



Managing Water, Securing Livelihoods

POLICY BRIEF

Sabina Dewan, Apoorva Dhingra, and Nidhi Batra

July 2023



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Introduction

From household use, agriculture, and food production, to aiding in electricity generation and nearly all industrial production, water underpins individual survival and the functioning of economies. The truism that water is life is accurate. Water is an economic good and a human right on which the right to life depends. In India, however, a burgeoning population, decades of unsustainable exploitation of resources, environmental degradation, and climate change have diminished water availability and quality. To alter the destructive path we are on, there is an urgent need to improve the management of the country's water resources for the sake of its people and the economy.

Water management refers to the process of planning, developing, and managing water resources, in terms of both water quantity and quality, across all water uses. It includes the institutions, infrastructure, incentives, and information systems that support and guide water management.¹

A UN report posits that “water is work” which reinforces the importance of water for livelihoods and reiterates that effective water management depends on a group of well-trained workers who are able to execute it.² For a country like India, which struggles to create enough good jobs for its large and growing population,³ water management is essential to support livelihoods, such as agriculture which employs 45.5 percent of the Indian workforce.⁴ But water management can also create more income generation opportunities

for individuals, especially in villages. Linking water security to livelihoods can ensure better water management outcomes and create avenues for direct and indirect employment. Put another way, jobs in the water sector are essential for supporting a wide array of indirect jobs, that is jobs that depend on water.⁵

It is with this hypothesis that JustJobs Network (JJN) and Arghyam launched Jal Kaushal, a project aimed at mapping the jobs-tasks-skills nexus of household and irrigation water management in India's rural areas. Through secondary and primary research in 40 Gram Panchayats (GPs) across 10 districts in Karnataka, Bihar, Odisha, Meghalaya, and Maharashtra, the project found that:

- Water supply overshadows water management. Across most districts, government officials and community members prioritise water supply, which follows the thinking that water management should occur only when access to water is provided.
- Water-related policies, acts, missions, schemes, and programmes note the importance of frontline workers in water management but do not conceptualise these roles as productive jobs. Community involvement remains largely dependent on unpaid, volunteer-based roles or paid appointments that are short-term. This is partially explained by the emphasis on water supply instead of integrated water management.

- Water management remains a technocratic subject, driven largely by technical experts hired at state- and district-levels. The top-down nature of planning and decision-making also limits the involvement of communities in water management and goes against the National Water Policy 2012's doctrine of institutionalising and strengthening community-based water management.⁶
- While enabling conditions to hire frontline workers may not yet exist, state-, district-, and village-level officials as well as community members underscore the need for frontline workers who are embedded, remunerated, and adequately skilled.
- Frontline institutions such as the Water User Associations (WUAs) and GP-embedded Village Water and Sanitation Committees (VWSCs) exist but are largely non-functional. In the places where they function adequately, they employ skilled individuals who are compensated for their services.
- In places where water management interventions exist, there is a tendency to retrogress once the intervention's duration ends. A reason behind this is the lack of a skilled workforce that can sustain water management initiatives beyond the duration of intervention.
- Traditional structures and practices are overlooked in favour of modern supply systems which causes loss of valuable knowledge and enhances dependency on state or civil society organisation-sponsored delivery systems and water management practices.
- Members from marginalised groups such as Scheduled Castes, Scheduled Tribes, Other Backward Classes, and women are rarely invited to participate in committees that are responsible for managing water. This compromises effective water management given that marginalised individuals suffer most from water scarcity.⁷
- Household water management and irrigation management are not integrated. Government and civil society organisation (CSO) programmes that enable their management largely view these uses as distinct. This results in two distinct workforces — one for household water management and another for irrigation management. As a result of this divergence, household water and irrigation become competing priorities.
- Governance of groundwater remains contested. Though a common pool resource, groundwater is perceived as individual property which severely limits community-based interventions to manage groundwater.

