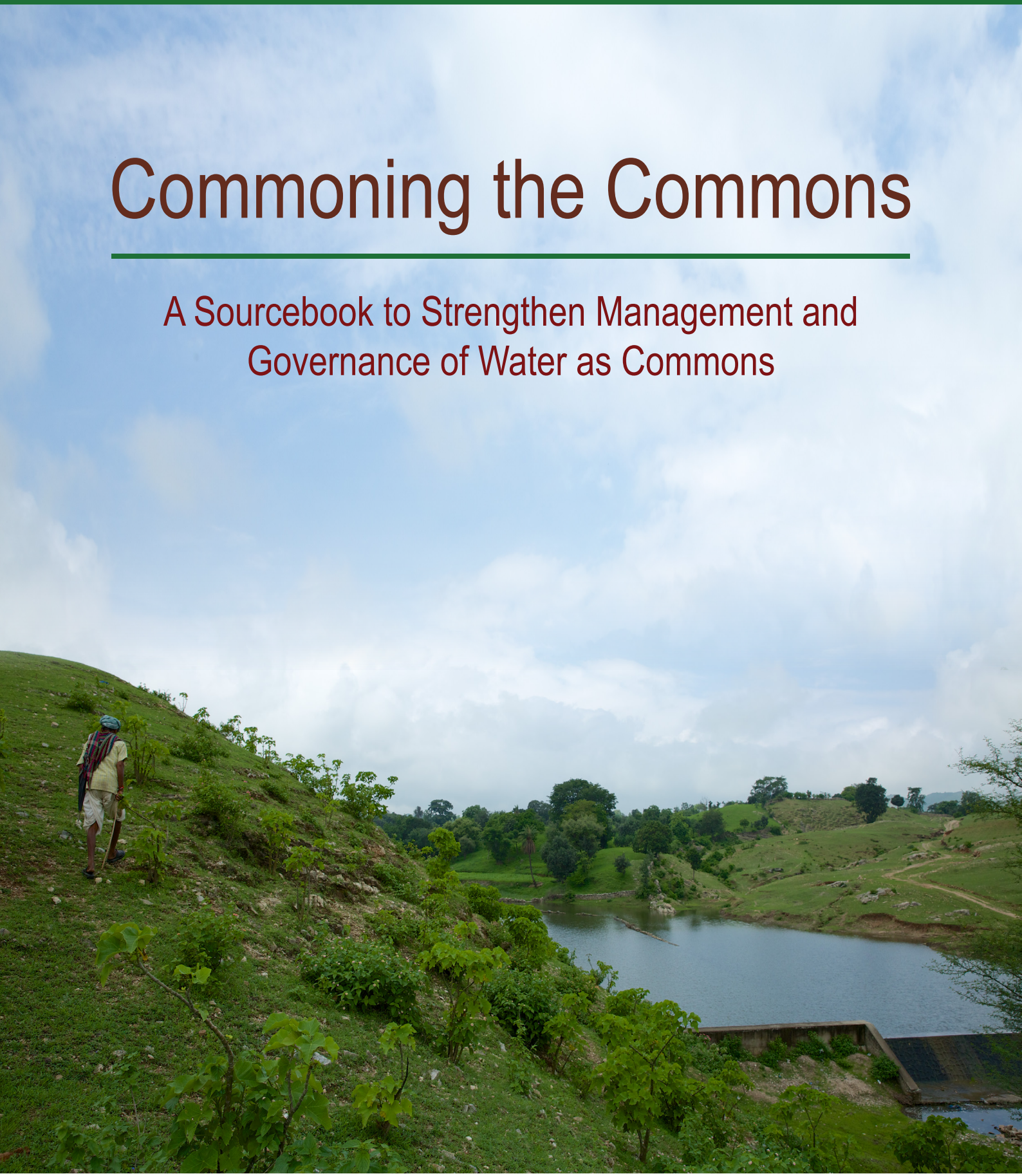
Commoning the Commons

A Sourcebook to Strengthen Management and Governance of Water as Commons



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Contents

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Chapter 1
Introduction

1.1. Why this Sourcebook?

Water is essential for the survival and sustenance of ecosystems and human societies. We are also aware that water is finite and a limited resource that is getting scarcer. People across the globe are experiencing a water crisis and this crisis is largely our own making. Globally, over 2 billion people live in countries experiencing high water stress (UN, 2018). In India, 54 percent of the country faces high to extremely high water stress (WRI,

2014) and India ranks 13th among the world's 'extremely water-stressed countries (WRI, 2019). The existing climate change scenario further amplifies the crisis and its impact on people.

The need and urgency to address the water crisis has been acknowledged and recognized at local, regional and global levels. The right to clean and safe drinking water has been recognized as a human right essential for the full enjoyment of life and all human rights. 193 countries (including India) have committed to ensure availability and sustainable management of water for all by 2030. There is also an increasing attention to issues of universal and equitable access, water-use efficiency, protecting and restoring water related ecosystems (mountains, forests, wetlands, rivers, aquifers and lakes) (Goal 6, Sustainable Development Goals).

While there is considerable headway in terms of technological solutions to improve water availability or enhance water-use efficiency, there are deeper issues of water management and governance that need to be addressed. As the competition for freshwater intensifies and the urgency to change the status quo increasingly felt, we are juxtaposed with several questions – Who has access to water and who does not? How much can one take, for what purpose and at what cost? Who is responsible for managing these resources? Who is responsible for monitoring and regulating water usage? How do you ensure coordination among different water users and uses? At a systems level, the question that needs to be addressed is, whether water is a 'Commons' that is for all, or is it a 'commodity' to be bought and sold in the market (and thereby limiting access to those with resources to buy it).

There are different pathways that communities, civil society organizations and state may take to address these questions. This Sourcebook describes one such pathway – a pathway that is rooted in the age-old wisdom of seeing water as 'Commons' for all of nature and all humans (at present, and in future) and believes in the capabilities of the local communities to work together to manage it as Commons. We share our own

experiences of engaging with rural communities in different parts of India, highlighting the various aspects of commoning water, the key principles, processes, methods and tools to strengthen management and governance of water as Commons.

Objectives

- To help FES partners, practitioners, and anyone engaging with issues of water and its management, strengthen processes of the management and governance of water as Commons
- To state the possible pathways, processes and action-steps which can be used to implement commoning of water resources
- To share the experiences and insights in a simple way for practitioners to unfold similar initiatives in other locations

1.2. Who is this Sourcebook meant for and what should the reader expect from the Sourcebook?

FES has been working on water Commons for the last seven years. The Sourcebook is an attempt to collate our experiences, opportunities, challenges, innovations and practices of commoning water. We share this with the hope that it will trigger discussion and provide a foundation for commoning water to practitioners working at the intersection of conservation, livelihoods and justice. The Sourcebook provides a broad set of principles, processes and action steps which can be built on and accustomed by practitioners working in different contexts to improve management and governance of water as Commons. In addition, each chapter also has a list of tools which would help in better engaging with communities on strengthening water governance; and illustrations and case studies from our field areas. We have tried to keep the Sourcebook simple, easy to read and it includes case studies, illustrations and list of reading materials on various aspects of commoning water.

1.3. What are the limitations of this Sourcebook?

Considering that the Sourcebook collates and draws from our own experiences of working towards commoning water, the approach and practices referred to in the Sourcebook are focused on improving the management and governance of water as Commons in the context of rural areas. The Sourcebook does not deal with complexities of rural-urban water transfers, inter-state water transfers or water management issues in the urban areas (though some of the principles of commoning highlighted in this Sourcebook could be applied in urban contexts as well).

Chapter 2

Understanding water as Commons

Today, our understanding of property ownership is primarily in terms of public and private. All resources including land and water are either privately owned by an individual or group (organization, institution etc.) or are state owned. With the increasing water crisis and scarcity, privatization of water is being seen as a solution to better manage water, especially in the recent past. However, privatization of water has been challenged on grounds of water as a basic human right (The Human Right to Water and Sanitation recognised by the United

Nations, 2010). Thus, water remains one of the most contested resources and its indispensability to the very sustenance of life itself is at the core of it.

By its very nature, water is a common pool resource with high subtractability and low excludability. This means that use of the resource diminishes its availability for another's use (subtractability) and excluding potential users from accessing the resource is a challenge (excludability), resulting in its over-exploitation. Historically, water has been treated as a Commons, with communities evolving mechanisms for the sustainable management and use of water.. However, effective management and governance of this resource remains a huge challenge in the present day. With the severity of the water crisis deepening, it becomes all the more important to understand water as a common pool resource that is to be conserved and managed communally.

Chapter 3
Understanding water in a landscape

3.1 Purpose

While trying to understand water as a common pool resource, it is important to look at water not just as a stand-alone resource, but as a part of the larger continuum of ecological and social systems. Due to its high subtractability and low excludability, it is crucial to understand the larger socio-economic landscape in which the resource is located. Since managing a water resource involves an interplay of multiple users, the social

Figure 3.1. Water in a landscape

and economic contexts of these users, linkages with other resources, dynamics between the different users and between users and resources, it is thus necessary to have a holistic understanding of the landscape and locate water resources in that landscape (Please see Figure 3.1).

3.2 Principles

Broadly, water sources in a landscape can be divided into surface, sub-surface and groundwater sources. We know that these water sources in a particular watershed are inter-connected and that the landmass surrounding a water source (catchment and command areas) also forms a part of the waterscape. Thus, water resources must be looked at in relation to the land and landscape, and cannot be seen in isolation. Land use and management of land resources have a direct impact on the sustainability of water resources.

Similarly, the users of a resource form an integral component of the resource system. Local communities, distant users, government, and other stakeholders depending directly or indirectly on the resource also affect its sustainability. The biophysical and social aspects and the interactions between the two, form a complex socio-ecological system. Thus, understanding water in a landscape should take a systems perspective to understand the inter-dependence of the various components.

Embedding water into the larger socio-ecological landscape is an essential part of the commoning process. It is generally easier to acknowledge surface water bodies such as lakes, tanks, ponds, streams etc. as shared or common resources. Groundwater, however, is widely perceived to be a private resource. One of the reasons is the 'invisibility' of ground water in a landscape. Ownership of land determines the ownership of water beneath the land. This is one of the challenges in the commoning of ground water. Aquifers as well as surface water sources constitute a watershed and the characteristics of a watershed (like geology, topography, etc.) needs to be understood for the management of these water resources.

3.3 Process

Following pointers will aid in developing a holistic understanding of landscapes thus enabling commoning of water-

1. Diagnostic/Preliminary understanding of biophysical and social landscapes

- Understanding the rainfall pattern, geology, aquifer systems, springsheds, land-use and land cover, soil, recharge and discharge zones helps in understanding the biophysical landscape of a particular geographical area. What is the primary river system / tributary in that area? What are the other water bodies and how are they inter-connected? What is the condition of these resources (availability and quality)? What are the existing usage patterns of these resources? What are the different production systems in the landscape (forest, pastures, agriculture, etc.) and their interconnections? What is the ecological history of the area/landscape? Answering these questions will provide a deeper insight into the ecosystem.

- Questions to develop an understanding of the social landscape of a region: Who are the different stakeholders – upstream-downstream, primary and distant users? What are the different uses associated with water and which sections of the community are dependent on these sources for what purpose? Who are the right-holders? What are the kinds of dependencies (economic, cultural, etc.)? Which is high/low? What are the legal regimes pertaining to water (surface and groundwater)? What are the various policies, programmes and schemes pertaining to water in the region?

2. Understanding social processes around water resources

The social processes involve the access, control, use and ownership rights over water resources, participation in decision-making, governance and management of these resources. It is necessary to consider caste, poverty, landholding, gender, local/distant, pastoral etc. as dimensions while assessing the users, their dependence and rights over the resources. Understanding historical perspectives, power structures, knowledge systems around water conservation, use and management, boundaries and conflicts arising as a result of it will help in developing an understanding of the social processes.

Some guiding questions to aid this understanding are as follows-

- Uses and Dependence: Who is dependent on the water resource? Does this change in different seasons/situations? Who are the users of the water resource? Does this change in different seasons/ situations? How was water used and how has it changed over time?

- Access, rights and control: What are the different institutional arrangements from village to landscape level that determine access, use, and control of water resources? Who has rights over the resource? Are these rights customary or legal/contemporary? What are the economic and financial costs of accessing the resource? What are the factors leading to lack of access to water? What are the sharing mechanisms and their impacts on access and control? Are there any conflicts around access/use? What are the indirect benefits/costs (spin-offs) of water access (eg. health, education, etc.)? What are the external factors (like policies, market, etc.) which affect the access and control of water resources?

