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# Perspectives on a Water Resource Policy for India

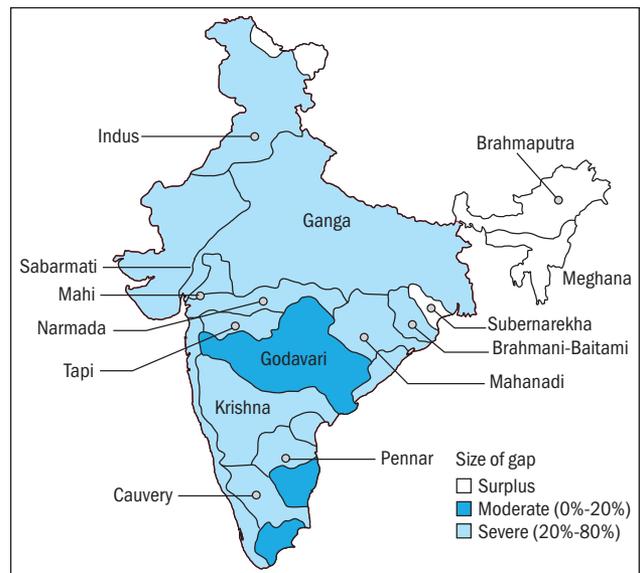
## Introduction

India sustains nearly 17 per cent of the world's population but is endowed with just four per cent of global water resources. About 50 per cent of annual precipitation is received in just about 15 days in a year, which is not being brought to productive use due to limited storage capacity of 36 per cent of utilizable resources (252 BCM out of 690 BCM). Leakage and inefficiencies in the water supply system waste nearly 50 per cent of usable water. The ground water level is declining at the rate of 10 cm per year. Over 70 per cent of surface water and ground water resources are contaminated. All this is leading towards a water scarce situation in many parts of the country.

India has undertaken considerable investments for infrastructure development of large dams, storage structures, and canal networks to meet the country's water and agricultural needs, particularly in support of technology-based interventions to improve production of food grains, pulses, oilseeds, and vegetables. This is evident from the huge increase in budgetary allocation from the 11th Five-Year Plan compared to the 12th Five-Year Plan in irrigation including Watershed Development (from Rs 243,497 crore to Rs 504,371 crore) and Drinking Water and Sanitation sector (from Rs 120,774 crore to Rs 254,952 crore). This step has helped in achieving food and water security to a large extent, but in many areas of less plentiful surface water, the increasing use of water in agriculture and a growing population has led to higher and potentially unsustainable extraction of ground water for irrigation and domestic needs.

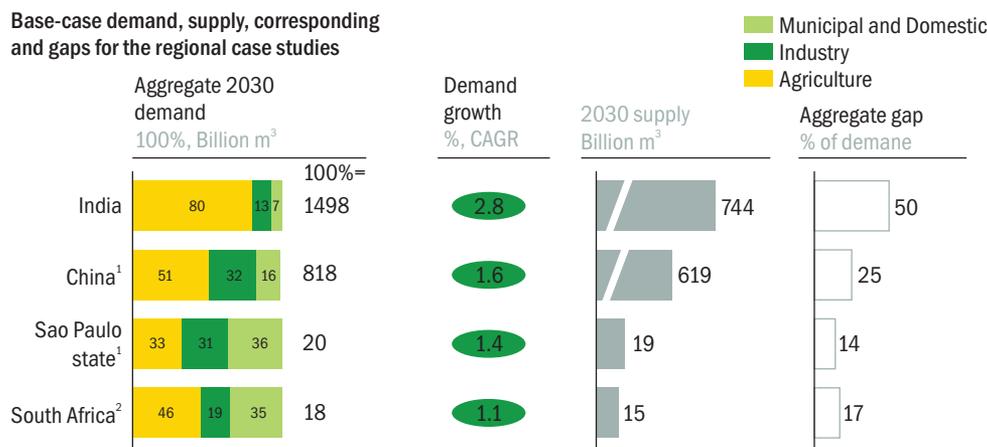
The estimated 'Water Gap' for India by the '2030 Water Resource Group'<sup>1</sup> (Figure 1) is an alarming 50 per cent. The water supply and demand gap in India in various river basins is depicted in Figure 2 as percentage of demand in the year 2030. India is now in a situation where some tough decisions regarding competing uses of water need to be taken.

The country is also facing the potent threat of climate change, which may have complex implications on the pattern of availability of water resources including changes in pattern and intensity of rainfall and glacial melt resulting in altered river flows, changes in ground water recharge, more intense floods, severe droughts in many parts of the country, salt water intrusion in coastal aquifers, and a number of water quality issues. Water being vital for equitable growth and development of a country, food security, livelihoods, and public health are at stake. Access to safe water has a direct bearing on productivity and health of human and animal populations. The public health implications of unsafe water are enormous and unacceptable.



**Figure 2: India's Water Supply and Demand Gap**  
 Source: UNICEF, FAO, and SaciWATERS. 2013. *Water in India: Situation and Prospects*

Water has a clear linkage to all the three development dimensions: *Environmental, Economic, and Social*. The challenges necessitate the need for a sustainable policy regime that facilitates Integrated Water Resource Management (IWRM) for efficient use of what is going to become a scarcer resource globally. The



<sup>1</sup>Gap greater than demand-supply difference due to mismatch between supply and demand at basin level  
<sup>2</sup>South Africa agricultural demand includes a 3% contribution from afforestation

**Figure 1: Gap between Water Demand and Supply in India**  
 Source: 2030 Water Resource Group Report

<sup>1</sup> 2030 Water Resource Group Report titled 'Charting Our Water Futures', 2009. Available at [www.2030wrg.org/publication/charting-our-water-future/](http://www.2030wrg.org/publication/charting-our-water-future/)

matter is assuming greater urgency as the country rapidly urbanizes and undergoes industrial transformation, because the global pattern in such cases is that water for urban and industrial use goes up substantially and reallocation of water between urban and rural areas as a result has the potential to create social tensions and even conflicts (Figure 3). This Discussion paper highlights some of the important issues, which need to be addressed to efficiently manage the water resources in the country. While the paper draws substantially on the National Water Policy 2012, it highlights the implications of some of the policy directions and brings out the consequential steps to be able to give effect to a consistent and effective science-based policy.



