Chapter 6
Local Governance and Participative Water Management in Urban Contexts

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Abstract Water governance has traditionally been in the hands of local communities. During the British Colonial period, and later in Independent India, the State arrogated control. While intentions were good, the outcomes were not. On the other hand, local water governance deteriorated with the decline of local institutions. While macro management should have taken a wider view of the resource, micro management had to ensure equitable distribution. Neither achieved their outcomes owing to limited abilities and vision. Further, the ability of local government institutions varies from state to state and, more often than not, declines with its size, i.e., smaller urban local bodies or panchayats are less capable than larger ones in water management. To address this, both the national and state institutions need to build capacities of local institutions while transferring power and finances to enable them to do their job. On their part, local institutions need to see their role as managers and not merely implementers of national or state policies and programmes.

Keywords Local water management · Community ownership · Water governance · Mansagar Lake · Jaipur · Bhopal · Odisha · Arvari Sansad

A poster on water shows a tree, roots and all. The caption says water from the top has no effect till it reaches the ground. That sums up how water ought to be managed, from the ground up. It also shows how it is managed in a top-down manner, by looking mostly only the higher levels of management and ignoring the local levels. There is a clear demarcation between macro and micro management in policy and practice. While macro management must take a wider view of the resource, micro management has to ensure equitable distribution. There are several problems with both levels of management originating from the ways macro managers view water (as an input) and micro managers lack the capacity to discharge their responsibilities. As per the national water policy which has been largely adopted by the states, the drinking water for human and other consumption has been given highest priority followed by agriculture and industrial uses in that order.

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Integrated water resources management (IWRM) requires the multiple sources and uses to be factored in. It considers water as a resource to be managed, rather than just an input for other uses. The sources are surface water and ground water. The major uses are domestic, livelihoods, agriculture and ecological. The quality and quantity of water from the different sources and uses vary sharply. The least quantity is for water for domestic use, but this demands the highest quality. Agriculture on the other hand needs the most water but of lower quality.

This chapter looks at the role of local government in water management in urban and rural areas. Each has its own section and examines it from the local to the state and Central levels with case studies. Local governments in an urban setting include municipalities while the higher levels include state and Central governments. Rural local governments include block and gram panchayats while higher levels start from the district through the Central government.

Municipalities are stand-alone entities reporting to state urban departments that in turn have a dotted-line reporting to the Central Ministry of Housing and Urban Affairs (MoHUA). Panchayats are 'managed' by block officials or engineers who report upwards to districts, state rural development departments and the Central government. At the Central government level there are multiple ministries concerned with water, the Ministry of Drinking Water and Sanitation (MDWS) being the most important from the point of view of local governance in rural context, followed by the ministries of rural development, panchayati raj, water resources and environment and forests. The districts are the unit of administration where macro plans merge with local ones and planning and implementation start.

Water does not follow administrative boundaries as watersheds and aquifers usually spread over several panchayats, or conversely a panchayat has more than one of them. This applies to larger areas as well. It makes planning and management of water resources difficult. Another confounding factor is the multiplicity of agencies at all levels. Irrigation, forest, rural development, fisheries, agriculture and revenue are some of the departments that control local water resources. Each has competing priorities that dictate how they manage water. On the other hand, the local level users have to share the same source for multiple uses.

Conventional water management does not differentiate between sources. The same source, usually groundwater, feeds multiple uses. A tube-well can be used for drinking, animal husbandry and agriculture. The overflow goes to recharge ground water or results in surface runoff water. It's the same case with ponds and rivers. This approach does not consider quality and focuses on adequate allocation in quantitative terms with the assumption that the quality will be taken care of by the consumer/indenting agency.

Government water provision for rural drinking water demands relies excessively on ground water. MDWS' statistics indicate over 90% of water for domestic use comes from this source.[1] Nearly 50% of water for irrigation also comes from the

[1] Census of India 2011.

same source, according to the Ministry of Water Resources. Rain irrigates over half of the farmed area. Surface water channelled through canals accounts for just 26%.[2]

In this muddle, local governments find themselves as passive recipients. This is despite the fact the National Rural Drinking Water Programme (NRDWP) mandates a role for panchayats to plan and monitor drinking water. Farmers get loans to install tubewells and subsidised (or free) power and diesel to run them. Village ponds are made and maintained by local people, their labour paid for under the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS).

Irrigation infrastructure is built and operated by Central and state irrigation departments. They have little to do with local governments as works are planned and operated by state departments, subject to the availability of water. Irrigation is the single largest user of water, consuming more than 80%.[3] Most of the time, raw water is shared between the irrigation and the domestic sectors where the dependence has been increasing on large reservoirs as the source (Water grid of Gujarat). Real time allocation and reservation of the water for various uses is strongly affected by the political economy and the pressures of livelihood assurance. Due to limited capacity of the rural and urban local bodies to provide adequate financial and political resources, the domestic use has the potential of getting short changed in an intensely competitive environment even though drinking water has been given the first priority by the Water Policy.

Local governments in rural and urban areas, therefore, have limited say in how water is supplied or allocated. One of the key problems affecting equitable water distribution in urban and rural areas is the limited capacity of the local bodies to maintain and operate the last mile distribution systems, which require large fund inputs that cannot be recovered from the end beneficiaries because of populist consideration. This leads to situations where even after providing adequate quantities at source, the pockets experience intense scarcity. Often, in such circumstances, people in both cities and villages have their coping strategies to make up for systemic deficiencies. Nearly 30 million tube wells—quite some numbers in the areas served by the piped networks in India—are a testimony to this. Most are privately owned. Digging of wells and of late, tubewells has been a traditional way of water supply at the household or community level since historic times. However, the increase in population has put this approach at increasing stress. That is not to say they have no expectations from the government: people raise demands through local elected representatives who in turn take up the matter with service providers. Public pressure has forced the latter to act. For example, Latur in Maharashtra faced a severe drought in 2016 and the state government started a water train to bring water from 160 km away.[4]

[2] Agriculture Census 2010–11.

[3] Prakash et al. (2012).

[4] Rashid and More (2016).

6.1 Urban Water Supply

MoHUA launched the Accelerated Urban Water Supply Programme (AUWSP) in September 1994 to provide water supply facilities in towns with populations less than 20,000. The main aim was to improve the quality of life and environment of the poor, specially the most vulnerable sections of the population such as women, children; and other deprived sections who do not have access to safe water.

In its implementation, community participation emphasis on rationalization of tariffs, separate of budget for water supply and sanitation from the municipal budget; subsidies for identified target groups and water conservation were envisaged. Operation, maintenance, distribution leak detection and preventive maintenance along with rehabilitation of existing system were given priority over new capital works. The water supply sector had to be treated as a public utility rather than a service. Water supply schemes in 575 towns were approved on March 31, 2001. These water supply schemes are to be operated and maintained by the Urban Local Bodies (ULBs) as they were mandated to do so under the 74th Constitutional Amendment.

This programme was folded into the urban reforms initiated in the mid-2000s under the Urban Infrastructure Development Scheme for Small & Medium Towns (UIDSSMT). ULBs were to prepare the Detailed Project Reports (DPRs) reflecting their priorities and submit them to State Level Nodal Agency (SLNA). SLNAs appraised the DPRs and submitted them to the State Level Sanctioning Committee (SLSC). From here, the reports were sent to MoUD and the Town and Country Planning Office (TCPO) for comments. Once finally approved, SLSC would submit the DPRs for funding to MoUD, sign a Memorandum of Agreement (MOA) for urban reforms with the state government, and send the release proposal to Ministry of Finance.

This Centrally-sponsored scheme was jointly funded by the Central and state governments in ratio of 80:10. The balance 10% could be raised by the implementing agencies including ULBs from the internal resources or from financial institutions.

MoUD monitored the scheme through a committee under the chairmanship of Joint Secretary (UD). The SLNAs were required to send quarterly progress report to MoUD through the TCPO. This indicated ULBs were to prepare DPRs that were collated and assessed the state government. Those that passed muster were included in the state plan and submitted for funding.

Currently, state action plans have replaced individual DPRs though the rest of the process more of less the same. Continuing JNNURM's mission, the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) ensures every household has access to a tap with assured supply of water and a sewerage connection. "All these outcomes are valued by citizens, particularly women, and indicators and standards have been prescribed by MoUD in the form of Service Level Benchmarks (SLBs)".[5] To provide piped water to all the estimated costs are ₹800,000 crores.[6] This is clearly an impossible amount.

[5] AMRUT (2017).

[6] Excreta Matters.