- Governance Mechanisms: Are there mechanisms in place which ensure fair distribution of water? To what extent are women and marginalised groups involved in planning and decision making around water resources? Do the current water resource management practices ensure/promote commoning? What are the existing practices around commoning?

1. In Balakavaripalle in Andhra Pradesh, during the aquifer mapping process, water bodies and bore wells were placed in the map. The contour lines were drawn based on water levels in the borewells. A strange situation was observed- one borewell had more water available in comparison to all the adjacent borewells. Discussions took place around that and it was identified that the water tank is acting as recharge for that particular borewell, whereas all the other borewells are recharging from hillock.

2. Borowali Madri is a village of around 250 households in Kamol panchayat of Gogunda tehsil, Udaipur. Recognising the Commons-agriculture-livestock inter-connections, the community has evolved an informal system to manage their natural resources. With the passage of time, however, the trend towards privatization of common pool resources is evident, be it in encroachment of common lands or extraction of groundwater for cultivation of water intensive crops such as sugarcane by some farmers in the village. Application of Participatory Rural Appraisal tools such as transect walks, resource mapping, social mapping, aquifer mapping etc. and focused discussions with the community helped in understanding the community's perceptions and the customary patterns of use and access of these resources. Building on the existing norms and rules, the community formulated specific bye laws for protection and conservation of common land and water resources.

Tools that can be used (refer to annexure for details):

1. Resource map
2. Aquifer map
3. Stream walk with social map
4. Catchment map
5. Geological maps

Chapter 4

Institutions to enable commoning water

While resources are classified as Commons, it is the processes of collectivization that are essential for a resource system to function as a common pool resource. This section discusses the importance of institutional arrangements to ensure commoning and strengthen collective management of resources. This chapter is discussed in two parts: structural aspects and normative aspects of institutions.

4.1. Structural aspects of institutions for commoning of water

4.1.1 Purpose

Collective management of water is best achieved with the establishment of an institutional arrangement, both formal and informal. Within such an arrangement, it is easier to define boundaries, membership, rules and sanctions which will guide the behaviour of the community towards management and use of a particular resource. What kind of institutional arrangement is best suited for water management? Who are the members of such an institution? What are the main functions of this institution? The following sections address these questions and outline the principles of an institution, its structure and functions, while using case studies and illustrations from our own experiences of facilitating institutions for water management.

4.1.2 Principles

There is no single institutional arrangement that is perfect for water governance. It broadly depends on the type of resource, usage and community dependence. However, any form of organization or institution that is formed for the purpose of communing and management of water may work towards strengthening the following institutional aspects – structural, functional and normative. The broad principles for strengthening institutional arrangements are listed below:

- Clearly defined boundaries of the institution – Individuals and households who have the right to manage, collect and use resources from the Commons in question must be defined, thus defining the membership of the institution.
- Universal membership and proper representation – Membership defines inclusion and exclusion in an institution and making provisions for all groups of people (women, poor and marginalised sections) to be part of the institution gives the best possible arrangement for working on water management. Subsequently, there must be at least proportional representation with an emphasis on representation from minority and disadvantaged groups in different layers of the institution.
- Supremacy of the general body and decentralized structure – This will ensure a decision-making process that is democratic and transparent in nature. It should provide the space for addressing the needs and interests of different sections of the community, allowing for debate, dialogue and dissent. A decentralized structure will also ensure that responsibilities and authority are diffused and there is greater accountability.
- Landscape level processes – As stated in the previous section, water cannot be seen as a stand-alone resource but as part of a larger ecological and social system. Thus, multiple stakeholders at multiple levels within and outside the community (including local governance bodies like panchayat and various government departments) are involved and affected by decisions around water resources. Thus, the institution is also responsible for coordinating and strengthening collective action around water across these levels, ensuring cross-learning, better regional-level planning, and advocating for favourable policy provisions.
- Institution development and resource management: The institution should primarily be involved in planning, implementing and monitoring of activities to strengthen management of water resources. Along with this, it should invest in developing and strengthening the institution while carrying out day-to-day administrative functions. It is also responsible for managing finances with transparency and leveraging funds for conservation and maintenance of water bodies and related structures.
- Management and protection norms: Evolving rules and norms regarding access and use are essential for the management and development of the water resource being protected. This process ensures

that members abide by the rules and are accountable to the institution. However, for this to be effective, the rule–making process must be inclusive and democratic, allowing its members to actively participate in the process.

- Conflict management: An institution dealing with a resource such as water, involving multiple stakeholders is sure to have some degree of conflict and differences. These can be positive till they threaten the structural integrity of the institution. Thus, the institution should also evolve effective conflict management strategies and mechanisms.
- Values of equality and equity: Inclusion is an important aspect of the institution and is essential for its sustenance. Thus, efforts should be made to ensure that rules and norms should address questions of equality and equity, especially in the face of discrimination within communities on the basis of caste, religion, gender etc.

* For further reading on guiding principles for strengthening institutions for water management, please refer to the FES' sourcebook on 'Social and Institutional Aspects'.

4.1.3 Role and structure of institutions

Role of the institution in commoning water:

One of the most important roles of the institution is to strengthen the idea of water as Commons. This idea is at the core of management and conservation of water. The nature of the resource makes it vulnerable to overexploitation, free-riding and misuse. This directly or indirectly affects different sections of the community- their access, water availability and water quality. Thus, it is imperative that water is seen as a common resource and its management and use are defined by this idea. The understanding of water as Commons can be furthered through the following principles: Improving access of water to all sections of the community.

- Improving access of water to all sections of the community.
- Evolving easily implementable rules and regulations (most effective with least efforts), that are understood easily by all members of the community.
- Provisioning of water for the poor and marginalized sections of the community and safeguarding their interests.
- Prioritization of water use on the basis of seasonal changes and availability.
- Sharing of water from privately owned water sources (borewell/ ponds).
- Institutional arrangements for sharing of water and ensuring maintenance and management of water bodies.
- Equal concern for water needs of humans, livestock and wildlife.
- Ensuring higher standards of participation of different sections (especially poor and marginalized) in planning and decision-making.

Structure of the institution:

There is no single institutional form that is ideal for water management. The form of the institution depends on the resource, its primary use, users and the biophysical and social landscape around the resource. Accordingly, the form of institution, structure and function may vary. However, not all institutional forms may treat water as a Commons. For example, a farmers' user group formed for the management of a check dam to benefit

their crops (through water for irrigation) is most likely to be exclusive in nature. In this case, a defined use and user group is excluding others from accessing water from the check dam. While the group may manage the check dam, however, it fails to promote commoning of water. Thus, it is important that an institution formed for the purpose of water management and use must first treat the resource as a Commons.

4.1.4 Nesting institutions

As mentioned earlier, a water resource should be seen as a part of a larger socio-ecological system rather than as a stand-alone resource. Thus, its management and conservation will involve multiple stakeholders at various levels of government agencies and private entities. The involvement of these various stakeholders is essential for regulation of water access, usage and management across a defined hydrological boundary. However, different institutional arrangements at different levels would exist for addressing various issues. For effective water management within a particular landscape/ region, it is important for various stakeholders to come together and work towards a shared objective for better water management. Nesting of institutions is important to improve the coordination between different stakeholders. Institutions at the village, multi-village, panchayat, block and district levels should be integrated and brought to a common platform where issues and possible solutions for water governance can be discussed. Water resources also serve different purposes for different sections of the community. Thus, there may be different institutions that are responsible for the management of these uses and users. For example, there could be multiple water user associations or tank management committees within a village/ landscape. Their membership is exclusive (only those with land in the command area of the tank) and uses limited (irrigation). This arrangement does not contribute to commoning and thus it is important to nest these institutions under a larger, inclusive institution that enables processes of commoning.

Since different stakeholders have different relationships with the resource, it becomes important to identify shared goals that would guide the work of such a collaboration. Additionally, the roles and responsibilities of each institution should also be clearly defined towards achieving this goal. With multiple stakeholders involved, it is almost certain that there will be challenges in working together. Differences in objectives, opinions, approaches and interests are bound to affect the functioning of the institution. Thus, it is also an important function of the multi-actor platform (MAP) to resolve conflicts and work towards reduced friction among stakeholders. Alongside this, the use of technology and data platforms to support the cause with evidence is essential to bring different groups together. The institution also plays an important role in educating people and advising other institutions nested within it on best practices for water commoning and collective management. Leveraging funds for strengthening these processes and conservation efforts is another responsibility of the institution, while also seeking accountability from different stakeholders including government agencies, academia, civil society etc. Guiding principles for strengthening institutional arrangements (mentioned in the previous section) should be applied here as well so that institutional processes are clearly defined and followed. Subsequently, the strengths of each of these stakeholders should be leveraged to further the objectives of the group. Thus, nesting of institutions is essential to work towards management strategies that are planned, long-term and sustainable in nature.

In South India, Dhan Foundation works on tank rehabilitation by forming institutions at different levels. Individual tanks have institutions managing them with command area farmers and other villagers. Tanks in a cascade i.e. those tanks that feed each other through overflows, form a cascade level institution. Together they may cover a watershed sub-basin. They promote collective tank management, good agricultural practices, campaigns etc. They also follow up with village level institutions. Cascades in a block form a federation which is aligned with the block administrative unit. This way, institutions are nested within larger federations that work across a landscape.

4.2. Normative aspects of institutions for commoning of water

4.2.1 Purpose

Institutions may adopt various ways to manage resource use. The conditions of resource use, access, management and conservation can be understood as rules and regulations that essentially govern the way in which interaction between resource systems and social systems take place. Thus, evolving rules and by-laws for the management and use of a particular resource is an important function of the institution. These rules define resource and user boundaries, uses, appropriation limits, and responsibilities towards maintenance and conservation.

4.2.2 Types of rules

Rules are evolved around different aspects of management-access, use, appropriation, maintenance, management and conservation. For easy understanding of the various kinds of rules, the following table gives a simple classification with examples from our own experiences with evolving rules around water.

Rules can be classified as (based on Ostrom's classification and definition of rules)[1]:

1. Operational choice rules: Operational rules are the day-to-day decision making rules, which determine the actions of different institutional actors in a system (**Ostrom 2011**; **Mincey et al. 2013**).

2. Collective choice rules: Collective choice rules structure institutional arrangements for rule enforcement. Thus, a difference between operational choice and collective choice rules involves practicing a right and determining the right to be practiced (**Ostrom and Schlager 1996**).

3. Constitutional choice rules: Constitutional choice rules are the highest level of the rule hierarchy, determining who will take part in collective choice decision-making processes (**Ostrom et al. 1994**).

1 Rahman, H. M. T., Saint Ville, A. S., Song, A. M., Po, J. Y. T., Berthet, E., Brammer, J. R., … Hickey, G. M. (2017). A framework for analyzing institutional gaps in natural resource governance. *International Journal of the Commons*, *11*(2), 823–853. DOI: http://doi.org/10.18352/ijc.758

Type of Rule		Examples/ Cases
Operational choice rules	Prevent damage to infrastructure	Encroachment of submerged areas of a water harvesting structure is prohibited. Existing encroachments will be evicted.
		Ban on use of soaps and detergents for washing in the water source meant for livestock drinking purpose.
		Complete shift to organic fertilizers and pest control to prevent pollution of water bodies
	Mobilize household contributions	Each family must contribute labour or money for cleaning and maintaining the village water pond.
		All households should contribute to compensate the neerugatti (water manager) for his service.
	Operate, maintenance, repair or improve infrastructure	Compulsory rainwater harvesting provision to be incorporated in new constructions.
		Repair of feeder channels and outlets; prevent encroachment of tank area and feeder channel; full cooperation of the community to the *neerugatt*i (water manager).
		Constructing and maintaining *khel, piyau* through to be done through individual/ community efforts.
		Opening/ closing of tank gates and distribution of water will be decided by the institution.
		Needs of women, marginalised should be specially considered while making decisions regarding water usage and management.
Collective choice rules	Withdrawal of water, fish, or other resource units	Ban on direct pumping of water from tanks/ ponds; decision to not release water for irrigation below a minimum level to conserve water for livestock drinking and domestic purposes.
		Distribution of water through channels will be decided by the *neerugatti*; last in the command area will get water first.
		Borewell farmers must share water with non-borewell farmers for critical irrigation during situations of drought and water scarcity.
		Ban on fishing from tank/ pond during breeding seasons.
		Collective crop choice shifts from water-intensive crops to water-efficient crops.
		Mandatory shift to water conserving technologies like drip and sprinkler irrigation and System of Rice Intensification (SRI).
		No private tap connections to individual households; only community taps.
	Enforcing rules / restrictions	Ban on drilling of new borewells; borewells can only be dug for drinking water purposes, whenever necessary.
		Ban on paddy cultivation during Rabi season under borewell irrigation.
Constitutional choice rules	Publicly provided and discussed water monitoring information	Improve appreciation of the value of water
		Crop water budgeting to improve understanding of the economics of crops and water use (shift from water-intensive to water-efficient crops)
		Monitoring water level in tanks / boribund / wells to decide on crop to be sown / water use for irrigation
	Agreement on wider scale resource management	Coordination with other villages to improve sharing benefits and responsibilities
		Engagement with panchayat to help in enforcement of rules
		Federation of institutions around cascade of tanks (promoting tank management, replicating good agricultural practices, organizing campaigns)
		Palampur Water Governance Initiatives – payment for ecosystem services to village forest committees protecting the springsheds by the Municipality
		Villages in the catchment of river brought together (river as a cultural identity)
		Panchayat Orders stating that water cannot be released during times of scarcity

4.2.3 Evolution of rules

These rules are not fixed or constant; they don't appear instantaneously. Rather, rules and norms evolve over time as they adapt to changing environments, needs and objectives of the community. They are products of extended processes of discussions, deliberations and debates among the actors who influence and are influenced by a common pool resource system. These rules could be formal or informal, written or unwritten, traditional or more recent and maybe accompanied by sanctions. However, to understand the community's role in water management and further strengthen these provisions, it is important to familiarise oneself with how these rules and sanctions have evolved over the years. These are some points that can be considered with respect to evolution of rules.