Figure 3: People Scramble to Collect Water from a Tanker at Khanpur in Delhi

## Legal and Policy Framework for Water in India: An Overview

The current legal framework pertaining to water in India is spread across a variety of instruments, legislation, legal principles, both from the colonial and post-colonial times, as well as customary mechanisms, and a number of judicial precedents, not necessarily in harmony with each other.

Under the Constitution of India, water is a State subject, with the States' jurisdiction extending to 'water supplies, irrigation and canals, drainage and embankments, water storage, and water power'

(Schedule VII, List II, Entry 17). These powers are, however, enjoyed subject to the authority of the Centre to regulate the development of inter-state rivers and settle inter-state water disputes (Schedule VII, List I, Entry 56). Since the river drainage systems across State boundaries and the major catchments are often in a State other than the one where major water usage may occur, the role of the Centre in ensuring the sustainable management of river systems extends to ensuring that the interests of all States to use natural resources for the States' development are reasonably protected and harmonized, and this often requires the Central government to take recourse to a number of other entries in List I and III, most notably the entry relating to Forests (Schedule VII, List III, Entry 17-A), to preserve and protect forest catchments. Emerging from this basic distribution of powers, there are a number of Central and State level legislations which address the subject of water or relate to institutions which are concerned with conservation and management of water in India. Of these, the most important perhaps, at least from the point of view of institutionalization, is the State Panchayati Raj Act. Minor irrigation, water management, and watershed development are included in the list of subjects in the Eleventh Schedule, which can be transferred to Panchayats if the State Government so notifies in terms of the State legislation, as several States have done. Similarly, water supply, public health, sanitation, and solid waste management are included in the list of subjects in the Twelfth Schedule which can be transferred to Urban Local Bodies (ULBs).

### Box 1

TERI organizes the *Delhi Sustainable Development Summit (DSDS)* annually on important sustainable development issues, such as water, energy and natural resources. The Thematic Track events on water involve emerging issues and latest developments in water sector and contribute significantly to policy level discussions.

Water Law is closely linked with the Water Policy because of the mutual feedback and interlock. Under ideal conditions, the Water Law empowers Water Policy, which is influenced by the political and economic institutions and ideology of the time. Water Policy, in turn, provides a larger vision and purpose to the Water Law and enables fine tuning of the implementation based on difficulties faced on-ground. Taken together they provide a comprehensive framework.

## The National Water Policy of India

The National Water Policy of the Government of India was first enunciated in 1987. The policy laid down an allocation prioritization principle for water as follows:

- Drinking Water
- Irrigation
- Hydro-power
- Navigation
- Industrial and other uses

The National Water Policy (NWP 2002) was subsequently introduced in relation to the rapidly changing scenario in the domain of water to address the emerging issues and provide critical policy inputs. NWP 2002 gave emphasis for the first time to ecological and environmental aspects of water allocation.

The National Water Policy (NWP 2012) calls for a common integrated perspective to govern the planning and management of water resources. Such a perspective would consider local, regional, and national contexts and be environmentally sound. The Policy<sup>2</sup> clearly states that water needs to be managed as a common pool community resource that is held by the State under the public trust doctrine to ensure equitable and sustainable development for all.

### Box 2

TERI organizes The India Water Forum every alternate year on important water sector issues. These events are platforms for policy level discussions and dialogues in the sector and contribute significantly in terms of technical as well as policy level deliberations.

NWP 2012 has done away with water allocation prioritization mentioned in NWP 1987 and 2002, but has emphasized on treating water, over and above the pre-emptive need for safe drinking water and sanitation, as an economic good. NWP 2012 also emphasises the fact that the service provider role of the State has to be gradually shifted to that of a regulator of services and facilitator for strengthening the relevant institutions.

### *Basic Guiding Principles of NWP 2012*

Some of the guiding principles stated in the NWP 2012 include:

- The principle of equity and social justice must inform the use and allocation of water resources.
- Planning, development, and management of water resources need to be governed by common integrated perspectives considering local, regional, and national context, having an environmentally sound basis, keeping in view the human, social, and economic needs.
- Safe drinking water and water for sanitation should be considered as pre-emptive needs, followed by high priority allocation for other basic domestic needs, supporting agriculture for food security and minimum ecosystem needs. After meeting the previously mentioned needs, water should be allocated in a manner to promote its conservation and efficient use.

<sup>2</sup><http://mowr.gov.in/writereaddata/linkimages/NWP2012Eng6495132651.pdf> (last accessed on May 10, 2014)

- Given the limits on enhancing utilizable water resources coupled with climate change impacts, meeting the future needs of water will depend more on demand management. There is an urgent need for evolving an agricultural system which can economize water use and maximize the value from water and also enhance water use efficiency by curbing wastages.
- Water-using activities need to be regulated keeping in mind the local geo-climatic and hydrological situations.

The NWP makes recommendations on several major issues including:

- Adapting to climate change
- Enhancing water availability
- Water demand management through efficient water use practices
- Water pricing
- Conservation of river corridors, water bodies, and infrastructure
- Project planning and implementation
- Management of floods and droughts
- Water supply and sanitation
- Institutional arrangements
- Trans-boundary rivers
- Database and information system
- Research and training needs
- Preparation of a plan of action by the National Water Board based on the National Water Policy

## Issues and Concerns regarding Water Resource Management in India

The increasing scarcity and deterioration in quality of water resources and their management have highlighted several concerns, which will need to be addressed through the National Water Policy,

and the State Water Policies thereunder, as well as by the Central and State legislations made in conformity with the policies. The important concerns to be addressed include the following:

- Poor management of water resources has led to a critical situation in many parts of the country. Poor or inequitable access to safe drinking water and sanitation continues to be a problem in many areas, creating conditions for social strife.
- The already wide temporal and spatial variations in availability and quality of water may increase substantially due to impact of climate change, aggravating water crisis and more severe incidences of water-related disasters, such as floods, droughts, and high erosion.
- Ground water continues to be perceived as an individual property rather than a community resource. Its extraction and exploitation continues inequitably and without any consideration for its sustainability and without adequate understanding of the variations in underground water quality.
- The existing irrigation infrastructures are inadequately maintained and poorly managed,

### Box 3

A study to evaluate the water quality of River Ganga was undertaken by TERI in the year 2013, with the objective of identifying the nature and extent of water pollution in the river. The study revealed that the river is subjected to heavy pollution load and has high Biochemical Oxygen Demand (BOD), total and faecal coliform bacteria, and Mercury in certain pollution hotspots.