The gradation of responsibilities means the onus of planning and execution falls solely on the ULBs. In addition, they are supposed to run urban water supply networks. However, the Asian Development Bank[7] has found these are severely constrained by the following factors:

1. Involvement of multiple institutions in water governance at the ULB level, such as water supply, drainage, health, roads, sewage and finance. They often work at cross-purposes
2. Capital intensity of urban water supply. An estimate places the cost of a new connection at Rs. 20,000 and recurring costs anywhere between Rs. 15 and Rs. 30 per kilo-litre. Tariffs do not come anywhere near that
3. Large-scale procurement of hardware that is beyond the ability or finances of most ULBs, necessitating continuous grant funding from state or Central governments
4. Interface between public and private sectors is lacking
5. Political pressure on tariffs enforces insolvency on the ULB
6. High demand for water services that is growing rapidly with urbanization and changing lifestyles (people are using washing machines, flush toilets and running water)
7. Water scarcity (and becoming more so due to population growth, resource depletion and climate change)
8. Dispersed service provision since some towns have very scattered settlements. Towns themselves can be very far from a viable source pushing up costs and losses
9. Weak institutional capacity. Vulnerabilities exist in policy making, regulation, organizational management, and operations. Often one engineer manages several departments and pays attention only to the lucrative or politically important ones

Local urban water supply systems in small towns are rudimentary, designed by the department concerned of the municipality. In larger towns have well-designed systems by a dedicated water supply agency in formal settlements. But for informal settlements (such as slums or peri-urban areas), some cities provide bulk connections or high capacity ground water extraction systems connected to stand-posts or pipelines laid by an informal service provider.

On a regular basis, ULBs are unresponsive to people's needs and are supply-driven. Development of urban conglomerations especially un-planned colonies put stress on the planned infrastructure and make the same fail. Thus, people cannot decide when water will be supplied, the quantity or the quality. People must build their lives around water rather than the other way around. The logic service providers have is they have only so much water to around so must stagger supply timings.

In several slums of New Delhi, the Delhi Jal Board (DJB) has installed tube-wells. The local municipal councillor, who is usually the strongman of the area, provides that pipeline network and charges Rs. 1500–2000 per connection. Monthly charges average Rs. 30 to cover power and maintenance costs.[8] Quality is seldom monitored.

[7] Learning Lessons, Urban Water Supply Sector (2011).

[8] Personal observations from visits to slum areas in Rangpuri Pahari, Govindpuri and Sanjay Colony.

While this system is responsive to local needs, it does not, crucially, involve people in decision-making or monitoring.

As these functions are discharged by the strongman who is the operator, it distorts local governance; the supplier favours supporters over others. This causes a permanent imbalance in water supply in a closed community. It forces the have-nots to create alternatives, pushing up their coping costs. Water becomes a tool in the hands of local politicians to reward or punish. It is not a chargeable service to be provided to everybody for which the representatives are accountable. The formal water service provider has not reached into slums with formal water supply networks owing to political pressure by these same people.

DJB officials have admitted as much in meetings. Political interference is rife as the agency reports to the state government. Localities supporting the ruling political dispensation get preferential treatment. In an experiment to circumvent this, DJB piloted private supply and tariff collection in three zones, Nangloi, Malviya Nagar and Vasant Vihar to improve service levels and tariff collection. DJB retains 'ownership' of the resource while private operators run the network.

Many other cities have experimented with public-private partnerships in small areas. The results are mixed.[9] Most people, according to research, consider water to be a free service. This works if the service provider is the government or its agency who can be bullied. A private supplier, concerned with profits, will ensure bill collection or disconnection. In PPP models, it is the people's representatives, and not the people directly, who set tariffs. People do not directly get to decide hours of supply and other issues. Again, the political economy ensures that local government interferes with the influence people have over their water service providers. This is appropriated by their elected representatives who, as we have seen, may have a different agenda.

Tariffs are another area where people have little say. Water tariffs, either volumetric or fixed, cover between a quarter and a third of the cost of supply. Some ULBs meet this gap by charging high tariffs from industrial connections or selling sewage, but the balance sheets of most are red. Water and power supply are the main causes. Raising tariffs is nearly politicallyimpossible. In turn, this means ULBs are permanently dependent on their state governments for grants. This further erodes any influence local people may have in planning or monitoring water supply systems. In fact, the Indian state water apparatus still shows little interest in the key issues of the management stage—participation, incentives, water entitlements, transparency, entry of the private sector, competition, accountability, financing, and environmental quality.[10]

[9] Excreta Matters (2012).

[10] Briscoe and Malik (2006).

This cycle of poor public participation, high capital costs, inadequate tariffs and overall poor governance, has created a situation in most cities where only a fraction of the population has municipal drinking water. The urban middle class have learned to make do with this. Their coping strategies include creating household storage, bottled water for drinking and household water purification systems. They have shown great ingenuity in 'working around' a poorly governed water system, purchase of water from vendors, and private wells to tap groundwater.

This works for the middle class even though they pay many times what they pay the water utility. But the urban poor fare far worse. They live in slums or resettlement colonies at the end of the water network, or off grid. They cannot afford to make the same coping investments as the middle class. They depend heavily on water vendors, most of which are, again, supplied by groundwater, and provide water of very high cost and dubious quality.

> Slums and informal settlements make up 25-40 per cent of most cities' populations. On average they consume just 5 per cent of the total water supply. This is a very iniquitous situation, aggravated by their exclusion from formal water networks. The political economy is at work: these are vote banks that are kept on the edge of basic services provision by their political masters by making provisions out of an already stressed system. Members of municipalities and councils who are supposed to voice their interests have instead appropriated the space occupied by suppliers. People have no say in water supply in these areas. As citizens of the country, they have a right to water and sewage services, and the willingness to pay. Ample studies bear this out. Some studies have put the amount slums 'tap' at just 5% of the total water supply to a city/town, less than the 50% distribution losses.

ULBs report to a state department of urban development that adapts national policies and allocates funds. While the Central government stipulates guidelines for urban water supply such as the quantity in litres per capita per day (lpcd), quality, distance to water point, etc., state governments modify these to suit their peculiar urban situations. State governments pass these guidelines onto ULBs for implementation as the situation in each town is unique.

Let us take the example of service level benchmarks for urban water supply. These have been developed by the Central Public Health Environmental Engineering Organization (CHPEEO), the technical wing of MoHUA. State urban development departments were advised to adopt it to guide ULBs on water supply, sanitation, sewage and storm water management. In principle, one department in a ULB was to handle all these activities; in practice there are several departments, officials or engineers.

The Service Level Benchmarks (SLBs) set the standards and define roles for each level of government described in table[11] below:

[11] Central Public Health Environmental Engineering Organization (2009).

Central government	State government	Urban local bodies
MoHUA will take the lead disseminating these service level performance parameters and building wider acceptance. They will be institutionalized through the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and other programmes. They will be an integral part of City Development Planning processes, both for assessment of current situation, and for setting targets under their plans. Wherever appropriate, SLBs will be dovetailed with the commitment on reforms, and subsequent process of appraisal of reforms. The SLBs should be part of Detailed Project Reports for concerned sectors, indicating both the current situation and what change the project will bring about. Subsequent processes of monitoring implementation of the project will also examine these SLBs. Under AMRUT, support may be extended to enable ULBs and other civic agencies to establish systems in their respective institutions for periodic measurement, reporting and analysis of SLBs	State Governments and their agencies in the urban sector have a critical role in driving performance of ULBs and city level civic agencies. State governments will need to periodically examine the SLBs as an input for its decisions related to policy, resource allocations, providing incentives and penalties, channelizing technical and manpower support, and regulatory considerations amongst others. The Directorate of Local Bodies/Department of Municipal Administration will need to play a key role in this process through constant inter-city comparisons. These departments should leverage the power of information technology to build and operate systems that periodically capture and report on SLBs. Web-based technologies should be leveraged for managing information flow. For other nodal state level agencies, the SLBs will provide specific inputs for their programs and interface with the ULBs and other civic agencies. SLBs will also be an important input to state finance commissions	ULBs are the most important stakeholders for institutionalization of SLBs. As service delivery institutions, ULBs will find it useful to institutionalize systems for performance management using SLBs. Performance data at the sub-ULB level (zone or ward level) is particularly useful for the ULB for taking appropriate decisions and monitoring performance of the various field units. Benchmarking with other cities within a state, or with similar cities facilitate a healthy competitive environment for continuous improvement. As the principal elected institution for self-governance in the city, ULBs will need to examine performance of other para-statal civic agencies, even if the ULBs are not directly responsible for service delivery in those areas. Performance management data using SLBs should be included in the set of information disseminated under mandatory public disclosure, as required by the reforms under AMRUT

This table show a gradation of roles from MoUD to ULBs. The Central Government makes and disseminates the policy to the state departments concerned. In turn, state governments tweak them and allot money, incentives and penalties, ensure human resources and monitor the performance of ULBs. ULBs implement the policies.