- Norms to rules – have the rules in their present form evolved from previously established norms or were they earlier norms that have now been formalised as rules??
- Unenforced to enforced – how effectively are these rules regarding water management enforced? Are they functional or do they just exist on paper?
- Inclusive or Exclusive – are the formulated rules inclusive or exclusive? Do they apply to select groups of the community or are they applicable to all? Who were involved in formulating these rules? Was it only the heads or village representatives or did it involve the whole community?
- Towards or away from Commoning – are the rules or norms enabling or disabling processes of commoning? Do they encourage commoning of the resource or do they take away from it?

- Free to user charges – do these provisions include user charges in any form (cash, labour etc.) or do they allow for free use of the resource?
- Gender Lens – different genders have a different relationship with common water resources. Do the rules take this into consideration? Are they formulated to account for differential gendered relationships?
- More or less sustainable – do the rules represent long-term sustainable management and use practice or do they address more short-term concerns that may prove to be unsustainable?
- Documented or not – are the rules written or unwritten? Have they been formulated documented such that they can be referred to at any point or are they undocumented but socially established?
- Supply side to demand side do the formulated rules address demand-side management (crop choices, irrigation, domestic use etc.) issues or supply-side management (maintenance of water harvesting structures, catchment area protection etc.) issues of water resources?
- Land-water continuum (catchment-water source; water source-command) – do the rules pertain to the resource in question or address the larger landscape within which the resource operates (the catchment area and the command area of the water source)?

4.2.4 Reasons/Drivers of Change

As mentioned in the previous section, rules and norms evolve over time and adapt to changing environments. Their effectiveness also greatly depends on their adaptability to suit the needs and demands of evolving

situations. What drives these changes? The following reasons are a few drivers that can be considered while understanding how rules and norms have evolved over time.

- Scarcity – The availability of water may change over time. These changes can be seasonal (short-term) or in some cases long-term. These long-term changes can result from decades of over-exploitation due to change in crop patterns, usage, management practices and demands. The degradation of the catchment areas and ineffective water harvesting mechanisms can also be a cause. Climate change has been a contributor to varying rainfall patterns, resulting in scarcity. These biophysical and social factors leading to scarcity can lead to changes in rules and norms.

- Over exploitation of resources – Over the decades, cropping patterns have undergone a drastic change. There has been a shift towards commercial agriculture and mechanised agricultural practices. With improved access to water for irrigation, the cultivation of high-water intensive crops has dominated our agriculture. This has been one of the main reasons for overexploitation of water resources. This shift in agriculture and water usage patterns has also been a major reason for communities to evolve rules and norms.

- External influence (schemes like MGNREGS) – External influences like government schemes and policies also have a role to play in defining the community's water management practices. Schemes like MGNREGS and policies that influence water use and management may require the community to formulate specific rules or follow those that have been mandated by the government under the provisions of these programs.

- Conflict – When we talk of collective management of a resource that involves multiple stakeholders, there is always a possibility for conflicts to arise between or among these various actors. In some situations, the outbreak of a large conflict or the threat of one can cause a change in rules and norms to manage the conflict and prevent such other instances.

- Interventions like water literacy – Education and awareness are effective instruments of change and have been used far and wide to bring about positive changes in people's thoughts and behaviours. Interventions to make people more aware of the issue at hand are sure to bring about changes in the way that they define usage and management of water to effectively address these issues.

- Commercialization/ Commodification of resources (leading to an increase in demand) – Natural resources have been the basis of many production and manufacturing systems, thus assigning them a high economic value. This economic value has often led to the treatment of these resources as commodities thus leading to their commercialization. Valuing the resource only for its economic benefit also leads to changes in use and management behaviour.

4.2.5 Consequences/Effects of Change

The evolution of these rules can nudge behaviour either towards commoning and traditional practices founded on the principles of commoning, collective decision making and collective action, or away from these principles, thus laying the foundations for understanding water as a common pool resource.

1. In Kanhari Khurd in Mandla, MP, community fishery led to evolution of rules around a pond that was used only by a few people who had lands adjacent to the pond. With the introduction of fishery, the pond became a common resource used by the entire community. Fishing was done by the community and rules with respect to fishing were made around distribution of fish and benefits sharing. Subsequently, sanctions were also decided for defaulters. Another layer of rules for prioritization of water use based on the water level of the pond was added. Rules regarding the method of water extraction also evolved.
2. In a village in Andhra Pradesh, direct irrigation from a check dam retained for recharging wells and tube-wells was banned. However, farmers started growing water intensive crops which they irrigated through their tube-wells. This led to shortage of water again. Hence, rules were evolved to restrict the area under water intensive crops as well as to adopt low cost, water saving technologies like drip irrigation systems.

Tools that can be used (refer to annexure for details):

1. Trendline
2. Aquifer map
3. Groundwater game
4. Crop water budgeting
5. Institutional analysis
6. Snakes and ladder game
7. Net actor mapping
8. Mind mapping
9. Data and infographics

Chapter 5

Planning and designing interventions for commoning water

5.1 Purpose

Processes for commoning water and strengthening water management practices require resources: physical, social and financial. While community mobilization is crucial in strengthening collective water management practices, financial resources are essential for undertaking activities that contribute towards the same. Working

towards improving water management involves planning and designing interventions that strengthen the idea of water as Commons, thus encouraging collective management practices. Where and how do we place our interventions?

5.2 Principles

- Conservation of uplands lead to a better soil moisture regime. It is important to focus on soil water conservation measures in upper and middle reaches of the catchment area. This ensures good recharge and collection of water in the lower areas.
- While conservation of the catchment areas addresses supply side challenges of water availability, it is equally important to address issues of water demand and usage. Thus, interventions like simulation games and crop water budgeting should be undertaken to bring about behavioural changes for managing demands for water in lower reaches.
- Water as a resource must be seen as an integral part of the larger landscape within which it operates. Thus, conservation and management activities cannot happen isolated. It often requires the efforts of multiple stakeholders across a defined boundary. Following a watershed approach or a landscape approach is important in strengthening water management and ensuring its sustainability.
- Water literacy is an important intervention that contributes to strengthening water governance. Campaigns on the importance of water as a resource and its sustainable management and use should be designed and undertaken on a large scale to make people aware of issues surrounding water and create narratives around their responsibility towards its conservation.
- As mentioned, multiple stakeholders are involved in issues relating to water and it is important to involve all stakeholders not just at the village level but at the landscape level and improve coordination between them in planning and implementing steps towards strengthening water management.
- Communities have long managed their resources. Historically, collective management of forests, pastures, tanks, lakes and ponds has been popular and some of these practices continue to exist. Though traditional management practices have weakened over the years, it is important to tap into communities' knowledge systems and nurture those that are enabling the commoning of water. Additionally, using newer technological tools and data platforms to support in strengthening water management should be encouraged.
- Leveraging funds from various sources and integrating plans within larger schemes and programs is also important while designing interventions. MGNREGA is one such program which provides an opportunity for communities to leverage government funds for natural resource conservation and management activities. Such provisions are important in providing opportunities for furthering work on water governance.

Kheriya Mangari is primarily a tribal habitation of Achalpur Gram Panchayat in Rajasthan. The village had just one pond which was first dug as part of the 'Food for Work' program in 1994-95. This was the only source of water for the community. Around 2013, the village faced a severe water crisis where the community had an acute problem of accessing drinking water during the summer months. The community first decided to volunteer for 'shramdaan' (voluntary labor) to dig a common well. Owing to the arid state of the pond, the well remained dry. In 2013, the village institution "Mamadev Jalgrahan Vikas Samiti' (Watershed Development Committee) became active and passed a resolution in the Gram Panchayat to undertake the deepening of the pond. Work began in April, 2013. In addition, the community also took up other works under the MGNREGS shelf of activities. The various activities under the MGNREGS continue, but thanks to the abundant rains, the water storage has improved and the pond has enough water.

Tools that can be used (refer to annexure for details):

1. Trendline
2. Crop Water Budgeting (CWB)
3. Composite Landscape Assessment and Restoration Tool (CLART)

Chapter 6

Challenges of Commoning

The process of commoning of water resources is not an easy one. There are several pull factors that influence water commoning at the local level. Some of the challenges in commoning are listed below.

6.1 Sectoral approach

The water resources are seen only as water bodies, rather than seeing them as ecosystems and how they are linked to the larger landscape. As mentioned earlier, these resources are a part of surface, sub-surface

and groundwater sources. However, for management and governance of water resources, the focus is not conjunctive. Decisions are taken considering groundwater and surface water as separate entities. Moreover, the different uses of water- irrigation, drinking, etc.- are governed by separate institutions or authorities, thus reducing water to a mere resource, rather than a socio-ecological system. Such a sectoral approach towards water makes it difficult to manage it as a common pool resource system.

6.2 Power relations

The diverse use of water naturally means a diversified user-base as well. Asymmetrical power relations within these users, emerging from the existing socio-politico-economic structures may lead to conflicts since the decision-making powers and control over resources are unequally distributed. Rural-urban conflicts, caste-based and gender-based dynamics within a rural area are some examples of power relations within and between communities managing and accessing water resources. This hinders the process of commoning of water.

In Bhatkhedi village in Rajasthan, villagers passed a rule banning digging of borewells. The rule was followed by most of the people. However, few influential people refused to follow the rule as there was no law against digging borewells. Since there was no legal backing for the rule made by the village institution, it could not be enforced in such cases.

6.3 State control

With the growing urban and industrial demand for water, water resources are increasingly controlled and owned by the State. Such a centralised control over resources lead to a de-commoning of the resources, that is, the onus of management shifts from the people using the State, which may lead to unequal distribution, conflicts and even exploitation of water. Since the ownership is not with the users of the resource, there is no responsibility to conserve it.

6.4 Privatisation

The creation of water markets, encroachment of catchment areas, activities like sand mining and brick kilns along river banks, etc. pose a big challenge to commoning of water resources. Water is thus seen as a commodity that can be traded, rather than a resource that needs management and conservation. In the recent past, there has been a push for privatisation of water, and is seen as a solution for the water crisis. This may not be conducive to the equitable and sustainable management of water resources.

Bhatgaon village in Niwas block of Mandla district is a predominantly tribal village. Bhatgaon reservoir is in the catchment of Gaur River, an important tributary of Narmada. It has developed in a natural depression with an earthen dam. The construction of Bhatgaon reservoir was completed in the year 2000 for the purpose of irrigation. As the reservoir retains water for the entire year, it also serves as an important source of fishing. For the past few years, the fishing rights have been usurped by a private contractor, in nexus with some of the rural elite of Bhatgaon. This had deprived the people of Bhatgaon the rights to fish in the reservoir causing much resentment. Moreover, the community also began losing control over the use of the reservoir. As the situation reached a breaking point, it called for dialogues on the communing of the water resources.

6.5 Laws and Programmes

Some of the existing laws and various programmes run by the State have in some ways hindered the processes of commoning. Legal provisions that attach water rights to land rights, Programmes promoting private water bodies like farm ponds, eucalyptus plantation, are few examples that have led to exploitation of water by individuals, groups as well as the State, thus making community management difficult.

