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Measuring Equitable and Inclusive Water Governance: A Net Actor Mapping Assessment of Institutional Stakeholders in Rural Rajasthan

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ABSTRACT

Water and natural resource governance in rural Rajasthan has been shaped through the interactions among social hierarchies, gender norms, and institutional arrangements that have a considerable influence on the access, control and allocation of water resources. Stakeholder networks, ranging from formal institutions to informal leaders and marginalised groups, demonstrate persistent inequities despite efforts toward decentralisation and participatory governance. Polycentric governance structures provide opportunities for participation but often maintain exclusion due to entrenched power dynamics. Procedural, distributive, and recognition equity perspectives highlight the contrast between institutional water policies and grassroots realities. Context-specific reforms that are adaptive and inclusive in framework and conduct are necessary to strengthen equity, empower marginalised groups, and ensure fair, equitable, and sustainable water access across all social groups and communities.

Keywords: Water Governance, Equity, Inclusivity, Actor Mapping, Participation, Social Networks.

Introduction

Water, along with being a scarce resource, is a symbol of social power, political contestation, and environmental vulnerability. Persistent inequalities and entrenched power structures continue to influence the access to water even after decades of policy reforms which have advocated for decentralised and participatory water governance. Institutional authorities, caste hierarchies, and gender norms determine who gets access to water for domestic and irrigation purposes and who remains excluded.

The observations are based on a study conducted by the Foundation for Ecological Security using net actor mapping method, to find out the complicated web of stakeholders involved in local water governance ranging from government and formal institutions to informal village and grassroots leaders and marginalised groups, to determine not only the visible actors but also the hidden networks and influencers that often dictate water access. Conventional frameworks often overlook these “hydrosocial” relationships highlighting how informal domains of power override formal participatory structures.

Polycentric governance, which is characterised by multiple overlapping decision-making centres, has the potential to adopt more responsive and locally adapted solutions, as well as lead to more exclusion. Marginalised and vulnerable groups, even after being formally included, still face obstacles because of social hierarchies of caste, causing a lack of opportunities for expression within informal structures.

The study attempts to highlight the significance of context-based, equity-focused programmes, policies and many other interventions for ensuring just and sustainable water management and governance in Rajasthan and other susceptible landscapes in India.

Weaving polity, ecology, equity and governance together

Political ecology challenges the viewpoint that environmental problems are completely technical or ecological in character, rather than examining the interlinkages within the historical patterns of inequality, institutional arrangements, and the exercise of power. According to this perspective, results of governance are as much about who has authority and whose concerns are recognised as they are about hydrological and hydrosocial availability or engineering interventions.

Blaikie (1985) offers the initial argument in his seminal “chain of explanation” by linking local-level ecological outcomes to wider structures of political economy and traditional inequality. Water scarcity in areas like Rajasthan, for instance, cannot be comprehended alone in terms of low rainfall or depletion of aquifers. Caste-based land ownership patterns, gendered labour divisions, and state-led development policies are also inherent, which favour dominant groups systematically. Tracking the chain from household to formal institutions makes it possible to identify how structural inequalities are rooted in the governance of water resources.

Democratic decentralisation reforms by Ribot (2004) argue that while the devolution of responsibilities can, on paper, enhance participation and accountability, it fails to transfer real discretionary powers [1]. Thus, decision-making stays with the state agencies or local elites, rendering the participation largely symbolic. It resonates with the functioning of water user associations and village water and sanitation committees in Rajasthan, where formal representation of marginalised groups often guards their limited influence over resource allocation.

The drawbacks of formal inclusion are further highlighted by Agarwal (2001) through his concept of 'participatory exclusion', which demonstrates how vulnerable and marginalised groups, especially women and lower castes, can be present in governance spaces but can be excluded from important decision-making and incentive sharing. Such exclusions arise from institutional norms, participation structures, and social hierarchies that favour dominant voices. Andrea Nightingale (2011) deepens this view by showing that governance outcomes are shaped by institutional access as well as individuals' perception and enactment of their agency within those spaces. In patriarchal and caste-based contexts, even when women and marginalised groups are present in decision-making authorities, cultural norms about expertise and authority might hinder their ability to participate actively.

Power over access to water in Rajasthan also reflects the dynamics given by Peluso and Watts (2001) in their political ecology of access and control. They argue that resource control is determined by legal rights, social relations, political authority, and economic leverage. In rural Rajasthan, dominant caste households often take over borewell ownership, irrigation channels, and linkages to state programs, enabling them to secure greater water access than those with formal but unenforceable entitlements.

Leach, Mearns, and Scoones (1999) highlight the role of governance systems that shape both the distribution of resources and the recognition of legitimate users. In the water governance scenario of Rajasthan, legitimacy is often determined in ways that are in line with the dominant socio-political groups, subordinating customary rights and the traditional knowledge systems of marginalised communities. Hence, recognition becomes a crucial component of sustainable governance, ensuring that those who have been excluded historically are acknowledged as deserving and rightful stakeholders.

Conceptualizing Equity in Water Governance

Water governance, according to FAO, is providing an enabling environment where water management actions can take place, encompassing the policies, strategies, finances, plans, and incentive structures that concern or influence water resources along with relevant legal and regulatory frameworks and institutions of planning, decision-making, implementing, and monitoring processes. Effective water governance promotes responsible actions and measures to protect and ensure the sustainability of water resources and to optimize the services and benefits obtained from these resources.

The Asian Development Bank (ADB) defines equity as an abstract concept covering philosophical issues like fairness and social justice, making the definition and measurement complex. Measuring equity of opportunity in society is an essential ingredient in the formulation of policies that promote inclusive growth.

Inclusive stakeholder equity, participation, and engagement form the bedrock of bottom-up formulation and implementation of policies from the grassroots to the apex institutions.

Global Perspectives of Equitable Water Governance

International and global frameworks have increasingly stressed the importance of equitable water governance in terms of access and participation by providing universal models, which are still questionable in their ability to encompass a larger context of water management across the world.

The OECD Water Governance Indicator Framework states 12 principles to promote inclusive and effective governance. The need for non-discriminatory participation, empowerment of local authorities, and active public debate and consultation to ensure fair addressing of the trade-offs across regions and generations has been specifically highlighted in Principle 11.

In the International Water Management Institute, Dhungana (2021) emphasizes participation and accountability as essential indicators, discovering how citizen involvement, discursive powers and the nature of decision-making spaces (invited, claimed or closed) determine the functionality of democratic water governance and equity in the process of making rules.

The Water Auditing and Governance Analysis developed by FAO provides the working guide and practical tools for country-level water governance reforms, focusing on mapping of relevant actors, roles, responsibilities, and the influence, and the political analysis phase observes how power dynamics and political economies shape outcomes, underscoring the centrality of actor-based strategies.

Overview of the National Frameworks for Equity and Participation in Water Governance

The policies, laws, and schemes formulated for water and irrigation management have both implicitly and explicitly stated the equitable and inclusive participation of stakeholders in the institutional governance and decision-making processes.

1. National Water Policy 2012: Adopted by the National Water Resources Council the National Water Policy 2012 aims to provide a framework for the unified management of India's water resources addressing the need for a holistic approach to water planning and management. Section 12 about Institutional Arrangements argues that water resources projects and services should be managed with community participation associating with both state and local institutional apparatus for improved service delivery on a sustainable basis.

2. Command Area Development and Water Management (CADWM) Report: The report titled 'Participatory Irrigation Management in Changing Times—Can one size fit all?', in association with DSC Foundation in 2019, states the involvement of farmers and community groups like the water user associations (WUAs) as the primary stakeholders in the decision-making process. The WUAs must have an inclusive membership structure allowing people from diverse backgrounds to become a part, represent, and address the concerns of their group and community.

Expanding the Lens of Equity to the Grassroots Level

Equity in the context of water governance involves fair resource distribution and highlighting the social, spatial and institutional inequalities that determine access to water. In decentralised systems like Village Water and Sanitation Institutions, it becomes necessary to inculcate equity within institutional structures with due consideration of the implications of gender, caste and participatory observations.

Gender equity remains neglected despite mandates in the policy. The TISS Report (2021) highlights that 43% of the Water User Associations (WUAs) fail to meet the criteria of one-third female representation. Even when women are present, tokenism and the influence of patriarchy prevent actual and effective influence, weakening the efficiency of governance, as women are primary water users.

Marginalised groups, the SCs and STs, for instance, also experience similar exclusion. Dominant groups tend to capture decision-making power, and without the active inclusion of marginalised groups, inequality gets further reinforced in such circumstances.

At the core is the right to water; a lack of the same results in ambiguity in entitlements, leading to resource capture. The Pani Panchayat models in Maharashtra and other Deccan regions, and groundwater budgeting in Andhra Pradesh, provide examples of fair distribution, keeping collective ownership of water and natural resources, individual entitlements and resource sustainability at par with each other.

