FRANK WATER

Beyond the Boundary

Water Stewardship Blueprint Methodology

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Background

This blueprint methodology is based on learning and insights from the implementation of a corporate water stewardship project in India. Two pilot watersheds, one each in Bengaluru and Chennai, were selected to develop a water stewardship approach that can be put into action and scaled up into practice by corporates and other stakeholders of the watersheds. This project, called Beyond the Boundary (BtB), has led to a range of insights into the state of governance, management and emerging challenges in sustainably using our watersheds. The experience gained in India through this document is being developed into a generalised set of ideas that can be applied to watersheds, catchments and basins globally. As long as the characteristics - hydrological, demographic, governance and land use appear to be similar, we assume that the blueprint methodology will certainly be of use in its components or entirety.

Watershed as a hydrological category is defined as a natural hydrological entity from which surface runoff flows to a defined natural drain - channel, stream or river at a particular point. It is a topographically delineated area that is drained by a stream system and is characterised by a common outlet through which excess overland flow collected within the watershed is drained out.[1] This definition and unit are important to note because water planning is typically observed to be based on catchment or basin scale. However, these may not be appropriate scales for action. The following table lists the categories and associated spatial scales. Watershed-level action will require high-resolution data and lead to highly improved water planning.

	Category of Hydrologic Units	Size Range (ha)	Average Size (ha)
1	Water Resource Region	270,00,000-1130,00,000	5,50,00,000
2	Basins	30,00,000-300,00,000	95,00,000
3	Catchments	10,00,000-50,00,000	30,00,000
4	Subcatchments	200,000-10,00,000	7,00,000
5	Watersheds	20,000-300,000	1,00,000
6	Subwatersheds	5,000-9,000	7,000
7	Micro-watersheds	500-1,500	1,000

The methodology applies to urban and peri-urban areas, towns and urban agglomerations due to the critical stress that watersheds in those regions tend to experience. It aims to inform watershed-level governance as well as management, primarily in the watersheds of peri-urban areas that are highly stressed and experience acute water stress. For example, Frank Water chose Anekal taluk of Bengaluru Urban District in Karnataka for a pilot watershed in 2023. Anekal as a site for a pilot watershed seemed ideal for its location as a peri-urban region to Bengaluru. The pilot project in 2023 aimed at developing a science-based, evidence-driven water stewardship approach. Anekal is characterised by significant industrial development coupled with high levels of water resource exploitation. A trend of depleting water resources and poor water quality in its surface water bodies was observed. In the event of expanding urban sprawl and industrial growth, a need for effective governance and monitoring of watersheds is required.

The blueprint methodology for water stewardship provides a structured approach to managing water resources that benefits stakeholders of a watershed. It does so by leveraging data-driven insights that inform collective action. This methodology aims to serve as a guide to achieve sustainable watershed management, which also guarantees equitable access and use of available resources so that aquifers do not end up being critically stressed.

[1] Karnataka State Water Atlas 2023. URL: Watershed Atlas (karnataka.gov.in)

The document applies to the following target audiences:

1. Site managers in businesses who are responsible for water stewardship activities and performance within a business
2. Government functionaries at federal, state, or district administrative levels, as in governmental agencies with water resource management mandates
3. Non-governmental entities (CSO, CSR departments) who work with watershed stakeholders

Individuals and teams tasked with the planning, provisioning and monitoring of water resources within a watershed will benefit from a structured, actionable approach to water stewardship. The priorities set out in this document are to achieve equitable access to water resources for all stakeholders; efficient use of available water resources and prevention of critical stress on aquifers and other water sources. Equitable access and efficient use can be the cornerstones for ensuring sustainable management and governance of water.

The tone and language used in this document is an informed choice made to facilitate easy understanding and minimise the use of technical language. It is written with the intent to facilitate its use as a manual and a source to look up information when encountered with questions like 'what should be done?', 'where to begin?' and 'how to do it?' This manual is not cast in stone! Rather, as more experience is gained on the ground, the blueprint itself will transform and evolve as a dynamic, adaptable tool.

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Introduction

A blueprint methodology set in the background explained in the previous section, provides a structured and systematic approach to achieving these objectives. This blueprint methodology helps in achieving water-related targets by offering the following:

A. A structured approach for establishing a baseline and enabling subsequent assessments
B. Data and information systems
C. Measurable targets
D. Risk mitigation
E. Resource efficiency
F. Builds a foundation for regulatory compliance
G. Robust and replicable stakeholder engagement

The methodology is organised into 8 sections:

1. Background
2. Introduction
3. Assumptions
4. Water Stewardship Principles (on which the methodology is based)
5. Importance of socio-hydrological regions as water-contexts
6. Key Ideas in Water Stewardship
7. Actors and roles in TAP
8. Implementing collective action

The consideration of collective action is central to this methodology because water usage in many countries is highly atomised. It is atomised at the point of use, if not at the higher levels of catchments and river basins. This means that water-related activities and decisions occur at hyper-local levels, such as individual households and farms. Further, these decisions are influenced by specific local conditions and situations. Often, despite noble and well-founded goals at more centralised levels of management, the sheer divide between levels of governance and usage makes water governance at watershed and basin levels hard to achieve, particularly when collective actions are desired. Therefore, to create effective collective action around water, work must start at these atomised levels where the actual work and needs are present. By addressing water issues at these small, localised scales first, such efforts can build up and aggregate into broader collective actions on a larger scale.