The ability of ULBs to manage or build water supply networks reduces progressively with the population served. While large cities have dedicated agencies, small towns typically have one engineer in charge of several departments, including water supply.

Several studies have pointed to the inability of the government water machinery to address the problems of the provision of urban water supply services. User charges are negligible, resulting in lack of accountability and insufficient generation of revenue even for O&M. The gap between tariff and value of water supply services has fuelled endemic corruption. Staffing levels are 10 times international norms, and most public funds are spent on salaries and pensions instead of maintaining infrastructure of creating new networks. This has been aptly described as 'Build-Neglect-Rebuild'.[12]

In principle, therefore, while urban water management ought to be completely within the ULBs' control, it is anything but. ULBs should decide and execute projects to ensure their citizens get adequate water of the stipulated quality. In practice, ULBs are permanently dependent on state governments for funds, bulk water supply and even treatment and distribution. In many states, a state agency sources and supplies bulk water to ULBs who treat and distribute it within their territories.

In Uttar Pradesh, the UP Jal Nigam performs these functions. In Karnataka, is the Karnataka Urban Water Supply and Drainage Board is the agency concerned, in Tamil Nadu, the TN Water and Drainage Board. There are similar agencies in most states. The good thing is they are staffed by experienced engineers familiar with building and running water supply networks.

The bad thing is they are not transparent, responsive or accessible to the people they serve. This top-down, hierarchical and rigid model takes a one-size-fits-all approach to water supply. Only planned or 'recognised' settlements in towns and cities are covered. The rest are left to their devices. There is no emphasis on water management, just on supply.

While intra-city water sharing is iniquitous, as we have seen, sourcing water is equally problematic. Few cities have adequate resources within their geographic boundaries. This propensity to source water from external and distant sources has been a cause for conflict between rural and urban India, and between states. Again, ULBs have no say in sourcing or conflict resolution.

Water sources pose perhaps the single biggest challenge to urban supply systems. In nearly all towns, ground water is over-extracted and polluted. The Central Ground Water Board's 2015 assessment report says, "A serious ground water crisis prevails currently in India due to excessive over-extraction and groundwater contamination covering nearly 60% of all districts in India and posing a risk to drinking water security of the population.[13]"

The report states that out of 6607 assessed administrative units (Blocks/Taluks/Mandals/Districts), 1071 units were over-exploited, 217 units were critical, 697 units were semi-critical, and 4530 units were safe. The moot point is, the endangered units happen to be in and around urban areas.

Conventional approaches to urban water supply of drilling tube-wells and connecting pipes to overhead tanks will, therefore, not be viable much longer. Surface water is not always available or may be too polluted to use without expensive treatment. Agra, a few hundred KM downstream of Delhi, received Yamuna River water

[12] India's Water Future.

[13] Report of the Groundwater Estimation Committee (2015).

that is too polluted to treat by conventional means. It has had to construct tertiary water treatment plants that are grant-funded and expensive to operate.

Some conflicts in recent years are those between Delhi and Uttar Pradesh over sharing water from the Tehri Dam and between Delhi and Punjab and Haryana over the Sutlej canal. Bangalore draws on the Cauvery River that is disputed by the states of Tamil Nadu and Karnataka. Chennai sources water from rural areas raising the hackles of local farmers. Mumbai's water comes from artificial lakes in the Western Ghats, contested by local people living near them. Jaipur gets its water now from the Bisalpur dam that was originally built to provide irrigation to farmers in Tonk district; several died in policy firing to protest the construction of the pipeline to supply to water Jaipur.[14]

The state governments concerned have been ham-handed in their response. Police have been deployed to forcible silence protests. Delhi, Haryana, UP and Punjab have attempted to dialogue with mixed success. The Central government, which is Constitutionally mandated to intervene in inter-state water disputes, has opened endless dialogues with these governments. Rather than reach an agreement, these have simply exhausted the parties and options.

Current domestic water supply approaches in cities do not provide an opportunity for users to choose their service. People should use the available water supply in the area or city. While water pricing depends on the utility, the water sources are often limited. Both pricing and supply are, however, of primary concern for water users. In the past there were movements to privatize water utilities to enhance profits. However, such movements have been revised to balance the public aspect of water utilities in meeting the social needs together with the business aspect of operation effectiveness and cost reduction.

Another characteristic of India's water bureaucracies is the near total lack of women at mid- or senior-management level.[15] What this means on the ground is these bureaucracies are gender-blind when it comes to design and operation of water networks. Systems that pipe water into homes are not such a problem but those that provide water through stand-posts can be an issue. Factors such as distance to home and the location of these stand-posts are important considerations for women, but not for the service providers. Here again, people are disconnected from ULBs.

State level water bureaucracies are supposed to develop policies, guidelines and allot funds. They adapt national guidelines and channel Central government funds to ULBs. Most state bureaucracies are top-heavy with an excess of engineers and bureaucrats in the state capital. The districts and ULBs are deprived of human resources.

In the middle, the district governments have little say in urban water supply. This peculiar situation arises from the way reporting systems and financial flows are set up. This despite the fact most district headquarters are in towns over which they have little jurisdiction. The district collector/magistrate, the head of the district, has nominal say in how the municipalities work.

[14] Media reports from 2005 onwards.

[15] Water in India, Situation and Prospects.

Often, municipalities in smaller towns are headed by a junior officer who handles multiple portfolios. Additionally, the elected ward representatives and mayor have limited understanding of their duties and government schemes. They cannot turn to the better staffed and trained district administration for support. Instead, they must rely on a distant state government. This creates a long line of command that is inimical to decision making and, more so, to public participation in governance.

Thus, in small-town India that has grown rapidly in recent decades, water supply is at the mercy of inadequately staffed and funded ULBs. The problem is set of intensify. Big cities are huge water sinks, sucking in water from distant source and polluting water bodies for many hundreds of kilometres around.

6.2 IWRM and Urban Water Supply

IWRM principles of conjunctive use, waste treatment, conservation, equity, pricing and consultative management between providers and users are not followed by ULBs or state governments. Domestic water supply is supposed to provide clean water to people in a stable manner and is highly public in its nature. It is essential for improvements in the social environment, such as less time for fetching water, etc.

When demands for water supply increase the utility must locate new sources, and be faced with the need to implement IWRM. When introducing IWRM, conformity with plans by other municipalities or other water users must be ensured by: accounting for upstream and downstream; right and left banks; and coordination among municipalities or water utilities.

Furthermore, infrastructure such as dams, intake weirs and treatment plants can be jointly developed and a joint management framework can be established. These can present substantial advantages to the domestic water supply sector. If there is shortage of water due to population growth or rapid urbanization, water transfers from other uses, particularly the agriculture sector, can become an option.[16] However, as has been witnessed at most parts of the country, the linkage of irrigated agriculture with livelihoods and economic security, leads to intractable conflicts which, as per the Water Policy, are to be managed only through interventions at higher levels of governance.

Maximising local water supply by rain water harvesting, conservation and recycling and reusing waste water and sewage are equally critical. Studies show cities can meet up to a third of their annual water needs through these methods at little extra cost.[17] Nearly all urban centres have public buildings, parks and roads that cover a substantial surface area. Rain water from these areas can be used for ground water recharge after suitable filtration. Similarly, they have ponds and other water bodies

[16]IWRM Guidelines at the Basin Level, 2009. UNESCO, World Water Assessment Programme, Network of Asian River Basin Organizations.

[17]Excreta Matters.

that can be provided legal protection and used for both storing excess rain and ground water recharge.

However, these will require change in municipal bye-laws and an intensive citizen education campaign. ULBs have not shown much inclination to do either. However, there have been some alternatives in maximising local water availability through people's movements.

6.3 The People Step In—Mansagar Lake, Jaipur

When a deadly famine struck Rajasthan in 1596, the ruler of Amer, a town near Jaipur, built an earth and quartzite dam across the Darbhawati river to meet the concomitant water shortage. The dam directed water into a natural basin in Aravalli hills, creating the 300-acre Mansagar lake. At its centre was built the majestic Jal Mahal or 'water palace'—a summer resort where the royal family would host duck-hunting parties. Maharaja Jai Singh II restored the lake and the palace in the 18th century, the last time a comprehensive project was undertaken.