Decadal Changes in Bhilwara's allocation for resource management

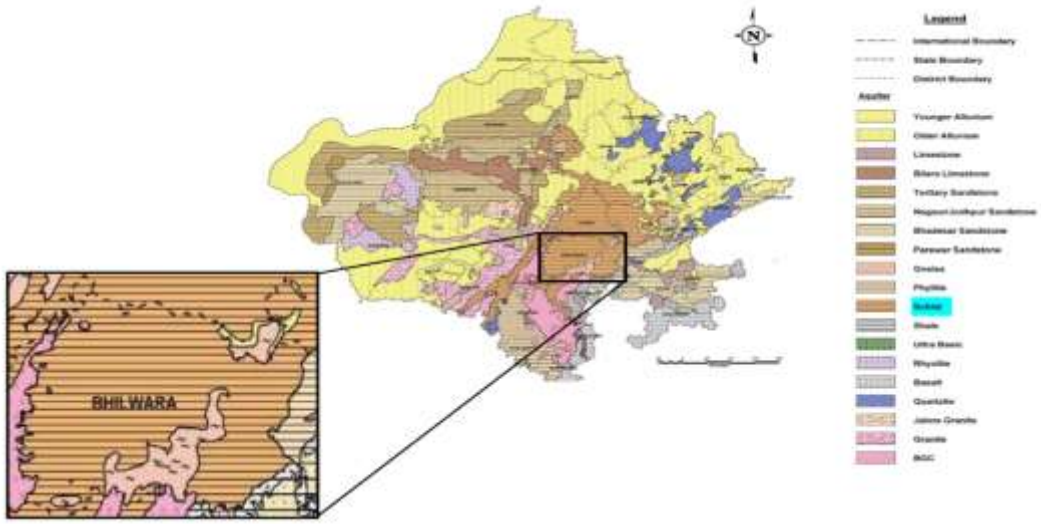
According to the MGNREGA Data of 2013-2024, in Bhilwada, the total number of days allotted for public works of Natural Resources Management in the Category A was 1.4 million days, around forty per cent. The total amount sanctioned for the public works was around 29.3 crores. The total amount of wages paid in the decade also comes to around 29.2 crores. Much focus has shifted towards Category D—Rural Infrastructure, which includes the construction of roads to increase rural connectivity.

Allocation and distribution of total man days, sanctioned amount and total paid wages for Natural Resources Management in MGNREGA

Bhilwara, Rajasthan: Aquifer Hydrogeology and Community Water Use Patterns

Bhilwara is a district located in the southeast of Rajasthan state, within the Aravalli hill region characterised by undulating terrain and hard rock geology, at 24 ° N and 75 °30' E. The surface water and the groundwater in this springshed move in opposite directions to each other, thus having a distinct behavior from the other hydrogeologic regions.

According to the 2012 Central Groundwater Board Report titled 'Aquifer Systems in India,' unconfined sandy alluvial aquifers are the most prevalent aquifer in the state, but the Bhilwada region has been characterised as having schist and gneiss rock structures underneath the surface, which is a hard rock aquifer.



Rajasthan Aquifer Map

Source: Aquifer Mapping and Village Level Ground Water Resource Information System for Rajasthan State, Ground Water Department, Rajasthan and European Union State Partnership Programme

As aquifers act as reservoirs for storage and transmission of water, the availability of water and the response of the people living in the region are directly proportional to each other.

Findings from the interviews and group discussions have revealed that potable water is available at a depth of 100 feet, which is similar to the geological characteristic of a hard rock aquifer as stated by Nynde (2016).

Shah (2009) distinguishes the behavior of institutions and groundwater users based on the type of aquifer present in that region in 3 different situations.

1. Alluvial Aquifer—Atomistic Individualism: In the Indo-Gangetic plains, for instance, the parts of Meghna-Brahmaputra Basin, Central Gujarat, which are characterised by the presence of a deep alluvial aquifer with a shallow water table, high water storage, recharge and infiltration rates, reduce the cost to extract groundwater. As a result, the situation of 'atomistic individualism' is present, where every water user operates independently of each other, with a lack of cooperation since there is very little incentive. Community mobilization also becomes difficult; therefore, the chances of collective action are low.

2. Sandy Aquifer—Collusive Opportunism: In Northern Gujarat, Kutch, and Western Rajasthan, the groundwater system is defined by an arid sandy alluvial aquifer with good storage capacity but limited recharge availability due to low rainfall. People expect to chase the water table to avoid the situation of resource scarcity, but over time, economic scarcity emerges due to rising pump costs and a decline in water quality. In these areas, 'collusive opportunism' takes place where small landholding farmers come together for opportunistic cooperation to enable the continued extraction of groundwater that reduces conflicts and competition and creates low interdependence among users.

3. Hard Rock Aquifer—Rivalrous Gaming: In the hard rock aquifer regions, especially the Deccan plateau area, groundwater availability is restricted by poor storage capacity and low infiltration rates. India is perhaps a unique case where such intensive groundwater dependence has emerged over hard rock formations. Identifying a water-bearing fracture underneath is the core issue here, which leads to the digging of multiple borewells and trying to hit the water, which might lie around a functioning well or existing recharge structure. A situation of 'Rivalrous Gaming' prevails, where users engage in competitive deepening of borewells to extract water, the fastest in the largest quantity, causing the pre-monsoon water table to go down. This results in a behavior mix of fatalism and opportunism—users know the resource is scarce, yet strive to maximize their access. Aware of the interdependence, there exists an aquifer community, but it engages in near near-zero-sum game with intense competition and congestion, making collective regulation extremely challenging.

Based on the description above, it can be inferred that people living in the Bhilwara region would resort to the blind digging of borewells and the construction of pumps to extract groundwater for individual consumption. But the discussion in the villages of Bhilwara provides two different facets to this discussion.

1. Household Consumption—People are allowed to dig borewells in their homes to pump and extract groundwater for their domestic consumption, owing to the understanding that less water is used for domestic purposes.
2. Irrigation—A mutual unwritten agreement has been decided upon not to dig borewells in the farmlands for the purpose of irrigation, as irrigation requires more water and will eventually lead to a decline of the overall groundwater table, therefore reducing the availability for all.

The observations indicate that the nature of groundwater changes depending on its use. It is treated as a part of property when it comes to domestic consumption, but it becomes a common pool resource in the context of irrigation, and both are conflicting views in nature.

Community Governance of Water Resources in Rajasthan

VILLAGE	NET SOWN AREA				UNIRRIGATED AREA				IRRIGATED AREA				CANAL AREA				WELL & TUBEWELL AREA			
	2001	2011	% Change	Result	2001	2011	% Change	Result	2001	2011	% Change	Result	2001	2011	% Change	Result	2001	2011	% Change	Result
Amli	263	355	34.98	Positive	105	142	35.24	Positive	158	213	34.81	Positive	81	109	34.57	Positive	77	104	35.06	Positive
Jhanjhola	103	142	37.86	Positive	28	39	39.29	Positive	75	103	37.33	Positive	0	0	0.00	Neutral	14	109	635.71	Positive
Nathji Ka Khera	43	84	95.35	Positive	18	35	94.44	Positive	25	49	96.00	Positive	0	0	0.00	Neutral	25	49	96.00	Positive
Bakhatpura	68	68	0.00	Neutral	8	8	0.00	Neutral	60	60	0.00	Neutral	46	0	-100.00	Negative	14	60	328.57	Positive
Achala Ji Ka Khera	70	73	4.29	Positive	26	27	3.85	Positive	44	46	4.55	Positive	0	0	0.00	Neutral	44	0	-100.00	Negative
Madhu Puriya	58	61	5.17	Positive	40	42	5.00	Positive	18	19	5.56	Positive	0	0	0.00	Neutral	18	19	5.56	Positive
Deogarh	14	23	64.29	Positive	0	0	0.00	Neutral	14	23	64.29	Positive	0	23	0.00	Neutral	14	0	-100.00	Negative

Census Data Comparison of rate of change in water availability for irrigation

Source: Census of India 2001; Census of India 2011

The villages of the Kalyanpura watershed in Bhilwada have experienced significant changes due to several interventions in watershed development activities and community mobilization programs in the last two decades [2]. The above table from the Census Data of 2001 and 2011 shows the rate of change in irrigation and water resources of six villages in Bhilwara. The watershed activities carried out by the Gram Panchayat in convergence with the MGNREGA have increased the overall level of the water table in these regions. As a result, there is a considerable increase in the Net Sown Area and Irrigated Area. The watershed development has also led to the overall socio-economic development of the villagers, who have tried to increase their property and resource ownership. But the water availability is yet to reach the increased land, therefore Unirrigated Area has also risen considerably. Despite hard rock conditions, the groundwater extraction through borewell digging has increased and there has been a trend of growing water-intensive crops like paddy, due to the ability of the crops to generate high income, in these regions which has led to increased extraction, but some regions like Achala Ji ka Kheda are also practicing community ban on borewell digging to prevent water levels from going down.