The dichotomous nature of planning and action means that while water management is atomised at local levels, policymakers tend to think in terms of river basins, which encompass broader, state-level considerations, including interstate conflicts over water. The policy is more river basin-oriented. Therefore, it is important for collective action to occur at the convergence of these two scales. The continuum from river basins to watersheds and vice versa is necessary to ensure that local actions align with and support broader policy objectives, creating a cohesive and comprehensive approach to water stewardship. Stakeholders such as businesses located in the watershed, government agencies, and community groups, who are either mandated or interested in making interventions at the watershed level, must position their actions within this framework of activities, actors, and decision-making processes described above.

A typical user of this blueprint methodology is seen as a professional in any of the following roles:

A. A site manager or water stewardship officer or the sustainability team in a company or wherein the manager and his or her team are in charge of assessment, planning, or acting upon the company's water use and water stewardship at a location. It is assumed that the site manager will also have to develop clear assessments of water-related risks to the business and mitigation plans for the same.
B. A government official in decision-making, executive role, or in charge of planning as well as guaranteeing water provisioning to its constituents in an administrative area. The government official could be located in any tier of the government - central, state, regional, district, or block-level. The user category also includes directors of industrial parks or special economic zones (SEZs) who are mandated with water resource planning for their agencies.
C. A government official in a decision-making or executive role in the agricultural or irrigation department which is responsible for ensuring adequate water supply for agriculture and allied activities in rural and peri-urban areas.
D. A water sector or allied services professional in civil society organisations (CSOs, Think Tanks) or in corporate social responsibility (CSR) departments of large companies need clear, concise, and simplified information to help them effectively integrate their actions within the water stewardship paradigm.

Assumptions

The methodology is based on a set of assumptions. These assumptions have informed the rationale and are explained in this section.

Water action is assumed as a continuum from river basins to watersheds and vice-versa. Water action in India is heavily decentralised, occurring at household and farm levels and determined by local conditions. To tailor collective action around water, it must begin at these atomistic scales and then aggregate to larger levels. People in rural and urban India are more familiar with the concept of watersheds than river basins, making it practical to start with watersheds and scale up to river basins. While policymakers often think in terms of river basins due to policy and interstate conflicts, collective action must converge at both watershed and river basin scales to be effective. The idea of a continuum, from watersheds to river basins, also speaks to the current narrative or the project style of thinking about priority basins, as in the case of 100 priority basins identified by the Water Action Hub[2], where references to basin-level outcomes are made but the processes to achieve those outcomes at sub-basin level are absent. Besides, river basins are imagined as canvases for very large-scale projects and are often implemented in a top-down manner instead of bringing the local community in.

Water action moves from community decisions to collective action. Currently, water action is not only atomistic but is also individualistic. Converting individual actions on water to community-level actions requires collective decisions. Collective action is a result of collective decisions, which need to be defined at a community scale. This community includes all stakeholders that use and affect water resources at a particular level, such as farmers, urban users, and industrial users, each with diverse demands on water. Robust collective action arises when these stakeholders come together to make decisions at a watershed level. The definition of the community, the scale at which it is defined, and the decision-making process are crucial for effective collective action.

2 The 100 priority basins list is a list of worldwide basins which includes those with the highest level of opportunity for collective action from an economic and shared water risk perspective. URL: Water Action Hub | 100 Priority Basins

The time for watershed-level collective action is now. It is essential to recognise the spatial and temporal dimensions of community decision-making and collective action. Effective water stewardship requires immediate attention to defining communities, understanding their needs and impacts on water resources, and fostering collaboration at appropriate scales. The urgency stems from the need to address water scarcity, pollution, and conflicts comprehensively, starting from familiar and manageable watershed scales and extending to broader river basin management. This urgency can also be read in the progress updates issued by UNWATER periodically. The 2021 update stated[3] that, "*The world is not on track to achieve SDG 6. Billions of people worldwide still live without safely managed drinking water, safely managed sanitation and basic hygiene services, especially in rural areas and least developed countries; the current rates of progress need to quadruple in order to reach the global target of universal access by 2030.*

When it comes to Integrated Water Resources Management (IWRM), the current rate of progress needs to double to meet the global targets, and only two SDG regions are on track to have all their transboundary water bodies covered by operational cooperation agreements by 2030. One-fifth of the world's river basins are experiencing rapid changes in the area covered by surface waters, indicative of flooding and drought events, which are associated with climate change."

At a given resource level, such as in a watershed, the people who use and affect the water resource must come together to make decisions. This collective decision-making process effectively defines them as a community. Only through this collaboration will robust collective action emerge. The nature of these decisions (taken by a defined 'community') is crucial. How a community is defined and at what scale it operates significantly impacts the water resource. The spatial dimension, which involves defining the community and its scale, is vital. Equally important is the temporal dimension, which considers how decision-making processes evolve and lead to sustained collective action. Both dimensions must be carefully considered to ensure effective water stewardship.

3 See UN-Water, 2021: Summary Progress Update 2021 – SDG 6 – water and sanitation for all. Version: July 2021. Geneva, Switzerland. URL: SDG-6-Summary-Progress-Update-2021_Version-July-2021a.pdf (unwater.org)

Water Stewardship Principles

(on which the methodology is based)

This section offers a set of principles that integrate the policy landscape, hydrological concepts and practice together, by listing a set of core principles that must drive thinking on water and reorient the approach to water stewardship at the policy level as well as administrative levels, when appropriate. Practitioners will find this part of the blueprint methodology useful in terms of understanding foundational ideas in water stewardship.