The Jaipur city administration's plans in the 1960s entailed channelling sewage from the city into the two large storm water drains that fed the lake from its catchments in the Aravalli Hills. This rapidly converted it into a cesspool and ruined the palace. The lake silted up, birds and local flora suffered. Some attempts were made to restore the lake but these piece meal, ill-funded projects were unsuccessful.

The turnaround for the lake began in 1999 when the state government developed a plan to clean up and revive Mansagar lake. The fact that it was the state government and not the ULB, the Jaipur Municipal Corporation, that took the plunge indicates a lack of foresight and ability on its the Corporation's part to undertake such a mission. This finds echo in other cities as well where municipalities have not planned and executed revival plans for lakes in their jurisdiction, as we will see. A public-private model was developed involving the Jaipur Development Authority, local citizens and a private company called the Kothari Group. Jal Mahal Resorts Private Limited won the tender for the project in 2004.[18]

The company was to clean and repair the lake and the palace and the government leased it 100 acres of land near the lake for developing tourism and recreation activities to recover its investments. Citizens were part of the monitoring committee that included officials from JDA and the Ministry of Environment and Forests. The project was executed under the National Lake Conservation Plan of the Ministry. A 99-year lease was signed between JDA and the private company at an annual lease of Rs. 2.52 crores with an increase by 10% every three years.

[18]Mansagar restoration model—success through innovation, 2013. Jal Mahal Resorts Pvt Ltd.

The first task was to stop inflow of sewage and solid waste through the drains, Brahampuri and Nagatalai, that flowed from the catchments through Jaipur, collecting the waste. In the map, the drains are marked in blue. They are fed by small streams from the east and west hills that carry untreated sewage from the city. A 1.5 km channel was constructed to divert this water to the south of the lake into a sedimentation basin on the east side of the lake. This screened out solid waste. The lake was dredged to remove accumulated silt deepening it by nearly 2 m and increasing its storage.

This had a salutary effect on water quality. Tests on water samples showed a sharp reduction in the biochemical oxygen demand (BOD) after passing through the sedimentation basin from 450 mg/L to 25. The coliform count fell from 2.4 million in 2000 to just 7000 in 2009–11.[19]

Apart from these two major steps, two sewage treatment plants also constructed to treat 7 million litres of sewage daily. This sewage was discharged into the lake. This helped maintain water levels in the lake. Mansagar Lake, that used to dry up in summers, now had water through the year. Five artificial nesting islands were made to attract migratory birds, fishes were introduced and giant bubblers were installed for aeration.

In 2010, the citizens and JDA organised a birding fair near the lake to popularise it as a tourism destination. This was a huge success and drew attention to its ecological importance.

In an unexpected development, the Rajasthan High Court in 2012 abruptly ruled that status quo must be restored in the lake. This meant dismantling all the infrastructure and letting sewage flow back in. The petitioners, K P Sharma of Rajasthan University, Dharohar Bachao Samiti and Heritage Preservation Society, said the project gave the private company undue benefits that violated various national acts and local municipal rules. However, shortly thereafter the Supreme Court stayed the

[19]Revival of Mansagar Lake, Jaipur: A case study, 2016. National Institute of Urban Affairs.

order and instructed the private company to only continue with maintenance work on the lake.

The Mansagar lake example shows how a well-conceived restoration activity can quickly run afoul of people who see conspiracies in private sector engagement in water-related projects. It also shows local authorities often do not have expertise in lake restoration and must engage experts.

6.4 Delhi, Neela Hauz

Like Mansagar, Neela Hauz in south Delhi is an artificial lake in a depression. It was created by building a low wall across a seasonal drain. The lake is at the head of a long water system that through a series of ponds and channels ends at the Hauz Khas lake. It is ecologically important as it helps maintain aquifer levels in south Delhi and is a source of water for local animals. It covers an area of about 2 ha and is bordered by Sanjay Van, a reserved forest, on three sides and institutions on the fourth.

Before Vasant Kunj and surrounding areas were developed, local people say the Hauz had plenty of rain water and was clean enough to swim in. After the developments, untreated sewage was discharged into the Hauz by the Municipality from Kishangarh, a nearby urbanised village and Vasant Kunj. This quickly reduced the Hauz to a cesspool. Local contractors dumbed construction debris and people threw garbage and dead animals into the pond. It was on a fast lane to becoming a memory like so many other water bodies of Delhi.

In 2008 the Delhi government started preparing for the 2010 Commonwealth Games. One of the projects was building a bridge over the Hauz to connect newly-made quarters for athletes in Vasant Kunj to the stadia. While residents welcomed this, they opposed destruction of the Hauz. They banded together under the Neela Hauz Citizens Group banner and launched a campaign to restore it. Public meetings and protests drew attention to the problem with the lake.

Meetings with the government revealed agencies working at cross-purposes. The Delhi Development Authority owned the land. The Public Works Department built the bridge through a contractor. The state environment and forests department gave the necessary clearances. The Municipal Corporation of Delhi washed its hands off the matter. None was willing to take responsibility for restoring the lake once construction was[20] over.

The Neela Hauz Citizens Group went to court to hold the authorities to account. This established ownership of the land, which all were denying. Some pointed to the MCD as the land owner. In court, however, DDA claimed ownership. A sequence was established for its restoration.

[20]Writ Petition No. 6914 of 2011, Delhi High Court. Malvika Kaul Versus Government of NCT of Delhi and Others.

PWD was to clear the area of all construction debris and material at the earliest and hand over the land to DDA for restoration. The Delhi Jal Board, that managed water supply and sewage treatment, was to prevent the ingress of untreated sewage from the adjacent village into the lake. Instead, it would provide treated water from a sewage treatment plant nearby. Neither happened even after the DDA completed its restoration.

As a workaround, the Neela Hauz Citizens Group worked with DDA to develop a water treatment system through an artificial wetland on the side from where sewage entered the lake. The lake was dredged, a wall constructed to raise its water level and trees and shrubs were planted to improve the local ecology. The steady inflow of water, treated and filtered through the wetland, has now ensured a stable water level in the lake. The overflow goes through a forest and into the Hauz Khas lake a few KM away.

Neela Hauz's example demonstrates the value of litigation coupled with local action in a positive manner. The group kept up pressure on the authorities through meetings, media and the courts. It drew in experts to advise on water treatment and brought DJB, DDA and PWD to the negotiating table. Called to account the agencies had to agree to a time-bound restoration plan.

The plans prepared by DDA, the agency responsible for restoration, were strange. They had construction of a boundary wall and walking track, parking area, tree plantation and beautification of the area adjoining the Hauz. There was no mention of how DDA would improve water quality. Through subsequent negotiations, the Group impressed upon the DDA officials to build an artificial wetland to treat sewage before it entered the Hauz.

The PIL impleaded DJB to only release treated sewage into the Hauz, intercept and treat all sewage flowing into the Hauz. While DJB's officials agreed to this in a meeting with the Group, it was only partly implemented. DJB intercepted one drain and diverted it to its treatment plant. Another, larger drain, was 'discovered' later and left untouched. Sewage from this one flows through the wetland, into the Hauz and beyond.

Even so, the restoration carried on till 2015. The court had ordered it completed by 2011. In its current form, an artificial wetland where the sewage enters the Hauz partially treats the water. The rest of the treatment happens in the pond. Water from the pond flows through a pipe into the neighbouring forests. Its quality is much better than a decade ago.

There are conflicting opinions on using these water bodies as treatment zones or even allowing treated sewage into them to maintain aquifers. One opinion states since DJB is incapable of treating all the sewage in the city, these bodies will continue getting untreated sewage. Therefore, all inflow of this water must be blocked to keep them from becoming cesspools. The counter-opinion states that these bodies need water and since their catchments have been built over, treated sewage is their only source of water.

The solution is viable citizens' bodies comprising residents to ensure no raw sewage enters these ponds and lakes. These bodies are already empowered under various legal cases to act and can take up the issue with DDA and DJB. It is critical

to keep these water bodies full of water and protect them from those would dump debris in them.

In this case, the city's development agencies worked at cross-purposes. The overall effect was to degrade the environment in a part of South Delhi affecting local water resources and forests. The custodian of these resources is a non-representative body, DDA. Its functioning is opaque and consequently, riddled with corruption.[21,22,23,24] When they refused to respond to letters and requests for meetings, the Group filed the PIL that forced them to the negotiating table. The first order of the court was for a time-bound restoration plan. When the agencies failed to comply, the Group filed another petition that finally forced the DDA and PWD to act.

