panchayat formally holds the fishing rights in the tank, and has attempted to auction off the rights, but the community has managed to keep the fishing rights as commons.

In contrast with the land commons, the most influential player in the tank Net-map is the village community itself (see [Figure 6](#)), which sees for itself a clear role in its maintenance and governance, as well as a source from where the plans emanate and a source of social galvanization. TGCS is perceived to be a forum for planning activities related to maintenance of the catchment areas and feeder channels that are important for upkeep of the water bodies. They are also seen to be a source of funding. Various government agencies are also important, as government programs result in the creation of water bodies like cattle ponds and play an important role in the maintenance of tanks. Both the Irrigation and Revenue Departments are considered important sources of plans and funds. The lower importance of the Gram Panchayat is surprising given that it has formal rights over the tanks. This

could reflect the general lack of trust over the allocation of fishing rights or tensions between various local political factions that limit its influence over the commons. This Net-map illustrates the importance of having strong local village institutions, to more meaningfully nest them into processes of devolution.

5. DISCUSSION

INSTITUTIONAL DIVERSITY AND NET-MAPPING

Both the view from above and the local view show that polycentric governance of commons involves a mix of hierarchical and parallel institutions, but also actors from multiple sectors and cross-sectoral actors. While nested levels of governance have received more attention in the commons literature, in this case, the agencies involved are more overlapping than hierarchical. This is particularly true because the village commons do not fit neatly into one resource category (e.g. “forest”), but encompass a variety of resources, used in various ways. Communities may also make creative use of other available programs, such as social protection, to improve their provisioning of the commons. This supports Nagendra and Ostrom’s (2012) notion of polycentricity looking at the interaction between