These principles are the underlying tenets of many national and regional policies. The blueprint methodology is concerned with converting the principles into actual actions on the ground.

A. Water as commons

Water as a "commons" means that water is a resource that is common to various users and meets environmental needs. In practical terms, some of the users or stakeholders must let go of or reduce their own demand to meet another's deficit, making collective decision-making crucial. In very few collective action forums, decision-making based on information and experience is discussed yet essential. This principle ensures that water is managed as a shared resource, accessible and beneficial to all. Only through a democratic system of decisions, where allocations or usages of water for different purposes are decided upon, can we achieve effective collective action.

B. Water as a Public Good

Defining water as a public good emerges in the context that water is essential for all forms of life and to sustain life processes. Therefore, access and use of water for basic human, and non-human life forms and ecological needs are deemed as non-excludable and non-rivalrous, which are key features of a public good.

Governments and community-based water governance systems place this idea of water as a public good at the centre of their rule-making as well as conflict resolution processes. In practice, it means that access to water for basic needs as described above is given the first priority when sharing a water resource. All other demands for water are secondary to this.

Water stewardship principles, therefore, are located within the water governance idea of water as a public good. Water stewardship must also necessarily assume water as a public good in the first instance.

C. Community Engagement through Participatory Knowledge Generation

Building knowledge through a participatory process ensures that the community is involved in generating the information needed for decision-making. When knowledge is generated at the community level and is both participatory and collaborative in nature, it becomes knowledge and information that is trusted by different stakeholders. This principle ensures that collective decision-making is better informed and more likely to be accepted by those affected.

D. Information for Decision Support

Access to accurate and timely information is crucial for making informed decisions. Information asymmetry impedes effective water stewardship. Community decisions through discussion must come from shared and accepted knowledge. Hence, participatory data collection forms the backbone of the process of decentralised collective decisions and actions. This principle ensures that stakeholders have the necessary information to make evidence-based decisions. The document aims to convert these principles into actual actions on the ground, providing a methodology that turns policy into practice.

E. The Concept of Stakeholder-Led Water Stewardship

Effective water stewardship requires someone to take the lead in bringing stakeholders together, facilitating discussions, and guiding decisions on collective action. This principle emphasises the need for leadership to coordinate efforts and ensure cohesive strategies. Someone must guide the discussions on what the collective action will involve, making this principle crucial for successful water stewardship. The actors are least likely to emerge from outside the watershed. Sustainable water stewardship requires actions that are initiated and emerge from within the watershed and are applied to the watershed from where ideas, knowledge, decisions and actions are generated. Hence, water stewardship must be a collective effort with equal voices and opportunities for various stakeholders. It must emerge through a democratic process of discussion leading to building an effective and acceptable set of decisions and actions.

F. Rights, Roles, and Responsibilities

Clearly defined rights, roles, and responsibilities are essential for effective collective action. Community decisions must emerge from discussions where everyone understands their entitlements and duties within the collective framework. This principle addresses the spatial and temporal dimensions of decision-making, ensuring that stakeholders are aware of their roles and responsibilities in managing water resources.

By bringing these principles to the forefront, the methodology drives the process of water stewardship by ensuring that stakeholders are well-informed and can work collaboratively.

Importance of socio-hydrological regions as water-contexts

The methodology assumes that 'water contexts' consist of a combination of sociological, hydrological and geological factors that must be considered in conjunction. To account for the context or background in which a watershed is located we have used the term 'water context'. It is not singular in nature but rather a complex interplay of sociological, hydrological, and geological factors.

Beginning with a general definition of a 'watershed' as areas of land that drain all the streams and rainfall to a common outlet, it can be seen that they play a significant role in determining the outcomes of availability, use and stability of resources that are enabled by water. Therefore, planning and implementing interventions in watersheds require a comprehensive understanding of their unique social and hydrological contexts. A methodology for water stewardship must consider the interplay of sociological, hydrological, geological, and meteorological factors to facilitate the development of solutions that are effective, acceptable and sustainable.

Sociological Context: Population, Livelihoods, Incomes, and Gender

India's socio-ecological diversity presents numerous dimensions that must be factored into watershed management. The population density varies significantly across regions, influencing water demand and usage patterns. In rural areas, livelihoods often depend on agriculture, which is highly water-intensive. Understanding the economic status of communities is essential, as income levels affect the ability to invest in water-saving technologies and infrastructure. Gender dynamics also play a critical role in water management. In many parts of India, women are primarily responsible for collecting water, therefore, any intervention must consider the impact on women's time and labour. Ensuring women's participation in decision-making processes is essential for more inclusive and effective water management strategies.

Hydrological Context: Topography, Built Area, Land Use, and Water Infrastructure

The hydrological context includes the physical characteristics of the watershed, such as topography, land use, and existing water infrastructure. India's varied topography, from the Himalayas in the north to the coastal plains in the south, affects water flow and availability. Urbanisation and built areas alter natural water drainage and increase runoff, leading to issues like urban flooding.