Another study is currently being carried out to assess the mobilization of Persistent Organic Pollutants (POPs) such as Polychlorinated Biphenyls (PCBs), Hexachlorocyclohexane (HCH), Dichloro-diphenyl-trichloro-ethane (DDT) and a range of Polybrominated Diphenyl Ethers (PBDE) in the river Ganga. The study reveals high content of POPs in certain stretches of the river and its catchment area.

leading to wastage and under-utilization of available resources. This has resulted in a widening gap between the irrigation potential created and utilized.

- In many parts of the country, large stretches of rivers are both heavily polluted by untreated industrial effluents as well as municipal sewage and devoid of flows to support aquatic ecology, cultural needs, and aesthetics. This is affecting the availability of safe water besides causing environmental risks and health hazards.
- There are a number of interstate disputes on river water sharing between States, which need to be expeditiously attended to by reexamining the existing institutional set up such as the Water Disputes Tribunal at the Centre.
- Holistic and inter-disciplinary approach to water as a resource and to water resource allocation related problems is missing.

## Essentials for Sustainable Water Management

### *Water Framework Law for Proper Regulation of Water as a Resource*

Water has to be treated as an economic good to promote its efficient use after basic needs such as those of drinking water and water for sanitation are met. There is a need to evolve a National Framework Law or a Model Law (subject to legislative jurisdiction of the Parliament) as an umbrella statement of general principles governing the exercise of legislative and/or executive powers by the Centre, the States, and the local governing bodies (the latter through devolution by the State). This should lead the way for essential legislation on water governance in every State and devolution of necessary authority

#### Box 4

As a National Key Resource Centre for Drinking Water and Sanitation (Rural), TERI is continuously engaged in organizing trainings for engineers and social scientists of various states on the issues and latest technologies of water supply and sanitation.

In the context of challenges faced by ULBs in terms of managing water resource efficiently, TERI organizes Training programmes focusing on the Water Demand Management in the urban water sector.

TERI also imparts training and capacity-building activities for Delhi Jal Board Officials on wastewater treatment technologies.

to the lower tiers of government to deal with the local water situation. The feasibility of “Right to Clean Water” as promoted by the Supreme Court of India through a series of judgments could be given legislative mandate through the National Framework Law.

Given the explicit distribution of powers with regard to ‘Water Supplies’ in favour of the States, a Framework Law at the National level is likely to be of only limited utility and the laws at the State level will need to incorporate the operational principles in their frameworks.

To the extent that a National Framework Law may not be adequate to address the concerns at State level, or even otherwise, to assist the States in developing the State legislation under the National Framework Law, it would be useful for the Central Government to draft a Model State Law and engage with the State Governments to enact the requisite legislation. Particularly, ground water which is rapidly depleting (Figure 4, Annexure I) needs to be managed as a community resource, held by the State under public trust doctrine.

The Planning Commission of India prepared a Model Bill<sup>3</sup> in 2011 for the conservation, protection, and regulation of ground water

<sup>3</sup> Draft Model Bill for the Conservation, Protection, and Regulation of Ground water  
Available at [http://www.planningcommission.nic.in/aboutus/committee/wrkgrp12/wr/wg\\_model\\_bill.pdf](http://www.planningcommission.nic.in/aboutus/committee/wrkgrp12/wr/wg_model_bill.pdf)

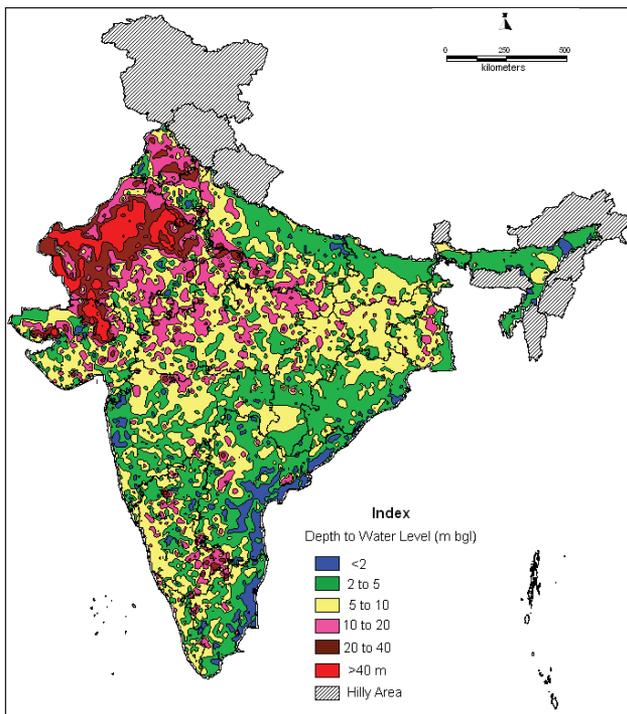


Figure 4: Depth to Water Level Map (January 2011)

Source: CGWB Report 2010

which aims at equitable regulation and control of ground water and addresses many of the concerns, including ‘Right to Water’, and water use prioritization principles. Importantly, it sets out an institutional framework for planning and regulation which is based on the Panchayat and Municipal framework provided in Article 243 of the Constitution. The States need to enact legislation based on a Model Law at the earliest. At the same time, the Model Law itself needs to treat ground water and surface water more effectively as a common resource.

### Equity and Efficiency

- The principle of equity and social justice must inform the use and allocation of water resources.
- The basin and sub-basin need to be the unit of planning and scientific management with an integrated social, economic and environmental perspective.

