Integration of Water Management into Planning Process

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Introduction

- Environmental Planning Collaborative (EPC) is a not-for-profit organization, which seeks to improve planning processes through action research, advocacy and capacity building and working much with the government. We started with work through funding, but realized that such projects do not have sufficient impact and we started work hands-on with the government.
- EPC believes in continuously improving existing institutions and systems.
- This presentation explores systemic interventions for integrating water management into official/legally valid planning process at various scales viz. micro/urban level, city level and regional level.

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Micro/urban level

1. Issues

1. Deteriorating water bodies

The reasons for this are several and some of them are highlighted: within city or municipal areas water bodies were perceived as nuisance due to health and hygiene factors, gradually becoming dumpyards and breeding grounds for mosquitoes and flies, hence were deliberately filled up by the municipal bodies. There was no perception of water as a "Common Property Resource" and also there is no institutional framework to address the same. Another major issue was that the emotional connection between people and water bodies got lost when water was made available to the communities through pipelines inside their houses.

2. Depleting ground water – quantity and quality

With rapid urbanization the demand of water is ever increasing. In absence of sufficient water bodies that can cater to the demand, the focus now has shifted to utilizing ground water. The increased dependence on ground water has led to its intense exploitation and water levels are receding at an alarming rate. Unplanned activities have resulted in deterioration of water bodies both in terms of its quality and availability.

3. Storm water

At present the tendency is to drain the rainwater out of the city/municipal limits as fast as possible. The current approach is a centralized system that channelizes storm water all the way to the nearest water body. Even for the present approach we don't have sufficient information, as most of the contour maps are outdated and poor

in detail (micro level planning requires contour interval of half or one meter while the existing maps have 5 m interval). With development the topography of the city changes drastically – new roads, plots getting filled up, etc. These developments are not captured in topography maps and hence our drainage systems are not based on topographical changes resulting in water logging in low-lying areas.

4. Waste water

Centralized systems are very expensive to build and hence new growth in internal and

peripheral areas is deprived of any wastewater collection/treatment because of high capital and O&M costs. Wastewater is often released untreated thereby polluting either ground water or surface water bodies.

2. Interventions

We will see a few examples of types of interventions that were taken up to address the above mentioned issues.

1. Rejuvenation of local water bodies

In an urban area if you want to protect or take care of a water body then you need to have publicly accessible developed open spaces (parks, gardens) around that water body, which will be used regularly and the deterioration will be 'felt' by the people. That is the only real way of protecting and conserving the body. In our planning process we try to ensure that development plans and micro-level plans would create such open spaces. The example shown in the picture is that of Vastrapur lake – this was surrounded by encroachments and the storm-water that drained into this lake was being blocked at different points due to developmental activities – AUDA (Ahmedabad Urban Dev Authority) gave better housing to all the people living in slums around that lake and also tried to clear up the drains leading into the lake – they tried this through trial and error without having accurate maps. Thus the water body was cleared from encroachments leading to its development and preventing from water being contaminated.

2. Conservation of ground water

The basic issues here are

a. Management of ground water withdrawal
b. Intercepting effluents contaminating water bodies
c. Replenishment of ground water – percolation wells at plot level/ community level for aquifer recharge.

There has been a lot of effort on creating percolation wells for recharge of ground water but with mixed results. Sometimes these wells are not properly designed, therefore get choked

up and do not facilitate groundwater recharge. Due to this the investment goes waste without yielding desired results. Another major issue is misuse of percolation wells thereby posing risk of contaminating the ground water (in the early 1990's there were cases of industries in south Gujarat boring deep percolation wells and putting in their effluents without proper treatment).

3. Rain water management

There has been a lot of discussion nowadays on tapping rainwater for augmenting ground water resources. In cities as well as rural areas rainwater can be effectively tapped by various methods as mentioned below:

a. Roof rainwater harvesting at building level
b. Percolation pit method
c. Borewell with settlement tank
d. Percolation pit with bore method
e. Channelize storm water into local water bodies.

4. Waste water management

Centralized wastewater treatment systems are capital intensive and high on O&M costs. The municipal authorities are not able to provide services to areas situated on the periphery and the waste water generated finds its way into nearest water body without treatment. Alternatively decentralized approach (DEWATS – Decentralized Wastewater Treatment Systems) can be adopted by such areas to treat wastewater near source and reusing treated wastewater for uses like landscaping, construction, etc.

3. Planning Tools

If one has the above ideas and want to put them in a planning process, one needs to identify an appropriate legal mechanism. In Gujarat urban planning takes place at two levels – Development Plan at the city level and Town Planning Schemes at the micro level.

Town Planning (TP) Schemes are land readjustment processes. An area, usually on the periphery of the city and coming under development pressure is delineated for planning. During the planning process, the entire land is vested in the agency which is preparing the TP scheme; and people continue to live and use that land, till the layout is finalized and "final plots" are given back to the people. The scheme is unique that you take a little bit of land from every person and give them back a more organized plot which is smaller and the land taken away is pooled and used for creating public infrastructure, including streets, open spaces, social infrastructure, etc.