Land use patterns, including agriculture, forests, and urban areas, influence water infiltration and soil erosion. Effective watershed management must consider these patterns to design interventions that enhance water retention and reduce erosion. Additionally, existing water infrastructure, such as dams, canals, and irrigation systems, must be assessed to optimise their use and integrate them into new management plans.

Geological Context: Soil Type, Percolation Rate, Rock Formations, and Aquifers

Geological factors, such as soil type and rock formations, significantly impact water percolation and storage. Different soil types have varying capacities for water retention and infiltration. For instance, sandy soils allow quick water percolation, while clay soils retain water but have lower infiltration rates. Understanding these properties helps in selecting appropriate soil and water conservation measures.

Rock formations and aquifers determine the availability and quality of groundwater. In regions with abundant groundwater resources, interventions may focus on recharge techniques, while areas with limited or poor-quality groundwater require different strategies. Assessing the geological context ensures that interventions are tailored to local conditions, enhancing their effectiveness.

Meteorological Context: Annual Rainfall, Rainfall Patterns, Monsoon Arrivals, and Climate Change

Meteorological factors, including rainfall patterns and climate variability, are critical for watershed management in India. The monsoon, which delivers the majority of India's annual rainfall, is characterised by its variability in onset, duration, and intensity. Understanding these patterns important in designing systems for rainwater harvesting, flood control, and drought mitigation.

Climate change adds another layer of complexity, as it affects rainfall patterns, temperature, and extreme weather events. Watershed management must be adaptive and resilient, incorporating strategies to cope with changing climatic conditions. For instance, constructing check dams and enhancing green cover can mitigate the impacts of erratic rainfall and improve groundwater recharge.

Key Ideas in Water Stewardship

This section concerns planning and understanding of water and human behaviours. Water stewardship essentially involves securing one's own demand for water while recognising other stakeholders' needs. If the national water policies of countries were to address situations arising from water sharing, and if they were effective on their own, water stewardship might not be required. However, when water is to be allocated, there is a conflict on the prioritisation of demands of various stakeholders, both through policies and through perceptions of people on the ground. Most national water policies have accorded priority to human needs for water under the principle of 'water for life'. It takes precedence, along with water for basic livelihoods. At the same time, industrial demand is seen as necessary for economic growth. Safeguarding industrial needs is seen as crucial for economic growth. These priorities need to be understood in the interest of effective water stewardship. This is requisite for designing and implementing an effective water stewardship program. The key ideas to consider can be grouped as the following:

1. Water stocks
2. Water demands
3. Water-related behaviour

1. Water stocks imply all the primary sources of usable water. It includes surface water and groundwater.

Effective water stewardship requires that sources such as streams and wells are part of larger surface and groundwater resources such as watersheds, river basins and aquifers. It is important to ensure that resources are recognised, identified and understood in terms of their characteristics and the changes that they undergo over time. Temporal and spatial dynamics of water stocks are key to understanding what could be planned and sustained by a watershed. While a broad understanding states that the water on the surface and subsurface is a single continuum, it is important to realise that there are surface and groundwater resources that are recognised with the following broad categorisation:

- **Surface Water:** Rivers, lakes, ponds and reservoirs are primary sources of surface water. They are vital for drinking water, irrigation, industrial processes, and maintaining ecological balance.
- **Groundwater:** Aquifers provide a significant portion of the water supply, especially in areas where surface water is scarce. Groundwater is critical for agriculture, rural water supply and as a buffer during droughts.

Managing these resources requires a comprehensive understanding of their availability, renewability, and the impact of human activities on their sustainability. A balanced approach to using surface and groundwater resources ensures a stable and reliable water supply.

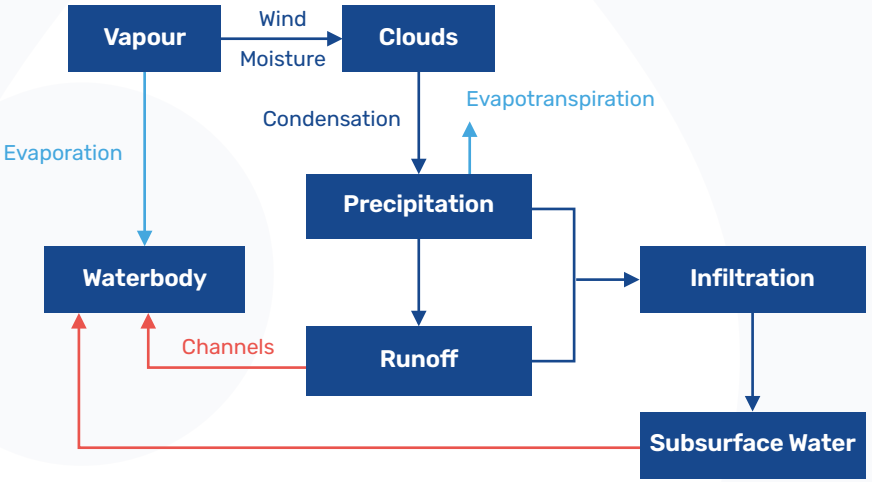

Figure: The hydrological cycle illustrating the circulation of water between the earth and its atmosphere. These flows constitute water stocks as discussed in this section. (Source: Chow et al)

The following is an indicative list of relevant variables to assess water stocks in a watershed