Frontline Work in Water Management

Frontline workers' primary function is to work directly with beneficiaries or the public to provide services, support, or products, usually on behalf of the government or a civil society organisation. In rural water management, frontline workers are typically recruited from local villages and are responsible for technical or non-technical tasks, depending on the intervention. As stated previously, most water-related policies, acts, missions, schemes, and programmes embrace the importance of frontline workers, making them vital water-management actors. These frontline worker roles can either be standalone opportunities or embedded within committees such as the Village Water and Sanitation Committee (VWSC) or Participatory Groundwater Management Committee (PGWMC), which are GP sub-committees convened as part of the Government of India's Jal Jeevan Mission and Atal Bhujal Yojana respectively. But since the nature of frontline worker roles – full-time, part-time, remunerated, non-remunerated – can

differ significantly, JIN researchers mapped the tasks performed by them to better understand their role in water management. To do this, JIN researchers developed three categories of tasks, namely technical, supporting, and administrative tasks. Technical water tasks are direct water tasks that fall under a) water resources management, including Integrated Water Resource Management (IWRM), ecosystem restoration and remediation; b) building and managing water infrastructure; and c) provision of water-related services.⁸ Supporting tasks are non-technical but offer necessary support for technical water works to take place. This includes communications and behaviour-change work, financial planning, and monitoring and evaluation. Administrative tasks include granting approvals, addressing grievances, and ensuring convergence amongst others. These are largely supervisory roles where workers are not specifically skilled or trained for water management roles and handle diverse administrative responsibilities.

Box 1

National Water Management Initiatives

Jal Jeevan Mission (JJM), launched in 2019, and Atal Bhujal Yojana (ABhY), launched in 2020, are the Government of India's key mission and programme respectively in the water management sector. JJM aims to provide all rural households in India with a functional household tap connection by 2024 while ABhY aims to improve groundwater management in 78 water-stressed districts across seven Indian states. Both JJM and ABhY stress the importance of community involvement in planning and implementation by involving frontline workers and convening Gram Panchayat sub-committees.



Figure 1

Categories of Tasks in Rural Water Management²

TECHNICAL

- Mapping, water budgeting, data gathering and data analysis
- Constructing and repairing water infrastructure
- Provision of water-related services such as supply, treatment, water quality, waste water management and operations and maintenance (O&M)

SUPPORTING

- Communications and outreach work
- Awareness generation and community mobilization
- Monitoring, evaluation and impact assessment
- Financial disbursement, auditing, and report writing
- Water charge collection and bookkeeping

ADMINISTRATIVE

- Development planning
- Decision-making
- Approvals
- Funds disbursement
- Grievance redressal
- Convergence

In line with the above-stated categories, the following table offers a list of tasks at the Gram Panchayat level observed through primary research in the five states of focus.

Table 1

Rural Water Management Tasks Observed in Five States

Category	Functions	Tasks observed in household water management	Tasks observed in irrigation management
Technical	Mapping and Planning	<ul style="list-style-type: none"> • Source mapping • Data collection • Water budgeting 	<ul style="list-style-type: none"> • Source mapping • Data collection • Data analysis • Water budgeting
	Implementation	<ul style="list-style-type: none"> • Construction and installation of piped infrastructure • Repairing existing infrastructure 	<ul style="list-style-type: none"> • Preparing designs and budgetary estimates • Construction of canals • Repairing existing infrastructure
	Operation and maintenance	<ul style="list-style-type: none"> • Pump operation • Cleaning and chlorination • Water quality testing 	<ul style="list-style-type: none"> • Water release and distribution • Canal and minor cleaning
Supporting	Community Engagement	<ul style="list-style-type: none"> • Awareness generation • Water meter installation and repairs 	<ul style="list-style-type: none"> • Community mobilisation • Awareness generation
	Administration and governance	<ul style="list-style-type: none"> • Water charge collection and bookkeeping 	<ul style="list-style-type: none"> • Water charge collection and bookkeeping • Organising meetings
Administrative	Administration and governance	<ul style="list-style-type: none"> • Approvals • Funds disbursement • Grievance Redressal 	<ul style="list-style-type: none"> • Approvals • Funds disbursement • Grievance redressal and conflict resolution

While the table above offers a list of tasks observed, it is important to note that most tasks did not exist across all five states. For example, mapping and planning for household management roles were only observed in Maharashtra, where Jnana Prabhodini, a small NGO in Osmanabad, launched an intervention to promote participatory groundwater management. Similarly, in irrigation management, most tasks only happened in places where an active network of water user associations (WUAs) existed. These associations are the primary vehicle for participatory irrigation management in India and are convened through each state's irrigation act.