Our effort at EPC has been to see how we can consolidate those open spaces and put it around existing/new water bodies. These public spaces can also be used for decentralized wastewater treatment and use that water for landscaping, etc. (e.g.– a set of 5 TP schemes in south-eastern part of Ahmedabad, totaling to 5 km^2 of area – taking them together, we could consolidate the open space more effectively).

At the city level, we can put in specific proposals in the city's Development Plan, to deal with micro-level problems e.g.– the Desalsar lake on the eastern side of Bhuj city, for which we had made the development plan – this shows how development plan proposes the redevelopment of recreational facilities (gardens/ restaurants, etc.) around the lake. Including it in a plan doesn't ensure that it gets done automatically. However, inclusion in the Development Plan provides a legal basis for anyone to act on it.

Another interesting project in Bhuj is restoring the traditional relationship between the urban community and water in the Hamirsar project. In the development plan we had pro-

posed the re-development of the space around the lake as a public recreational space. The proposal also included developing one side of the lake, which was originally meant for migratory birds – it was shallow enough for feeding and breeding. This project of rejuvenating the Hamirsar involved clearing channels leading to Hamirsar; treating wastewater flowing into the lake; developing lake edge; dredging and grading the lake and also creating islands for migratory birds.

City Level

1. Issues

1. Water bodies and storm water management

If we scale up the issues mentioned earlier, then most cities used to have a system of interconnected water bodies and courses to store and manage storm water. This over a period of time got deteriorated. City Development Plans don't even recognize such systems and most of the cities do not have a management plan for their revival. The storm water drainage plans do not view the city as "catchments" and in fact the cities haven't been re-surveyed after the British left, although the topography has changed a lot.

2. Ground water

Monitoring or management of ground water is not mandatory for urban local bodies, and therefore the data regarding the same is very poor. Moreover; there is no legal framework at city level for regulating the exploitation of ground water resources.

3. Waste water

As mentioned earlier the current approach of centralized treatment systems do not work because of inadequate networks, inefficient treatment plants and water intensive means of transporting waste to sewage treatment plants; plus the coverage being limited to city limits because of high capital and O&M costs.

4. Institutional issues

Urban local bodies have limited capacity to address the problems that are emerging. Problems and their solutions often extend beyond city limits, particularly when dealing with flowing water. As the 73rd and 74th Constitutional Amendments have not been implemented fully, there is no institutional framework for conflict resolution at the city/regional scale (District Planning Committee, etc.).

2. Interventions

- Revive and maintain natural system of water bodies – for this there is need to carry out accurate topographical survey, map all catchments and turn them into projects to restore the natural system or create a new system.
- Conserve and manage ground water – this essentially means monitor ground water conditions and also regulate exploitation of ground water.
- Promote decentralized waste water treatment systems – we are trying to work with the DEWATS group in Bangalore and Auroville to figure out how to scale up the systems to be functional at city level i.e. define appropriate "units" for decentralization: spatial/ community/ administrative units and integrate these decentralized units within a city level system. This may involve balancing costs and charges i.e. if urban communities/institutions invest in water management, how it should reflect in the charges they pay the city. Moreover, we need to price the use of "treated" water very realistically

to increase the incentive for local treatment.

3. Tools

It is important to include proposals in the City Development Plan, which is one of the legal documents prepared for the city as a whole. e.g.– the Bhuj Development Plan recognized the traditional system of water bodies and proposed its revival. The proposals were widely discussed in a consultative process, so that relevant stakeholders become a part of the planning process. Participatory interventions from Bhuj NGOs like Kutch Navnirman Abhiyan, Sahjeevan, have taken up a systematic exercise to revive the Hamirsar catchments as their initiative. The entire system was documented as it originally existed and how it changed with the city's development.

Regulatory interventions

The Development Control Regulations which contains the building by-laws, has in the case of Bhuj, introduced the compulsory requirement of seeking permission for ground water withdrawal. i.e. any person intending to withdraw ground water within the limits of Development Area shall make an application in writing. The regulations in Bhuj also specify that the quality of effluents that can be released into the ground/open; industrial effluents should follow Gujarat Pollution Control Board norms. However these regulations offer the challenge to find a system for monitoring ground and surface water conditions.

The other major tool is infrastructure planning – in Bhuj the detailed infrastructure plans were prepared by another agency – they have proposed a centralized system with a treatment plant at one end, but the DEWATS (decentralized) idea is picking up in Bhuj.

Regional Level

We started with 3 regional planning exercises one of which was in Kutch after the earthquake disaster, funded by the Royal Netherlands Embassy through the UNDP. The following shows our experience with Kutch.

1. Issues

Lack of holistic approach and perspective planning across space and time has resulted in increasing cross boundary conflicts amongst various users and sectors. At micro level the issue is more about providing safe drinking water, while at the regional level the issue is more between bigger players like industries and agriculture that account for most of the water consumption.