Research Questions

By critically engaging with these findings, this paper seeks to answer:

1. How do the intersecting social and institutional actors shape water governance outcomes in Kalyanpura?

2. How do the interactions among various actors reinforce or challenge existing hierarchies?

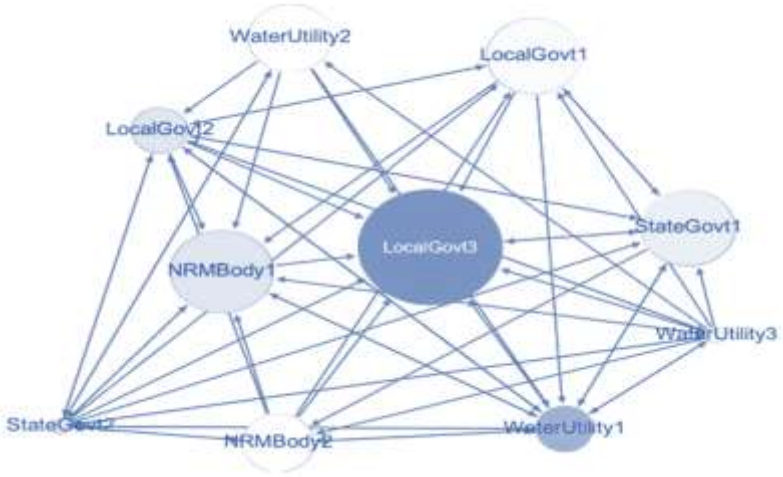
3. How can future governance reforms better integrate equity to ensure just and sustainable water access for all?

Methods

This qualitative research employed an interpretative approach to explore the experiences and perspectives of the individuals directly involved in water resources management and governance. The study aimed to delve into the nuanced perceptions and political and social dynamics of equity in access and distribution of water resources, participation in local-level institutions, and recognition of the individuals in the institutional decision-making in the villages of the Kalyanpura Watershed region in Mandalgarh, Rajasthan.

The main objectives of the study were to examine equity in irrigation by using the net-mapping tool to identify key actors involved in water access, distribution, and governance in the village; to map the linkages and relationships between these actors; to assess their level of influence; and to analyze how these dynamics shape different patterns and affect stakeholders and equity perspectives.

This study employs a polycentric governance framework as illustrated in the figure below, informed by Deora (2021) and McLwain (2023), stressing both the scalar dynamics and deeply embedded power and political dimensions of commons governance, highlighting how watershed governance functions across nested levels—from community groups to state agencies—and how these scales interact, negotiate authority, and produce resource outcomes. Deora critiques mainstream institutional analysis for neglecting power asymmetries and instead advocates a social constructionist approach that uncovers the role of discursive practices, actor subjectivities, and historical narratives in shaping who gains and loses in governance arrangements.



Polycentric Governance Network Diagram

Source - McLwain L. (2023). Structural Power Dynamics in Polycentric Water Governance Networks, Society and Natural Resources Volume 37. Taylor and Francis

Participants

A diverse group of individuals, both men and women, who are involved and experience benefits, as well as issues, in using the available water resources of a village, was gathered for interviews and group discussions. An individual who was working or had worked in the past in the local institution and has knowledge of the village, its history, and the available resources was preferred to provide the details about the village. The individuals' ages ranged from 22 to 70 years old; they are regular users of water resources who are capable of providing rich narratives regarding their experiences and perceptions of water resources governance and decision-making in their respective villages. The participants belonged to different classes and communities to provide a holistic view. The number of participants varied from 5 to 12 in different activities and methods.

Data Collection

Semi-structured interviews, focus group discussions, visual aids, participatory ladders, resource mapping, and net actor mapping served as the primary methods of data collection, allowing participants to articulate their experiences, perspectives, and emotions related to water resource governance and institutions.

Semi-structured interviews and discussions had open-ended questions and discussions with the informants, allowing flexibility to reframe the structure to find out information. Visual aids helped the informants observe and verify whether the visual resonates with their lived experiences. The participatory ladder was used to measure the level of participation and influence in decision-making and check the autonomy given to make independent decisions. The resource mapping was done to identify the location of the water resource structures and the direction of flow of water from these.

Net Actor Mapping is a tool that facilitates collaboration, allowing people to see, discuss, and comprehend situations in which a wide range of individuals or groups influence the outcomes (Schiffer and Hauck 2010). It provides a clearer picture than simple Venn diagrams used in short community studies, which only indicate which external groups are involved. It demonstrates the various group types, their connections, and the magnitude of each group's influence. In order to find out how the community views the shared management of resources and how well this tool aids in understanding such shared governance, it was employed in the villages for this study. The net actor mapping was done using chart papers and flashcards with various actors and stakeholders written for the ease of understanding and identification of their roles for the informants. Water was drawn at the middle of the chart, and actors were placed close or far from the water, indicating the level of influence on the water resources. Informants were encouraged to identify and locate the actors themselves based on their observation and experience of all the involved actors, stakeholders and institutions.

The interviews were conducted in public settings, ensuring open and active participation and comfort for the participants. The interviews with women were conducted in a private setting where men or individuals other than the selected informants were not allowed to influence the discussion. Each interview lasted approximately 30 to 70 minutes and was audio-recorded with participants' consent. The interview protocol included open-ended questions designed to elicit detailed narratives about participants' experiences, the impact on various aspects of their lives, coping, and interactions with healthcare providers and social networks.

Data Analysis

The recorded interviews were transcribed verbatim and subjected to thematic analysis following the framework outlined by Julia Bailey (2008), which emphasizes verbatim transcription, careful notation of pauses, overlaps, and nonverbal cues, and iterative reading to identify emerging themes. This approach facilitates an in-depth thematic analysis by preserving the nuanced context of participants' narratives. The analysis process involved multiple iterative stages to identify recurring themes, patterns, and variations in participants' narratives. Initially, two researchers independently familiarized themselves with the data, generating preliminary steps to capture key concepts and ideas. Subsequently, through collaborative discussions, the researchers refined and organized the survey framework into overarching themes that encapsulated participants' experiences with water resources and local-level institutions. Discrepancies in theme identification were resolved through consensus among the research team.

The observations of the Net Actor Mapping were inserted in the Social Network Visualizer (SocNetV) tool to quantify the collected data and visualize the strength and structure of the actor relationships, bringing more clarity in understanding which actors are more crucial, how they group together or form clusters, and how their influence is distributed across the network.

Trustworthiness

To enhance the trustworthiness and rigor of the study findings, several strategies were employed, including prolonged engagement with the data, member checking to validate interpretations with participants, and peer debriefing sessions to solicit feedback from colleagues. Additionally, reflexivity was acknowledged throughout the research process to recognize and mitigate the potential influence of researchers' biases and assumptions on data interpretation.

Ethical Considerations

All participants provided informed consent before participation and recording of the discussion and were assured of confidentiality, anonymity, and the right to withdraw from the study at any stage without repercussions. No names were recorded of the participants to prepare the list of all the informants, to protect their identities.

Results

Association and involvement of actors at multiple levels concerning access to water resources and decision-making on water-related issues were observed in these villages through the Net Actor Mapping method. The actors were studied at a generic level and then at the village-specific level to find the power dynamics among them.

General Perspective: Multi-level Institutions of Commons Governance

From the bottom up, local village-level institutions were formed by the village through self-initiative and support from local NGOs to manage water and other common-pool resources. These institutions were known as Samitis and were named after the use of the common resource. For instance, the committee for the development of the grazing land, i.e. Charagah, was named the Charagah Vikas Samiti. These institutions are named after the local deities in the villages.

Village institutions of the villages on the sides of the rivers Mej and Menali came together to form a federation. They are mostly formed by the communities, Panchayats with assistance from NGOs or government agencies.

Gram Panchayats comprise one or more villages under the Panchayati Raj Institutions (PRI) for a range of self-governance, which consists of management and governance of water resources and formulation of watershed development plans, implementation strategies and repair and maintenance work. Gram Panchayats coordinate and work with existing Samitis and other local-level village institutions and federations, and with central and state-level government authorities, with overlapping membership and leadership.

The Irrigation Department was the major line department, as identified by the informants, playing a key role in the management of commons, by providing subsidies in seeds and equipment. The Irrigation Department had taken back the powers of making the budget, which it had given to the Panchayats earlier. There were revenue wastelands located on the outskirts of most of the villages, which were under the Revenue Department. The Regional Electricity Board provides electricity to pump groundwater and surface water, and provides subsidies on the use of electricity for a certain time limit.

At the central level, 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 the construction of roads and schools, land development activities, and the 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 the commons. 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.