This map demonstrates, however, that these tasks are important and there is potential for them to exist across household water and irrigation management in the presence of enabling conditions.

Annexure 1 provides a detailed list of tasks necessary to be undertaken for water management for household and irrigation water, rated on how predominately these tasks are commonly undertaken at village level and mapped to examples of frontline workers, committees, and relevant departments, responsible to undertake the task.

Box 2

Profile of a Frontline Worker

Nirmala Tai, a resident of Gorewadi, Osmanabad, was trained by Jnana Prabhodini to become a Jal Doot. Through this intervention, she learned valuable skills such as water budgeting, taking rain gauge readings, and promoting crop rotation. But even before she became a Jal Doot, Nirmala Tai was a fierce advocate for water management who understood the linkages between reliable water supply and livelihood security. She was instrumental in mobilising the community for *shramdaan* [voluntary contribution of labour] and getting the SHG group involved in this project. Being a Jal Doot has empowered her to the degree that she is now planning to stand for the post of the Sarpanch.

Gaps in Tasks and Jobs

While an integrated approach to managing water is necessary, household use and irrigation are distinct categories with respective sets of frontline workers. To this end, JIN researchers studied these separately and found the following gaps in tasks performed.

Household water management

Table 1, when read against an exhaustive list of water management tasks located in Annexure 1, makes it clear that crucial tasks such as source mapping, data collection of groundwater levels and corresponding analysis, and community mobilisation are absent in most states across the country.

JIN researchers found that this is because there is an overemphasis on water supply which compromises demand management. As a result of this, most frontline roles are concentrated in functions like operation and maintenance and administration, resulting in positions such as the pump operator and bill collector. Where other functions like mapping and planning and demand management happen, they are driven entirely by civil society organisations. This is despite the guidelines of Jal Jeevan Mission, Atal Bhujal Yojana and other schemes and missions echoing the importance of such functions and frontline workers who can perform them. This brings the sustainability of these tasks into question as the scale and duration of any civil society intervention is severely limited.

Box 3

Supply and Demand Management

Water supply management is characterised by an engineering-based approach that aims to increase the amount of water available by identifying new sources and increasing storage capacities amongst others (Australian Aid, 2017). Demand management, on the other hand, aims to increase water use efficiency through judicious use and reduction that reduces or delays the need to have increased supply systems. Examples of this include behaviour change, making water use plans, and measuring losses (Australian Aid, 2017). Given that there are finite water resources, it is imperative for both approaches to be implemented in tandem for effective water management to occur.

Irrigation management

Irrigation management fares better than household water management in terms of tasks observed, which is a credit to WUAs that have become the primary vehicle for participatory irrigation management. However, JN researchers only found active WUAs in locations that fell under the command area of a dam in the state of Maharashtra. The limited locations in which WUAs are present makes clear that irrigation management is currently surface water oriented. This is a matter of concern given that 60 percent of the total area irrigated in India is done so through groundwater.¹⁰

But it is also evident that WUAs have the requisite capacity and institutional structure to manage groundwater if they are enabled to do so. As a result, it is not the lack of tasks undertaken, but the inability of WUAs to convene and sustain that impedes effective irrigation management. Some states attempted to achieve this by bringing WUAs into the fold of the Pradhan Mantri Kirshi Sinchayee Yojana (PMKSY), which is a national-level scheme launched by Government of India in 2015 in part to achieve convergence across irrigation investments in the country. But whether WUAs have been empowered and scaled through PMKSY is yet to be observed.



The Need for Frontline Workers

Understanding the criticality of frontline workers, government officials across the five states echoed the need for their involvement in managing water. In Maharashtra, a senior official from the Water Resources Department (WRD), which manages the planning and development of irrigation facilities in the state said, “we rely completely on the WUAs for operation and maintenance work” so much so that WUAs have begun maintaining the major canal as well, which falls outside the ambit of their responsibilities. Another official from Maharashtra’s Groundwater Survey and Development Agency (GSDA) said, “Mobilisers do important work in the gram panchayat such as raising awareness about groundwater management, and we need more of them across the country.”