- Safe drinking water and sanitation should be considered as the pre-emptive need, subject to minimum ecosystem requirements. After meeting this need, water should be allocated in a manner to promote its conservation and efficient use, with high priority to other basic domestic needs and agriculture for food security.
- Given the limits on enhancing utilizable water resources coupled with climate change impacts, meeting the future needs of water will need to depend heavily on demand management. There is an urgent need for evolving an agricultural system which economizes on water use and maximizes value from water and enhances water use efficiency by curbing wastages. Clear and socially equitable water pricing policies need to be evolved, which are based on the principles of demand and variable charges. Regulatory systems for the purpose will need to be put in place.
- Water using activities need to be regulated, keeping in mind the local geo-climatic and hydrological situations.
- Conservation of river corridors and water bodies need to be taken up as part of the long-term strategy for eco-management and restoration and to provide additional resilience in the face of climate change.

### Institutional Capacity-building

Proper management of water as a resource cannot be ensured by the Central government or even by the State governments on their own. While the governments can provide the funding, knowledge, technical and management support, by its very nature, water requires active cooperation at the individual and community user levels. Water usage practices have specific connotations based

on local culture and practices, whether it is for domestic use or agriculture. Better and more efficient management requires the development of community institutions to help develop and propagate better local practices and apply social pressure to ensure proper regulation, minimize wastage, and enhance efficiency. Panchayati Raj Institutions (PRIs) and ULBs, which are already positioned to be entrusted with this function in the Eleventh and Twelfth Schedule of the Constitution of India, are key to sustainable management of water resources for the country and their capacity-building has to be a matter of prime concern.

### Critical Action Points

The following section summarizes some of the key action points emerging from the National Water Policy along with a few consequential steps for effective implementation, which will need to be addressed by the government, policy makers, PRIs/ULBs, and Civil Society Institutions, keeping in view the urgency or criticality of the issue.

### Adaptation to Climate Change

Climate change is clearly the biggest challenge in the immediate future. Adaptation strategies such as increasing water storage, better water

#### Box 5

TERI has been working closely with some States for developing their State Action Plans on Climate Change (SAPCCs) and also carrying out assessments for their vulnerability towards climate change. TERI has assisted the Governments of Rajasthan, Assam, Gujarat, and Maharashtra for preparation of their respective action plans with support from the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). TERI has also been involved in carrying out vulnerability assessments in the States of Maharashtra, Rajasthan, and West Bengal. These studies assess current as well as future vulnerabilities through modelling and field-based techniques.

use efficiency, proper demand management, incorporating coping strategies for climate change, and enhancing the capabilities of community to adopt climate resilient technological options are urgently required to be formulated. The National Water Mission of India, one of the eight Missions created under the National Action Plan for Climate Change, also emphasizes research studies on all aspects related to impact of climate change on water resources including quality aspects.

#### Action Points

- Enhancing water use efficiency through the adoption of climate resilient agronomic, technological, management, and institutional approaches.
- Incorporating strategies for climate change in the planning and management of water resource structures, such as dams, flood embankments and tidal embankments.
- Incorporating watershed-based planning and land use so as to increase the scope for *in situ* moisture conservation and use.

### Integrated Planning and Utilization of Surface Water and Ground Water

About 28 per cent of India's average annual precipitation is utilizable, but presently only about 16 per cent is being utilized. To augment the water available for utilization, the following strategies need to be adopted:

#### Action Points

- Surface water and ground water need to be treated as a common resource for planning, management, and O&M (Operation and Maintenance). In particular, water body rejuvenation in and around urban settlements need to be prioritized, and the Central scheme for Repair, Renovation, and Restoration (RRR) of water bodies has to be coordinated with

Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) to achieve the necessary synergy. For this purpose the Tamil Nadu model of using MGNREGA funds for earth work, excavation, and desilting, and scheme funds for engineering and protective measures can be a starting point.

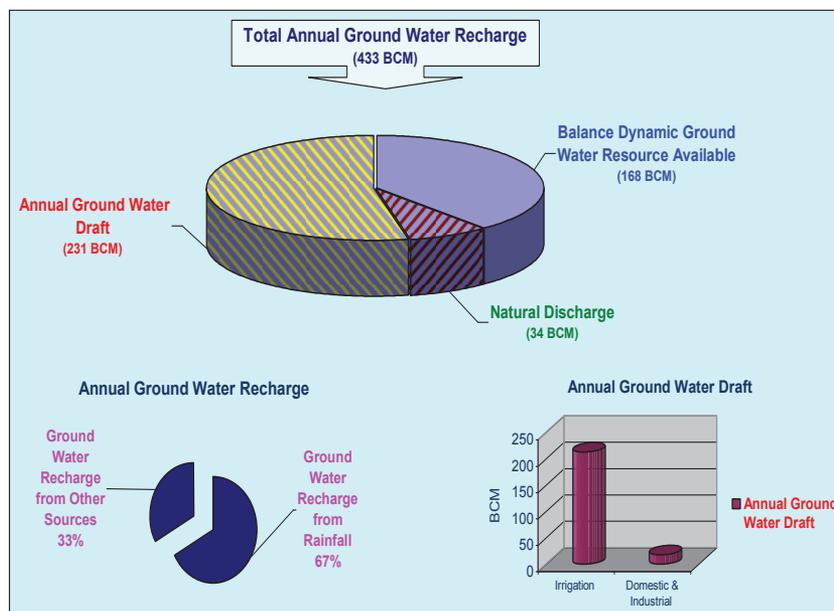
- Ground water recharge and draft (extraction) pattern for the country as a whole is shown in Figure 5. Declining ground water levels in overexploited areas (Annexure 2) need to be arrested by encouraging community-based management of aquifers, and providing a regulatory role for PRIs at the appropriate level. Additionally, artificial recharging projects should be undertaken so that more water is recharged than is extracted from aquifers. The National Water Mission reiterates the need for sensitization of the local communities and community leaders and public representatives of overexploited areas on dimensions of the problem and also stresses on the investment under MGNREGA towards water conservation by ground water recharge. This can be best

**Box 6**

TERI has been involved in designing a model for water recycling and reuse on maintenance lines for Indian Railways. The goal of this exercise was conservation and efficient management of fresh water for ensuring long-term availability of water, which involved forward-looking water management strategies.

achieved by converging MGNREGA with the Integrated Watershed Development Programme (IWDP).