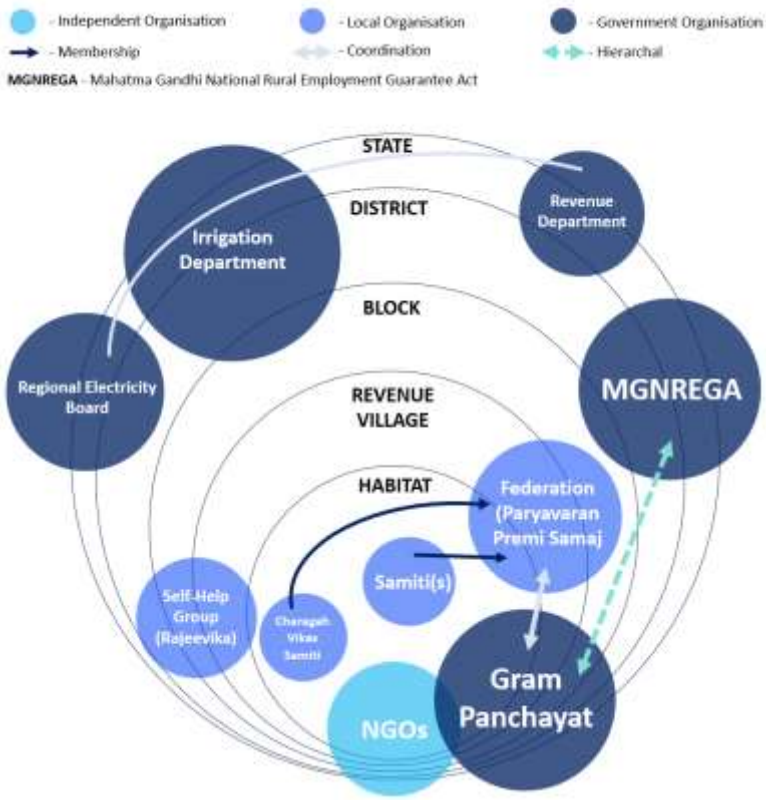
The Gram Panchayat Development Plan is created in convergence with the MGNREGA objectives and thereby sets the priorities for the MGNREGA works, while the line departments and other state agencies advise on the technical aspects of the projects to be carried out with the collaboration and participation of the village community. Water resources activities are a priority under MGNREGA, particularly labor-intensive earthworks that can increase water storage, thereby creating new opportunities for securing and restoring commons.

NGOs play the role of training, capacity building, community mobilization, and meetings to support common resource management and development of inclusive habitation-level organizations that can claim rights to the commons.

Self-Help Groups (SHGs), even though meant for financial matters, served as the platform for discussions related to the problems faced by women with regard to water, both in domestic and in irrigation settings, intended to be put forward in most of the institutional meetings along with their financial considerations.

It is crucial to understand that a number of stakeholders with differing levels of influence and occasionally competing interests affect the character and results of common-pool resource governance, such as forests, grazing areas, and tanks. Each operates at various temporal and spatial scales; some were established as a result of legal or constitutional provisions, while others have developed within communities and serve their interests.

As the decision-making authority is not centralized in a single hierarchy, this institutional organization is clearly polycentric. For instance, Gram Panchayats do not report to line departments, and village federations do not report to Gramme Panchayats. These are cross-sectoral, incorporating social protection, other investment agencies, and departments of natural resources. Village institutions are governance systems with established social links and informal networks, some of which are more recent, while official governance structures are established by legislation.



Polycentric Governance Network of Water Resource Management in India

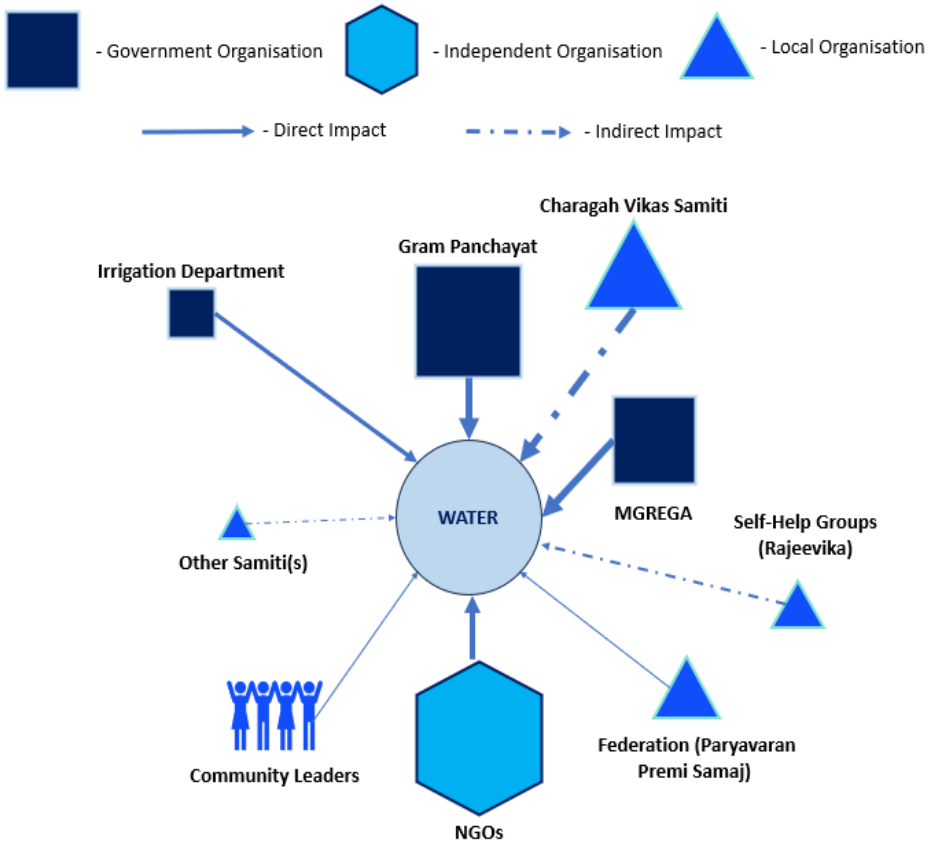
Source - Illustrated by the authors

The figure given above shows the system of polycentric governance managing the village water resources. The concentric rings represent the nested levels of administration from Habitation or Grassroots to the State. Locally organised bodies like the Charagah Vikas Samiti and other Samitis manage commons like grazing lands and water sources, facilitated by the NGOs interacting closely with Gram Panchayats, which coordinate planning, asset creation, and implementation of programs like MGNREGA. SHGs like Rajeevika also serve as forums of discussion on water-related issues, which are sometimes put forward in the Gram Panchayat meetings.

Technical and Administrative assistance is provided by the upper tiers, that is, the State Government bodies like the Irrigation, the Revenue Department and the Regional Electricity Board. Federations like the Paryavaran Premi Samaaj build a consensus of the multiple village-level institutions at the block and district levels. A multi-scalar system with several authorities and organizations exists without a single central authority.

Grassroots Perspective: Community-Driven Power Dynamics of Commons Governance

The villages managed various patches of the commons, with varying degrees of dependence on them for their livelihood over time and varying levels of governance success. The net actor mapping exercise helped identify the intrinsic and extrinsic factors influencing decision-making.



Grassroots-Level Polycentric Water Governance Structure in Kalyanpura, Rajasthan

Source: Illustrated by the authors

The informants primarily identified the institution formed for the development of the grazing land, called the Charagah Vikas Samiti, as the institution that was either working or had worked at the local level. This committee was facilitated in the earlier stages by NGOs to hold regular meetings to discuss and undertake the development and maintenance of the grazing land together. Rules were formulated to sustain the grazing land for generations. However, these committees declined gradually due to several reasons. External factors like conflict with the neighboring villages over the ownership of the grazing land, expansion of boundaries, and other reasons led to the decline of trust and initiative to further take care of the grazing land, and it eventually became an open land used by everyone.

Informants reported that earlier, there was a situation of water scarcity. People used to go to fetch water from faraway sources like open wells. The watershed development activities that ran from 2006 to 2013 witnessed steadfast improvement in the condition and availability of water sources in the villages. For instance, the area under cultivation increased, the amount and variety of crops in a single field rose, there was an increase in the overall water table of the region, and the water in the open wells had risen and remained more stable in the agricultural season. Production of crops increased manifold, and consequently, so did the income of the farmers. There was a rise in education levels and awareness about cultural, spiritual, and moral values.

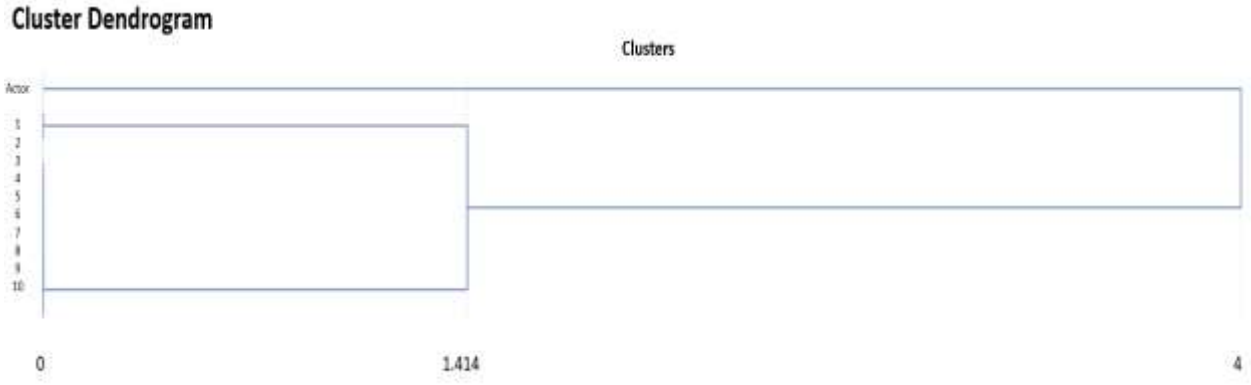
According to the net actor mapping, the Gram Panchayat, in coordination with the MGNREGA, is the primary actor responsible for carrying out all the activities related to watershed development, such as the construction of watershed structures from ridge to valley and the repair, maintenance, and replacement of the watershed structures.