6.5 Hussain Sagar, Hyderabad

This old artificial lake was built by Sultan Ibrahim Qutb Shah in 1575 at a cost of Rs. 2.5 lakh. It supplied drinking water to Hyderabad, but since 1930, the city has switched to other sources. It has also protected people living in low-lying areas from floods. The main threat to the lake was encroachment by private and public agencies. Over 30 years, its area shrank 40 per cent from 550 to 350 ha. Additionally, untreated domestic sewage and industrial effluents turned it into a cesspool.

Knee jerk, piece meal efforts have been going on for 15 years to revive and protect the lake. In 1995, a Public Interest Litigation was filed by K L Vyas, convenor of the Save the Lake Campaign in the state high court. The judgement covered the protection of all water bodies in Andhra Pradesh. In 2000, the Hyderabad Urban Development Authority (HUDA) issued a notification to protect lakes in and around the city but it has continued to sanction projects on water bodies. In 2001, the court finally ruled that no further permanent structures including involving activities will be allowed on or near the water of the catchment area.

In 2007, WWF and the Buddha Purnima Project Authority of the Hyderabad Urban Development Authority (HUDA) studied its biodiversity. It suggested mitigation strategies to restore the lake and improve its biodiversity. Four drains carry polluted water into the lake: the Kukatpally drain, Balkapur drain, Banjara drain and Picket drain. These carry 78 MLD of sewage into the lake, according to the state pollution control board.[25]

A sewage treatment plant has been set up on the Balkapur drain to treat 30 MLD, and another 20 MLD one has been made to handle waste water from the Kukatpally and Picket drains. However, Save Our Urban Lakes (SOUL) activists say these are inadequate. A proposal for improving water quality entailed diverting untreated

[21] 17 DDA Officers Booked for Corruption in Last Three Years (2016).

[22] Over 300 DDA Employees Face Corruption Charges (2009).

[23] MCD Tops in Corruption Cases (2009).

[24] Lokayukta be Allowed to Probe Corruption in DDA (2015).

[25] Sengupta (2015).

sewage and industrial effluents into the Kukatpally drain that bypasses the lake and empties in the Musi River. However, this has its own problems as the water is very severely polluted. In 2010, HUDA tried out bio-remediation to improve water quality with little success.

To mitigate the high concentration of heavy metals in the water and sediments, and pollution in general, it proposed bioremediation strategies using microbial inoculation, phytoremediation and bioaugmentation. In 2012, C. Venkateshwar of Osmania University claimed he had technology to clean up the lake in 15 days. Called Venkateshwara Technology, he said it would do the needful at a fraction of the cost of other methods.[26]

The different citizens groups like SOUL and Forum for a Better Hyderabad have been pressuring the government agencies for restoring the lake. In 2005 the Supreme Court appointed a three-member committee to examine all aspects of the lake. The committee assessed the encroachments and recommended their removal.[27] This is only now beginning to bear fruit.

In addition to the lake, its feeder channels have been encroached upon. GHMC was assigned the job to remove these but in 2014–15, managed to remove only 775 of 2452 encroachments. Political interference is the main reason for this. In 2015, the new government of Telangana proposed drastic measures—to drain the lake, desilt it and refill it. Thankfully, this was never carried out given its gargantuan size.

Here again, while the Greater Hyderabad Municipal Corporation (GHMC) was largely responsible for the lake's deterioration, it had no role in its restoration. The citizens and courts have kept up the pressure on the authorities. This at least has halted encroachment even though it has not had any tangible impact on the water quality. Hopefully the government and citizens will come together with a viable plan for the lake.

6.6 The Bhoj Wetlands Projects, Bhopal

There are 18 lakes in and around Bhopal, the largest of which is the Upper Lake. Created by constructing an earthen dam across the Kolans driver in the 11th century, its original spread was about 300 km^2. In 2002, MoEF declared them as the Bhoj wetland and it was declared a Ramsar site. An integrated plan for its conservation was developed and executed from 1995–2004.

On its part the state government constituted the Lake Conservation Authority in 2004 and registered it as an autonomous society to manage all the lakes in the state.

The rapid growth of Bhopal created the usual mix of pollution and encroachment. Water inflows were reduced because of construction in the catchments. Idol immersions raised the amount of clay and non-biodegradable material in the lakes. Obstruction of the spillway for the Upper Lake increased siltation. Untreated sewage,

[26] Sreedhar (2012).

[27] Nitin (2016).

dumping of solid waste by the Bhopal Municipal Corporation and encroachments along the edges polluted the water.

The conservation plan took care of these issues in an integrated manner. Executed by the Bhoj Wetland Project Directorate and supported by the Japan Bank for International Cooperation, it was started in 1993. It gathered speed only five years later when procedural and administrative issues were sorted out.

In the project, no construction was allowed within 50 m of the full tank level. Encroachments were removed and roads were built to demarcate the lake's boundaries to the north-east and south-east. Plantations were created in buffer zones to check soil erosion. The catchment areas were treated. Sewage lines, pumps and treatments plants were made—87 km of sewers were laid in areas from where sewage flowed into the lake and STPs with a combined capacity of 56 MLD were made. The lake was dredged in five zones. Idol immersion during festivals was stopped and restricted to a certain area of the lake.[28]

A NGO called Prayatna filed a PIL with the State Human Rights Commission on the mismanagement of biomedical waste by the Hammadi Hospital.

The case of the Bhoj Wetlands is interesting as it was a multi-stakeholder high-stakes project. The work done under the project was designed to handle future growth. Even though political compulsions in the form of pressure from builders continues to gnaw at the lakes, they have held their own more than a decade after the project was completed. NGOs have ensured the government remains on its toes. Here again, the Bhopal Municipal Corporate has little role to play, underlining the lack of interest and ability from the ULB.

In all the cases above, the municipality has been a bit-player or the agency responsible for destruction of the water bodies. ULBs also have little or no role in providing water, as we saw in the first part of this section. This lowest rung of governance, where citizens have a voice through their municipal councillors, is ineffective in providing drinking water or protecting what is left of local resources. The causes and solutions have been discussed above. It is for bureaucrats and politicians to provide space for ULBs to grow by handing over responsibilities to specialised cells within them. Only then can they claim to represent the needs of the people.

6.7 Rural Water Issues

Compared to the mess and opacity of urban water supply, rural water supply is relatively straightforward. In most states, a single agency such as the public health engineering department, provides drinking water while the irrigation department provides with water for agriculture. A single source usually covers multiple uses, called multiple use water supply (MUWS). For instance, the same tube well could be used for drinking, irrigation and watering animals.

[28] Kodarkar and Mukherjee (2006).

Tube wells are the main source of drinking water, covering about 80% of the rural population.[29] The trend of providing hand pumps and tube wells started in the 1960s, accelerated through the 1980s and 1990s and is now the accepted norm. Various estimates put the number of tube wells in India at about 30 million; these include irrigation pump sets, hand pumps, private tube wells, wells by industries and water utilities. This, along with urbanization, has put a severe strain on ground water as we saw in the previous section. It is now the main cause of rural water shortages.

Under the 73rd Constitutional Amendment, panchayats are mandated to build and manage their water supply systems. In practice, it is very different. The government department concerned installs tube wells or hand pumps on the demand of panchayats. In most states, they also repair faults. Some states have local networks of hand pump mechanics who, for a fee, perform this job. Some have upgraded their skills to fix piped water networks as well.

Each sarpanch and village secretary, along with the ward members of the panchayat, is responsible for preparing a water security plan. The National Rural Drinking Water Programme (NRDWP) guidelines place the onus of this on the panchayat. They also state panchayats need to have a village water and sanitation committee (later, this was change to the village health, sanitation and nutrition committee) for the purpose. The committee is to ensure all households have adequate and safe water. The current service level under NRDWP is 40 L per capita per day (lpcd) and drinking water must meet standards of the Bureau of Indian Standards (BIS).

Water governance at the panchayat level has slowly moved from a supply-led to a demand-led approach. The high gross coverage levels of 98% is one reason, as people do not merely need a top-down approach to coverage. Instead, they need a system that responds to faults and quality issues.

In this, people express their needs at gram sabha meetings that are recorded and collated into a water demand from the panchayat. The overall availability, quality or access are not considered, just the presence of a working water source. For instance, they could demand a hand pump in place of another that has gone dry. Even knowing the cause (depleting aquifer) will not deter them from placing this demand if it provides water for the present.