Water Source	Form	Variables
Surface water	River	• River basins • Flows - annual, inter-annual • Baseflow and eflow • Temporal history • Flood events • Water quality • River ecosystems
Surface water	Dam	• Catchment / Watershed • Storage volume • Use • Changes in storage - seasonal, interannual • Water Quality
	Lake	• Catchment / Watershed • Storage volume • Use • Changes in storage
Groundwater	Well	• Aquifer system • Type of well • Depth • Water quality
	Natural Springs	• Type of spring • Yield • Seasonality • Long term behaviour • Water quality

2. Major Demands

Water is demanded across various uses and by various users. The supply may not always be in proportion to the demand and vice versa. Water resources in a watershed are often subjected to competing demands. Even though most national water policies in countries set a clear priority of needs, and through respective regulatory bodies intervene in serving the demands of users, the outcomes are not always equitable or just. Competing demands exist between sectors like water in domestic, agricultural and industrial environments; regions like urban and rural; systems like built environment and natural; competition is not always easily perceived and understood.

- **Rural Demands:** In rural areas, water is primarily needed for agriculture, livestock, and domestic use. Agriculture is particularly water-intensive, and ensuring a reliable supply is crucial for food security and rural livelihoods. While water for livestock and domestic uses including meeting human drinking water needs, is a small proportion of agricultural demand for water, the latter often determines conditions of seasonal scarcities in domestic water and water for livestock, especially if all demands are coming from the same resource, say a local aquifer.
- **Urban-Industrial Demands:** Urban areas demand water for domestic use, industrial processes, and services. Industrial water use supports economic activities and job creation but often competes with domestic needs.
- **Urban Domestic Demands:** Cities require significant amounts of water for households, sanitation, and public services. Ensuring equitable and sufficient water supply in urban areas is a growing challenge with increasing urbanisation.
- **Ecological and Environmental Demands:** Ecosystems require water to maintain their health and biodiversity. Environmental flows are necessary to support riverine ecosystems, wetlands, and wildlife, contributing to the overall ecological balance.

Understanding these diverse demands helps in prioritising water allocation and addressing potential conflicts among users. While household water needs are critical, industrial and ecological demands must also be met to sustain economic growth and environmental health. Water demands are considered on a rural and urban basis because this categorisation captures the nature of human settlements and occupations/livelihoods.

The blueprint methodology emphasises the importance of effectively managing both surface water and groundwater resources.

3. Water-related Behaviour: The TAP Framework[4]

Water-related behaviour is about the perception and agency of individual actors who constitute various stakeholders. Behaviour is examined through the lens of transparency, accountability and participation (TAP) framework. This framework assumes that water use and its governance in a watershed is shaped by three factors - how is accountability defined for water resources management; who is accountable and how transparent are the decisions and actions in water usage and management; and finally, who gets to participate in the governance of these resources. These three factors are formative to effective watershed-level collective action.

The TAP framework—Transparency, Accountability, and Participation—provides a structured human-centric approach to understanding and improving water governance.

Transparency: Clear and accessible information on water availability, usage, and management practices fosters trust and informed decision-making among stakeholders. Practically, it means ensuring that information about water resources, usage, and management is openly available and accessible to all stakeholders. Similarly, decisions by communities leading to collective actions must also include a high level of transparency.

Accountability: Holding authorities and users accountable for their actions ensures responsible water use and management. This includes regulatory compliance, fair allocation, and enforcement of water-related policies. In practice, this involves establishing clear roles, responsibilities, and mechanisms for holding water users and managers accountable for their actions and decisions. At the same time, collective action efforts also require a high degree of accountability that is a function of responsibility by individual members and transparent means of communication.

Participation: Involving communities, stakeholders, and users in water management processes leads to more inclusive and effective solutions. Participation ensures that diverse perspectives and needs are considered, enhancing the legitimacy and acceptance of water policies. Participation also means a democratic means of data-gathering, and community decisions leading to collective actions. Participation involves the inclusion of all stakeholders, irrespective of the proportion of their stake in a water management effort. Gender, equality and social inclusion (GESI) is an integral part of many programmes today. Participation involves integrating GESI into a water management and governance effort.

Applying the TAP framework can help identify and address the social, institutional, and governance-related barriers to effective water stewardship, complementing the technical and environmental aspects. By incorporating the principles of transparency, accountability, and participation, water stewardship frameworks can help organisations and communities:

- Develop a comprehensive understanding of water-related risks and opportunities
- Engage with stakeholders to identify and address shared water challenges
- Implement water management strategies that balance the needs of different user groups
- Monitor and report on water stewardship performance
- Continuously improve water stewardship practices through learning and collaboration

The TAP framework provides a foundation for building trust, collaboration, and shared responsibility in water stewardship, ultimately leading to more sustainable and equitable management of water resources.

[4] TAP Framework is proposed by Dr Himanshu Kulkarni. It articulates a human behaviour centric thinking of water resource use and governance and is derived from many programmes in India discussing the including factors of accountability and transparency. However, both of these cannot be fully met without a strong inclusion of participation by various stakeholders..

Actors and roles in TAP

The TAP framework in its application rests on an identified set of actors in a watershed. The following table identifies all the stakeholders who may be identified as actors. For the identified actors, the table describes how transparency, accountability and participation of the respective actors influence the watershed outcome.