NODE	IDENTITY	CLIQUE COUNT
1	Water	3
2	Gram Panchayat	3
3	MGNREGA	3
4	Irrigation Department	3
5	NGOs	5
6	Community Leaders	3
7	Charagah Vikas Samiti	2
8	Other Samiti	2
9	Self-Help Groups	3
10	Federation	4

SocNetV: Clique Census Report

The actors tend to form a clique, which is a subset of the network showing the extent to which the actors are tied to each other, which has been demonstrated as per the data collected from the Net Actor Mapping.

NGOs play an important role in the facilitation of these activities, acting as a catalyst for the completion of work on time. They also mobilize the villagers to come together, discuss, and realize that the natural resources belong to the community as a whole, and the use, ownership, and responsibility need to be held on a shared basis over individual efforts to own and capture the resource. The line departments, like agriculture and electricity, influence the governance of water by providing farming assistance and equipment and electric connections to run pumps and motors in the farmland.



Note: Actors are same as the Nodes in the table above

The above dendrogram, as given by SocNetV, illustrates the connections and ties formed by all the actors involved in decision-making in the villages regarding water-related concerns. Actors are functionally aligned in distinct domains. According to the informants in the Net Actor Mapping, administrative departments, that is, Nodes 2-4, form a hub of centralized decision-making, while Nodes 5-10 are the grassroots institutions showing patterns of collaboration in governance of the water resources. NGOs emerged as crucial connectors, structurally aligning and clustering with community actors at a distance of 1.414 but serving as intermediaries between the community actors and the formal institutions, as the line blurs between Actors 1 to 5. At distance 4, clusters merge at higher distances with NGOs at the formal institutions in the decision-making, but are less connected due to structural differences.

Informants also mentioned community leaders, both men and women, who showed more awareness and concern about the condition of the water sources and raised the issues first in the meetings. There were also some private distributors who sold seeds and equipment and who gave recommendations on how to use water for sowing a particular crop and which tools and machinery for efficient use of water.

Node	Label	CC	CC'	%CC'
1	Water	0.637813	0.574032	57.403189
2	Gram Panchayat	0.445860	0.401274	40.127389
3	MGNREGA	0.409357	0.368421	36.842105
4	Irrigation Depar	0.315671	0.284104	28.410372
5	NGOs	0.389430	0.350487	35.048679
6	Community Leader	0.236154	0.212539	21.253866
7	Charagah Vikas S	0.389430	0.350487	35.048679
8	Other Samitis	0.368906	0.332016	33.201581
9	Self-Help Group	0.280280	0.252252	25.225225
10	Federation	0.344686	0.310217	31.021748

Closeness Centrality Report: SocNetV

The table shows that water structurally is the core actor, having a symmetry in influence with all the other actors, that is, impacting one another. MGNREGA, NGOs, and Gram Panchayat are the significant intermediaries in the movement of resources and information across the network, as the Net Actor Mapping revealed how these actors are directly involved in the construction and maintenance of structures and institutions. The Charagah Vikas Samiti shows a similar score, as it is the most common committee formed across all the villages and involves all the other stakeholders. The decisions in this samiti are further taken into consideration in the Gram Panchayat meetings and discussed by the NGOs also. Community Leaders, even though they have a low score, are crucial, as they are at the forefront of bringing water-related concerns to the meetings.

Variance is low at 0.0087, implying the actors are not drastically separate from each other. There are moderate levels of centralization in the statutory authorities of decision-making indicated by a mean of 0.343. A sum of 3.817 indicates the aggregate relations among the actors is moderate, where some actors are closely connected to each other, like the Gram Panchayat and MGNREGA working in tandem for the water resources and watershed development, while the Irrigation Department has a distant connection, which is evident in the role it plays only in technical and administrative support. Samitis like the Charagah Vikas Samiti and other Samitis, the Federation and SHGs are the decentralised bodies which are considerably involved in the water-related decision-making process.

Withering Away of Participation: Village Narratives of Commons Disengagement

Even after the watershed restoration and revival of commons gained initial momentum and witnessed visible improvement, the Charagah Vikas Samiti across the Kalyanpura Watershed lost its relevance within a few years after its formation. While there are specific cases of decline of these committees in different villages, almost all of them share the issues of silent withdrawals, contested authority and eroding collective belief. The case narratives from the study of the villages in the watershed depict the unfolding of the institutional disengagement – not as a dramatic event, but a gradual decline due to conflicts, frustration, and a breach of social trust.

Demolition of Barriers through Intrusion and External Conflicts: In the middle-sloping villages of the Kalyanpura watershed, continuous external strife and conflict eroded the restoration and the intent of the community to govern the common grazing lands in these areas. Early efforts to erect barricades, carry out afforestation work and regenerating grass cover through the decisions made in the Charagah Vikas Samiti were short-lived because the villages which were outside the watershed development area started claiming and capturing the common land within the watershed, thereby disobeying the district government demarcation of land when they saw the successful development. The Charagah Vikas Samiti found itself unable to protect its commons from the invasion of the residents of neighboring villages outside of the watershed.

Non-adherence to the demarcation was followed by the undocumented historical claim of usage rights and forcible access to the Charagah land by entering the land to feed the livestock at night as there was no one to see and catch them. The situation worsened when external groups began damaging the infrastructure built around the Charagah Bhoomi and carried it away for their own use. A particular hostile act involved setting the Charagah Bhoomi on fire, as a response to which a case was filed in the police station only to end up nowhere. With lack of institutional response from the administration, and no sanctions imposed on the violators, the community realized their vulnerability and isolation on this matter.

The unity and social organization of the invasive villages made the resistance more difficult as these invaders belonged to a single community, which was dominant in that region. Their numbers and closeness to the Charagah gave them an advantage in rapid mobilization and their access routes to the Charagah was easier than the legal custodians of the same land who came under the watershed. In addition, some member of the caste group external villages lived in the watershed villages themselves which fragmented the committee and the village's internal unity. This insider-outsider dynamic gradually destabilized the committee. Moreover, the Charagah Bhoomi was actually closer to the external villages than the legal owners who were in the

watershed. This made it tiring and frustrating to go and protect the land from invasion and destruction. As a result, people lost interest and the committee meetings served no point anymore, eventually leading to its decline. Individualistic practices increased due to shift of the Charagah land from protected to open land which became a ground for competition for expansion and claiming of the land for personal use.

When the external forces remain unchecked and the state fails to act it causes breakdown of local governance, without legal and administrative backing. The Charagah's boundaries were neither respected nor enforced, and violators operated without any fear. The result was the erosion of committee and belief that commons governance could every time, reflecting a deeper social churn: a moment where collective gave way to the individual and commons' collective responsibility became nobody's responsibility.

Dissolution of Committees due to Absence and Isolation:

In the peripheral villages of the watershed where the population is sparse, perched at higher elevation and disconnected from other villages due to lack of roads and proper infrastructure, the remoteness of the village is also shaped by physical, administrative and political factors. With a small number households scattered across the landscape, there is lack of a meaningful demographic scale which is required for mobilization of the community.

The Charagah Vikas Samiti here organized by the NGOs and conducted periodically by the Adhyaksh, lost its momentum after the death of the Adhyaksh and it came under direct rule of the state. Even prior to the death of the Adhyaksh the meetings had to be facilitated by the NGOs, which signaled that the committee was externally driven instead of organically constituted. Residents attended meetings more out of deference to visiting facilitators than out of belief in the structure itself. Without any immediate successor and state rule, it became a system too distant and overstretched to provide consistent engagement. Without much NGO facilitation, the Charagah Vikas Samiti eventually eroded. The villagers who were already accustomed to managing resources informally, quietly let the committee dissolve.

The Charagah land itself which was fenced and marked initially slowly turned into an open-access land, where livestock roamed freely without any control of the area. Without any leadership or proper institutional setup, the governance framework silently collapsed, leaving the commons unmanaged and unprotected.

In contrast to the villages where committees disbanded due to external conflicts, here the absence of enabling conditions – demographic strength, connectivity, leadership and state presence – prevented long-term institutional building. Even though the Charagah Vikas Samiti was formed with the right intent and policy support, the structural deficiencies of terrain, distance, and depopulation rendered it unsustainable.

Participatory governance often assumes a baseline of community size, access and agency. In remote and ecologically weak areas, these assumptions cannot be made. Without continuous state facilitation and adaptive institutional design, the idea of commons governance remains far from practical, and an acceptance of the issue that some places are simply too far to govern.

Dissolution of Committees due to Absence and Isolation**:** In the lower hilly regions of the Kalyanpura watershed, which are close to the valley, where the terrain gently slopes toward downstream fields and check dams, a systemic neglect was witnessed. The Charagah Vikas Samitis that were setup with the objective of participatory resources management and governance did not succeed to include women and marginalised caste groups, despite a formal representation on paper.

These groups were rarely informed about the committee meetings. NGO workers have to go at the doorsteps to ask for participation. Participation was passive and reduced to silent observation instead of active contribution. Frustration due to negligence of their raised concerns repeatedly was the major reason for the disinterest in the samiti meetings. Dominant members frequently questioned the capacity of these vulnerable groups to understand the 'technical' aspects of the development of the Charagah, which created an informal hierarchy of knowledge, deeming the experiential understanding less valuable which further discouraged meaningful engagement.