6.6 Lack of data and information

With the advent of resource-intensive agriculture and livestock production systems, promotion of dairy and horticulture, there has been a shift in extraction of water from surface water to groundwater sources. However, the challenge with groundwater is the unavailability of data and proper information as it is a fugitive resource. Due to this, it becomes difficult to manage aquifers as shared resources (Aquifers are underground layers of porous and permeable rock capable of storing groundwater and transmitting it to wells and springs). These knowledge gaps encourage uninhibited exploitation of groundwater by drilling deeper borewells, thus depleting the common aquifers as well. Due to these reasons, it is a challenge to manage groundwater as a common-pool resource.

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Annex I. The Tools

1. Purpose of tools

Using certain tools and methods help in developing an understanding of water resources in ways stated in the previous sections. These tools and methods can be used differently depending on the local contexts and situations. Listed below are some essential uses of employing tools for strengthening shared water management:

- To understand landscape and water resources
- Use available secondary data to know the current/ present status of the resources
- Information will be available with the community for informed decision making
- Will help in interventions, strategies to deal with issues- future planning
- Tools will help in opening up/facilitate discussions in communities, provide platform for influencing
- Identifying stakeholders of different resources
- To understand existing methods, practices, traditional norms, rights, accessibility to resources, issues around it
- Bringing together communities/ stakeholders at different levels
- Linking village level to larger landscape level
- Help in influencing external agencies (ex. Agriculture department), information and data can be used by these external actors for taking decisions

2. Challenges in using the tools

- Getting updated information and data
- Practitioner's understanding of maps
- Presenting data in simple ways to communities, taking discussions forward using the data

3. Various tools for water governance

A detailed description of each of the tools mentioned across the sourcebook is given below:

3.1 Resource Map

What: Resource Map is a tool that helps in recording the natural resources of a village, including water sources, grazing lands, forests, etc., with the help of community members. It gives the community's perception about their resource-base.

Why: The Resource Map is an important way to understand the various water bodies in a village, uses and users of these resources, which resources are important for the community, and also the accessibility to these resources.

When: Resource Mapping is done in the first or second meeting with the community.

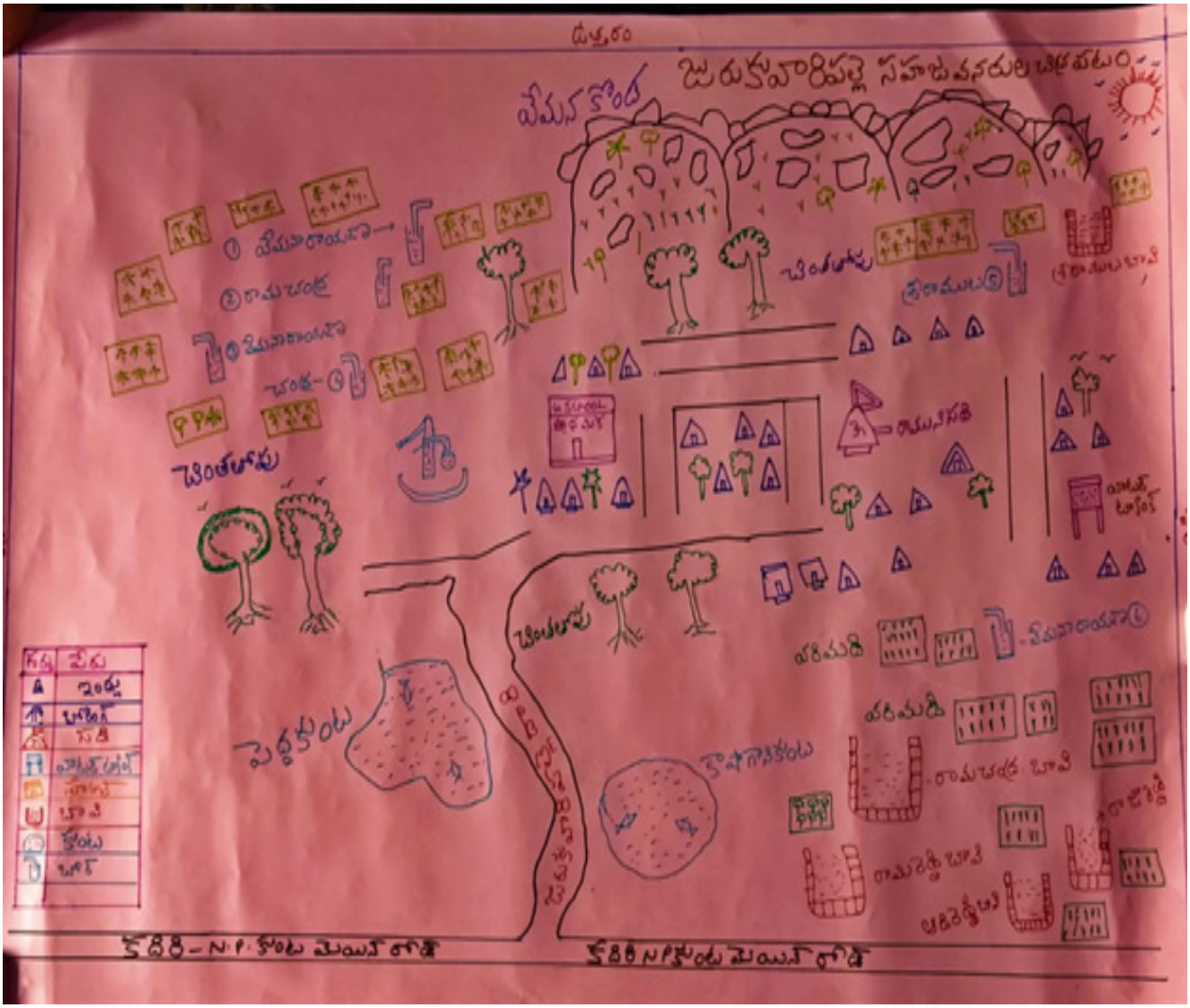
With whom: This exercise is preferably done with the whole community, involving different sections like women, farmers, landless, village leaders etc.

How:

- The facilitator asks a community member to draw a rough map of the village (village boundary, important landmarks, roads etc.).
- The villagers then draw the resources on the map- the facilitator can give examples or ask questions to help them.
- Once the map is drawn, the facilitator can ask further questions to trigger discussions and get more information about the resources shown by the community, and these can be noted on the map.
- The exercise can be concluded by presenting the map to the villagers and asking them to validate.

Outcomes:

A spatial understanding of the resource-base of the village and community's perception about the resources.



A chart used in resource mapping exercise

3.2 Stream Survey with Social map, Catchment Map

Community members engaged in Stream Survey exercise

What: Stream survey is a participatory mapping of stream with the communities accessing it/ residing close to it. It includes mapping the physical as well as social landscape along the stream and catchment.

Why: This tool is used to develop a holistic understanding of the landscape and resource (stream, catchment) - uses, stakeholders, dynamics between the upstream and downstream users, kinds of dependencies and so on. It helps the community to place the water resources in the larger socio-ecological landscape.

When: Stream mapping and catchment mapping is done after initial discussions with the community, along with other baseline surveys.

With whom: Community members residing close to the stream and in the catchment, preferably involving different sections like women, landless, farmers, etc.

How:

- The facilitator walks along the stream, with the community members. Observations are noted and questions are asked to encourage discussions about the social aspects
- The community members then draw a rough map (not to scale) and all the observations are pictorially represented on the map
- The map could be shared with the entire village/ larger community for validation and to trigger further discussions among themselves

Note: A similar process is followed for catchment mapping.

Outcomes:

A comprehensive understanding of the ecological and social systems of the entire riverine landscape (stream and catchment).

3.3 Aquifer Mapping

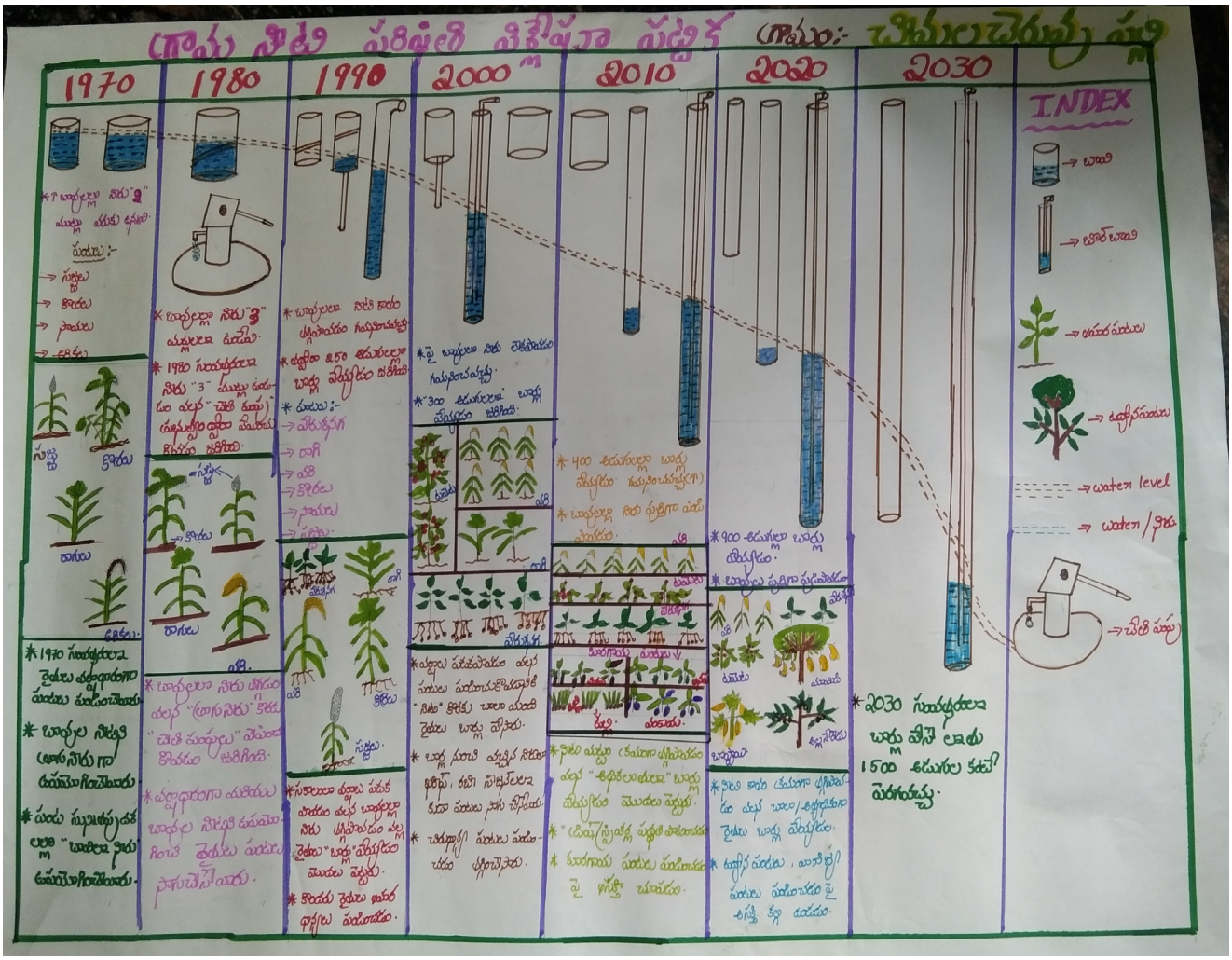


Chart Used in Aquifer Mapping exercise

What: Groundwater is essentially a resource that is hidden or cannot be seen in its actual state until it is accessed and extracted from its aquifer. The aquifer mapping is a tool that tries to diagrammatically represent the aquifers that are present below the Earth's surface. The tool relies on the information given by the community with respect to the borewells and wells and their water levels for drawing up the map.

Why: Aquifer mapping is done to get a fair idea of areas where water availability is high or low. It is important to understand the aquifer and aids in furthering discussions to influence behaviour of the community towards optimum use, thus avoiding over-exploitation.

When: The aquifer mapping is done during the initial meetings in the village, when primary data is being collected and first-hand experiences about water are being understood through the community.

With whom: The mapping is done with those people who own wells or borewells in the village. The map is then presented to the entire village.

