

## Background Paper on Integrated Domestic Water Management

### Introduction

Water forms the very basis of life. A person's survival depends on drinking water. Other uses of water include agricultural, industrial, household, recreational and environmental activities. Most of these activities require fresh water, which is in short supply. Though water covers 71% of the Earth's surface, only 3 % is fresh water. Of this 69 %, is locked up in glaciers and icecaps, 30% is ground water and 0.3 % is contained in rivers and lakes<sup>1</sup>. Thus very little of the water available is usable. It has been estimated that by 2025 more than half of the world population will be facing water-based vulnerability<sup>2</sup>. Reports suggest that by 2030, in some developing regions of the world, water demand will exceed supply by 50%<sup>3</sup>.

On the Indian subcontinent water availability is strongly influenced by a number of climatic and geographic factors. The actual distribution of water resources over space and time limits access to certain geographic regions and is confined to only certain months of the year. Of the 1869 km<sup>3</sup> available as annual surface runoff, only an estimated 1122 km<sup>3</sup> can be exploited due to topographic constraints and distribution effects<sup>4</sup>. The average per capita water availability (from 1997) is 1967 m<sup>3</sup>, although this value varies from a low of 360 m<sup>3</sup> in the Sabarmati basin to 16589 m<sup>3</sup> in the Brahmaputra and Barak basins<sup>5</sup>. Already, the potential of most river basins is being exploited beyond 50% and several basins are considered to be water scarce. About 7 km<sup>3</sup> of surface water and 18 km<sup>3</sup> of groundwater are being used for community water supply in urban and rural areas. As per the international norms, if per-capita water availability is less than 1700 m<sup>3</sup> per year then the country is categorized as water stressed and if it is less than 1000 m<sup>3</sup> per capita per year then the country is classified as water scarce. In India per capita surface water availability in the years 1991 and 2001 were 2309 m<sup>3</sup> and 1902 m<sup>3</sup> and these are projected to reduce to 1401 m<sup>3</sup> and 1191 m<sup>3</sup> by the years 2025 and 2050 respectively.<sup>6</sup>

The availability of water in the country is decreasing with every passing day. According to a World Bank report, "Unless water management practices are changed India will face a severe water crisis within the next two decades and will have neither the cash to build new infrastructure nor the water needed by its growing economy and rising population."

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<sup>1</sup> <http://ga.water.usgs.gov/edu/waterdistribution.html>

<sup>2</sup> Kulshreshtha, S.N (1998). "A Global Outlook for Water Resources to the Year 2025". *Water Resources Management* **12** (3): 167–184.

<sup>3</sup> "Charting Our Water Future: Economic frameworks to inform decision-making" **McKinsey & Company**

<sup>4</sup> <http://www.devalt.org/water/WaterinIndia/characteristics.htm>

<sup>5</sup> Ministry of Water Resources, 2001

<sup>6</sup> CURRENT SCIENCE, VOL. 89, NO. 5, 10 SEPTEMBER 2005

Agro-climatic regions such as those of semi-arid areas (Bundelkhand, Gujarat, Rajasthan and Maharashtra) are considered particularly vulnerable to water stress due to their almost complete dependence on water and other natural resources for livelihood and survival. They are also restricted by their limited capacities to anticipate and effectively respond to these stresses. Burgeoning water vulnerability threatens the water security of a region as demand often exceeds that received by rainfall. Physical water scarcity i.e. the primary water supply exceeds 60% of the region's potentially utilizable water resources is naturally prevalent in arid regions. It may also be manifested through man made interventions as in sustained overuse. In such regions ensuring water security is a major challenge even with high water use efficiency and productivity, as the demand exceeds supply. The main strategies for such regions would be to restructure the water allocation pattern, importing food and adopting technologies such as desalination.

## Issues and Concerns

Overexploitation of groundwater is leading to reduction of low flows in the rivers, declining of the groundwater resources, and salt water intrusion in aquifers of the coastal areas. Over canal-irrigation in some of the command areas has resulted in water logging and salinity. The quality of surface and groundwater resources is also deteriorating because of increasing pollutant loads from point (Pollution originating from a single, identifiable source) and non-point (spread out throughout a large area) sources. Habitations which were covered in earlier years slip back to not covered or partially covered status due to reasons like sources going dry or lowering of groundwater, sources become quality affected, systems working below their capacity due to poor operation and maintenance (O&M) and normal depreciation. Increasing population leading to emergence of new habitations also increase the number of un-served habitation.