Members of Scheduled Caste and Scheduled Tribes communities reported systemic exclusion where they were allowed to participate on paper by the dominant community took majority of the important decisions, which skewed the allocation of access to grazing land. As there was rigidity and friction in the committee participation, the interest of these members declined slowly.

Institutional disagreement is not always loud and visible. The erosion of participation here emerged from a slow accumulation of silence, dismissal and invisibility. The exclusion of women and marginalised caste groups not only weakened the committee's effectiveness but also hollowed out its base claim of being community-led. Governance of commons cannot be inclusive by structure alone and it must be inclusive in voice, trust and recognition.

Mistrust over local governance institutions: At one of the peripheries of the watershed, where the government presence reduces lied some villages where institutions and watershed activities became active in the early phases of watershed development. The Charagah Vikas Samiti which worked well for a few years, started unravelling, not because of any external threats, negligence or shortage of population, but because of something more inward and alarming: a triad of mistrust between the Sarpanch, the Adhyaksh, and the villagers themselves.

The Sarpanch and the Adhyaksh of the village belonged to different caste groups, each traditionally dominant in their own groups but reluctant to share power and authority. Their interaction was very rare in any meaningful capacity. Their public appearances were limited to ceremonies. Both of them suspected each other of political undercutting and personal gain.

This mutual non-cooperation created a void in the administration. The Sarpanch who was expected to support the functioning of the Charagah Vikas Samiti and integrate its priorities in the Gram Panchayat Development Plan, remained non-committal. On the other hand, Adhyaksh struggled to mobilize

villagers without any institutional support. For the villagers it was unclear who to approach, trust and hold accountable. Several residents expressed that they were not aware of what and how much funds are being allocated to the Charagah, nor who was responsible for its maintenance.

This confusion eventually became suspicion. As months passed without visible improvement in the grazing land or follow-up meetings by the committee, villagers began to speculate that the two leaders were colluding to siphon off public funds, due to absence of transparency which allowed distrust to take root and spread. People began to talk quietly at first then opened up saying that the money for the development of the Charagah had been eaten by those at the top. The villages said that nothing has happened much for the development of the Charagah land after a meeting which was held once.

This breakdown of trust happened at three levels: between the Sarpanch and the Adhyaksh, between the leaders and the villager and amongst the villagers spread along the caste and kinship lines in their allegiances. Some believed in the Sarpanch's version of events, others took the side of the Adhyaksh. The Charagah Vikas Samiti meant to be a space for collective decision-making, became a site of blame, silence and avoidance.

Meetings eventually stopped. Those who had been actively participating in the Charagah planning earlier, especially from lower castes, felt increasingly sidelined and disillusioned. Several community members stated that even if the meetings were called, they would not attend because they no longer believed that any further change is possible, and that there was no point because the division and fragmentation had already taken place amongst them and the local governance heads, the Sarpanch and the Adhyaksh don't need them anymore. The physical commons reflected this institutional decay. Fences began to collapse and were left unrepaired. The land which once started regenerating, became overgrazed. A few better-off households began sending their livestock to graze without any coordination, therefore, returning to informal, individualistic practices. The idea of collective control had been replaced by practical disinterest and a sense of protecting the commons was futile of those in power could not be trusted. The separation and suspicion between two leadership positions hollowed out the very possibility of shared governance. The Sarpanch and the Adhyaksh, by refusing to cooperate or even communicate, set the momentum towards a larger breakdown in participatory culture.

The mistrust reflected a deeper social dynamic rooted in caste-based fragmentation where the Sarpanch and the Adhyaksh were not just individuals but social representatives with histories of competition and status anxiety. Their lack of coordination was not merely administrative, it symbolized a divided village, where consensus was elusive and suspicion was common. In such a setting, constructing commons governance becomes twice as difficult. Committees rely not just on structure, but on a culture of collaboration. Eventually the Charagah Vikas Samiti became inactive. Meetings stopped. NGOs evaluation and follow up visits reduced. The Sarpanch focused on other tasks while Adhyaksh remained visible but his relevance drastically declined. For villagers the collapse of the committee became another example of why trusting local leadership is risky, and why individual solutions are often more reliable than collective ones.

Trust is not an input but an outcome. It has to be built, maintained and restored continually through transparency, dialogue and cooperation. Charagah Vikas Samiti cannot survive where mistrust exists and gets deeply rooted into social reality.

The breakdown was not because of ecological stress, but a failure from within, a slow decline of legitimacy that started with silence between leaders and ended with silence in the community. The Charagah is still there but no one claims it with the grass eaten freely and broken fences. The committee still awaits if anyone is willing to close the space between distrust and dialogue and therefore revive the committee and its activities.

Discussion

Sustainable ecological and societal rural development in Rajasthan is implicitly connected with the water or common-pool resources governance. Grassroots institutions such as the *samitis*, panchayats and water user associations have an important role to play in ensuring just and fair access to resources and sustainable management. The Charagah Vikas Samitis have significantly contributed in the improvement of management and governance of grazing lands, leading to a rise in fodder availability, better livestock outcomes and higher household incomes, thus reflecting Ostrom's principles of commons governance, which emphasize collective-choice arrangements, effective monitoring, and locally formulated rules.

However, resource governance in Rajasthan functions within a complex and fragmented institutional scenario. In spite of the central roles played by the Panchayats and MGNREGA in water management, the effectiveness of interventions relies heavily on the inclusivity and engagement level of institutions, which are at the grassroots level. NGOs function as key facilitators, helping in mobilization, capacity building, and institutional coordination.

Expansion of irrigation facilities and tendencies towards water-intensive cropping patterns have led to a rise in demand for water and energy, with implications for groundwater sustainability and ecosystem health. Farmer's costs of production and environmental burdens increase due to dependence on energy required to pump water from the surface and underground. Environmental degradation, including soil quality and loss of wetlands and pasturelands, shows how fragmented sectoral policies might result in trade-offs that under long-term resilience. These areas face pressures from agricultural expansion and overuse. The protection and restoration of these areas is essential for integrated water management in dryland areas.

In terms of programs and policies, Rajasthan and India have begun recognizing the importance of cross-sectoral integration. However, institutional fragmentation still obstructs the effective implementation of the nexus approach. Rural households make daily decisions based on complex trade-offs involving access to resources, social norms, supply of electricity and ecological risks, depicting that real integration happens more through adaptation than policy mandates. Groundwater monitoring must go along with institutional reforms, targeted subsidies, and participatory governance to resolve deeply entrenched inequalities and ensure equity and sustainability.

Effective resource governance in Rajasthan relies on recognizing local institutions, facilitating integrated planning, and developing adaptive capacity among communities. It is essential to utilize the nexus approach grounded in equity and ecological awareness to secure rural livelihoods and resilience.

Procedural Equity: According to Sustainability Directory 2025, procedural equity is about fairness in the processes through which decisions are made, ensuring proper and equitable means, demanding inclusive participation, transparency, accountability, and dismantling power imbalances to provide scope of active participation to the marginalised groups.

In the context of gender, it would mean ensuring women have meaningful, informed and active roles in water-related decision-making processes.

For marginalised sections, procedural equity must involve SC/ST and other excluded groups in governance forums with equal voice and decision-making power.

Procedural equity should also define the water rights in a transparent, inclusive, and accountable manner.

In terms of participation, it should facilitate inclusive, transparent, and democratic participation in all stages of water governance.

Distributive Equity: Sustainability Directory 2025 argues that distributional equity refers to the fairness and just distribution of resources according to the needs and vulnerabilities across a population or community.

It should guarantee that women receive fair access to water, resources, and benefits of irrigation or water supply.

It should allocate to address the historical and structural disadvantages faced by the marginalised groups.

It should allocate water fairly based on the need, vulnerability, and landholding over power over or proximity to the resource.

Participatory processes should be used to guide equitable distribution of water and its benefits.

Recognition Equity: Fraser (2000) mentions that recognition has to be understood as intersubjective, mutual recognition of individuals as bearers of rights, as morally responsible persons, and as contributors to society.

Women's knowledge, experiences, and identity as primary water users should be acknowledged as legitimate and valuable in water governance.

The social identities, worldview, and customary practices of the marginalised groups must be respected and treated as valid within institutional frameworks.

Affirmation should be given to every individual's right to water and they should be recognised as legitimate stakeholder in the use of the resources

In participatory terms, value should be given to everybody's inputs, especially those who have been considered subordinate historically.