Sarpanchs collate and present the demands from the village to the block office where a junior engineer vets them and gives approval if it meets certain criteria. The criteria he uses is the presence of another working source within the prescribed distance (of 150 m) or recorded water quality issues. Each panchayat is provided a field test kit to do a quick and dirty quality assessment. If a problem is found, the panchayat can opt for testing in a district water quality lab. This and water plans are passed up to the district water mission for approval and action.

Each district has a water (and sanitation till Swachh Bharat Mission started) mission. The executive engineer heads the mission that is chaired by the collector or magistrate and co-chaired by the district chief executive officer. This multi-stakeholder body is supposed to plan water supply for rural areas in the district, allot funds and monitor. It is also supposed to run water quality testing laboratories where pan-

[29] Ministry of Drinking Water and Sanitation MIS.

chayats can send suspect water samples. Most districts have laboratories but not all are adequately staffed or funded. The Central government recently allowed district water missions to use the services of local colleges that are equipped to test water on payment.

In practice, it collates plans and requests received from blocks into a district plan according to a format specified in NRDWP. This is sent further up to the state public health engineering department. In some states, this sits under the rural development department that is headed by a principal or additional chief secretary. A chief engineer runs the PHED in the state, supported by additional chief engineers for different functions such as engineering and finance. Zonal engineers take care of water supply in different zones of a state. This is the typical PHED structure though some states have variants of PHED that follow the same structure.

In most states, PHEDs do not have engineers below the block level. That means one engineer is responsible for managing water supply for approximately 100,000–120,000 people spread over 12–18 panchayats and a large area. This creates problems of adequate monitoring and timely fault repair. Conventional response times stretch over days or even weeks, forcing people to fall back on poorer quality water sources.

The village water security plan should have details of the water demand, sources, distribution, source protection and quality monitoring. It can be defined as the reliable availability of an acceptable quantity and quality of water for health, livelihoods and production, coupled with an acceptable level of water-related risks.[30] The plan balances supply with demand. It takes care to identify and protect sources for drinking water. The supply must be equitable and affordable.

A complex plan like this is often beyond the expertise of the sarpanch, his secretary or others in the panchayat. Here again, the government guidelines allow them to hire experts or an NGO to make the plan. Many NGOs do this as part of their regular, grant funded projects as well. A comprehensive village water security plan can have a multi-crore rupee budget and be implemented over several years.

Even if an NGO or expert prepares the water security plan, it is best done in consultation with the sarpanch and other village leaders. There are several variables to be considered: population composition, scattered hamlets, local water sources such as ponds or rivers, ground water, rainfall, terrain, land use, forest land on the one hand. Multiple uses of water in a typical village are irrigation, watering animals and human use (drinking, cooking, bathing, washing and hygiene). Each needs water of progressively higher quality.

The main consideration in water supply so far has been of quantity of 40 lpcd. This is somewhat erroneous. A person needs about 10 lpcd of water of the highest quality for cooking and drinking at or near home. Water for bathing and washing can be of lower quality i.e., have excess fluoride, arsenic or dissolved matter; people sometimes walk to the nearest well or hand pump not used for drinking. Animals are usually bathed in the nearest pond or stream, though this also has potential to pollute a source for the neighbourhood, if carried out indiscriminately.

[30] Water Security Plan of Tumbabel Panchayat, Jharkhand (2014).

Water security plans must cover these various aspects with adequate water of the right quality. In doing so, they must ensure drinking water sources are protected. There are two types of safeguards, one to ensure there is water year-round, and the other to ensure quality. Watershed treatment upstream of the source addresses both. State and district governments, NGOs and companies have extensive watershed treatment programmes. While not explicitly directed towards water security these are designed augment overall water availability in downstream areas.

Unfortunately, in these plans panchayats are passive recipients, even though they participate in planning. Their lack of expertise and funds to implement the plans are constraining factors. Very often, plans run afoul of forest departments since a large part of the watershed activities need to be executed on forest land. In some cases, the departments build the structures needed but this is the exception. Thus, water security plans need to factor the risk that forest departments will be unsupportive. Even petitioning the district collector/magistrate can fail to convince the department to let the panchayat build watershed structures on their land.

NGOs state their plans are made and executed with the panchayat. This is partly true. The panchayat does provide inputs for planning but seldom for execution. There are exceptions that prove the rule such as in the Sobara panchayat of Gajapati district, Odisha and Hiware Bazaar in Ahmadnagar district, Maharashtra. A somewhat different approach is to be seen in the Arvari river basin in Alwar district, Rajasthan.

6.8 Sobara Panchayat's Water Use Master Plan (WUMP)

A WUMP is a participatory planning tool developed to help experts and panchayat members prepare water master plans. One definition is that is a holistic, participatory and inclusive planning process that takes an integrated approach to the management of water resources and uses at the village level. It specifies the total water budget for its planning unit, the village development committee (VDC), and explores potential uses for it. It empowers marginalized groups to claim their rights to an equitable share of water with in and between communities. WUMP also helps local bodies with annual and periodic planning and project prioritization.[31]

WUMP was tried out in the Sobara panchayat of 11 villages on the Odisha-Andhra Pradesh border, in the Gajapati district. The hills are forested on their upper slopes with tropical deciduous forests, while the lower slopes are part covered with plantations and part denuded where the indigenous Soura people practice shifting cultivation. The flatlands are sown with paddy, sugarcane, ragi, vegetables, pulses and groundnut. Parts of the panchayat are well-watered by the Mahendratanaya River.

The lower slopes of the hills in the Panchayat have been planted with a monoculture of cashew. From just 20 acres 40 years ago, the area under cashew has increased to 240 now. They do not inter-crop cashew with other plants; inter-cropping helps improve soil moisture and reduce soil runoff.

[31] Bhatta (2013).

All villages have various water sources, the most common being a dug well, followed by handpumps and streams. Ponds have also been part of the water landscape for watering animals and irrigation but most villages have relegated them to the background; these are now making a comeback as part of village WUMPs. Along with ponds, people have started making small dykes across the many drains, along with percolation tanks, for rainwater harvesting (RWH).

A few of villages (Padmapur, Hatibadi and Gowda Talasing) have piped water systems, though only the one in Padmapur works. Each village occupies its own micro-watershed making water use planning localized and simpler as there are few upstream-downstream issues. Hatibadi is the only exception to this.

A local NGO, IWD, started the two-year WUMP project in 2010 to evaluate the impact on water resources and women's empowerment. WUMP was an exercise to assess the total availability of water and future trends. By getting people to understand, map and plan to improve their water resources WUMP has effectively empowered especially women with an understanding about their rights, responsibilities, government schemes and how to approach government officials. The planning included projecting current and future water use (up to 10 years in the future), preparing water balances, source sustainability, assessing natural resources, conducting a needs assessment and training for needs assessment and planning. It culminated in developing and executing a WUMP that included a capping mechanism to control the use of water, for example through changes in cropping patterns or alternative livelihoods. Sanitation was included to demonstrate the link with hygiene, health and the use of toilets.[32]

The main planning tool was a map of each village showing houses, natural resources (forests, water bodies and streams, grazing grounds and fields), defecation areas, garbage sites, roads, hills, places of worship, government buildings and big trees. The maps also showed the cattle paths, routes people took to bathing wells or springs, irrigation channels, check dams, light points and telephone towers. They helped people understand their surroundings geographically. The NGO staff supervised preparation of the maps while the educated youth of the village made them, along with palli sabha members and women from self-help groups. It was a guided, participatory process involving the panchayat as well.

Another tool listed the power hierarchies such as the powerful people and the relationship between them, and the community. This included government officials from the panchayat to the district, their functions and schemes they administer. These helped people understand how power flowed and by extension, who to approach for specific problems. For instance, they had to approach the district education officer for opening a school, or if a school teacher was not coming on duty regularly.

The water use charts indicated how much water the average household used, for what purposes, where they got it from and who fetched it. Women fetched 4 buckets of water a day per house but households using toilets needed another two a day. Therefore, toilets had increased the load on women that was the flip side of convenience, safety and any health benefits that may accrue.

[32] Jacob (2011).

IWD's work created considerable social capital though activities in women's empowerment, strengthening panchayats, livelihoods and governance over the past decade. There were self-help groups in the 11 villages covering 90% of adult women. These SHGs had given them employment and empowerment. SHG women were more vocal, politically aware and readier to get their due from their elected representatives and government officials.

For men, the NGO facilitated the creation of Village Development Committees (VDCs). These comprised half of men and half of women in each village and were responsible for all the development work. They were instrumental in securing government schemes and money and solving local problems. Ward members were also part of VDCs.