Access to adequate water is one of the leading factors limiting development in India. Agricultural, industrial and domestic uses are competing more and more for a limited supply. The agricultural sector continues to dominate water use owing to its continued importance to the Indian economy, while industrial demands are increasing as the sector continues to grow. Domestic needs claim only a small portion of the annual water withdrawals (about 5%<sup>7</sup>). access to adequate water and sanitation supplies remains low throughout most of the country. though World Bank data indicates that demand will double over the next twenty years.

Water has multiple uses even in the domestic arena. Domestic water use is water used for indoor and outdoor household purposes like drinking, cooking, bathing, washing (clothes, utensils, livestock), sanitation needs, brushing teeth, watering the garden, and for animals. These uses are interconnected. The availability of water for these has a direct bearing on the health, survival, development and contentment of the people.

Domestic water usage is generally the prerogative of women. Women are the collectors, users, managers and the guardians of water especially in the sector of household chores including cooking, washing, drinking, and child caring. In water scare regions they are the one who have to spend several hours in finding water sources and have the burden of carrying water from far away distance. On an average, women or girls in developing countries have to walk six km per day in search of water<sup>8</sup>. This can lead to serious social implications in terms of lack of education and livelihood opportunities for women caging them in the vicious cycle of poverty.

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<sup>7</sup> World Resources Institute, 2000

<sup>8</sup> The Global Health and Education foundation report

The stipulated norms of supply is **40 litres per capita per day** (lpcd) for humans within a walking distance of **1.6 km** or elevation difference of 100 metres in hilly areas, to meet the following requirements<sup>9</sup>.

<b>Purpose</b>	<b>Quantity (LPCD)</b>
Drinking	3
Cooking	5
Bathing	15
Washing utensils & house	7
Ablution	10

With a normal output of 12 litres per minute, **one hand pump** or stand post is estimated for **every 250 persons**<sup>10</sup>. This is not always the situation on ground.

In spite of the importance domestic water usages has in our daily life it is often neglected in national policies and programs. The Government has prioritized uses as Drinking water and Irrigation. According to National water Policy 2002, water allocation priorities are:

1. drinking water,
2. irrigation,
3. hydropower,
4. ecology,
5. agro-industries and non-agricultural industries
6. navigation.

Other domestic uses are not mentioned at all. Also there is no mention of different quality of water needed for different uses of water. Drinking grade water is generally provided for all other domestic uses and this can be quite unnecessary. The govt. is more interested in treating the water problem as a whole rather than encouraging domestic management.

Nina Brooks in her paper entitled "Imminent water crisis in India" notes: "India's water crisis is predominantly a manmade problem. India's climate is not particularly dry, nor is it lacking in rivers and groundwater. Extremely poor management, unclear laws, government corruption, and industrial and human waste have caused this water supply crunch and rendered what water is available practically useless due to the huge quantity of pollution. In managing water resources, the Indian government must balance competing demands between urban and rural, rich and poor, the economy and the environment."

At central level the main institutions involved in water resources management are:

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<sup>9</sup> <http://megphed.gov.in/knowledge/standards/guiderural.pdf>  
<sup>10</sup> Tenth Five Year Plan 2002-07

- The Ministry of Water Resources, which is responsible for laying down policy guidelines and programs for the development and regulation of the country's water resources.
- The ministry's technical arm, the Central Water Commission, provides general infrastructural, technical, and research support for water resources development at state level. The Central Water Commission is also responsible for the assessment of water resources.
- The Planning Commission, which is responsible for the allocation of financial resources required for various programs and schemes of water resources development to the states as well as to the Ministry of Water Resources. It is also actively involved in policy formulation related to water resources development at the national level.
- The Ministry of Agriculture, which promotes irrigated agriculture through its Department of Agriculture and Cooperation.
- The Central Pollution Control Board is in charge of water quality monitoring, and the preparation and implementation of action plans to solve pollution problems.

India adopted a National Water Policy (NPW) in 1987, modified in 2002; for the planning and development of water resources to be governed by national perspectives. NWP emphasizes on the continued government control over water resources. As water resources development is a state responsibility, all the states are required to develop their state water policy within the framework of the NPW and, accordingly, set up a master plan for water resources development, however not much progress had been achieved by the states in this regard. The impact of the NWP is still limited by the lack of institutional mechanisms to plan, coordinate, and implement water development across state boundaries and among users.