- Ground water remains a missing link in the city water accounts and cities are failing to promote recharge. Regulatory and tariff-based measures have to jointly address this issue.
- Integrated watershed development activities need to be undertaken to increase soil moisture, reduce sediment yield, and increase overall land and water productivity. Programmes such as MGNREGA are being used by farmers to harvest rainwater using farm ponds and other soil and water conservation measures, but the planning and executional quality needs substantial



**Figure 5: Ground Water Resource and Development Potential in India**  
 Source: CGWB Report 2010

improvement to yield the desirable outcomes. PRIs need to be capacitated so as to be able to properly discharge the functions expected of them for the purpose under MGNREGA. The Common Watershed Development Guidelines issued by the National Rain-fed Areas Authority (NRAA) under the Planning Commission needs to be revisited for the purpose.

- Aquifers need to be systematically mapped in order to assess the quantum and quality of ground water resources, and to plan for their sustainable management by involving local communities. The Central Ground Water Board (CGWB), the Geological Survey of India (GSI), and Directorate General of Hydrocarbons (DGH) need to jointly work out their field season programmes and develop a common spatial database.

### ***Demand Management and Water Use Efficiency***

The National Commission for Integrated Water Resource Development (NCIWRD) has assessed that in India about 83% of water is used in irrigation and the remaining for domestic, industrial and other purposes. Although, water for irrigation would increase over the time, the share of irrigated water in the overall demand has been estimated<sup>4</sup> to reduce from the present level to about 69% by the year 2050.

The National Water Mission suggests an increase of 20 per cent in water use efficiency by 2017. The National Water Policy also stresses on efficient use of water, as part of the demand management strategies. This is an achievable goal and must be strongly supported by State level policies. This should require States to adopt

#### **Box 7**

TERI has carried out 'Water Audit' studies<sup>5</sup> for Thermal Power Plants and other industries and recommended measures for water saving. There is an urgent need to make water audit mandatory for major water consuming industries, given the fact that the industrial sector is growing significantly and has a huge potential for water saving.

technological as well as regulatory measures, some of which include the following:

#### **Action Points**

- Methods to encourage water saving during irrigation which need to be propagated include aligning cropping pattern with natural resource endowments, micro-irrigation such as drip, sprinkler (Figure 6), automated irrigation operation, and evapotranspiration reduction.
- Conjunctive use of surface water and ground water needs to be encouraged.
- Local level micro-irrigation through small bunds, field ponds, agricultural, and engineering methods for watershed development would be very useful for enhancing water use efficiency.



**Figure 6: Drip Irrigation for Water use Efficiency**

<sup>4</sup> National Commission for Integrated Water Resource Development Plan, Ministry of Water Resources, 1999

<sup>5</sup> TERI's Policy Brief titled Enhancing Water use Efficiency of Thermal Power Plants in India: Need for Mandatory Water Audits, December 2012. Available at [http://www.teriin.org/policybrief/docs/TERI\\_Policy\\_Brief\\_Dec\\_2012.pdf](http://www.teriin.org/policybrief/docs/TERI_Policy_Brief_Dec_2012.pdf)

- Water use efficiency needs to be incentivized by proper energy pricing for use in agriculture, both in ground water extraction and lift irrigation.
- Regional water audits with respect to water use in agriculture on sample basis needs to be institutionalized in order to locate policy and management gaps for remedial action.
- Water audit needs to be made mandatory for specified types of industries and/or identified areas in order to efficiently manage water resources in the industrial sector.

### Water Pricing

Water pricing is a contentious issue, especially in the context of equity and meeting minimum needs, particularly for the poor. However, appropriate pricing ensures more efficient utilization, thus increasing water availability in general, and for the poor in particular, who may otherwise actually end up paying a high monetary and health price for less appropriate sources of water. The principle of differential pricing may therefore be retained for essential and pre-emptive use. For other uses, water should be allocated and priced according to economic principles of two-part tariff structure having fixed and variable charges. Increasing Block Tariff (IBT) is most appropriate for domestic users, while uniform volumetric charges should be used for non-domestic users.

### Action Point

- A Water Regulatory Authority (WRA) should be established in each State. The authority will be responsible for fixing and regulating the water tariff system for not only irrigation, but for all users. Where the statutory responsibility for tariffs is with another agency, the WRA must be consulted and its recommendations must be given high weightage so as to ensure reasonable

### Box 8

TERI undertook a study in the year 2009 to review the existing guidelines of determination of user charges for water and sanitation services and to incorporate economic principles of pricing in urban water supply sector in India. The study involved review of present practices, key bottlenecks, and accordingly guidelines were prepared for setting price for urban water. The study recommended a two-part tariff structure consisting of a demand charge and variable charges; and Increasing Block Tariff (IBT) being more appropriate for domestic users, while uniform volumetric charges was recommended for non-domestic users.

uniformity in policy and management of tariffs within the State. Tariffs may be levied on a volumetric basis or a combination of minimum and volumetric basis. The authorities should take into account development, management, and O&M charges while fixing tariffs. Water Users Associations (WUAs) or PRIs should be given statutory powers to collect (and enforce collection) water charges and retain a portion, manage the volumetric quantum of water allotted to them and maintain the distribution system in their jurisdiction.

### Sustainable Management of Surface Water Bodies

Conservation of river corridors, water bodies, storage and flow structures are extremely important for sustainable management of the available water resources. This requires preventing encroachments, renovating the existing infrastructure of water bodies, and controlling pollution of water bodies through stringent punitive action. The National Water Mission of India has also stressed on expeditious implementation of water resource projects and formulation of river interlinking projects.