Policy/Act Name	Objective	Actors	Decision-making Levels	Influence on water	Equity Focus	Procedural Equity	Distribution Equity	Recognition Equity
Rajasthan River Basin and Water Resources Planning Act, 2015	Integrated Water Resources Management (IWRM), interlinking rivers, optimal utilization of surface & groundwater	State Water Resources Advisory Council, Planning Authority, water-related depts	State-level (Council chaired by CM), line depts, also local implementation. Decisions are made at the state level by a council chaired by the CM. Line departments handle basin planning, while local units implement at the field level. Inter-departmental coordination is essential.	Direct — manages river basins, aquifers, inter-basin transfer. Direct influence through river basin management, aquifer development, and inter-basin water transfer strategies.	Emphasizes inter-basin equity and balanced allocation across regions; integrates drinking, irrigation, and environmental flows; general stakeholder inclusion but lacks deep mention of tribal or gender-specific vulnerabilities.	Moderate – Some procedural equity via multi-stakeholder council, though largely government-driven. Basin-level institutional mechanism ensures stakeholder roles. River basin authorities created with planning roles. Emphasis on	Low — aims optimal use but risks unequal impact on downstream communities. Emphasis on basin-level equity in water sharing. Resource optimization prioritized.	Low – Less explicit on cultural/tribal recognition; mainly technical. Recognizes diverse basin users. Less focused on vulnerable communities. Calls for inclusive basin representation.

						decentralised data.		
Rajasthan Land Revenue (Allotment of Land for Renewable Energy), 2007	Facilitate land allotment for renewable energy plants (wind, solar, biomass)	Developers, RREC, District Collector, State Govt	State (rules), District for land, local verification. Land allotment governed by state rules. District Collectors verify and process land allocations. Local site-level checks are essential for renewable project approvals.	Indirect — changes land use, potentially affects recharge, grazing. Land use changes driven by policies can impact groundwater recharge and restrict traditional water-dependent activities.	Facilitates investment but bypasses community land rights; no frameworks for equitable land distribution or safeguards for vulnerable user groups.	Low – Procedural fairness mainly through application process, not community voice. State-centric land allocation. Minimal procedural checks for local impact.	Low — Energy corporations favored. Risk of marginalization of common land users. Local resource dependency overlooked.	Low – Recognition minimal, largely economic lens. Ignores traditional land-water livelihoods. Does not recognize community rights on common property resources.
Rajasthan State Action Plan on Climate Change & Human Health, 2022-27	Address climate-sensitive diseases, build climate-resilient health infra	Health Dept, NCDC, hospitals, local health facilities	National guidelines, State plan, district hospitals. National guidelines are adapted by the state government. Implementation is done via district hospitals and health departments. Focus is on district-level preparedness and response.	Indirect — addresses water-borne diseases, sanitation. Water-borne disease and sanitation policies influence water quality and availability indirectly.	Focuses on resilient health infrastructure for vulnerable populations (women, urban poor); sanitation links with water-borne disease equity; lacks gender-caste specifics.	Moderate – Some consultative processes for health planning. Multi-departmental planning; some public consultation. Not fully decentralised.	Moderate — Focus on vulnerable groups in heat stress and waterborne diseases. Health equity considered. Community and people centric disaster response measures.	Moderate – Recognizes vulnerable populations, stresses resilience. Acknowledges vulnerable populations and future climate risks. Strong recognition equity in health-water linkages.
Rajasthan Soil and Water Conservation Act, 1964	Soil and water conservation and land productivity	Conservation Board, Committees, Officers	State, District, Block. Responsibility shared by state, district, and block-level officials. Panchayats implement at the village level. Includes landowners in	Direct – Watershed and recharge focus. Focused interventions to conserve watersheds directly impact groundwater recharge and surface water flow.	Prioritizes support for land-owning farmers; limited outreach to tenants or smallholders; no explicit gender or caste targeting.	Moderate – Procedures exist for plan preparation and compensation claims; however, technocratic control limits deeper grassroots inclusion.	Moderate — Efforts directed at degraded lands; benefits may bypass marginal farmers. Efforts directed at degraded lands; benefits may bypass	Low – Recognition exists for beneficiaries, especially khatadar tenants; lacks intersectional lens (e.g., gender, caste). Soil health emphasized; social

			planning and verification.			Department-led planning; village-level coordination possible.	marginal farmers.	differentiation not.
Rajasthan Groundwater Vision 2025	Community-based groundwater management and sustainability	Groundwater Dept., PRIs, Users	Village, District, State. Action at village, district, and state levels. Local user groups and panchayats help implement. Technical and administrative monitoring is state-led.	Direct – Aquifer depletion, quality. Policies regulate groundwater extraction to prevent aquifer depletion and ensure water quality.	Strong community involvement prioritizing critical zones; advocates small/marginal farmer inclusion, but lacks specific caste/gender targeting.	High – Emphasizes village-level water budgeting, user participation, capacity building, and decentralised water governance. Outlines clear planning framework with decentralised data.	Moderate – Focus on critical and overexploited blocks; spatial targeting helps, but no explicit provisions for socially disadvantaged or water-poor households. Promotion of equity; lacking enforcement.	High – Recognizes traditional community water knowledge, groundwater stress zones, user rights, and farmer-led governance roles. Provides strong recognition to aquifer stress and over users.
Rajasthan Irrigation and Drainage Act, 1954	Water regulation for irrigation and flood control	Irrigation Officers, State Govt.	Subdivision to State. Implemented from subdivision to state level. Local engineers manage canal operations. Farmers engage in joint-use committees for fair distribution.	Indirect – Surface flow control. Policies indirectly influence water surface flows via infrastructure or landscape alteration.	Engineer-led irrigation model benefits larger landowners; minimal protections for tail-end or marginalised users; no gender/caste focus.	Low – Top-down bureaucratic model with Irrigation Officers; no formal spaces for community voices or grievance redress. Outdated procedural structure.	Low – Infrastructure development benefits not equitably distributed; rules do not target or account for diverse user needs or vulnerabilities. Distribution via command areas; tail-end users often neglected.	Low – Fails to acknowledge socio-culturally vulnerable users or their knowledge systems; purely technical in its view of drainage and irrigation. Focuses on engineering, not on user diversity.
Mukhyamantri Jal Swavlambhan Abhiyan (MJSA)	Achieve rural water self-sufficiency through decentralised, community-managed conservatio	Gram Sabhas, Panchayats, District Administrations, NGOs, Technical Experts, CSR contributors	Village: Gram Sabhas prepare water budgets; District: Technical approval; State: Fund release, monitoring.	Direct impact—focus on watershed management, water harvesting, aquifer recharge, soil moisture	Village-level equity via Gram Sabhas; strong pro-poor and gender inclusion; targets drought and	High – Very strong procedural equity—Gram Sabha-driven planning, women's participatio	High – Strong distributional equity—village-level prioritization of needs ensures marginalised groups	High – Provided recognition equity—acknowledges ecosystems via conservation but non-human rights not explicitly

	n and watershed activities using a "Four Waters" approach		Village-level Gram Sabhas draft water budgets. Districts approve technically; State monitors and funds. Community ownership is encouraged.	conservation. Targets comprehensive water conservation methods including aquifer recharge and watershed sustainability.	marginalised regions.	n, bottom-up decision-making. Strong advocacy of principles od decentralised governance.	benefit; financial inclusion through local contributions and CSR. Focus on drought-prone, backward regions.	mentioned. Acknowledges community resilience.
Rajasthan State Water Policy, 2010[3]	Ensure sustainable and integrated management of water resources through IWRM, with prioritized allocations and community participation	State Water Dept., State Water Regulatory Authority, Panchayati Raj Institutions, Water User Associations, Farmers, Industries, NGOs	State: Policy formulation, regulatory authority setup; Basin/Sub-basin: Water planning; Local: User groups, Panchayats. Policy framed at the state level with regulatory bodies. Basin/Sub-basin levels do the planning. Local groups like user associations or panchayats are involved.	Direct: Allocates water by priority (drinking, agriculture, environment), regulates groundwater use, promotes conservation. Directly manages how water is prioritized among sectors and promotes sustainable groundwater practices.	Prioritizes drinking water, environment, irrigation; calls for vulnerable-targeted pricing; acknowledges women's roles.	High – Strong procedural equity—mandates participatory processes, decentralised management, stakeholder involvement. Encourages holistic planning encompassing multiple stakeholders.	High—priority given to vulnerable sectors, water pricing sensitive to affordability, and requires monitoring to avoid elite capture and equitable distribution emphasized in principle.	High – Provides recognition equity—acknowledges human and environmental needs, requires direct engagement with non-human actors or customary practices to an extent. Recognises all stakeholders, including vulnerable groups.
Rajasthan Water Resources Regulatory Act, 2012	Regulate water allocation, ensure equitable, sustainable management of water resources	State Water Authority, State Water Council, Water User Associations, Farmers, Industry	State: Water Resources Dept, Authority, Council; Basin/Sub-basin levels, Project-level entities. State sets up regulatory	Direct: Core water governance mechanism—allocations, entitlements, quotas, water plans. These are central	Incorporates bulk and individual entitlements; includes stakeholder participation but lacks focus on women/tribal groups;	Moderate – Procedural equity is partially met—special invitees from farmers & sectors participate,	Moderate – Distributional equity addressed via bulk and individual entitlements, but risks of elite capture exist. Aims for rational	Moderate – Recognition equity partially addressed via stakeholder participation clauses but ecosystem needs are underrepresented. Recognizes

			bodies. Basin and sub-basin councils manage planning. Local user groups are consulted for equitable water distribution.	policies defining how water is allocated, who gets it, and under what terms.	tertiary irrigation and industrial users prioritized.	but broad civil society engagement is limited. Proposes independent regulation partially.	allocation; lacks affirmative support for marginal users.	inter-sectoral uses.
Swajal Dhaara Guidelines, 2002	To ensure sustainable rural drinking water supply through decentralised, demand-driven, community-managed systems	Village Water & Sanitation Committees, Gram Panchayats, District Panchayats, NGOs, State Water & Sanitation Missions, Ministry of Rural Development	Village: VWSC, GP; Block: Intermediate Panchayat; District: DWSC; State: SWSM; National: MoRD. National to village-level execution: VWSCs at the village, GP at block level, DWSCs at district. State SWSM oversees. MoRD provides national-level guidance.	Direct: Focus on rural drinking water security, water source sustainability (rainwater harvesting & recharge included). Ensures secure and sustainable drinking water for rural areas, including rainwater harvesting efforts.	Strong emphasis on community-managed systems; women's participation mandated; cost-sharing includes pro-poor subsidies.	High – Strong procedural equity in design—participatory decision-making, inclusion of women & marginalised groups in VWSCs, but real-world execution may vary. Strong procedural emphasis on role of community.	High – Community cost-sharing required; risks excluding the poorest unless subsidies or exemptions are ensured. Village-level equality promoted.	High – Partial recognition of traditional water management practices, but programmatic ownership by communities is encouraged. Recognizes women's role in water.