For household water management, too, officials realise the need for an active cadre of frontline workers. A member of the district project implementation unit in Muzaffarpur, Bihar said, “we welcome the Bihar government’s decision to hire Anurakshaks [pump operators] because pump breakdowns and damaged pipes are a huge problem in the villages.”

Similarly, village residents in Karnataka expressed the need for a technically trained pump operator or plumber who can handle minor breakages and repairs. In Karnataka, this was an especially urgent need as the state uses HDPE pipes for household water supply, and plumbers are usually unable to repair these pipes due to a lack of training. In

Meghalaya, too, village community facilitators (VCFs) are a famously vital part of the water management machinery, assisting villages in water budgeting and implementation. Their involvement has been so successful that the state plans to empanel them in a Centre of Excellence, which will enable a continuation of their services beyond the Community-led Landscape Management Project (CLLMP).

However, it is important to note that barring a few individuals, the demand for workers from both government officials and village residents was concentrated around operation and maintenance and infrastructure provision. This means that demand management, which aims to manage water by adjusting demand, is largely absent in India’s gram panchayats if not specifically pursued by a specialising CSO. Neither do village residents articulate the need for demand management and the associated workers, nor do governments adequately empanel them. As a result, demand management and water conservation tasks such as water budgeting, source mapping, rainwater harvesting, and wastewater collection do not happen, putting pressure on already stressed water resources.

Reasons Behind a Weakened Frontline Workforce

Jal Kaushal found that while water supply is relatively well-addressed, demand management and the subsequent empanelment of frontline workers does not happen because the enabling conditions do not exist. A few examples of what restricts their participation are:

1. Technocratic water management

Despite several state water policies that suggest shifting to community-based solutions for water management, it remains a technocratic subject. This means that despite an emphasis on institutionalising community-based management practices, it is driven largely by technical experts hired on state- and district-levels. Specialised appointments for planning, mapping, budgeting, awareness generation, community mobilisation, groundwater management, and accounting amongst others are absent at the village-level. Only roles involving operations and maintenance and infrastructure provision, whether standalone or embedded in committees, exist which are also short-lived. As a result, communities are mere recipients of water management initiatives instead of being meaningful stakeholders in the process. With a robust cadre of VCFs, Meghalaya presents as the only exception.

2. Traditional practices overlooked

There is country-wide acknowledgement that traditional methods of water management can help alleviate India's water crisis.¹¹ But despite that, traditional structures and practices are overwhelmingly overlooked in favour of modern supply systems. This leads to a loss of valuable knowledge and enhances dependency on state- or CSO-sponsored delivery systems and water management practices. This is most visible in Odisha, where traditional systems of water provision have fallen into disrepair while modern systems of water delivery have not yet arrived.

3. Contested governance of groundwater

Groundwater is the primary source for household and irrigation needs but existing groundwater regulation is extremely dated. According to experts, recent interventions lack an aquifer-level approach, which includes designing localised solutions according to the aquifer's characteristics, and the understanding that groundwater management is a local issue that must be addressed at the local level.¹² Groundwater is still considered a private resource, not subject to community-based interventions. In Maharashtra, where JJN researchers conducted extensive research on irrigation management, groundwater remains an unmanaged resource because it does not fall under the purview of the WUAs.

4. Restricted participation of marginalised communities

Sub-committees such as Village Water and Sanitation Committees (VWSCs) and Participatory Groundwater Management Committees (PGWMCs) reserve seats for SC/ST individuals and women, but JIN researchers found that Scheduled Castes, Scheduled Tribes, Other Backward Classes, and women were rarely invited to participate. Similarly, WUA members were overwhelmingly male; wherever women were invited to participate, they reported not feeling empowered to engage in decision-making. By not pointedly ensuring the participation of women and other marginalised communities, who suffer the most from water scarcity, effective water management becomes severely compromised.¹³

5. Household water and irrigation as competing priorities

While the Atal Bhujal Yojana (ABhY) aims to facilitate convergence between household water and irrigation, JIN researchers observed that the two remain competing priorities. According to a senior official from Maharashtra's Water Resources Department, their department was not consulted when Maharashtra Jeevan Pradhikaran (MJP) and the Zilla Panchayat, the two departments delivering household water in the state, developed their water supply infrastructure. This hampered the irrigation ecosystem because the MJP would often source water from the canals, which is meticulously budgeted against farmers' needs. The lack of departmental dialogue undermines integrated water management while exerting pressure on frontline workers who are not equipped to handle both household water and irrigation management.