How:

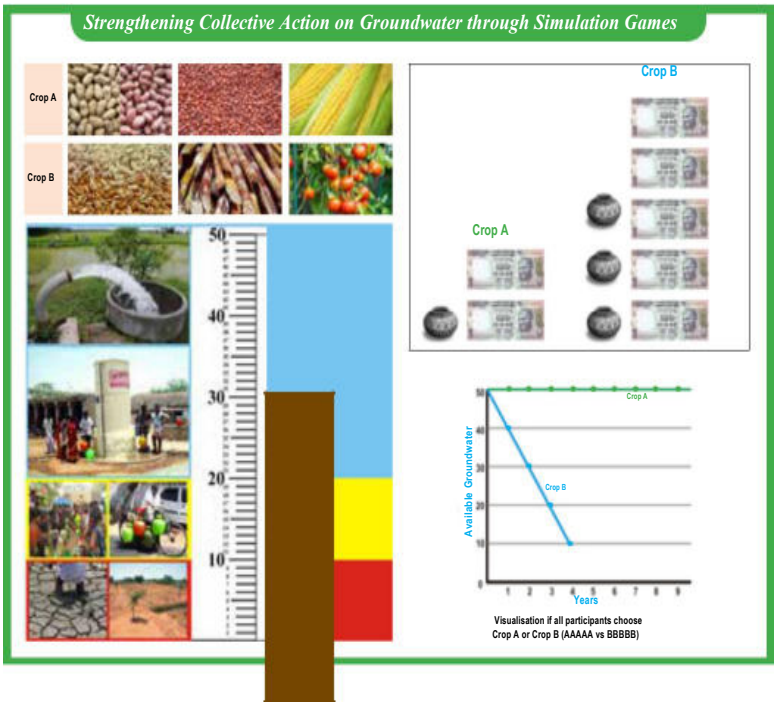
- Map of the village is drawn with the help of the community.
- All the wells and borewells present within this boundary are identified and marked on the map.
- Information regarding the depth of the well and the static water levels in the wells are collected and noted down on the map.
- Contour lines (imaginary lines that indicate aquifer boundaries) are drawn through those wells and borewells where the static water levels fall within close range.
- The different layers are then distinguished and coloured.
- The map is then presented to the entire community to triangulate the well data and give a fair idea of the aquifers and its boundaries.

Outcomes:

Rules around drilling borewells

3.4 Groundwater Game

Why: Groundwater is one of the most exploited natural resources. It is a fugitive resource and the issue is even more complicated since water rights are attached to land rights in our country. However, groundwater is a common resource with high subtractability and low excludability. Individual extraction behaviour has an impact on the availability of the resource for the rest. Private access to this resource (through means like bore wells) has led to unequal distribution and a general idea of water as a private resource.



Banner used in Ground Water Game

What: Simulation games on groundwater has been found to be very useful in triggering discussions on groundwater as a common resource. The game attempts to create real-life situations where the players are expected to make cropping decisions, the effects of which are reflected through the game. It is an effective tool to actively engage the community in discussions around groundwater and its management.

When: The game is usually played along with tools like the Crop Water Budgeting (CWB) to compliment these tools in furthering the idea of groundwater as Commons and its efficient management. It is played before the water budgeting is done.

With whom: The game is played with farmers, mostly those who own borewells and irrigate their lands through this means.

How:*

- A group of farmers (usually 5) are selected for the purpose of the game and the game is introduced.
- The game is played in two rounds (without communication and then with communication among the players), in the presence of other members of the community (who simply observe).
- Through the game, key observations and discussions are noted.
- At the end of the game, a debrief session is held with the whole community.
- The experiences of the players with respect to the game are shared with the larger group and discussions are steered around commoning of groundwater and groundwater management.

*a detailed groundwater practitioners' manual can be downloaded here.

Outcomes:

- Rules and regulations related to water usage.
- Shared understanding of groundwater as a common resource.
- Evolving practices around water sharing through borewells.
- Rules towards ensuring equity in water access and usage.

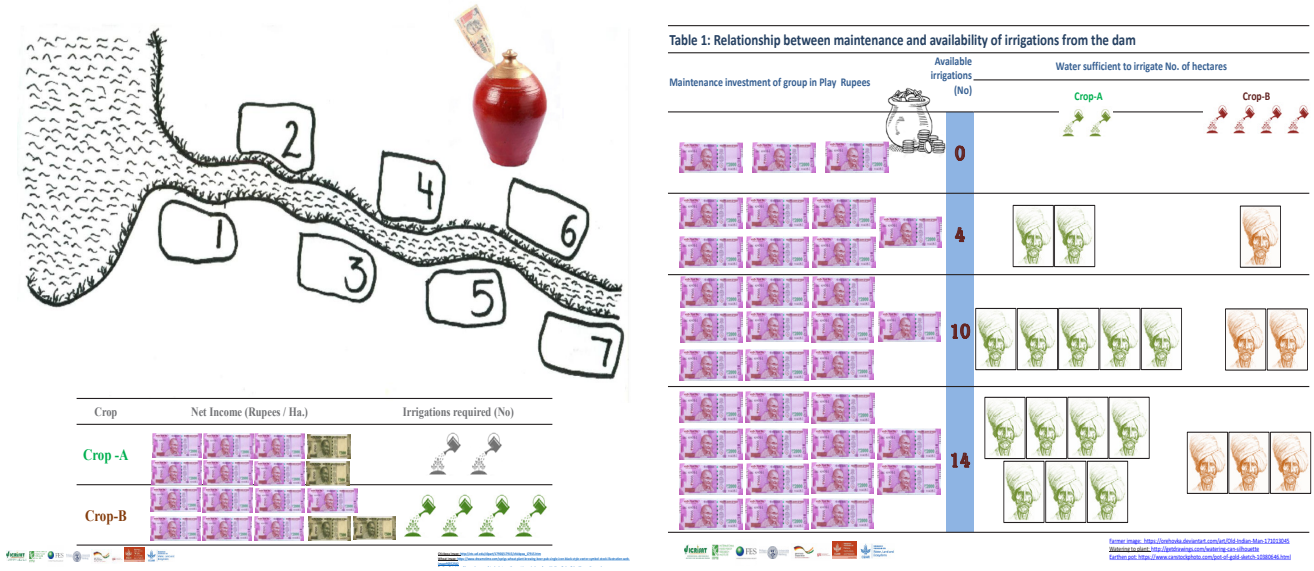
Anantapur, Andhra Pradesh is one of the most drought-prone districts in the country. Introduction of borewells led to high abstraction of groundwater, making it one of the most water stressed regions. With a complete breakdown of indigenous water-harvesting systems and the introduction of water intensive crops like tomatoes, the situation worsened. In 2013-14, FES began conducting a series of experimental games on groundwater to test the hypothesis that participation in these games affects the attitude of the participants towards groundwater helping trigger collective action around this vital common pool resource. Feedback from the 39 villages after the second phase of the study indicate that experimental games are an effective way of raising awareness of the interconnectedness of groundwater use and could trigger collective action for groundwater management in Andhra Pradesh.

- In Somarajakunte, people had decided not to harvest more than one acre of paddy per farmer unless the irrigation tank is full, thus taking steps to collectively manage and conserve groundwater.

3.5 Surface Water Game

Why: Check dams, stop dams, and anicuts are the most important common pool water resources in the community, and they are difficult to manage, as they are shared. Maintenance and allocation of benefit from it requires coordination among the community members. The surface water game explicitly highlights how individual choices impact outcomes for the entire community of resource users. The surface water game is one in which players take individual contributions decision regarding the maintenance of the dam, and in the second phase, they take decision for water withdrawal, but they experience the impact of uncoordinated decision-making because each individual's decision impacts the state of the resource.

What: The Surface water game was created to support development partners involved in water-related projects in facilitating communities' social learning and innovation with regard to crafting locally adopted



Banners used in Surface Water Game

water management rules specifically related to minor water infrastructures. The game is played with people, such as local farmers, who manage minor water infrastructures. It is designed as a participatory intervention supporting communities to find locally adapted solutions.

When: The surface water game is played before the post rainy season or before the maintenance of the dam. It will help to encourage community members to prepare rules for the maintenance of the common water infrastructure and allocation of benefits.

With whom: The target group of the experiment is water managers. We mainly play the game with farmers who live close to a stop-dam or water-harvesting structure, which is used for irrigating crops in the post-rainy/Rabi season. Alternatively, the game can be played with representatives of water-user associations or community organizations.

How:

- A group of farmers (seven or fourteen) are selected for the purpose of the game, and the game is introduced.
- The game is structured in two phases, in the first round players make individual decisions without any communication, and the second phase is with communication. In the second phase (five rounds) if the players agree to reveal their individual decisions, then their results are revealed in front of others with the help of record posters.
- The game is designed similar to other irrigation games, including the provision and appropriation problem, as well as asymmetric access to the irrigation system.
- Seven fields are placed successively downstream to the dam. Each field is owed by a farmer; player one is closest to the dam and player seven the farthest.
- At the start of each round, participants are provided with the same initial endowment amount of 4000 rupees (play money).

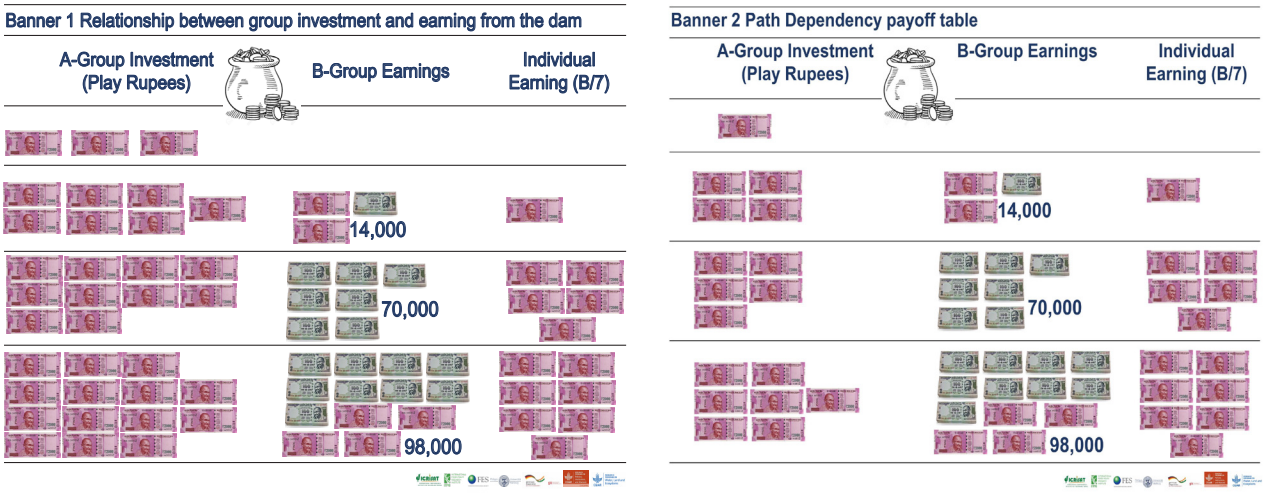
- All participants decide how much amount they want to invest in the maintenance of the dam.
- The accumulated contributions determine the overall availability of water in the dam.
- In a second step, participants decide on their crop choice-water efficient crop or water-intensive crop. Water intensive crops give more benefit than water-efficient crops, but water-intensive crops require more rounds of irrigation.
- Depending on which crop they chose, different quantities of water is used from the dam.
- In the game, even under the condition of optimal dam maintenance, there is only enough water to irrigate four fields of water-intensive crop, whereas there could be enough water for all seven players to irrigate seven fields of water-efficient crop.
- There are four game variations in the game, if participants are interested to continue the game after six rounds, then the facilitator can choose a suitable variation as per the discussion of the participants during the game.

During the game process, participants allow discussion, and keynotes of discussion are noted.

3.6 Dam Maintenance Game

Why: Like all public good experiments, the dam maintenance game focuses on the provisioning action situation, namely the maintenance of the common water infrastructure. The dam maintenance game helps community members to understand how an individuals' decision impact on other members.

What: The dam maintenance game was created to support development partners involved in water-related



Banners used in Dam Maintenance Game

projects. The game is played with people, such as local farmers, who are living close to water infrastructure and enjoy benefits from water infrastructures. It is designed as a participatory intervention supporting communities to find locally adapted solutions to sustain water infrastructure.

When: Generally water infrastructures are maintained in the summer season. So it will be good to play the

dam maintenance game before the summer season, which will help community members to prepare rules and regulations to maintain their common water infrastructures.

With whom: The target group of the experiment is water managers. We play the game with farmers who live close to a stop-dam or water-harvesting structure, which is used for irrigating crops in the post-rainy/Rabi season. Alternatively, the game can be played with representatives of water-user associations or community organizations.