For all administrative purposes water falls under the state list. Water resources are controlled and managed by the state government machinery. Village level institutions, which have the largest stake in the use of these resources, play a negligible role in managing them. Policies need to be people-centered and recognize communities as the rightful custodians of water. There is a need to ease exclusive control by the government machinery over water resources so that a paradigm shift to participatory, essentially local management of water resources can be made. Advocacy empowering the affected communities to play an active part in the realization of their rights is required.

State driven Public Health Engineering Departments (PHED) are not in a position to ensure O&M and sustainability of drinking water supply systems and merely transferring these assets to PRIs has no meaning without creating an agency to support them. The 11<sup>th</sup> FYP recommends an institutional structure which is

responsible to the District PRI for example the District Water and Sanitation Mission (DWSM) should be converted in an agency for implementation and maintenance of water supply and sanitation facilities.

Another concern is the availability of information. Data on water resources are 'classified' and it is ironic that the policy makers do not have any access to them either, let alone the public. It is essential that information is available in the public domain for access to communities. This is critical to the process of planning. Decentralized planning and management of water resources is heralded as the solution to solving the water problems of the country. It is imperative that local basin level information is available for this process to be carried out.

Given the context of the semi arid region; will essentially be focused on management of natural resources, especially water. The approach needs to be built around community based water management in terms of source creation; resource management, of both in terms of quantity and quality augmentation measures; enabling and sustaining community institutions to plan, implement and operate a service delivery model of water management. There is a need for integrating the various phases of the water cycle i.e. planning, supply, use, treatment and disposal. This integrated approach will enable communities to manage their water resources in a sustainable manner.

## **Integrated Domestic Water Management**

Integrated Domestic Water Security aims at providing safe, sustainable water for all. It lays emphasis on community owned, managed systems with appropriate institutional mechanisms to ensure inclusion and equity. The idea is to manage water locally, by closing the water loop between sources, supply systems and infrastructure, access and usage, and treatment; thereby reducing vulnerability. Key principles are integration and convergence. Such a system will be driven by strong Panchayati raj or village level institutions which will ensure that programme is 'socially', 'economically', 'technically', 'institutionally' and 'environmentally' sustainable.

Integrated Domestic Water Management (IDWM) promotes integrated handling of issues around domestic water supply, rational use, reuse and recharge to arrive at a holistic solution that is based on participation of local stakeholders. All parts of this integrated cycle of water management hinge on the ownership and effectiveness of local community institutions in planning, design, operation and maintenance of assets created.

The cornerstones of the IDWM approach are given below:

### **Stakeholder participation**

The public trust doctrine states that natural resources are properties of the public. They are placed in the trusteeship of the government. This principle of international law has now been accepted as part of Indian legislation as a case law. Thus the communities are the true owners of water resources and the management should be placed in their hands.

Management of the water resources for diverse uses should incorporate a participatory approach; by involving not only the various governmental agencies but also the users and other stakeholders, in an effective and decisive manner, in various aspects of planning, design, development and management of the water resources schemes. Necessary legal and institutional changes should be made at various levels for the purpose, duly ensuring appropriate role for women. Water Users' Associations and the local bodies such as municipalities and *gram panchayats* having adequate representation of women should be involved in the planning, operation and maintenance.

Each context has its own special characteristics that are a result of the geo-climatic conditions, socio-economic considerations and indigenous cultural practices. Local stakeholders, particularly the village communities themselves are the best judge of their water related needs. This would be both in terms of quantity as well as quality based on their livelihoods and indigenous lifestyles. They are best placed to design solutions that are not only environmentally, socially and financially viable but also sustainable in the long run. In addition,

they are also willing to contribute towards the materialisation of the solutions. Similarly, in the search for solutions, institutions of local governance as well as line departments must be included in the various aspects of planning, design, development and management of water resources.. This not only facilitates smooth delivery of service but also enable leveraging for added benefits.

Whenever the community has been involved from planning stage, the programme has always become sustainable. While programmes have elaborate guidelines for community involvement, field level adoption is far from satisfactory. The 73rd and 74th Constitutional amendments have devolved the water supply responsibility to Panchayati Raj Institutions/local bodies. Due to their inherent weaknesses like funding constraints, low technical ability etc. the devolution of power is yet to make a desirable impact on the ground. While sporadic success stories are trickling in, this aspect has yet to go a long way. States have to play an important role in placing the Twelfth Finance Commission (TFC) grants devolved to Panchayats and placing the implementation agency at the command of local bodies. The second is simply absent in many states. Involvement of the community in the monitoring of the water supply works should be made a primary condition for release of funds for completed work.