### Action Points

- Encroachments and diversion of water bodies and drainage channels must not be allowed and

the State Water Regulatory Authorities must be given supervisory and directory powers. Wherever such diversions have taken place, they should be restored and maintained to the extent feasible. The law should be strengthened so that encroachment removal follows a summary process, with no scope for delay by the powerful or vested interests.

- Pollution of sources of water and water bodies should not be allowed. Water bodies should be periodically inspected by a third party under a mechanism devised by the WRA which should provide for levy of penalty and issue of directions to undertake rectification.
- A survey should be conducted for inter-state Rivers and large water bodies to identify polluted or dying rivers/water bodies and a systematic-area based rejuvenation mission needs to be launched to restore these river stretches/ water bodies to maintain its ecological flow and quality.

### *Coordinating Water Supply with Sanitation*

Water supply, sanitation, and sewerage in both urban and rural areas need to improve tremendously. There is a huge disparity in water supply in urban and rural areas. Also, though in the water supply sector India has achieved Millennium Development Goals (MDGs), in the sanitation sector it is still lagging far behind. Safe drinking water requires proper management of sewage, and better water management requires recycling of water from sewage, since almost 70 per cent of supplied water returns through the sewage system.

#### *Action Points*

- In urban and industrial areas, rainwater harvesting and de-salinization (where feasible) should be encouraged to increase availability of utilizable water.
- Urban water supply and sewage treatment

schemes should be integrated and executed simultaneously. Water supply bills should include sewerage charges.

- In the urban areas, investment in sewerage must match investment in water supply and the backlog in sewage treatment must be made up in a phased manner.
- As part of the urban sewage management, water recycling targets must be set and enforced with increasing benchmarks for efficiency over time.
- A proper mix of regulation and incentives should be implemented to encourage the recovery of industrial pollutants, which are otherwise capital-intensive. This holds true also for recycling of the used water for appropriate purposes. The National Water Mission emphasizes incentivizing for recycling of water including waste water.

### *Institutional Strengthening and Capacity-building*

As has been mentioned, institutional capacity-building is of utmost importance. This requires the building up of planning, regulatory, R&D, data management, and community-level institutions, each of which needs to perform a specific set of functions in order to ensure that the mechanism of overall framework ensures efficiency in treating water as a finite but renewable resource to be carefully managed and judiciously utilized.

#### *Action Points*

- **Regulatory and Planning authorities**
  - Regulatory action through pricing of water is critical for its economical and efficient use. The State Water Regulatory Authority can be statutorily empowered to fix (or where there is another such agency, to at least statutorily recommend) appropriate tariffs,

enforce recycling measures, prevent and control pollution, ensure the preservation and management of water sources, promote R&D, and capacity-building. The Central Government needs to enact a Framework Law or develop a Model Law, so that States can enact legislation conforming to a broadly uniform framework.

- While the Regulatory Authority can regulate, it is essential to separate the planning function and energize the National Water Board and the National Water Resources Council for the purpose. Similar Boards at State level would need to discharge the State Level planning functions, suitably providing for planning role for Municipal and Panchayat bodies at the regional level.
- The Central Ground Water Board (CGWB), under the Ministry of Water Resources, Government of India, is the National Apex Agency entrusted with the responsibilities of providing scientific inputs for management, exploration, monitoring, assessment, augmentation, and regulation of ground water resources of the country. The Board has been constituted as the Central Ground Water Authority (CGWA) for the purpose of regulation and control of ground water management and development in terms of the Environmental Protection Act (EPA). This enables it to regulate withdrawal of ground water in critical and overexploited areas and to prevent construction of ground water structures or drilling of tube wells in areas notified as critical or overexploited. However, regulatory functions need to extend to proper management of the resource and a specific legislation is required for the proper management of not merely ground water but for surface water and ground water as a jointly managed resource.
- The Central Water Commission is a premier technical organization of India in the field of water resources under the Ministry of Water Resources, Government of India. The Commission is entrusted with the general responsibilities of initiating, coordinating, and furthering in consultation with the State Governments concerned, schemes for control, conservation, and utilization of water resources in the country, for purpose of flood control, irrigation, navigation, drinking water supply, and water power development. The restructuring and repositioning of the Commission would be necessary as part of the process of operationalization of a Framework Law and for facilitating the implementation of State-level water laws relating to sustainable management and regulation.
- At the Municipal and Panchayat levels, water supply and sanitation should be jointly managed. In the States where a para-statal body is responsible for water supply, it will need to be responsible for sewerage as well. In case if a State, local Municipal bodies are responsible for water supply, it is best that they are made responsible for sewage as well. In rural areas, PRIs will then perform the analogous function (at the Village or Block level, as appropriate).
- **Training and R&D**
- Training of engineers and water supply and sewage staff at all levels is essential to ensure efficiency and reduce waste. Each State should set up a training institution to provide training and develop skills for Municipal, Panchayats, and outsourced service providers and Central Government should set up an R&D institution with Regional Centres for research on all aspects related to resource-use efficiency in the sector. There is a need to identify adequate number of National

and State level Key Resource Centres to build the capacity of the staff and officials on efficient management of water resources. The training and capacity-building activities should be carried out in a sustained manner, with appropriate monitoring mechanism in place in order to effectively disseminate the learning and implement it on-ground.

#### ■ **Database and Management Information System (MIS) and Disclosure**

- The database and information system needs to be made robust in order to effectively monitor the developments in the sector. A National Water Informatics Centre should be established to collect, collate, and process hydrologic data regularly from all over the country and maintain it in an open and transparent manner on a Geographic Information System (GIS) platform. All hydrological data should be shared in public domain subject to considerations only of national security.

#### ■ **Capacity-building**

- Capacity-building of the WUAs and PRIs should be carried out for strengthening the institutions and it should be given statutory powers to collect and retain a portion of water charges and maintain the distribution system in their jurisdiction. Training and awareness generation of WUA and PRI functionaries is critical.
- Civil Society Organizations (CSOs) and Non- Governmental Organizations (NGOs) continue to play an important role in promoting positive changes in the water resource management. The institutional capacities of NGOs in terms of resource mobilization (internal or external), capacity-building, networking and public advocacy, and sound internal management are critical for addressing any development issue effectively.