Recommendations for Nurturing a Frontline Workforce

As evident above, frontline workers emerging from the community are essential to ensuring village-level water security. Frontline workers hold the maximum knowledge about their areas and are vital actors in ensuring contextualised decision-making. However, even though the need for frontline workers is recognised, most of these workers are either engaged as part-time workers, volunteers, or are unpaid. This neither helps cultivate water security nor supports meaningful livelihood generation. Jal Kaushal recommends the following actions for nurturing frontline workers for sustainable water management:

1. Mapping essential tasks at decentralised unit

A detailed village-level mapping of the tasks that need to be undertaken to achieve integrated water management is required. This should include aspects of grey water management, drainage, source management, behaviour change, water for industrial use, along with water for domestic and agricultural use. Mapping would have to be contextual to various geographical conditions that are directly correlated to water stress and management systems. Jal Kaushal offers a framework for this mapping exercise, located in Annex 1, which should be scaled to cover other dimensions of water management, regions, and states.

2. Recognising water workers

State- and central-schemes as well as policies emphasise community participation in water management, but are largely silent on availability, training, and productive engagement of frontline workers. Recognising frontline workers as essential water workers either through skilling and certification or positioning them with a designated role at the village level is required to ensure meaningful community participation.

The sustainability of frontline workers and ensuring that they are engaged in water works also requires that the roles they undertake are remunerated. It is acknowledged that many of the activities undertaken by workers do not amount to full-time jobs but are either seasonal in nature or require limited hours in a day. It is essential to map all these necessary activities, estimate the work hours and effort involved, and develop a method of linking appropriate remuneration for the service that the workers provide.

3. Revive traditional methods and enhance equitable participation

More concerted effort in reviving traditional water management system and meaningfully engaging associated workers is essential for water secure villages. Traditionally, water systems were managed by the community which led to various roles. Some states have been able to bring these workers into their water management systems;

for example, *kollalus* in Garhwal, *chowkidars* in the Kumaon hills in Uttaranchal, and *havaladar*, *jagliyas* or *patkaris* in Maharashtra.

Involving women and other marginalised members of the community in decision making and water management is also essential to ensure equity and access. Jal Sahelis, women Jal Doots, and self-help group members in villages are inspiring examples of the role of women in water management and influencing behaviour change.

4. Skilling and capacity building

Mapping gaps in the tasks required allows us to adequately build the capacity of various institutions such as VWSCs, PGWMCs, and WUAs and skill frontline workers. The workers also require an introduction to the relevant technology that supports these tasks, such as various digital apps for resource mapping, data collection, and new solar technology. Recognised Certification of the worker would further ensure that possible avenues for vertical mobility exist. Programmes such as short-term training and recognition of prior learning should be leveraged.

5. Avoid duplicity of workers and converge the efforts for water security

Frontline workers are well positioned to enable convergence across schemes and missions at the decentralised level. Various schemes have different foci; JJM focuses on delivering household tap connections, ABhY focuses on groundwater management in water insecure villages; and WUA and PMKSY enable irrigation management. These varied interventions have their own frontline workers such as pump operators in JJM, *bhujal jankaars* in ABhY, WUA members, watershed

assistant under PMKSY. Jal Kaushal found that water can only be managed well if the missions and schemes are implemented in such a way that there is programmatic convergence but also convergence amongst frontline workers, who have the requisite knowledge of the water systems in that region.

There is also a need to enlist various water workers that have been trained and engaged through various government and CSO led schemes at the village level. A digital repository of the workers and their skill sets can ensure that the same set of workers are engaged in different problems, ensuring livelihood sustainability, while also making sure that technical and tacit knowledge is not lost.