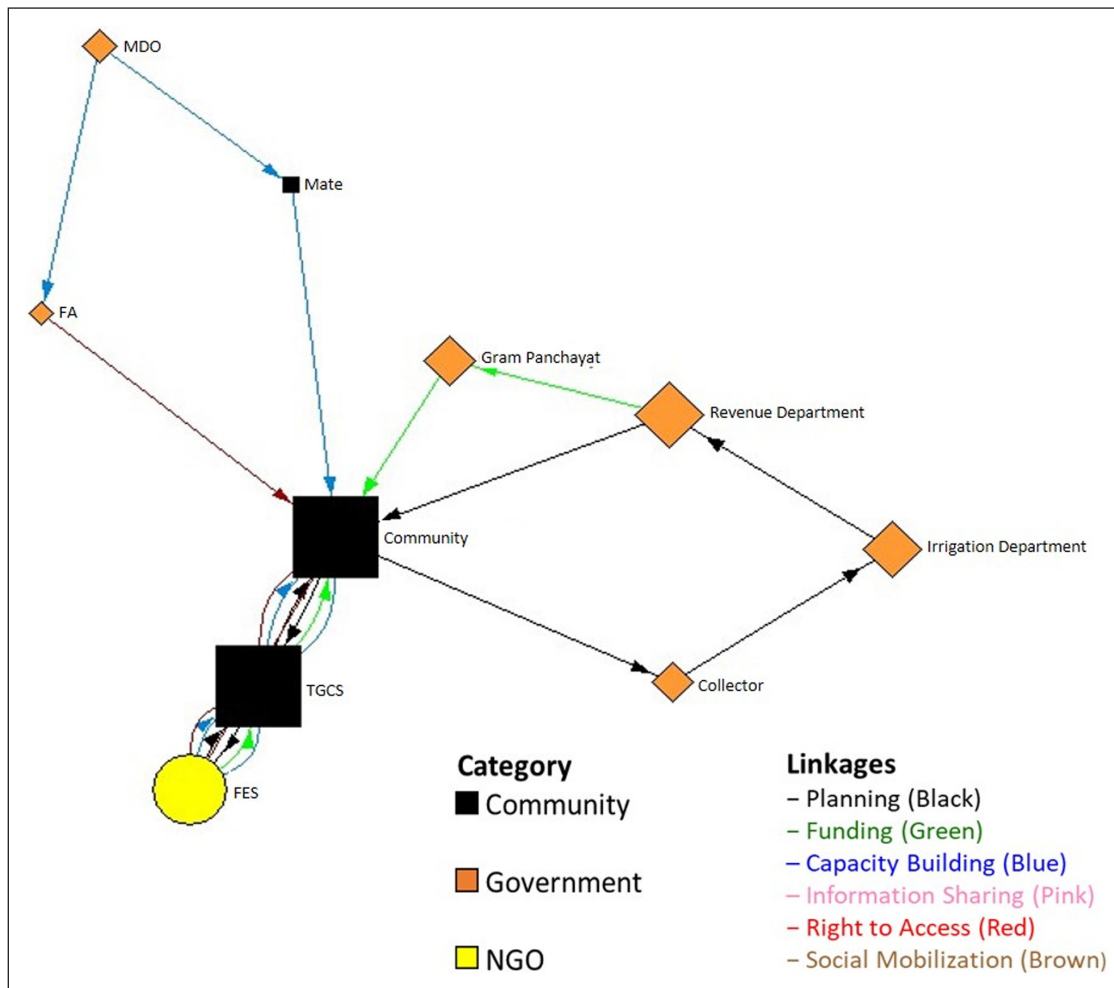


Figure 6 Vepullapalle Irrigation Tank Net-map.

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.

Karnataka and Andhra Pradesh have similar sets of organizations and institutions, although the habitations are smaller and Gram Panchayats have a much stronger role in Karnataka, and MGNREGA plays a greater role in provisioning for the commons in Andhra Pradesh. This similarity could 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 governance 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. In Karnataka, habitations are smaller than in Andhra Pradesh, so the PRISC in Karnataka is comprised of people who interact on a daily basis. Other differences reflect different state policies as well as the extent to which communities have reached out to tap into different programs (an aspect

of commoning). As evident in the last case, even within the same village, two different commons can look very different. Further discussion with FES and communities indicated that many of the organizations such as Village Watershed Committees and Village Forest Committees were set up by external projects, and once the project ended, people had less incentive in investing their time or efforts in engaging with that institution. By contrast, the tanks have a long history of local governance, especially in Andhra Pradesh, anchored in the *neerugattudaarudu*, who are part of the community. Even the Tree Growers' Cooperative Societies, which are at least 20 years old, comprise 'old hands' at commoning, led by older members who are less likely to migrate to cities in search of work. They have the experience, the inclination (given their long affiliation with commoning) and time (given their physical presence in the village). On the other hand, the relatively newer institutions—whether it be the VWC, the PRISC or Agriculture Project Officers—are targeting younger people who are more likely to look for income sources outside the village and therefore not as heavily invested in the health of the commons.

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 degradation and improve shared resources that contribute to rural livelihoods. The Net-maps indicate gaps in local knowledge and links to programs that could strengthen local claims to commons and provide resources. They also point to opportunities to create and strengthen decision-making and participatory processes by looking at the flows of information, planning, and other resources. Even where government programs are available for communities to obtain recognized rights to the commons, specifics matter. Vepullapalle obtained rights from the Revenue Department for a TGCS to plant trees on the commons, and became part of the National Tree Growers' Cooperative Federation. By contrast, M. Veyapulapalle in Karnataka had obtained some rights from the Forest Department under the JFM, but felt their investment was "stolen" from them when the Forest Department auctioned the trees without community permission, making them suspicious of the government agencies, particularly the Forest Department. Such unilateral moves by the government agencies make the village communities question the value of investing in the governance of the commons: unless the community is involved in appropriation rules, they are unwilling to contribute to provisioning.

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 by the state government, local communities may not 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 their respective roles, or they do not see them as important. The extent of actors, linkages and connections communities are aware of, how they see their role and interactions with others in the polycentricity sphere, and whether they see themselves as influential, may indicate how far they are along the road to commoning.