## State Water Policies

Water being a State subject, the State has jurisdiction extending to water supplies, irrigation and canals, drainage and embankments, water storage and water power as mentioned in Schedule VII, List II, Entry 17 of the Constitution.

States and local governance institutions ultimately have to manage the proper use of local resources, and local communities and local governance institutions and Panchayats and Municipalities have to work in coordination with each other and the State departments concerned. State governments need to bring out clear and comprehensive policies in furtherance of the national policy. The Policy must:

- Set out State level priorities based on State level conditions, policies, and prospects of industrialization, urbanization, etc.
- Specify regulatory policies.
- Put in place State level and local planning regulatory systems to address issues of pricing, management, and good governance.
- Spell out the role for Panchayats, ULBs, User Associations, Community Institutions, and Civil Society Organizations and how their capacity can be enhanced.

#### Box 9

TERI has prepared the "Perspective Water Vision 2030" for the State of Arunachal Pradesh, comprising: (1) Law and policy aspects related to the unique Constitutional status accorded to the State and the status of implementation of 73rd and 74th Constitutional Amendment Act (CAA) vis-a-vis water; (2) Technical aspects relating to the assessment for water availability/potential for irrigation and for enhanced sustainable agricultural practices, and (3) To evaluate and recommend the suitable institutional, planning mechanisms to the Government. The Vision Document 2030 is expected to guide the Water Resource Department of Arunachal Pradesh to plan their future programmes.

## Conclusion

Water law in India continues to remain non-uniform, inconsistent, and somewhat inadequate to deal with today's complex water situation characterized by scarcity and depletion of this renewable but limited resource, and increased demand. A business-as-usual (BAU) approach will not be able to plug the gap between water supply and demand. Good national water management requires a paradigm shift, comprising at least the following:

- Clear and comprehensive science-based Water Resource Policy at Central and State levels for integrated water resource management, which focuses on both supply- and demand-side dimensions of water use.
- A Water Framework Law at Central level laying out the architecture for planning and regulation and technical institutional support.
- Effective legislation at State level (based on the Central Model Law) for regulation of ground water and surface water providing an explicit and

increasing role for Municipal and Panchayati Raj Bodies in planning, management, and regulation.

- Restructuring, strengthening, and empowerment of the existing institutions (Central, State, and local) involved in different aspects of service delivery so as to improve efficiency in management and sustainability of the resource.
- Shift in approach in water resource management from purely engineering works to systems that incorporate traditional practices, local materials and are manageable and maintainable by local communities. The Gram Panchayat as well as the local community need to be involved at all stages of discussion, planning, implementation, management and maintenance.
- Funding for capacity-building and R&D to bring in resource use efficiency and sustainability.
- A Water Portal with full disclosure of all the data in usable formats, accessible to Government institutions, policy makers, society, and regulatory institutions.

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Annexure 1: State-wise ground water resources availability, utilization, and stage of development, India

S.No.	States / Union Territories	Annual Replenishable Ground Water Resource				Natural discharge during non-monsoon season	Net annual ground water availability	Annual Ground Water Draft			Projected demand for domestic and industrial uses	Ground water availability for future irrigation	Stage of ground water development (%)	
		Monsoon Season		Non Monsoon Season				Irrigation	Domestic and Industries	Total				
		Recharge from rainfall	Recharge from other sources	Recharge from rainfall	Recharge from other sources									
<b>States</b>														
1	Andhra Pradesh	16.04	8.93	4.20	7.33	36.50	3.55	32.95	13.88	1.02	14.90	2.67	17.65	45
2	Arunachal Pradesh	1.57	0.00009	0.98	0.0002	2.56	0.26	2.30	0.0008	0	0.0008	0.009	2.29	0.04
3	Assam	23.65	1.99	1.05	0.54	27.23	2.34	24.89	4.85	0.59	5.44	0.98	19.06	22
4	Bihar	19.45	3.96	3.42	2.36	29.19	1.77	27.42	9.39	1.37	10.77	2.14	16.01	39
5	Chhattisgarh	12.07	0.43	1.30	1.13	14.93	1.25	13.68	2.31	0.48	2.80	0.70	10.67	20
6	Delhi	0.13	0.06	0.02	0.09	0.30	0.02	0.28	0.20	0.28	0.48	0.57	0.00	170
7	Goa	0.22	0.01	0.01	0.04	0.29	0.02	0.27	0.04	0.03	0.07	0.04	0.19	27
8	Gujarat	10.59	2.08	0.00	3.15	15.81	0.79	15.02	10.49	0.99	11.49	1.48	3.05	76
9	Haryana	3.52	2.15	0.92	2.72	9.31	0.68	8.63	9.10	0.35	9.45	0.60	-1.07	109
10	Himachal Pradesh	0.33	0.01	0.08	0.02	0.43	0.04	0.39	0.09	0.03	0.12	0.04	0.25	30
11	Jammu & Kashmir	0.61	0.77	1.00	0.32	2.70	0.27	2.43	0.10	0.24	0.33	0.42	1.92	14
12	Jharkhand	4.26	0.14	1.00	0.18	5.58	0.33	5.25	0.70	0.38	1.06	0.56	3.99	20
13	Karnataka	8.17	4.01	1.50	2.25	15.93	0.63	15.30	9.75	0.97	10.71	1.41	6.48	70
14	Kerala	3.79	0.01	1.93	1.11	6.84	0.61	6.23	1.82	1.10	2.92	1.40	3.07	47
15	Madhya Pradesh	30.59	0.96	0.05	5.59	37.19	1.86	35.33	16.08	1.04	17.12	1.74	17.51	48
16	Maharashtra	20.15	2.51	1.94	8.36	32.96	1.75	31.21	14.24	0.85	15.09	1.51	15.10	48