6. Creating the demand for water management

Over time, water workers can only be sustainable if there is a market or demand that is created for them. There are various innovative financing mechanisms by the State that can support entrepreneurship in water management. For instance, local solar businesses that install and undertake O&M of solar pumps which are used for both household and irrigation purposes.

An essential part of creating the demand is to make aspects of water management visible to the people and thereby influencing behaviour change. This can only happen through greater outreach, awareness, and community mobilisation. Water as a socio-technical subject requires that the state invest in this cadre of workers who can take on communication and advocacy.

Annexure 1: List of Tasks in Water Management

The following table offers an authoritative list of tasks necessary for household water and irrigation management. This was developed through secondary and primary research and verified by Arghyam's partner CSOs involved in water management.

Table 2

List of Tasks in Household Water and Irrigation Management

Functions and Tasks	Household Water Management	Irrigation Management
Mapping and Planning	<ul style="list-style-type: none"> • Source mapping • Data collection • Data analysis • Water budgeting • Identifying interventions - supply side and demand side • Drafting plans • Vetting and approval of plans 	<ul style="list-style-type: none"> • Source mapping • Data collection • Data analysis • Water budgeting • Identifying interventions - supply side and demand side • Drafting plans • Vetting and approval of plans
Implementation	<ul style="list-style-type: none"> • Preparing design and budgetary estimates • Construction and installation • Laying infrastructure, such as pipes • Solar pumps installation • Source strengthening and protection activities • Monitoring and supervision of implementation 	<ul style="list-style-type: none"> • Preparing design and budgetary estimates • Construction of canals, pipelines, contour trenches, and farm ponds • Installing borewells/tubewells • Installation of drip and sprinklers • Solar pumps installation • Soil testing • Monitoring and supervision of implementation
Operation and Maintenance	<ul style="list-style-type: none"> • Pump operation • Pump repair and maintenance • Solar pump repair and maintenance • Tank Cleaning • Maintaining existing infrastructure • Water quality testing • Collecting water charges • Maintaining accounts 	<ul style="list-style-type: none"> • Water distribution • Recording and tracking water disbursement • Collecting water charges • Maintaining accounts • Pump repair and maintenance • Solar pump repair and maintenance • Desilting
Demand Management	<ul style="list-style-type: none"> • Facilitating community engagement and soliciting relevant input • Behavior change - encouraging safe practices 	<ul style="list-style-type: none"> • Facilitating community engagement and soliciting relevant input • Encouraging crop diversification
Governance	<ul style="list-style-type: none"> • Establishing relevant sub-committees such as VWSC • Regular meetings and review • Grievance redressal 	<ul style="list-style-type: none"> • Establishing WUAs • Regular meetings and review • Grievance redressal

Annexure 2: Methodology

JustJobs Network researchers conducted primary research in 40 Gram Panchayats (GPs) across the five Jal Kaushal states. In the GPs, they conducted focus group discussions with village residents and semi-structured interviews with frontline workers and GP officials. They also conducted semi-structured interviews with block-, district-, and state-level officials. In addition to that, the researchers conducted scoping interviews with CSOs prior to their field visits and semi-structured interviews after their field visits to verify their findings. Information gaps emerging from primary research were filled through desk-based secondary research and conversations with CSOs.

Access to the GPs and officials was facilitated by Azim Premji Foundation in Kalaburagi and Vijayanagar; by Nirdesh in Muzaffarpur; by Abhijit Mohanty in Koraput and Mayurbhanj; by Mahatma Jyotirao Phule Water User Association and Yuva Mitra in Nashik; and by Jnana Prabhodini in Osmanabad. JN researchers wish to express their deepest gratitude towards members of these organisations for supporting them in their research.