Both SHGs and VDCs helped in village cohesion, an important factor in more effective village planning under WUMP. This pre-existing social capital catalysed the project by accelerating the evolution of consensus around any issue. To the social capital was added expertise on watershed development and rural development by empowering panchayats. The WUMP process had the following steps –

1. A transect walk to understand the physical and social geography of each village along with all village members
2. Dividing the villagers into groups for each activity
3. Identifying literate youth to make maps and charts
4. Preparing the map with the physical, social and natural features, including garbage disposal and defecation sites
5. Preparing charts on power equations in the village, disease mapping by type, season and prevalence, water consumption per house by use and the government machinery responsible for different schemes
6. Identifying watershed activities required for improving water quality and quantity. For example, in S Talasing, people decided to dig two recharge ponds and two bunds upstream of the village to ensure that at least one well downstream has more water in summer; located next to the village church, the well is the only perennial well but even that has little water in summer
7. Watershed protection such as tree plantation even inside cashew plantations where, in the places around recharge ponds, local shrubs and trees were planted. However, the scope for additional tree plantation was limited owing to the natural forests and cashew plantations
8. Identifying improvements to existing wells, toilets and handpumps to improve sanitary conditions and reduce bacterial contamination
9. Other measures to improve better village hygiene. In Hatibadi for example, they decided to keep cows off the main village street as the huge quantity of cow dung made the street hard to walk on, attracted flies and smelt bad.

WUMP has achieved early success in the panchayat to improve water use planning, community empowerment, greater ability of panchayat members to deliver services and government schemes, and leveraging government funds. More than water, what was most striking was the confidence that some of the ward members and sarpanch showed in dealing with officialdom. Whereas earlier they were content to sit out their

terms, after the programme they became proactive agents of change who wanted to derive the maximum benefits from government schemes.

This project drew on the IWRM techniques of data collection, participatory planning, watershed treatment and conjunctive use of water to work out current and future water needs, and therefore, what must be done to meet them. It brought in sanitation and influenced behaviour. It enabled the panchayat to tap into MGNREGS and other government programmes to create village-level assets such as water harvesting structures and wells.

The work continued through source protection, watershed treatment, replacing plantation crops with natural forests, reducing soil erosion and discouraging jhum cultivation. Sanitation had improved, but toilets were sometimes located upstream of water sources. This needed to change.

Much more attention was needed on water quality, a glaring omission in the early part of the project. True, most water sources were checked and found to be clear of arsenic and fluoride, but bacterial contamination was common. This could be handled simply by boiling water.

Sobara's example showed how involving a wide range of local and higher-level officials and politicians accelerates a programme. Water became the rallying point for all other activities as people recognised it as a central resource. Being agrarian, the panchayat's people use water for everything. Most own farmland or plantations. This made it easy to evolve consensuses on WUMP.

The project took in the bigger picture of water security, not just drinking water. That was an essential ingredient for its success. Had it focussed only on drinking water, it would not have got the support of most men who manage cashew plantations and rice. Even though women were empowered by being in SHGs, their power to take larger decisions—a piped water scheme for a village, for example—was still inadequate to influence higher authorities.

WUMP also had the advantage of several micro-watersheds. Nearly all villages had their own and only two shared a watershed. In their case tensions had arisen over sharing water; the downstream village had a piped water scheme and the main supply pipe ran past the upstream village. The source was common to both. The villagers upstream frequently interrupted water supply. IWD resolved the matter only after protracted negotiations and the BDO's intervention. It was a fragile peace.

A well-established NGO can stretch government resources much beyond what they are designed for. In Sobara's case this meant using available MGNREGS funds for all the watershed treatment works, including digging pits, canals and check-dams. The forest department cooperated with the NGO unlike in many other places where water security plans have come to nought because of their intransigence. The NGO had built up the social capital required to fast-track the project; it could achieve in two years what might have otherwise taken four.

6.9 Hiware Bazaar, Maharashtra

Ahmadnagar district makes news for drought rather than sensible water management. This arid part of the state is susceptible to failures in rainfall. Tube wells have lowered the water table and made finding a water vein a hit or miss affair. The hard-rocky geology makes is even harder to get ground water. In this extreme environment, the example of Hiware Bazaar stands in stark contrast to moribund government schemes.

Hiware Bazaar in Nagar taluka has a population of about 1300 comprising mostly Marathas engaged in farming. Some had taken up jobs. However, nearly all families owned some land (about 10 out of 220 families did not). Those who did not had very limited say in the programme. Till the early 1990s, the panchayat had scarce water and most farmers could just manage one kharif crop and jowar in the rabi season. Alcoholism and gambling were common.

In 1989, some young villagers persuaded Popatrao Pawar to return to the village and work. He contested the gram panchayat elections and was elected as the sarpanch. Importantly, both the impetus for change and leadership came from within the village itself. The inspiration came from Ralegaon Siddhi and Tarun Bharat Sangh.

Pawar started with 'safe' works such as fixing the school walls and expansion, and repairing the village temple. Having established his credentials, he took on more pressing issues: eliminating alcoholism and augmenting water availability. The village took up watershed development and applied to the Adarsh Gram Yojna.

Gram sabha resolutions were adopted to work on the 'panchasutri' or five principles: restrictions on free grazing, ban on tree felling, ban on alcohol, adoption of family planning and voluntary labour. Pawar set up an NGO called Yashwant Agricultural, Rural and Watershed Development Agency in 1993 and started work in 1994. Here again, the NGO was home-grown and worked with the gram panchayat.

The geographic area of the village was divided into three micro-watersheds. Activities included contour trenching and tree plantation (on forest, private and panchayat land), contour bunding, nala bunding, making percolation tanks and storage structure (bandharas). These were completed in four years under AGY. This had the immediate visible impact of raising ground water levels and biomass.

The technical quality of the watershed works and the socio-economic changes have been widely documented and acknowledged. From a single cereal crop, farmers started growing high-value horticultural crops such as onions, garlic and mustard. Additionally, more area was brought under agriculture. The animal population increased as did dairying. Milk production increased tenfold and the village set up a dairy cooperative.

Socio-economically, migration to cities stopped. People built themselves brick and mortar houses in place of mud huts. All of them had toilets and water. Women did not have to walk long distances to fetch water. But they remained domestic water providers and responsible for watering and bathing animals.

Initially, the panchayat banned cutting of trees and demarcated areas for grazing, preventing cows from entering the areas where watershed works were in progress. The gram sabha resolution on tree felling prevented people from cutting any branches

of trees on the village commons; they could do so from trees on their land. This reduced soil erosion and enabled regeneration of local flora. But it deprived landless households of firewood and nothing was done to help them. Other water works followed such as contour bunding, building recharge structures and percolation tanks.

The panchayat imposed rules for water use and distribution. These determined who would get water and how it was allotted. All landed households were in principle allowed open access to ground water without separating land ownership from water rights. Those whose benefits from watershed development were limited were compensated.

The ban on tube wells for agriculture and water-intensive crops ensured groundwater use was both sustainable and equitable (larger farmers did overdraw ground water at the expense of smaller farmers).

Perhaps what is of most concern to women is water for domestic use. This is mentioned in the objectives of watershed development but technical works take precedence. In Hiware Bazaar, only a few common sources for drinking were built for drinking water. The panchayat installed 12 handpumps that ensured the benefits of improved water availability was not limited only to those with their own sources of water. Additionally, the distance to source was reduced and dependence on tankers in summer, eliminated.

Social aspects were harder and started later. These addressed alcoholism, family planning and getting villagers to contribute voluntary labour, 'shramdaan'. The village people adopted restrictions on cultivation of water-intensive crops and on the digging and use of borewells. Sugarcane and rice were a strict no-no.

The grazing restrictions were removed once the watershed structures were completed. People could take a head-load of grass a day on payment of a fee of Rs. 100 a year (waived for poor households).

Most households contributed voluntary labour, shramdaan, for the watershed project. Households contributed because it was a requirement under AGY. They also contributed because of the perceived agency it brought them in the programme. The contributions allowed them access, within rules, to the commons created or enriched by the programme. This applied to the landless and landed households alike.

Even though water availability increased, the benefits were unevenly distributed, at least in the beginning. Bigger land owners benefited earlier and more than others because land ownership was correlated to ground water ownership. While household incomes increased, so did intra-household disparities as women seldom owned land. Some claimed their work load had increased because of the rise in cattle population.

Employment and wages went up in the village. However, even here there were disparities with women getting half as much as men. Thus, while there was more work—the cropped areas increased as did the number of animals—men and women continued to be paid different rates.

Hiware Bazaar has several SHGs that have had a positive impact on women, especially from the landless, marginal, and small households who make up the bulk of members.