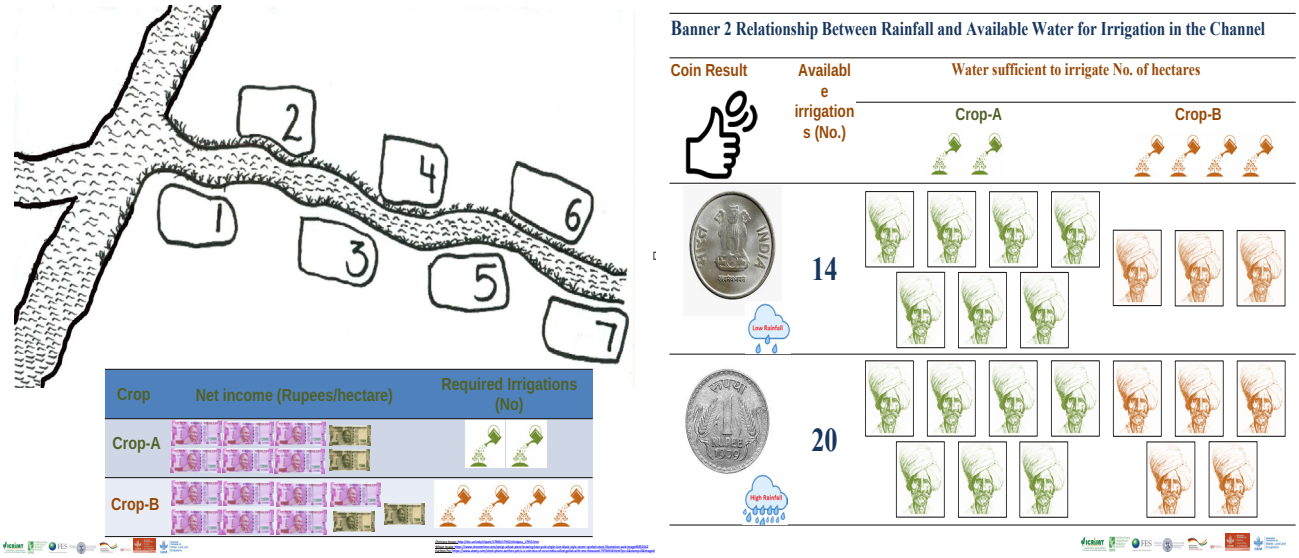
How:

- This game focuse on the provisioning action situation for the maintenance of the common water infrastructure. Pay-offs are adjusted to region-specific estimates of average maintenance costs of dams as well as typical income derived from dam management.
- The game can be played with one group having seven members or with two groups.
- The game is played in two stages: one round without communication and five rounds with communication.
- At the beginning of each game round, players received an initial endowment of 4000 rupees (play money).
- In the first round, the players decide and conceal the share of endowment they want to invest in maintaining the supposed dam.. In the game, two different colored envelopes and play money is used for investment decisions.
- The total of all individual contributions determined the group earning.
- In each round, the group earnings are distributed equally among the players.
- After playing the first round with concealed decisions, we announce that the players' decision will be disclosed in the subsequent rounds. From round two onwards, contributions and earnings were written on a poster visible to all. After each round, players could openly discuss for five minutes.
- The facilitator takes notes of the participants' discussions.
- After completion of the six rounds, if the participants are interested to continue the game, there are four game variations. The facilitator can choose suitable game variation to play with those participants as their discussion.

3.7 Channel Irrigation Game

Why: Despite huge investments made by Governments or any other organizations in the water resources sector, the unsatisfactory water distribution and inefficient management of the system, which contributed to the declining economic and social rate of return was largely attributed to the lack of participation of the users in this sector. The channel irrigation game helps to understand which community members can increase their income as a group instead of individual benefit.

What: The channel irrigation game was created to support development partners involved in water-related projects. The game is played with people, such as local farmers, who use channel water to irrigate their fields. It is designed as a participatory intervention supporting communities to find locally adapted solutions to



Banners used in Channel Irrigation Game

sustain the channel and to earn more benefit in a group.

When: The game is usually played before the planning of the post rainy season with community members. It will be effective if we play a game session with a water user from the one water channel.

With whom: The target group of the experiment is water managers. We play the game with farmers who live close to a channel used for irrigating crops in the post-rainy (rabi season). Alternatively, the game can be played with representatives of water-user associations or community organizations.

How:

- A group of farmers (seven or fourteen) are selected for the purpose of the game, and the game is introduced.
- The game is designed similarly to other irrigation games, including the provision and appropriation problem, as well as asymmetric access to the irrigation system.
- Seven fields are placed successively downstream to the dam. Each field is owed by a farmer; player one is closest to the dam and player seven the farthest.
- The game is structured in two phases, the first round is played without any communication between the players, and the second phase is played with communication. In the second phase (five rounds) if the players agree to reveal their individual decisions, then their results are revealed in front of other players with the help of record posters..
- In the game, the availability of the water in the channel depend on the rainfall. In case of high rainfall situation, available water in the channel is enough for 20 irrigations; while in low rainfall situation, it is only enough for 14 irrigations.
- In the game, we flip the coin to decide the rainfall situation in each round. Head means low rainfall, and tail means high rainfall.
- In a second step, participants decide on their crop choice-water efficient crop or water-intensive crop.

Taking all costs and labor inputs into account, a water-intensive crop gives a better return per hectare than a water-efficient crop, but a water-efficient crop requires substantially less water.

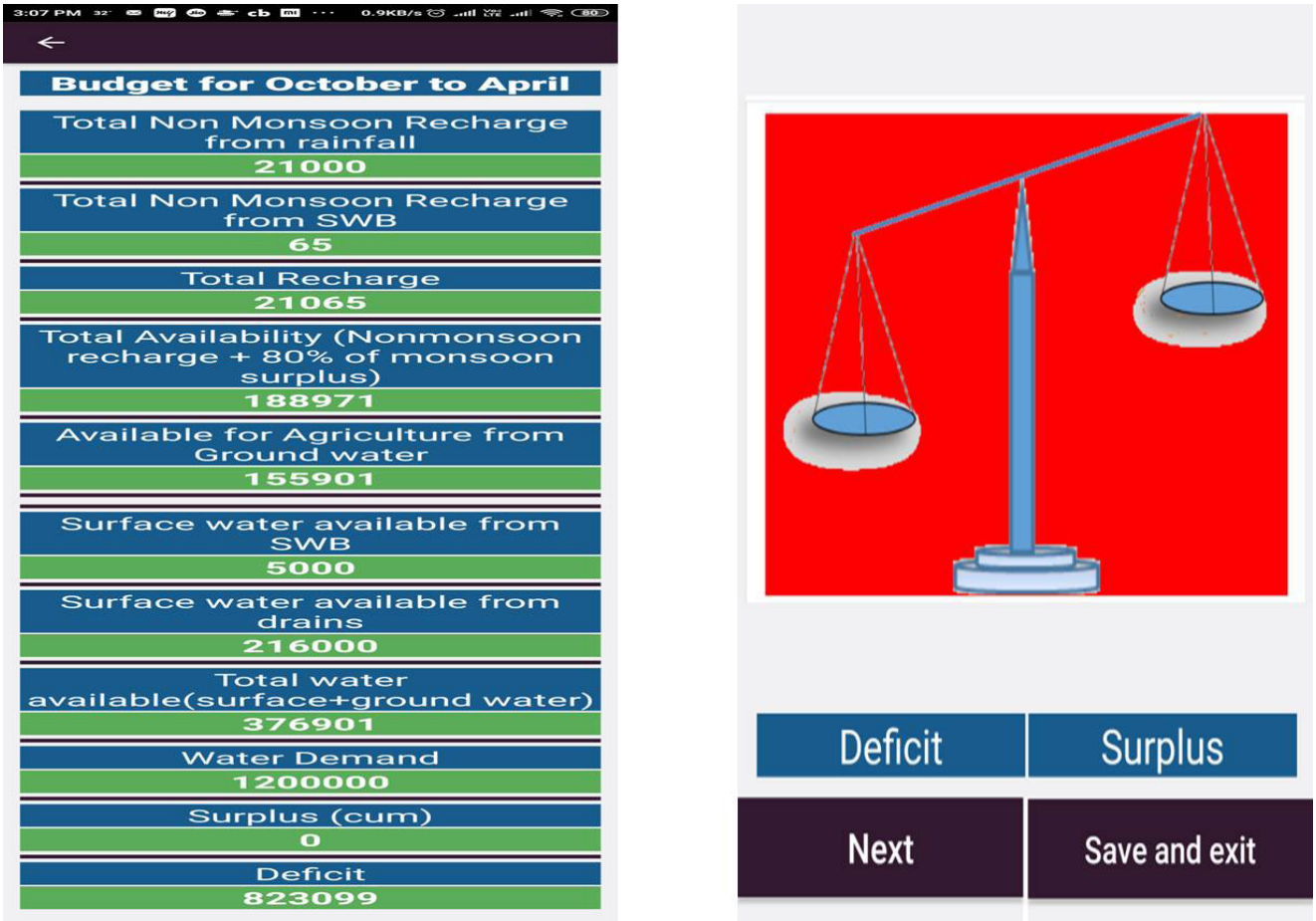
- In the game, in both rainfall situations (high or low), there could be enough water for all seven players to irrigate seven fields of water-efficient crop. But there are only three and five fields of irrigation available for water-intensive crop in case of low and high rainfall situation respectively.
- During the communication rounds, if the group agrees, then we reveal the player's decision with the help of record posters, and we allow participants to discuss among them.

The facilitator takes notes of the participants' discussions.

3.8 Crop Water Budgeting (CWB)

Why: Cropping choices and water use is mostly based on individual decisions of farmers and most often than not, is exercised to maximize each one's gain by extracting as much as is the capacity of each individual. However, the resource in question which is finite, in many situations, is being accessed from a common source (tanks, aquifers) which means that an individual decision/ behaviour affects others' access to the resource and the resource itself.

What: The CWB tool has been designed to ensure that informed, collective decisions about water usage are made based on water availability so that common interests of the community (habitation, village, panchayat, tank command area farmers, aquifer etc.) are protected. It assists in the proper management of water resources. It is a community-centric tool that assists in creating the support system needed for village communities to balance demand with supplies (by quantifying these), so that the collective water consumption by individual



Images from Crop Water Budgeting Dashboard

farmers does not exceed the limits of recharge through rainfall, stream flows and surface water storage, thus creating a situation of scarcity.

When: The CWB tool can be used especially during the time of crop planning, before the start of the cropping seasons.

With whom: The CWB tool is mostly used with farmers in a village or a defined area to take an account of their crop water requirements as opposed to the water availability (through recharge and surface storage) in the same defined area.

How:*

- Through various discussions, information about the different water harvesting structures, storage structures along with rainfall data, soil type and recharge potential data of the area is collected.
- Information on the likely crops that they would be cultivating and the crop water requirements is also collected and compared against each other to understand the water availability versus the demand.
- This calculation is then presented back to the community. Discussions are carried on to revise crop plans based on the water budgeting analysis so that demand is well within the available quantity.
- Evaluation at the end of the season as to what extent the plans have been executed
- Dashboard is prepared at the community level for ready reference of the community

*a detailed crop water budgeting manual can be downloaded here.

Outcomes:

- Improved understanding of water balance.
- Individual to collective decision making with respect to crop choices.
- Rules and regulation related to water usage.
- Adoption of water saving practices (irrigation scheduling) and technologies (drips, sprinklers).

Successful demand-side management by steering discussions on which is the best suited crop, given the situation of water availability, ultimately translating to better suited crop choices (for example, highly water intensive to low water intensive crops or crop varieties in water scarce regions).