Table 3

GPs, Districts, and States Visited for Primary Research

State	District	Gram Panchayat
Karnataka	Kalaburagi	Kawalga, Kalmood, Dongargaon, Gotoor, Ghattarga
	Vijayanagar	Hampi, Koolahalli, Adavihalli, Kadihalli, Shivpura
Bihar	Muzaffarpur	Dadar Kolhuwa, Sherukahi, Harchanda, Makdumpur, Kodana, Bhatauna
	Begusarai	Banwaripur, Maheshpur, Takiya, Lakho, Samsa
Odisha	Mayurbhanj	Laxmansahi, Bangara, Khadisal, Bisoi, Durdura
	Koraput	Mastipur, Malda, Pitaguda, Khurji, Maliput
Maharashtra	Nashik	Janori, Lakhalgaoon, Pimpalgaon Baswant, Sunderpur, Kepanagar
	Osmanabad	Kawalewadi, Gorewadi, Khamswadi, Junoni, Chilwadi

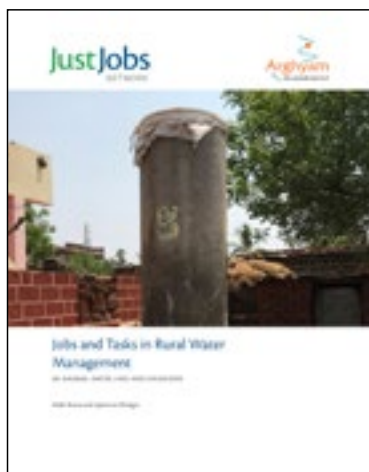
Annexure 3: Jal Kaushal Reports

This policy brief is accompanied by two baseline reports and five state reports – one for each Jal Kaushal state – that expand on the findings and list state-specific recommendations. These reports are:



Landscape of Rural Water Management

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Jobs and Tasks in Rural Water Management

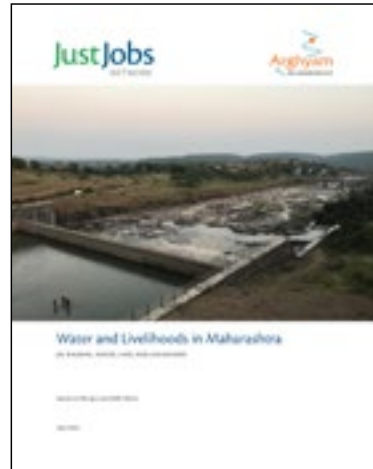
Nidhi Batra and Apoorva Dhingra





Water and Livelihoods in Karnataka

Nidhi Batra and Apoorva Dhingra



Water and Livelihoods in Maharashtra

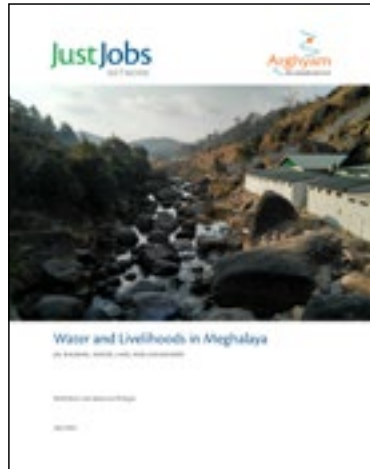
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Water and Livelihoods in Odisha

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Water and Livelihoods in Meghalaya

Nidhi Batra and Apoorva
Dhingra





Water and Livelihoods in Bihar

Apoorva Dhingra and Nidhi
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- ⁸ UN WWAP, *The United Nations world water development report 2016: Water and jobs*, 2016. <https://www.unesco.org/en/wwap/wwdr/2016>
- ⁹ These three categories of tasks performed by frontline workers in rural water management were developed by JustJobs Network researchers based on secondary and primary research.
- ¹⁰ Central Ground Water Board (CGWB), Government of India. (n.d.), *National Project on Aquifer Management (NAQUIM)*, Retrieved March 29, 2023, from <http://cgwb.gov.in/AQM/NAQUIM.html>
- ¹¹ Vivek Kapadia, “Relevance of Traditional Indian Methods of Water Management in the Present Era,” *International Commission on Irrigation & Drainage*. https://www.icid.org/pd3_pap_kapadia_relevance.pdf
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- ¹³ National Campaign on Dalit Human Rights – NCDHR, *Droughts, Dalits and Adivasis: A Study on the Impact of Droughts catalysed by Climate Change on the Dalits and the Adivasis of Marathwada region of Maharashtra*, September 2022. <http://www.ncdhr.org.in/wp-content/uploads/2022/09/NCDHR-Drought-Report-low-res.pdf> and UNICEF, “Water scarcity: Addressing the growing lack of available water to meet children’s needs,” <https://www.unicef.org/wash/water-scarcity>

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