A limitation of Net-mapping is that results depend on the timing and who participates in the exercise. For example, in a good year of rainfall, the role of the tank manager would appear stronger than in a dry year. It is important to get knowledgeable respondents who are involved in commons management; if a group of 10 of the most knowledgeable people do not mention a particular organization, it is likely that it has not been very involved in the commons in that site. Even with knowledgeable people, Net-mapping

may not capture 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 Agriculture Department, as this has an impact on governance of commons.

APPROPRIATION AND PROVISION RULES

Each set of institutions has different appropriation and provision rules that affect the security and sustainability of the commons. Traditional village and user group institutions have provided for commons and other local public goods through *shramadana* (communal labor), and have set appropriation rules 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 collectively hire tank managers to undertake many provision activities as well as oversee appropriation. However, the degree of rule enforcement varies, and mobilizing communal labor is more difficult with increased seasonal and longer-term labor migration.

Watershed Development Committees make plans and use funds to carry out earthworks, reforestation, and other changes. Yet massive investments channeled through watershed development programs have often not been sustained, owing to the lack of effective rules for maintenance or appropriation of benefits. NABARD is another source of provision resources, especially for tribal communities. Agencies may be a source of technical expertise, as well as holding authority to govern resources, which is sometimes shared or delegated.

Forest Department regulations tend to focus on (restricting) appropriation, emphasizing biodiversity and resource protection. JFM has offered a way to increase incentives for community labor provision in planting and protecting forest commons by promising use of non-timber forest products and a share of the tree harvests. 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. However, the M Veyapulapalle case shows how such promises of appropriation rights, if unfulfilled, can destroy the villagers' trust in the government and undermine their willingness to invest in provision.

By contrast, Vepullapalle case shows a positive commoning outcome due to the village's strong local institutions, rule enforcement and effective leveraging of resources from other actors such as MGNREGA to invest in provisioning. Vepullapalle village community identified more actors overall than the other case studies, which can be indicative of relatively higher awareness of the actors

involved in polycentric governance of the commons, and linkage to a federation.

Beyond the traditional resource line agencies, MGNREGA can provide important support for improving land and water resources, if communities know about this and can get assistance. This reflects Krishna's (2002) notion that while social capital (embedded in community collective action) is crucial, it is also important to have capable leaders ("agency capacity") to tap into the potential of external programs to meet community needs. One question is whether the availability of external assistance, or the ways in which it is provided, may displace local rule-making regarding provisioning 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 discuss how the benefits from improvements may be shared, reducing the risks of capture and inequitable exclusion, as well as protecting commons against overexploitation.

FES activities have pursued democratic social inclusion in government, better livelihoods, and sustainable resource use, supporting communities in claiming commons, tapping into programs like MGNREGA, and developing their own rules governing resource protection, provision, and extraction, such as moratoriums on grazing while tree seedlings grow, and prohibitions on burning grassland. However, FES engagement with communities is not constant over the years, depending on specific projects. 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.

6. CONCLUSIONS AND IMPLICATIONS FOR SECURING THE COMMONS

How do different forms of polycentric governance make commoning effective? The case histories and Net-maps show that multiple local organizations work autonomously with a variety of state and other organizations to strengthen authority and mobilize resources for governing shared natural resources such as forests and grazing land. This contrasts with conventional models of single-resource sectoral silos of specialized agencies and user groups. While results vary, this process of polycentric commoning is designed to simultaneously improve livelihoods, inclusive governance, and sustainable management of natural resources.

In terms of functional polycentricity (Carlisle and Gruby 2017), the different organizations have substantial autonomy in how they act, though coordination is not always sufficient. Federations like tree growers societies and watershed development committees provide forums for sharing experience and working together to solve problems. Where the commons are under tremendous stress and the institutional arrangements surrounding these resources have been weakened significantly, MGNREGA funding for local labor provides an opportunity for provisioning to revive and restore these resources. Foundation for Ecological Security activities to promote more inclusive and more active involvement of communities in planning these works illustrates the opportunities for strengthening habitations as centers for decision making. The participatory planning process also creates opportunities for panchayats and district level agencies to influence the planning and implementation of programs.