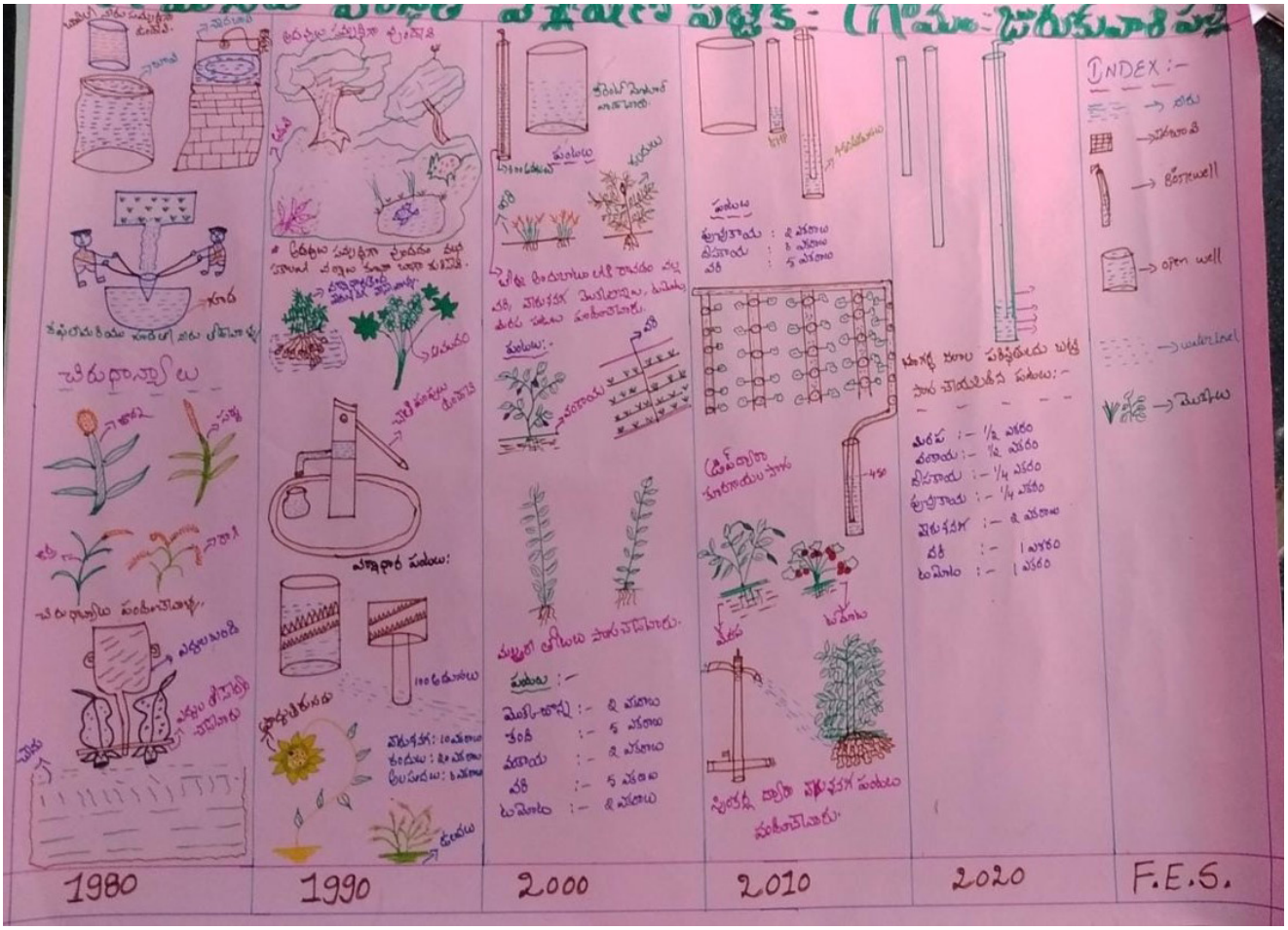


Chart used in Trend Line exercise

1. In Luniyara in Udaipur district, irrigation from the tank is scheduled every 22 days after the completion of a round of irrigation to all fields in the command area.
2. In a village in Andhra Pradesh, 1 portion of the land is dedicated to the cultivation of millets.
3. In a village in Nimmanpalle area, Andhra Pradesh, farmers went on a crop holiday due to scarce water availability.
4. In Devrajpalli in Karnataka, all farmers with borewells decided to adopt drip and sprinkler irrigation methods after understanding water usage through the CWB tool.

3.9 Trend Line

What: Before exploring the water situation and possible management strategies, it is important to understand how the community views water and how this has changed over time. The trend line is a tool that allows us to pictorially/ graphically represent these changes in a particular resource condition. It provides an opportunity to discuss the ways in which water and its usage has changed within the context of the community over a period of time. It also allows us to have discussion around changing crop practices and the reasons for the same.

Why: The trend line exercise is a start point to discussions on varying water situations and usage patterns over time. The exercise helps in getting an understanding of traditional water management systems (if any). It also becomes important for the community to understand their aquifers to make decisions with respect to water management.

When: The trendline exercise is done in the first or second meeting with the community.

With whom: This exercise is preferably done with the whole community, involving different sections like women, farmers, landless, village leaders etc.

How:

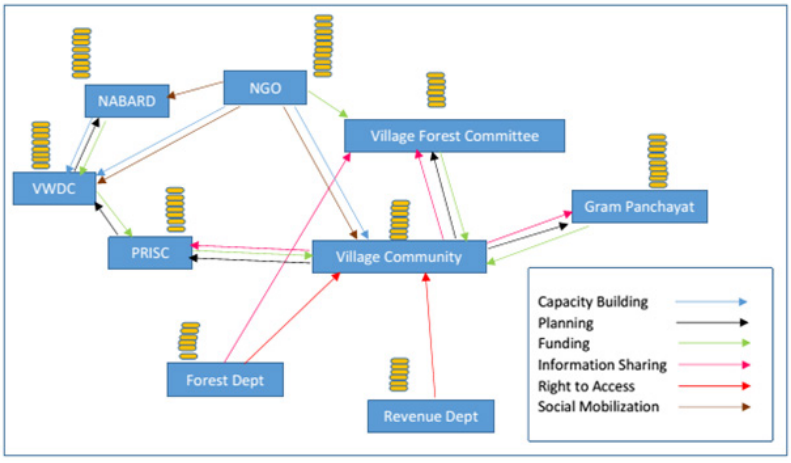
- The resource map is already completed and the main sources of water for the village are identified.
- A timeline is drawn with the community by asking them to recall significant events over the past 20 years at approximately the same intervals.
- A discussion is started about the important water resources and whether and how this has changed over the years.
- The community is then asked to represent their perception of the resource condition through the decades, by asking them to recall the same with each of the significant events identified by them as their reference points.
- The discussions need to also be carefully noted. A dedicated note keeper could be given this responsibility. This is to ensure that key points of the discussion (the story) that the trend line may not be able to capture are not missed.
- Once the trend line for the main water sources is drawn, the same can be done for related aspects like crop patterns, types of crops and livestock populations.
- The meeting can be concluded by retelling the story that has been narrated by the community and validating if it has been understood correctly and to check if there are any missing links.

Outcomes:

- An understanding of the water situation over the past 20 years and its effect on related activities like farming and livestock rearing.
- An infographic to represent this story which can be part of the village dashboard for the reference of the community.

3.10 Net Actor Mapping

What: As has been mentioned throughout the sourcebook, water as a resource is part of a larger socio-ecological system and its management thus involves various stakeholders, right from the communities that directly depend on it to local and national government agencies. The net actor mapping tool helps in identifying/ diagnosing a problem, mapping out all the various stakeholders (actors) who are associated with the problem, the



type of influence (positive/ negative) and the level of influence these actors have in a given situation and facilitate Multi Actor Platforms (MAPs) to strengthen collective management of water resources.

Why: The net actor mapping tool is important in listing out actors and understanding the potential role they will play in management of a resource. It aids in understanding the role that multiple actors can play towards collaborative action for tackling socio-ecological issues and strengthening shared management of the water resource.

When: The net actor mapping exercise is done when the different stakeholders need to be mobilized to take action on identified issues with respect to shared water management.

With whom: The exercise is done with communities that are directly dependent on water and with other actors involved (as listed by the community).

How:

- List down multiple actors/ stakeholders who maybe associated with the issue under consideration and discuss the influence that these actors will have on addressing the issue.
- Segregate the actors into different categories (government, NGOs etc.) and identify their roles (and potential contributions) towards solving the issue at hand.
- Map connections between the various actors to understand influences they have on one another and the nature and level of this influence.
- Identify the goals of different actors and how they may be aligned with the shared goal.
- Allow participants to make changes so that any mistakes that have been overlooked can be corrected.

Outcomes:

Formation of a multi actor platform for strengthening collective action towards governance of water resources.

3.11 Snakes and Ladders Game

What: Remember the snakes and ladders game we played as children (or even as adults)?! This game is exactly that with elements of water management attached to snakes and ladders. Snakes represent decisions that go away from commoning (like digging of new borewells, growing water intensive crops etc.) while ladders represent decisions that strengthen commoning (restrictions on borewell drilling, growing less water intensive crops etc.). The snakes (threats) take the community down while the ladders (opportunities) take the community further in their efforts to conserve and manage water efficiently.

Why: The game is a fun way to involve the community in evolving shared strategies for water management. The game can be played as a preparatory activity to having discussion around water management strategies, collective crop choices and use of water saving irrigation technologies. It also involves the community as active participants in the process.

When: The game can be played in the initial few meetings planned for discussions around evolving water management strategies.

Community members playing snake and ladder game

With whom: The game is facilitated by a trained community resource person (CRP) and played with the community. It is important that all sections of the community participate, including women, landless and the marginalized groups.

How:

- Use a life-size snakes and ladders board (printed on a flex) with threats or decisions that move away from commoning written with the snakes and opportunities or decisions that move towards commoning written with the ladders.
- Explain the game and call up volunteers from the community to be the players (the players can be rotated to involve more people).
- Ask children or other members from the community to roll the dice while players move along the board.
- Have a debrief session at the end of the game where experiences of the players with respect to the game are shared with the larger group and discussions are steered around commoning of water and water management.

Outcomes:

Discussions around evolving shared strategies for water management and strengthening commoning of water.

Given below is a sample of a snakes and ladders board (the opportunities and threats can be developed as per local contexts):

48 Committee will prepare the CWB plans and implement	47 Digging new bore wells	46	45 Using the water saving techniques – drip, Sprinkle	44 GW sharing among farmers and providing the critical irrigation	43
37	38 Growing water intensive crops	39 Observing there is a increase in GW level	40	41 Farmers Losing the interest in the process	42 Irregular digging of the bore wells in the village
36 Irrigating more number of Acres (area) and getting maximum yields	35	34	33	32 Change in crop and area	31 Sharing the data analysis of groundwater trend and rainfall situation with farmers in grama sabha
25 Taking up GW improvement works	26 Cap on new bore wells digging	27	28 Irregular in data collection & mismatch in data	29 Taking the bore well depths regularly by farmers	30
24	23 Growing irrigated dry crops	22 Violating agreed norms/ rules	21	20	19 Collective decision making in bore well digging, crops to grow
13	14	15	16	17	18
12 Evolving norms/rules in water usage and securing resources	11 Crop water budget preparation	10 Analysis of collected data	9 Monitoring of data collection	8 Bringing awareness among farmers on Crop and water budgeting	7 Taking Groundwater levels regularly
1. Awareness building	2	3 Groundwater monitoring/ restoration committee formation	4 procuring the GW monitoring tools/materials	5 Volunteers selection and training	6

3.12 Composite Landscape Assessment and Restoration Tool (CLART)

What: Supply side management of water is an important part of water conservation and management. These include interventions to ensure that maximum water is harvested and conserved so that there is water availability for longer duration, even during dry spells. CLART is a GIS based mobile application developed to plan soil and water conservation activities based on the topography of the area under consideration based on soil type, rock type, recharge potential, surface and sub-surface flows etc. It also gives the most optimum intervention plan and estimated budgets for the work that is to be undertaken.

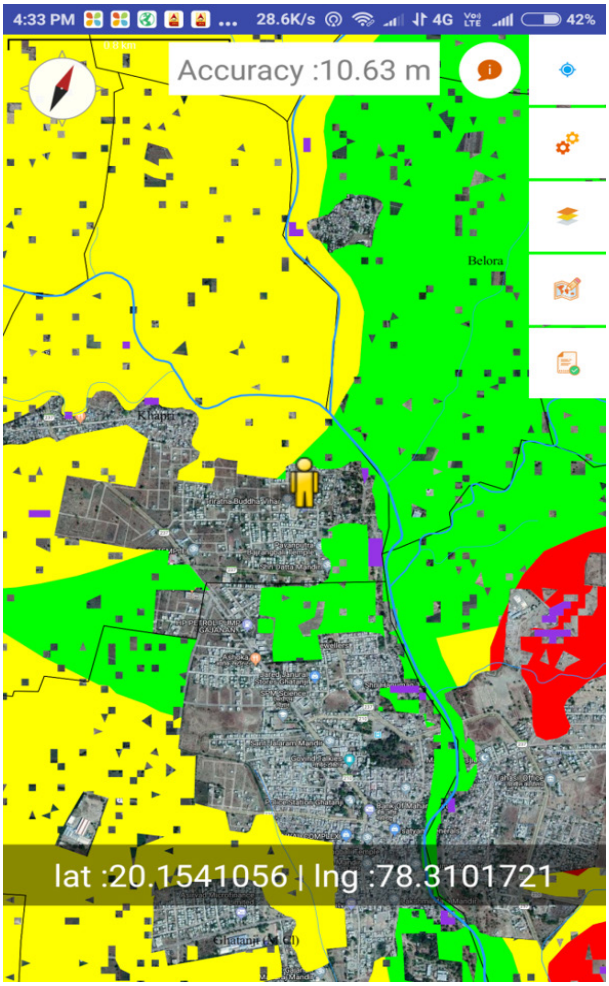


Image of CLART application in use

Why: While planning most physical interventions for water harvesting and conservation, important parameters such as soil type, recharge potential and sub-surface flows are not studied systematically, if at all taken into consideration. This leads to construction of recharge structures like check-dams and ponds in places where the potential for water harvesting may not be optimum. Thus, it is important to have a good idea of the landscape and the geography of the region before planning physical interventions aimed at improving water availability. Since a majority of the community may not be best equipped to undertake this analysis, CLART provides a simple and accessible way of planning interventions that are best suited to the local conditions of the place under consideration.