Using the TAP Action Table: Any user of the blueprint methodology (site managers/government officials at appropriate levels etc) can use this table to identify actors in their watershed and develop a quick profile of the actors in terms of their status on TAP. Developing the TAP table for a watershed can lead to the identification of the most suitable actors and potential sites to begin addressing the water challenges of a watershed.

In water stewardship standards (like AWS' Standard) there is a stage for identification of shared water challenges in a watershed or catchment. This table can serve as a precursor to understanding the shared nature of challenges. It can also help in the identification of gaps in governance and overlaps in the influence of actors. The table, at this stage, is only to illustrate the case. It remains flexible to build in actors and their roles and responsibilities as appropriate to any specific location.

Actors	Transparency	Accountability	Participation
Government Institutions in Water Governance & Associated Sectors (e.g., Forest Department)	**Role:** Custodian of water data and allied data. **Current Status:** Limited data availability in the public domain. Moreover, data at gross, and regional levels. Publishes a water atlas annually. **Improvement Needed:** Increase data transparency by providing real-time access to water data, and making detailed reports and datasets available online.	**Role:** Responsible for managing water resources and ensuring water availability. **Current Status:** Limited accountability to the public, mainly focused on providing drinking water needs. **Improvement Needed:** Establish clear accountability mechanisms, such as performance audits and public reporting.	**Role:** Leads decision-making processes. **Current Status:** Conducts limited public consultations; minimal interaction with businesses on water issues, except through established regulatory instruments. **Improvement Needed:** Foster greater public and business sector involvement in water-related decision-making through regular consultations, workshops, and stakeholder forums.
Community-led Institutions	**Role:** Currently no significant role in transparency. **Improvement Needed:** Empower these institutions to collect and share local water-related (usage) data with broader networks and platforms to enhance grassroots transparency.	**Role:** Moderately accountable to their users. **Current Status:** Existing mechanisms ensure some level of accountability. **Improvement Needed:** Strengthen internal governance and accountability by adopting formal reporting and feedback systems.	**Role:** Willing to participate in decision-making but have less influence. **Current Status:** Limited power to influence resource use or allocation decisions. **Improvement Needed:** Increase their decision-making power by including them in local water management boards and committees, ensuring their voices are heard and considered.
Industry/Private Sector	**Role:** No significant role currently. **Improvement Needed:** Mandate the disclosure of water usage data by industries to promote transparency and encourage sustainable practices.	**Role:** Ensuring water security for their needs. **Current Status:** Limited to ensuring their water needs are met. **Improvement Needed:** Enforce regulations requiring industries to report water usage and impacts, and implement penalties for non-compliance.	**Role:** Currently, minimal involvement in broader water management decisions. **Improvement Needed:** Actively involve industries in water stewardship initiatives, allowing them to contribute resources and expertise to community water projects.

The following example serves as a case to understand the utility of the TAP action table. The example assumes a brewing and bottling unit in the beverage industry. This hypothetical unit is water intensive due to the use of water for the production of the beverage, wherein 2 litres of water is used to produce 1 litre of the finished beverage. It is assumed that the unit is located in India in a watershed that has aquifers categorised as moderately stressed. Let us examine the TAP framework as it relates to this unit in the beverage industry.

Assuming that the TAP framework is applied for a set of outcomes, the table illustrates how an action set can be designed.

Actors	Transparency	Accountability	Participation
Agricultural Users	**Role:** Water use for wells is not measured; canal water volumes are known but not always transparent. **Current Status:** Incomplete data on water usage. **Improvement Needed:** Implement metering and monitoring systems for both borewell and canal water usage to ensure transparency.	**Role:** Limited to areas with canal irrigation. **Current Status:** Minimal accountability for water use, especially for private borewells. **Improvement Needed:** Develop policies requiring water use reporting and create incentives for sustainable water practices among farmers.	**Role:** Limited participation in canal irrigation areas; none for borewell users. **Current Status:** Inadequate representation in water management decisions. **Improvement Needed:** Facilitate farmer involvement in water user associations and irrigation management committees to ensure their input in decision-making processes.

Net Outcome:
1. Reduced water withdrawal and consumption through process optimization, water recycling and reuse, and innovative technologies. 2. Improved water quality through advanced treatment and responsible discharge practices. 3. Replenishment of water resources through watershed protection, groundwater recharge, and other restoration efforts. 4. Increased resilience to water-related risks through better understanding of water availability and collaboration with stakeholders.

Action Table:

Component	Action	Outcome	Cost of Achieving Outcome (as % of total available budget)
Transparency	• Openly report on water withdrawal, consumption, and discharge data, as well as water quality • Disclose water footprint across the value chain, including agricultural supply chains	• Allows stakeholders to understand water impacts • Enables holding companies accountable	• Hiring water auditors: 1-2 % per audit • Implementing monitoring systems: 2 -10%
Accountability	• Set clear water-related targets and goals • Implement monitoring and reporting systems to track progress • Propose developing a water credit system to incentivize conservation	• Ensures compliance with regulations • Drives continuous improvement • Promotes efficient use of budgets	• Developing water stewardship strategy: 4-10% • Implementing tracking and reporting systems: 10-20%
Participation	• Engage with communities, governments, NGOs, and other users to understand challenges and develop solutions • Partner with organisations to share best practices and learn • Involve employees and customers in conservation efforts	• Facilitates collaborative problem-solving • Ensures shared ownership of goals • Leverages external expertise and funding • Aligns efforts with sustainability objectives	• Hosting stakeholder workshops: 1-4% per event • Partnering with NGOs and research institutions: 10-40 % per project • Running employee and customer engagement programs: 2-10%