External resources can be effectively tapped for provisioning, but when activities are not planned or implemented properly, such as when MGNREGA wages are not paid in time or when programs of interest to the village communities are not included in the activity roster (as reported in Cherukorpalle), people lose interest in the activities undertaken, and in managing the 'assets' thus created. Differences between states in how programs are carried out also show the existence of autonomy on the part of state governments and their departments. The roles of Gram Panchayats and other local organizations also vary. This makes clear that implementation is not a simple matter of "replication" but depends, among other things, on the political context.

In some cases, even the knowledgeable villagers who participated in the Net-mapping, after years of experience, seem to have limited awareness of relevant programs and agencies. This shows gaps in the reach of those agencies or programs, or in the capacity of villagers to tap into the resources they might provide. In some cases, a brokering organization like FES might help make the connections. In other cases, coordination mechanisms exist, including both vertical linkages to higher level agencies and horizontal linkages between communities sharing commons such as watersheds and forests.

The Net-maps show linkages that are present, and others that are missing or not well-understood. To strengthen the functionality of the polycentric systems for effective commoning, bringing together resource users and agencies, creating forums for discussion can create or enhance key linkages. Monthly commons "convergence" meetings called by the District Collector or Block Development Officer offer one example. These provide platforms for sharing of ideas and experience, and creation of consensus, as well as the formation of more formal federations.

The community histories show the changing attitudes among people towards grazing lands and forests. Whereas previously communities were invested in the process of governing commons, today they seem to be less interested in provisioning, especially where youth migrate for employment. One key point concerns the crucial role of trust: as illustrated by the community's reaction to having forest commons "stolen," trust takes a long time to build, but is easy to break. If they invest in provisioning but cannot control appropriation, they will not be interested in commoning.

The methods of this study for 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 transaction costs of establishing or strengthening polycentric governance arrangements. 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.

By helping elucidate the polycentric nature of the commons, Net-mapping can help strengthen the capacity of communities, government agencies, and NGOs to navigate a complex institutional environment, across sectors as well as scales and secure their rights to govern commons crucial to their livelihoods. The methodology could also be used for monitoring and evaluation of effective commoning, looking at whether and how community perceptions of their own role and other actors or programs influencing the commons change over time, especially related to program interventions. For example, work by FES seeks to equip communities to defend their commons and obtain external resources to improve the commons. FES also works at bridging at the district and block level, getting the different agencies talking to each other, which could also be monitored using Net-mapping. Community influence scores offer an indicator of their perceived strength in commoning, while the number of other organizations and the flows, especially of information, authority for appropriation, and labor or financial resources for provisioning can provide indicators of their capacity to operate in a polycentric environment. Standardizing these indicators and collecting them over a larger number of sites, over time, could further help identify the factors that contribute to effective commoning.

NOTES

- 1 Participants in the Net-Mapping exercise were purposefully selected to include older, articulate villagers who knew the history of resource use, and current developments. Despite efforts to

include women in the discussions, few women participated, partly related to timing of Net-mapping exercises when women are busy with domestic responsibilities.

- 2 Some communities chose to rank from one to 10 or 1 to 15. Nevertheless, relative influence between organizations remained indicative. For original scores, see Data Appendix.
- 3 States and union territories in India are divided into districts which are further divided into sub-districts or blocks, which may be called Tehsil, Taluka, Community Development Block, Mandal, Revenue circle etc. The number of villages in a block ranges from approximately 50 in Gujarat to 300 in Uttar Pradesh.

ADDITIONAL FILE

The additional file for this article can be found as follows:

- **Data APPENDIX.** Net-map influence scores, by case study. DOI: <https://doi.org/10.5334/ijc.1082.s1>

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COMPETING INTERESTS

The authors have no competing interests to declare.

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