When: The CLART can be used on any android phone on-site where soil and water conservation activities are being planned.

With whom: CLART can be used by any trained CRP (Community Resource Persons) or community member who has access to an android device (tabs, phones) or MGNREGA mates, along with members of the community and people who will be part of the physical works that are to be undertaken.

How:*

- Download the CLART app on an android device here.
- Take the device to the exact location where the soil-water conservation structure is to be built.
- Allow the app to access the location of the device (location should be enabled on the device) and take the coordinates of the site where the intervention is being planned.
- Allow the app sometime to run the diagnosis of the region.
- Based on the different colour codes assigned to the type of area (recharge zone, discharge zone),

the app will make an assessment of the suitability of the area and generate a report that can be downloaded.

- The proposed plan for the activity, along with the estimated budget can then be downloaded and submitted to the concerned authorities for further action.

*a detailed manual to use the CLART can be downloaded here.

Outcomes:

A proposed plan for undertaking soil and water conservation activities based on diagnosis of the area for assessing its suitability, along with estimated budgets which can then be used for planning and undertaking the proposed intervention.

3.13 Mind Map

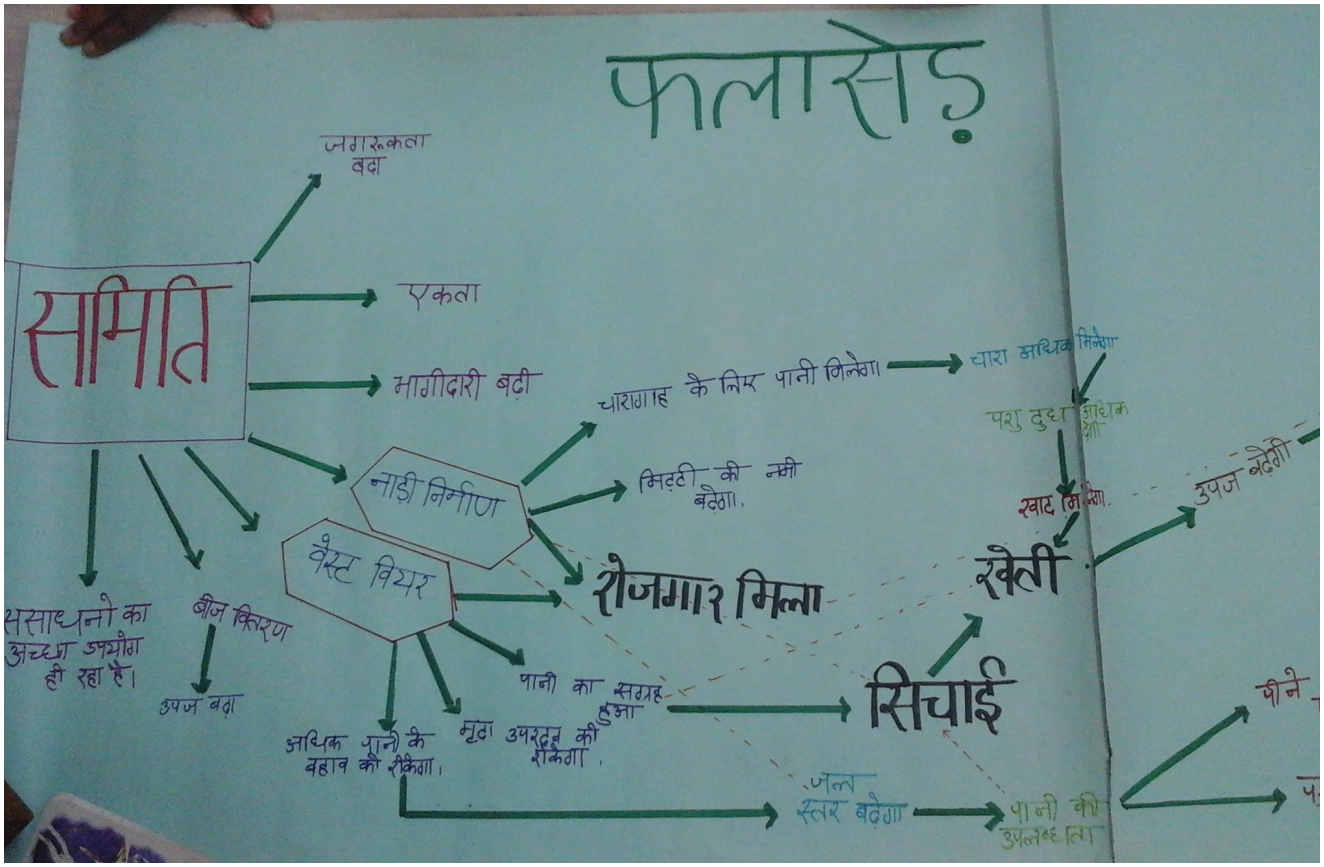


Chart used in Mind Mapping Exercise

What: Mind map is a tool that helps the community and the facilitators working with the community to get a deeper understanding of the community's perceptions on resource systems. In the process, one gets a clearer picture of the interconnections between resource systems (such as forests and water bodies), people and livelihoods. It helps in defining these linkages, think through immediate and long-term impacts and take informed decisions around water management.

Why: The landscape within which issues of water management is discussed involves various biophysical and social elements which influence each other. These influences and interconnections define outcomes for

resource systems, people and their livelihoods that are dependent on these systems. Thus, understanding these causal relationships is crucial to make informed decisions for collective water management that is efficient and beneficial to the community and the sustainability of the resource.

When: The mind map tool can be used in different meetings with the community, especially in the initial stages of interactions with them.

With whom: The exercise is facilitated by a trained community resource person (CRP) and undertaken with the community. It is important that all sections of the community participate, including women, landless and the marginalized groups.

How:

- A meeting is called with the community members for discussions around water resource management.
- The community is asked to list out all the resources that are part of their everyday lives.
- The participants in the meeting are then asked to list out all the factors that influence or are influenced by these resource systems.
- The nature of influence (+ve or -ve) and the extent of influence is also discussed and a map is created showing these various relationships.
- Discussions that follow can be based on the mind map.

Outcomes:

- Better understanding of the community's mental models.
- Clear picture of the relationships and interconnectedness between resource systems and social systems as perceived by the community themselves.

4. Maps, data and infographics

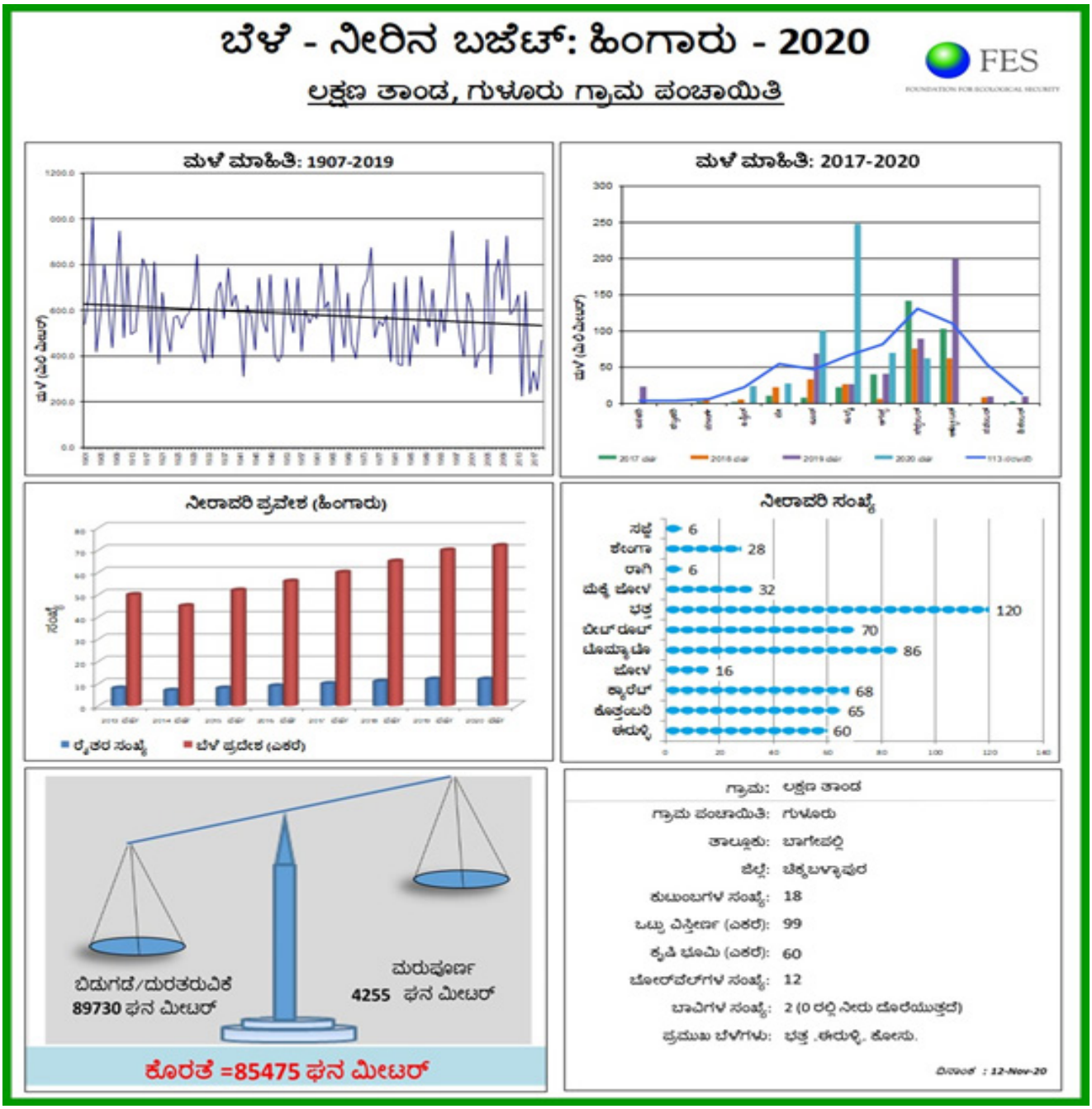
While talking about a landscape of biophysical and social resources, it becomes important to have a good understanding of the ecosystem before planning and designing interventions aimed at promoting shared management of water. Maps and infographics play an important role in translating these landscapes into visual representations. Maps of the landscape along with the catchment areas, command areas, ridges and valleys, water resources (streams, tanks, ponds etc.), recharge and discharge areas allow people to visualize a large landscape and the interconnectedness of these different resource systems. Representing communities and settlements that are dependent on these resources through maps is also an effective way of aiding the discussions around upstream and downstream management, federating smaller institutions and creating multi-actor platforms for water management.

As water management involves multiple stakeholders, bringing them on a common platform and identifying shared goals is a challenging process. Data and infographics play a crucial role in making people aware of prevailing situations and identifying common problems to be addressed collectively. Data on various indicators like rainfall, water availability, functional water harvesting structures, water demand, area of the catchment, status of groundwater, population demographics, economic status, resource dependence, crop profile etc. can be used and presented to the stakeholders to find a common start point to discussions around

the need for collective water management. Data on these various indicators is available on Government sites (like census, agriculture dept., minor irrigation dept., national water mission, central water commission etc.). Much of this data is also available on the India Observatory website, a data platform that brings together data and tools to aid in strengthening conservation and collective action. Alternatively, specific data that is not available through secondary sources may also be collected and analysed.

While dealing with multiple stakeholders, presenting data sets can be a challenge. Infographics is an effective way of presenting analysed data to large and diverse audiences. Dashboards can be created to present data in a simple and accessible manner. Thus, use of maps, data and infographics is extremely important to bring in a certain rigour to the process of strengthening collective management of water.

Example of a dashboard presenting data on rainfall, water demand and water availability in a village in Karnataka.



Infographics from various dashboards

For any queries, kindly contact

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