There is a need to focus on changing behaviour patterns. Government schemes will work only if the people it is directed towards understand the importance of the change. Cost sharing by the communities for development activities is a critical pre-requisite for ensuring this long term interest and ownership of the assets created. Awareness is key to the success of a program. Managing demand can ease the disparity of supply in different areas. There are certain self-limiting policies like demand management (leakages, slabs, pricing and support for the economically weak), destination management and pollution control. In order to universalise access to water for domestic reasons, it needs to be isolated from agriculture and other uses wherever possible. To prevent lowering of water tables due to excessive extraction, cooperation with agricultural users becomes necessary. Communities can decide their water budgets if the allocations of resources are under their consideration.

### **Institutional Systems for sustainability**

IDWM emphasises the involvement of existing / creation of new community institutions that can be entrusted with management responsibilities. The institution created will include representation from different sections of society. This institution will also put into operation the decisions taken by the community with regard to tariff structure, collection of monthly water charges from the users, ensuring proper maintenance of the system so as to ensure reliable and regular supply of safe drinking water. The ownership of the assets created will also rest with the community institution to ensure sustainability of the initiative.

Convergence of various programmes for funds and physical sustenance is most important, the 11th FYP suggests states should put in place an effective

coordinating mechanism for attaining success. The National Rural Employment Guarantee Programme (NREGP) has seven identified work component related to water. There are other programmes like Backward Region Grant Fund (BRGF), artificial recharge of groundwater schemes and rain water harvesting, restoration of water bodies scheme (both pilot and external assisted) by Ministry of Water Resources the National Project for Renovation of Water Bodies and schemes such as the National Afforestation Programme, River Valley Project, Flood Prone River Programme, Integrated Wasteland Development Programme, Grants under Twelfth Finance Commission, Hariyali and the states own schemes. Convergence of these programmes should help to augment funds and bring institutions together for sustainable water supply.

### **Environmental Resource conservation**

In the planning, installation and operation of the water systems, preservation of the quality of the environment and the ecological balance should be a primary consideration. Adverse impact, if any, on the environment should be minimised and should be off-set by adequate compensatory measures.

Different initiatives like rain water harvesting, field bunding, tree plantation, etc should be included in the system with the objective of minimising resource depletion and encouraging replenishment in due course of time.

Water secure regions satisfy the socio-economic and cultural requirement of water while making available required quantity for sustenance of the ecosystems. Water security hence requires good governance, since water allocation systems, through proper governance and institutional structure, influence the economic productivity, social and cultural well being and ecosystem quality in a country by prioritizing the access to water resources for consumptive uses such as drinking water, other domestic uses, agriculture, and industry and for non-consumptive uses such as hydropower, recreation/tourism and environmental protection. Access to clean water could be enhanced through dams or improving rainwater harvesting and storage. With decreased water availability, conflicts arise among users from different sectors, that is, domestic, hydropower, irrigation, industries, recreation and also ecosystem functions within the river basins. Witnessing the water crisis in the country, it has become imperative to bring science and policy constructively together so as to stop the direction of continuing damage and then to reverse the damage, and prevent further peril. The governance and management challenges are in prioritizing the country's/region's water requirements and planning resource allocation strategically.

## **Initiatives**

The NWP states that over-exploitation of ground water resources is to be avoided. The groundwater accounts for about 80% of domestic water requirement. The strategy adopted by the Department of Drinking Water Supply, Ministry of Rural Development, is to shift the focus of 80% ground water based systems to 20% systems and fulfil the remaining by combination of roof-water harvesting, ground water recharge and surface water harvesting as conjunctive use.

The NWP advocates use of non-conventional methods for utilisation of water such as inter-basin transfer, artificial recharge of ground water and desalination of brackish or sea water as well as traditional water conservation practices like rainwater harvesting, including roof-top rainwater harvesting, watershed management, catchment area treatment. It ignores the importance of involving local communities in simple methods to ensure that rainwater is trapped and refills natural aquifers in the ground. The conjunctive use of groundwater, surface water and roof top rain water harvesting systems will be required to be encouraged as means of improving sustainability and water security. The 11th Five Year Plan (FYP) stresses on rainwater harvesting at the community and individual household level for recharge of ground and surface water and for direct collection.

The Total Sanitation Campaign (TSC) which started in 1999 emphasizes on Information, Education and Communication (IEC), Human Resource Development, Capacity Development activities to increase awareness among the rural people and generation of demand for sanitary facilities. They provide loans and financial help to households for constructing individual and institutional (school/ angandwadis) toilets. As per the Constitution 73rd Amendment Act, 1992, Sanitation is included in the 11th Schedule. Accordingly, Gram Panchayats have a pivotal role in the implementation of Total Sanitation Campaign. The TSC is implemented by the Panchayati Raj Institutions at all levels in collaboration with NGOs.