A limitation of these projects and programmes is their size. Both have been very successful in small, homogenous rural communities. An NGO has worked with the

panchayat to bring about change. The amount and quality of water has increased significantly. So, has the ability of people to plan and manage it. But when it comes to taking these examples farther afield, the models falter. They run into all sorts of resistance, from different socio-cultural contexts and climatic conditions to a recalcitrant bureaucracy and sarpanchs unwilling to change. An exception to this has been the Arvari Sansad that is one of the river basin level organizations in India.

6.10 Arvari Sansad, Rajasthan

The Arvari river flows through the Alwar district of Rajasthan. It has four tributaries and tens of villages in its catchment. The area is dry, on the edge of the Thar desert. Ground water was scarce and CGWB had declared it a 'dark zone' from where no further groundwater was possible. This was despite the Sariska Forest Reserve nearby and several other ranges of the Aravallis. Since the 1940s, when forests covered a lot of the area, it had been systematically denuded and farmed. This accelerated in the 1970s and 1980s creating an ecological wasteland. Extensive and mostly illegal mining, abetted by politicians and bureaucrats, added to the toxic mix.

From the mid-1980s Tarun Bharat Sangh, a local NGO, started working on restoring the water balance in the area. Nearly all villages have ponds (johads) that had gone dry in a prolonged dry spell in 1985–86. One of TBSs' early pioneers Rajendra Singh wanted to teach children in the local villages but a tribal elder suggested to solve the water problems instead. He explained the tradition of building johads, which were created by making an earthen check dam across a ditch to stop the flow of rain water allowing it to percolate into the ground.

Over the next 30 years, TBS built over 10,000 of these simple little water-harvesting structures and restored 2500 ponds in 1058 villages. Hydrological studies have indicated recharge of ground water from johads but in the absence of a baseline, it is impossible to quantify improvements since 1985. Anecdotal evidence from talks with village people points to substantial increases in water in wells; many that were dry have water round the year.

With the revival of the river, aquatic life prospered and there was natural growth of the fish population. As a result, the government gave the contract for catching fish to a private party. The people of the region, whose hard work had revived the river, resisted this move, suspecting that the government may try and take control of the whole river. Individual villages found it hard to resist this. TBS decided to unite them and present a single face that could take on larger, river basin issues.

There were also disputes between villages, such as between Bhaonta-Koylala and Aghar, over access to the Bhairon dev Lok Van Jeev Abhyaran, or people's wildlife sanctuary. This sanctuary is spread over 14 km^2 and has been formed by the people of 5 villages who decided to protect their common lands, as also wasteland, that lay between their villages. In just seven years, the hills are green and covered with shrubs that will grow into trees. The sanctuary is proof that people willing, old cultural links between man, water and forests can be revived, with dramatic effects.

The major challenge was carrying forward the Bhaonta experiment to neighbouring villages. Aghar is a larger village of about 5000 people, few of whom depend on farming. They feel there are ample natural resources now and don't feel the need to create more. Many brew liquor illegally for which they need wood. Rather than pay, they go into the sanctuary and cut what they need. Others from the village follow their example.

"In a large village like ours with 5000 people, only those with a stake in agriculture are concerned about the environment. Traders, those making hooch and other such people have little interest in protecting it," says Gauri Shankar, shopkeeper and farmer. "The TBS's work has been extremely successful in Bhaonta because it is small and more people have a stake in farming."

To deal with inter-village disputes and external threats, the Arvari River Parliament was set up in 1999. The Parliament, with two representatives each from 72 villages, has framed 11 rules regarding the use of the river waters, relating to all aspects of water management, from the extraction or selling of water from the river, to the revival of traditional methods of water conservation. A coordination committee comprising members selected by the Parliament handles the operations and ensures compliance with the rules.

The Arvari Parliament meets twice a year and has been successful in resolving conflicts and safeguarding the water resources. Though it has no legal status and its decisions are not legally binding, the moral force of the people made its survival possible. The staff of TBS facilitated the Parliament initially and its success has consolidated its position.

The village representatives are nominated by the gram sabha, not the sarpanch. Conventionally, they are people who have worked to restore local water resources such as johads, or plantations. This loose criterion has helped ensure those in Parliament know what they are talking about and discussions are focussed on water and soil conservation.

The Arvari basin presents a stark contrast to others in the area. For most of the year, farms are green. The vegetation is diverse though still dominated by vilayati babul, the Mexican mesquite the British imported at the turn of the 20th century to 'green' the Aravallis and provide their new imperial capital of Delhi with wood. Diversifying vegetation has not so far been a priority of TBS because it involves working with the forest department. However, villagers have planted peepul, neem, bargad, bel, ashok and amla local trees that are suited to the climate and soil.

Another blind spot has been transforming the condition of women. Like elsewhere in India, women provide for water at home and for livestock. The usual source is the hand pump, installed abundantly in the villages. True, most used to run dry before TBS started work and now have water round the year. This had made it easier for women to fetch water.

However, village rules such as those forbidding the entry of cattle into ponds to preserve water quality make it necessary for them to fetch water home to bathe livestock. While good for the johads, it is not so good for the women. TBS feels a blanket approach that improves overall water availability is good for all and therefore does not need to do something specifically for women.

This watershed improvement work has been gender-blind. It has not specifically reached out to people of lower castes, other religions and the disabled. Equity, in other words, has not been explicitly addressed and remains a glaring gap in an otherwise successful venture.

True, the overall availability of surface and ground water have improved. Despite increasing population and mining for dolomite, the water situation remains stable.

6.11 IWRM?

Perhaps unwittingly these three rural water augmentation cases have followed IWRM principles (or vice versa!). They have taken the overall water availability to use and balance the water budget. Cropping patterns have been altered with consent of farmers, overuse of ground water has been curbed and local institutions have been brought into decision-making and management. The missing component, of no great significance here, has been assigning water rights.

What has worked in their favour is the absence of any industry or major town in the vicinity. Both are large water sinks drawing in resources from far afield and large quantities of water to dilute their pollution. Small and relatively homogenous communities have helped develop the social capital quickly.

The NGO model where an organization works intensively in one area for an extended period has its strengths and weaknesses. The strengths are durability and longevity of the outcomes. The weakness is the model cannot be transplanted elsewhere given its peculiarities. However, some general principles can be extracted for use in any context.

6.12 Conclusion

Communities need to step up to the line. NGOs and leaders can show the way but until the local people want change and are willing to work towards it, watershed projects will not work. The projects have a long gestation period. NGOs and leaders change but local people do not. Their meaningful engagement mitigates the risk the project will end once the NGO moves on or runs out of funds, or the leaders will change.

Building local institutions that include people, not just their leaders, is critical. Instead of focusing only on panchayats, project proponents need to reach into the communities and identify those who can play a role in the activity.

These institutions need training to understand what water management entails. Mere watershed restoration or changing crops will not be enough. They also need to view the programme from an equity angle to ensure women, minorities, lower castes and the disabled are not left behind. From providing water, these programmes

have the potential to be socially transformative; this is a missed opportunity for all of them.

Local leaders are more important to the success of programmes than the local bureaucracy. They are unlikely to move out of the area and are usually heavily invested in their communities. Giving them due importance and real work ensures the programme's success. This group includes elected representatives and prominent citizens.

The government must support at least tacitly if not explicitly. Tacit support is basically staying out of the way, not creating hurdles. Explicit support can include getting difficult agencies such as the forest department to cooperate with the local government and NGO. It can also include financial support from various programmes.

Augmenting local water availability is the cornerstone of success. Regular rainfall can demonstrate success faster but even in deficient years, well-executed watershed works can have an immediate effect. Tapping all possible resources to augment local water resources is critical. This sometimes runs counter to grandiose government water supply schemes. Local communities are the best champions of this approach.

Wastewater, especially sewage, must be accounted for in the water use master plans. Too often water projects overlook what happens to sewage. This distorts the benefits because with more water comes more waste water. Its proper segregation and treatment, with reuse, has to be part of the programme's planning and execution.

It is also necessary to understand that the sewage may become the source of raw water for downstream communities and therefore, the costs of re-establishing the quality before the same is released back into the common stream is necessarily factored in. Unless use and discard approaches are curbed, the supply assurance will come under increasing stress.

Adequate resourcing is critical. Having the money to make watershed structures or rainwater harvesting systems can make the difference between success and failure. Human resources are also needed, suitably trained and motivated. Voluntarism may be good for building a spirit of cooperation but an underlying economic sustainability model can ensure the programme's outcomes last.

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