Overview of Rajasthan's policies of water and related sectors at the state level from the Equity perspective

Local Dynamics of Equity and Justice in Water Governance

Water and natural resource governance in rural India has given more emphasis on efficiency, for instance, the technical coverage, economic returns, and maximizing supply, hence subordinating equity and justice as secondary concerns. Lived experiences and frameworks have underscored that water is more than a commodity, a social resource embedded in moral, cultural and political life.

The standard theories of the Capability Approach by Amartya Sen and Justice as Fairness by John Rawls, equity in water governance can be understood as ensuring distribution and real autonomy to benefit from water, based on the specific context of the region. In Kalyanpura, distributive justice is provided via kinship ties, and local customs and rules like the Ora System of collective management of wells, where assurance and flexibility to obtain water from somewhere else, over worrying about a lack of individual resources, shape the fairness and equitable distribution over rigid terminology of equality. This moral principle balances traditional sharing with exchange and highlights the application of mixed governance practices.

Environment and infrastructure of the region further influence access, as the households in higher elevated areas, which are not connected properly, face more scarcity, indicating the interaction of geography with social dynamics.

Procedural justice of 'who participates, how, and with what power' reveals both commitment and contestation. Real influence seems to be lopsided even after the formal inclusion of women in the panchayats and *samitis*. Dominant families often drive decisions, and the voices of women might be overlooked despite formal representation. While the experience of SHGs or social diversity is larger, meetings are more participatory, showing how facilitation and context determine outcomes.

Recognition justice stresses respect along with presence. While lower-caste members and women are included in formal institutions, they often lack the agency to construct agendas and objectives. Cultural practices like the women-led ceremonies, like the Navratri puja, affirm water's spiritual importance and the

Aspect	Field Observations	Equity Dimension	Limitations/Gaps
Procedural	Open meetings, local rules for water timing, and recorded membership	High (rules known, opportunities exist)	At local level, but unstable with policy changes from above
Recognition	Gender, caste proportional representation, women's growing confidence in meeting attendance	Partial (presence, but not always effective voice or agency)	Women's concerns sidelined; disengagement risk
Distribution	Universal water connections, communal fodder benefit, fair irrigation rotation	Advances (physical access improved)	Initial costs excluded some, ongoing risks of elite capture if local rules not enforced.

significance of honoring the community's knowledge and intangible ethics.

Mapping the patterns of disengagement in commons governance

The instances of the Kalyanpura watershed project a gradual process of breakdown and exit of participants, where institutions of common resource management collapsed everyday withdrawal, silent and mistrust. A promising model of participatory governance like the Charagah Vikas Samiti slowly dissolved into fragmented responses, informal practices, and institutional frustration. While different villages faced disengagement differently, the outcomes bore a striking resemblance of returning to open-access grazing, the disbanding of committees and the erosion of collective action.

A core factor connecting the decline of these samitis is the fragility of trust among the villagers, community leaders and formal institutions and those they are supposed to serve. The formal structures of committee formation and decentralised planning are often based on assumed legitimacy and collaboration, instead of earned confidence, trust and accountability. In the absence of sustained support, transparent communication, social cohesion, these structures have been proved to be prone to pressure from external intrusion, caste divisions or governance gaps.

The Kalyanpura case also challenges the widely held assumption of participation is equal to empowerment. There were primarily the instances of superficial participation and tokenism like adding names into the list, uneven decision-making authority and neglect of concerns of the vulnerable and minority groups. The lived experiences of the women and SC/ST groups was one of symbolic presence without any substantial influence. The gap between formal representation and actual participation shows that inclusion in procedure is not a guarantee of equity in participation and distribution.

Where leadership existed, through Sarpanches and Adhyakshs, coordination and mutual accountability were often absent causing a void in leadership, increasing the suspicion of the villagers and preferring to stay out of the local committees. This raises crucial questions about the design of the formal institutions in decentralised governance that whether parallel power structures reinforce each other or undermine collective legitimacy. The best structure models can fall prey to confusion and disengagement without clarity of roles and proper horizontal communication.

Geographical and demographical factors also shaped the feasibility of the institutions in powerful ways where in some villages governance cannot be sustained without external facilitation, with little absence of states, poor infrastructure and demographic decline. In such contexts, institutional integration must go beyond one-size-fits-all approach and should adapt to varying terrain, scale and community differences.

External conflicts and violations eroded the legitimacy of Charagah Vikas Samiti rapidly, which undermined the Ostrom's principles of clearly defined boundaries and enforceable sanctions. The withdrawal of the community was not due to apathy, but due to frustration because of unequal power dynamics.

These discussions reveal that decentralised governance that intends to empower, decentralizes responsibility without always decentralising capacity or protection. Communities were expected to protect the commons against legal ambiguity, social hierarchy, and external aggression without any meaningful support from the state or non-state actors. In such situations, withdrawal happen for ensuring survival not due to a lack of interest in participation.

Lastly the narratives reflect how failures in governance mechanism are not visible as there were neither any mass protests nor cases of public dissent. Instead, the villagers showed disagreement by staying away and resorting to individual strategies. These are the forms of social churning that often are

unmeasured in the evaluations of rural institutions. Yet they are inherently instructive, directing towards a structural reform, a cultural shift towards trust, respect and recognition.

Holistic Approach towards strengthening Equity

Addressing equity and participation in water governance in the rural landscape of Rajasthan needs interventions that transcend superficial participation and restructure the underlying systems which reproduce inequality.

Strengthening procedural equity begins by ensuring that representation turns into actual influence. Decision-making needs to go along with the existing system of representation for women, SCs and STs in water user associations and watershed committees. Independent Grievance mechanisms should be provided to hold local leaders accountable for discriminatory practices or excluding certain people or groups from decision-making.

Targeting capacity-building initiatives for marginalised groups is important to foster recognition equity, enabling them to participate actively instead of being a symbolic representative. Participatory Rural Appraisals and Net Actor Mapping can be formalized in the water planning processes to allow the inclusion of local knowledge systems and perspectives into governance.

Distributive Equity can be ensured by shifting water allocation criteria from political influence to vulnerability indices, so that conventionally subordinated communities are prioritized in the allocation of resources. Collective resource agreements can also help balance competing demands between agricultural production, domestic needs, and ecosystem health.

Finally, forming a robust polycentric and coordinated governance implies the creation of institutional forums at the block or watershed level that combine Panchayats, NGOs, and state agencies to align objectives and decrease duplication. Data platforms can help improve transparency in water allocation decisions and project management and implementation, ensuring that every stakeholder has equal access to information. These measures together can help construct a more inclusive, resilient, and equitable governance framework for water resources in Rajasthan and largely in India.

Conclusion

The interaction between formal decentralisation policies and deeply rooted social hierarchies determines the access to and control over water resources. While the state and national frameworks have increasingly emphasized participatory governance, procedural inclusion often conceals the structural inequities present in caste, class, and gender. Net Actor Mapping in the Kalyanpura watershed brought attention to a polycentric governance system with several institutions, for instance, Panchayati Raj authorities, NGOs, and watershed committees, which operate simultaneously, still underachieving the incentives of equitable distribution.

Groundwater depletion, energy costs, cropping patterns and choices, and ecosystem pressures are deeply interlinked, and inequities in one dimension echo across others. Present governance arrangements, even though abundant in institutional diversity, fall behind in coordination, recognition of marginalised voices, and fairness and distribution required for long-term resilience.

Environmental outcomes are not only technical or ecological problems but are influenced by social and political structures. Without addressing the deeper inequalities present in the governance systems, participatory reforms for equitable access and distribution risk reinforcing existing hierarchies under the guard or veil of inclusivity.

Endnotes

[1] Ribot's critique of decentralisation is a segment of a larger area of literature that questions if devolution of responsibilities without matching authority or resources can give equitable outcomes.

[2] Large-scale watershed development activities took place during 2006-2013 in the Kalyanpura region, undertaken by Panchayati Raj Institutions in convergence with MGNREGA and community mobilization and facilitation were done by NGOs and other community-level organizations.

[3] Rajasthan's State Water Policy 2010 denotes a shift from supply-side infrastructure development to participatory demand-side management, despite uneven implementation.

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