“Nirmal Gram Puraskar”, the incentive award provided to achieve open defecation free environment in PRIs has resulted in huge motivation amongst the rural people and the incentive award is taking the shape of Campaign mode with number of awardees increasing from a mere 40 in 2004-05 to about 5,000 in 2006-07. To incentivise communities and local governments to establish “100% drinking water security.” the Government of India launched the “Sajal Gram Puraskar” award scheme from the year 2008-09. The focus is on rain water harvesting, community initiatives and traditional wisdom of the people in order to ensure sustainable rural water supply. Award schemes work as trigger points that mobilize communities and PRI's to work towards achieving positive objectives.

The revised National Rural Drinking Water Programme (NRDWP) Guidelines 2009-2012 issued by Rajiv Gandhi National Drinking Water Mission, Department

of Drinking Water Supply has shifted the focus from 'source development and installation of water supply system for providing drinking water supply to rural household' to focus on development of 'village security plan' which also includes village safety plan before taking up planning & installation of water supply system to ensure provision of safe and adequate water supply to each rural household at a convenient location on a sustainability basis. Each community should develop its own village water security plan taking into consideration the present water availability, reliability and its different usage and equity. This integrated approach can help ease the negligence borne by the domestic water sector.

Swajaldhara, a reforms program in the rural drinking water sector, talks about the adoption of a demand-responsive, adaptable approach along with community participation based on empowerment of villagers to ensure their full participation in the project through a decision making role in the choice of the drinking water scheme, planning, design, implementation, control of finances and management arrangements. It lays out clear guidelines for setting up committees and financial layouts for drinking water supply scheme planning, designing, implementation, operation, maintenance and management.

SWARA or The State Water Resource Agency was created in June 2001 in the State of Uttar Pradesh for management, planning and sectoral allocation of Water Resources (both Surface & Ground) to various agencies viz. Drinking Water, Agriculture, Industrial Development, Hydro Power, Transportation, Entertainment and Thermal Power Production, Environmental flow of water in rivers and to give legal base to the above preparation and use of Surface/Ground water and to work as a technical secretariat to the State Water Board.

The NWP stresses on proper planning and developing of water resource development projects and the effect of these projects on their surroundings (environment, settlements, human lives, etc). However there are no mechanisms in place to co-ordinate this process across the various sectors it spans. There is a need for an integrated approach to be followed. Multi way communication between the various departments like rural development, water resources, pollution control, sanitation, irrigation, etc is imperative for the smooth functioning of the plans.

## **Recommendations:**

- There is a need to tap traditional knowledge about water resources in terms of capture and recharge. Measures like rain water harvesting, ground water recharge, use of traditional structures, etc are needed to be able to tide over the scarcity faced by regions spread across space and time.
- New and innovative technologies for capture, transfer, conservation and efficient usage should be developed, researched and propagated widely.
- Awareness campaigns are needed with emphasis on the role of communities in water management. The importance of the resources, the concerns facing the population today and solutions to combat it should be shared across the spectrum. Water is a universal resource. Each person is a stakeholder and should be part of the process of planning and management.
- Media should take a proactive step in disseminating information about resource and the process governing them. Proactive steps taken in certain regions should be shared with the rest of the country. The media has a prime responsibility of mobilizing people to take action.
- Greater role for participation of rural communities in water provision and management. The planning and management of water resources should be done at the most basic level of consumption i.e. community level. Communities should decide the allocation, management and payments for water for various uses in a consultative manner.
- There should be a multi-way dialogue among various participants in the planning dialogue.
- Community participation needs to be formalised. Government policies should detail inclusion processes for community representative to be part of the planning and management processes.
- Strengthening community commitment to water 'quality'. Quality is as important as quantity though often neglected. The community should be made aware of the parameters affecting quality and remediation measures.
- Government program need to realize the importance of domestic needs of water. Provisions for the same should be built in existing programs. An integrated approach should be adopted for all domestic needs. It should include source conservation, use, treatment and disposal.

- Integration of schemes that have a water related component is needed. Use must be followed either by recycling, treatment or recharge so that the 'cycle' continues. Hence related schemes should converge to help the end user.
- Encouraging water-based enterprises to promote a 'service provision' perspective for access to potable water.