Cost Explanation:

- The costs mentioned are indicative and can vary significantly based on the specific context, scale, and complexity of the beverage company's operations in an emerging market economy.
- Costs for transparency measures like audits and monitoring systems can be lower in emerging markets due to lower labour costs but may require more capacity building.
- Developing and implementing accountability systems like water stewardship strategies and tracking platforms can be more expensive due to the need for specialised expertise and technology.
- Participation costs can vary widely depending on the level of stakeholder engagement, the number of partnerships, and the scope of employee and customer programmes.
- Overall, beverage companies should expect to invest a significant portion of their operational budgets (potentially 1-5%) to achieve meaningful water stewardship outcomes under the TAP framework in emerging markets.

Implementing collective action

In water stewardship discussions it is often asked what collective action means for participants. We step aside from that question wherein most responses try to achieve an all-encompassing definition. Most versions of such definitions can be accepted as aspirations. Instead, we ask what is required for collective action in a watershed.

This section concerns itself with implementing collective action in a watershed - beginning with asking, "What is required?". It then lists the necessary requirements and explains what they mean. We draw on our specific experience of implementing a collective action-led project in two pilot watersheds in Bengaluru and Chennai for more than two years, while also drawing upon other, wider experiences along similar lines.

Collective action requires a robust foundation of knowledge that is accessible and understandable to all stakeholders involved. The principles of "Open Data" should be employed to ensure transparency and inclusivity. The knowledge generated must be in a form that can be easily communicated and utilised for decision-making at local scales. This includes high-resolution data from household surveys, groundwater levels, and governance structures.

The following are necessary requirements for collective action:

Demystified knowledge - "Open Data" principles: Using open data principles, the aim is to generate, improve, and communicate knowledge effectively to promote collective action. The data must be demystified and made comprehensible for local decision-making, ensuring it is actionable at both local and broader institutional levels. This involves integrating various data sets such as rainfall patterns and household narratives to provide a comprehensive understanding of the watershed dynamics and enabling access through decision support systems such as CII's Water Planning and Assessment Tool (WATSCAN) . Every stakeholder must strive to make data openly available and accessible. Further, key stakeholders can also take charge of ensuring that the data is in a communicable form to inform local-level decision-making.

Communication and Skill Building: This includes the mode and means of communication and building skills in effective communication. Effective communication is essential for bridging the gap between knowledge and decision-making. It involves not only the mode of communication but also the means and skills required to convey the inferences from data to different audiences. Investments in communication skills are necessary to ensure that messages are tailored to diverse groups. Facilitating dialogues between people from different locations and backgrounds to enhance mutual understanding and cooperation is also included in this aspect.

Principles of engagement at the watershed level will require:

- Transparency, Accountability, and Participation (TAP framework)
- Facilitate experience, dialogue, and self-critique among actors

Process of data to decision to action: The process of converting data to decision to action involves several steps. First, the data needs to be collected and analysed to identify patterns and trends. This analysis should then be communicated to the relevant stakeholders in a way that is understandable and actionable. Decisions made based on this data must be implemented at the ground level, with continuous feedback loops to ensure the effectiveness of the actions taken. This process requires collaboration between various organisations and institutions to ensure that all aspects of watershed management are considered.

For instance, in the Sriperumbudur watershed near Chennai, there are three main sets of data:

1. Watershed delineation and hydrological data from secondary databases. This was collected by the Confederation of Indian Industry - The Water Institute (CII-TWI). This informed the water allocation analysis.
2. High-resolution, high-risk household data collected by Myrada.
3. Data on institutions and governance structures as well as practices collected by Foundation for Ecological Security (FES).
4. A set of nature-based solutions (NBS) with cost-benefit analysis and their applicability to semi-urban watersheds. This was developed by WELL Labs.

The data-decision-action process can be set in motion by asking a set of questions. This is a simplification of a multi-faceted problem as encountered in a typical watershed. However, this will help any person in charge of water stewardship get started. It will enable the professional to develop the 'first comprehensive picture' of the watershed. Begin by finding answers to the following set of questions.

	#Question	Tools to Use
1	What is the current total amount of water received in the selected area from all sources?	Secondary Data Analysis, Hydrological Models
2	How has the land use and land cover changed over the preceding decade (ex: a study in 2024 can use the period 2013-2023)?	Remote Sensing, GIS, Land Use Data, Land Use and Land Change (LULC) maps
3	What is the current water demand in the selected area disaggregated by water use category?	Water Use Surveys, Statistical Analysis, Water Demand Maps
4	What is the total amount of water available for use in the watershed?	Hydrological Models, Water Balance Studies, Water Availability Maps
5	What is the percentage of current demand that is being met?	Water Supply Data, Demand Analysis, Water Balance Studies
6	What is the current water storage capacity in the area?	Reservoir Data, Infrastructure Surveys
7	What is the available storage potential in the watershed, and what percentage of future demand can it meet?	Capacity Assessment, Demand Projections
8	Projections or demand scenarios of water demand sector-wise for the next 10 and 20 years.	Demand Forecasting Models
9	Projections for land use and land cover changes for the next 10 and 20 years.	Land Use Models, Scenario Analysis
10	What has been the precipitation trend over the preceding decade (ex: a study in 2024 can use the period 2013-2023), and how will it change in the next 10 and 20 years?	Climate and Meteorological Data, Trend Analysis, Climate Models
11	What is the temperature and relative humidity over the preceding decade (ex: a study in 2024 can use the period 2013-2023) and how will it change in the next 10 and 20 years?	Meteorological Data, Climate Models
12	What is the aquifer recharge and how is it likely to change in the next 10 and 20 years?	Groundwater Models, Climate Impact Studies
13	How has water quality changed over the preceding decade (ex: a study in 2024 can use the period 2013-2023)?	Water Quality Data, Monitoring Reports
14	What are the locations of critical/ stressed sources of groundwater?	Groundwater Surveys, Stress Analysis Tools