Sub-optimal use of surface water sources over the years due to advancement of techniques has shifted the reliance on to ground water and therefore resulting in over-exploitation. In addition to these there are many actors that play an important role in management of water resources but there is no synergy across various agencies.

2. Interventions

It is necessary to prepare basin-wide management plans that account for the entire hydrological cycle, looking at the balance between resource protection and resource utilization; balance between the economic growth and sustainability; stakeholder participation (involving the people is an absolutely essential activity) and integrated water management.

Within the Water Resources Action Plan, EPC used the concept of Water Balancing. For this the entire area was delineated into water basins and within each basin, we estimated what would be the demand and supply components.

- Demand Components included
  - Domestic
    - Human, livestock population
  - Agriculture
    - Land-use
    - Seasonal crop pattern
    - Water demand projected based on crop water requirement
  - Industrial
    - Industrial Growth patterns
      - Type of industries and their water requirement
- Supply Components included rainwater mainly being distributed into
  - Ground Water
    - Ground water recharge potential zones based upon sub-surface geological features
  - Surface Water
    - Medium and minor structures, check dams
  - Soil Moisture
    - Land use, soil associations
    - Water holding capacity of the soil
  - Evapotranspiration losses
    - Vegetation coverage and losses from each type.

Doing this exercise for every basin – 78 in our case, we arrive at whether the basin is a water surplus basin or a deficit basin. In those basins where there is a surplus we see that the run-off has been mostly tapped, while the rest of the basins most of the run-off has not been tapped. Our assumption is that even if 50% of the unaugmented run-off can be tapped, then the deficit could be managed.

Another concept/exercise is the prioritization of water use across sectors – in the Kutch region it is known that approximately 85% of ground water extracted is used for agriculture, 10% for domestic use and rest 5% for industries. We have prioritized the water use across these sectors in all the basins and we find the priority as follows:

1. Domestic - firstly ground water for safety and then surface water
2. Agriculture - firstly utilizing runoff, surface water and then ground water
3. Industry - utilizing surface run-off, should avoid dependence on ground water as far as possible.

Another exercise is to identify/grade the whole area in terms of water recharge potential and on that basis plan what industries will come where – this requires a lot of hydrological, morphological and tectonic data. Based on this we can use the technology appropriate for water management – e.g. coastal areas will use technologies that will prevent salt water intrusion; soil conservation areas will use structures that will help that.

We have proposed a Decision Support System to simulate groundwater scenarios and support land use decisions (for a given quantum of rainfall within a region, what would be the likely scenario for different situations) – it will give assessment of basin-wide ground water recharge; 3D simulated model of the ground water aquifers of the region; trend analysis for ground water; a spatial ground water modeling system and based on this we can rationalize land use decision making for prioritization of water use across various sectors.

Right now we do not have regulation/policy on ground water extraction - we suggest that there should be regulatory (official) mechanisms and bodies (board) to manage ground water exploitation; regulate depth and density of bore wells to control the salinity ingress; electricity connection may be linked to the permission from the board.

Prioritization of drinking water supply interventions – by studying the mapping of delivery mechanisms (e.g.– breakdowns because of pipeline damages); mapping of efficiency;

mapping of vulnerability (to see areas that fall within a water supply scheme but still subject to water scarcity).

3. Tools

- Regional Plans
  - Some states have Regional Planning Acts, most don't
- District Plans/ Metropolitan Area Plans
- District/ Metropolitan Area Planning Committee
  - Mandated by the 73rd and 74th Constitutional Amendments – not operational in most states
- Watershed Management Plans of the DRDA
- Various Government Schemes and Projects

Conclusions

Considerable experience and knowledge is available through numerous scattered initiatives on water management across the country. However, institutionalization through formal, statutory planning processes is crucial. Existing institutional frameworks are underdeveloped. To bring about significant change, we have to undertake systematically organized advocacy efforts with stakeholder participation at regional level.

Q/A

Any of the planned spaces around the water bodies have been implemented?

Yes, the space around the Hamirsar is being developed right now and one of the streams leading to the Hamirsar – there is a local NGO working in collaboration with the Govt – to create a 'greenbelt' on both sides of the stream right upto the lake.

The issue of encroachment is being tackled in Ahmedabad by the town planning authority who gave land specifically for housing to the weaker sections. – this is a legal provision in any town planning scheme that 10% of land needs to be set aside for creating housing.

Why do we need another Board to regulate and monitor the ground water extraction, when the CGWB already exists for this purpose?

CGWB is too far away from the reality of the locale. It has to be a local body.

Have you seen the issue of pricing of water?

The water supplied to communities is charged at Rs. 14 per year. But the collection mechanism was not in place owing to reasons like lack of staff, political pressure to waive off the charge and communities perception of water being a social right and therefore has to be supplied free of cost. Supplying Narmada water to Kutch will cost significant and therefore we have proposed metering of water supply and communities to pay for the quantum of water consumed.