Agency of actors: We identified actors and their roles in the TAP framework discussed earlier. The TAP framework may be a useful way for decision-makers to understand where to start, which groups are most suitable for collective actions on identified water issues, and develop a plan of action accordingly. This understanding is critical for successful collective action. It requires recognising the roles of various organisations and their contributions, such as data collection, community engagement, and policy advocacy. Experience, dialogue, communication, and self-critique are important components of any agency that links policy, institutions, and governance, ensuring a cohesive approach to watershed management.

For instance, in the Sriperumbudur watershed near Chennai:

- Farmers and community members are directly associated with household-level decisions.
- Local institutions like panchayats, water user groups, and pond custodians are the groups of relevance for community-level decisions.
- Policymakers like the irrigation department, agriculture department, water supply and sewerage board are relevant for introducing appropriate policy and for enabling the policy environment.

Equity and efficiency: Equity and efficiency must be addressed together to ensure fair and just outcomes in watershed management. Investments should focus not only on efficiency measures, such as improving irrigation systems or efficient water-saving technology at the industrial level but also on ensuring equitable access to resources. This involves making distinctions between efficiency and equity and addressing both through targeted interventions. The ultimate goal is to achieve a balance where efficient practices do not overshadow the need for equitable resource distribution.

For instance, in the Sriperumbudur watershed near Chennai, some of the intervention options identified from data and stakeholder engagement appear as follows:

Investments for Collective Action	Considerations
• Replace inefficient irrigation methods with efficient ones on farms • Promote water-efficient crops and technologies • Incentivize farmers to adopt sustainable practice	• Apply the precautionary principle to ensure investments do not adversely impact vulnerable groups (remunerative farming can displace tenants) • Balance equity and efficiency in water management

Policy Context

The policy context plays a crucial role in facilitating collective action in watershed management. National and sub-national policies should be designed to encourage collective efforts and provide incentives for sustainable practices. Good practices on the ground can influence policy shifts, and robust policies can guide collective actions. This two-way relationship between policy and practice is vital for achieving sustainable management of water resources. The integration of institutions and governance structures into policy frameworks ensures that collective action is supported at all levels.

For instance, in the Sriperumbudur watershed near Chennai, some of the intervention options identified from data and stakeholder engagement appear as follows:

Policy Enablers for Collective Action:	• Encourage public-private-people partnership model • Offer incentives based on changes in behaviour at the ground level • Consider demand-side factors (e.g., urban migration, non-agricultural employment)
Institutional and Governance Roles:	• Define the role of local institutions (e.g., water user associations) in collective action • Integrate participatory groundwater management and participatory irrigation management
Desired Policy Outcomes of Collective Action:	• Sustainable management of water resources • Improved livelihoods and economic outcomes • Sustainable ecosystems

The following table includes a quick checklist of ingredients for collective action. We assume that this may be a useful starting point for a decision maker or site-level team to begin organising their thoughts on what it will take to achieve their business mandate on water stewardship and line up resources as well as estimate effort accordingly.

Guidelines for Companies to Achieve Water Stewardship Goals

	Steps	Description
1	**Identify Key Stakeholders that 'can'**	Who are the actors who are involved in water management? This could include government bodies, community institutions, industry partners, and agricultural users. Check if the identified actor is also capable of participating in water stewardship-related actions. Typically (in emerging markets), communities and community institutions cannot, even if they stand to be highly impacted.
2	**Enhance Transparency**	Implement internal policies at the facility level and commonly agreed ways of working between various actors in the watershed for transparent reporting of water use and conservation efforts. Collaborate with government institutions to share and access water data.
3	**Increase Accountability**	Adopt industry standards and best practices for water management. Engage in third-party audits and certifications to validate water stewardship efforts. The AWS Standard System is best positioned to assist with this.
4	**Foster Participation**	Create platforms for regular dialogue with community institutions and agricultural users. Involve stakeholders in water management projects and decision-making processes. Support and participate in public consultations and water forums organised by government institutions.
5	**Develop and Implement a Comprehensive Water Stewardship Plan**	Assess current water usage and identify areas for improvement. Set clear, measurable goals for water conservation and management. Allocate resources for the implementation of sustainable water practices. **This can be done effectively with the AWS Standard Systems framework.**
6	**Communication and Awareness**	Conduct training and awareness programs for employees, stakeholders, and the community on water conservation and sustainable practices. Share success stories and best practices to inspire collective action. Various forums like Impact Accelerators of AWS, farmer training programmes through Agriculture Extension Services etc are useful for this.

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