17	Manipur	0.20	0.005	0.16	0.01	0.38	0.04	0.34	0.002	0.0005	0.002	0.02	0.31	0.65
18	Meghalaya	0.79	0.03	0.33	0.005	1.15	0.12	1.04	0.00	0.002	0.002	0.10	0.94	0.18
19	Mizoram	0.03	0.00	0.02	0.00	0.04	0.004	0.04	0.00	0.0004	0.0004	0.0008	0.04	0.90
20	Nagaland	0.28	0.00	0.08	0.00	0.36	0.04	0.32	0.00	0.009	0.009	0.03	0.30	3
21	Odisha	12.81	3.56	3.58	3.14	23.09	2.08	21.01	3.01	0.84	3.85	1.22	16.78	18
22	Punjab	5.98	10.91	1.36	5.54	23.78	2.33	21.44	30.34	0.83	31.16	1.00	-9.89	145
23	Rajasthan	8.76	0.62	0.26	1.92	11.56	1.18	10.38	11.60	1.39	12.99	2.72	-3.94	125
24	Sikkim	-	-	-	-	0.08	0.00	0.08	0.00	0.01	0.01	0.02	0.05	16
25	Tamil Nadu	4.91	11.96	4.53	1.67	23.07	2.31	20.76	16.77	0.88	17.65	0.91	3.08	85
26	Tripura	1.10	0.00	0.92	0.17	2.19	0.22	1.97	0.08	0.09	0.17	0.20	1.69	9
27	Uttar Pradesh	38.63	11.95	5.64	20.14	76.35	6.17	70.18	45.36	3.42	48.78	5.30	19.52	70
28	Uttaranchal	1.37	0.27	0.12	0.51	2.27	0.17	2.10	1.34	0.05	1.39	0.06	0.68	66
29	West Bengal	17.87	2.19	5.44	4.86	30.36	2.90	27.46	10.83	0.81	11.65	1.24	15.33	42
	<b>Total States</b>	<b>247.87</b>	<b>69.51</b>	<b>41.84</b>	<b>73.15</b>	<b>432.43</b>	<b>33.73</b>	<b>398.70</b>	<b>212.37</b>	<b>18.05</b>	<b>230.41</b>	<b>29.09</b>	<b>161.06</b>	<b>58</b>
<b>Union Territories</b>														
1	Andaman & Nicobar	-	-	-	-	0.330	0.005	0.320	0.000	0.010	0.010	0.008	0.303	4
2	Chandigarh	0.016	0.001	0.005	0.001	0.023	0.002	0.020	0.000	0.000	0.000	0.000	0.020	0
3	Dadra & Nagar Haveli	0.059	0.005			0.063	0.003	0.060	0.001	0.008	0.009	0.008	0.051	14
4	Daman & Diu	0.006	0.002	0.000	0.001	0.009	0.0004	0.008	0.007	0.002	0.009	0.003	-0.002	107
5	Lakshadweep	-	-	-	-	0.012	0.009	0.004	0.000	0.002	0.002	-	-	63
6	Pondicherry	0.057	0.067	0.007	0.029	0.160	0.016	0.144	0.121	0.30	0.151	0.031	-0.008	105
	<b>Total Union Territories</b>	<b>0.138</b>	<b>0.075</b>	<b>0.012</b>	<b>0.031</b>	<b>0.597</b>	<b>0.036</b>	<b>0.556</b>	<b>0.129</b>	<b>0.052</b>	<b>0.181</b>	<b>0.050</b>	<b>0.365</b>	<b>33</b>
	<b>Grand Total</b>	<b>248.01</b>	<b>69.59</b>	<b>41.85</b>	<b>73.18</b>	<b>433.02</b>	<b>33.77</b>	<b>399.25</b>	<b>212.50</b>	<b>18.10</b>	<b>230.59</b>	<b>29.14</b>	<b>161.43</b>	<b>58</b>

Source: CGWB Report 2010

Annexure 2: Categorisation of Blocks/Mandals/Talukas in India

S.No.	States / Union Territories	Total No. of Assessed Units	Safe		Semi-Critical		Critical		Over-exploited		Remarks
			Nos.	%	Nos	%	Nos	%	Nos	%	
<b>States</b>											
1	Andhra Pradesh	1231	760	62	175	14	77	6	219	18	-
2	Arunachal Pradesh	13	13	100	0	0	0	0	0	0	-
3	Assam	23	23	100	0	0	0	0	0	0	-
4	Bihar	515	515	100	0	0	0	0	0	0	-
5	Chhattisgarh	146	138	95	8	5	0	0	0	0	-
6	Delhi	9	2	22	0	0	0	0	7	78	-
7	Goa	11	11	100	0	0	0	0	0	0	-
8	Gujarat	223	97	43	69	31	12	5	31	14	Rest 14 Talukas - Saline
9	Haryana	113	42	37	5	4	11	10	55	49	-
10	Himachal Pradesh	5	5	100	0	0	0	0	0	0	-
11	Jammu & Kashmir	8	8	100	0	0	0	0	0	0	-
12	Jharkhand	208	208	100	0	0	0	0	0	0	-
13	Karnataka	175	93	53	14	8	3	2	65	37	-
14	Kerala	151	101	67	30	20	15	10	5	3	-
15	Madhya Pradesh	312	264	85	19	6	5	2	24	8	-
16	Maharashtra	318	287	90	23	7	1	0	7	2	-
17	Manipur	7	7	100	0	0	0	0	0	0	-
18	Meghalaya	7	7	100	0	0	0	0	0	0	-
19	Mizoram	22	22	100	0	0	0	0	0	0	-
20	Nagaland	7	7	100	0	0	0	0	0	0	-
21	Odisha	314	308	98	0	0	0	0	0	0	Rest 6 blocks - Saline
22	Punjab	137	25	18	4	3	5	4	103	75	-

23	Rajasthan	237	32	14	14	6	50	21	140	59	Rest I block- Saline
24	Sikkim	1	1	100	0	0	0	0	0	0	-
25	Tamil Nadu	385	145	38	57	15	33	9	142	37	Rest 8 blocks - saline
26	Tripura	38	38	100	0	0	0	0	0	0	-
27	Uttar Pradesh	803	665	83	88	11	13	2	37	5	-
28	Uttaranchal	17	12	71	3	18	0	0	2	12	-
29	West Bengal	269	231	86	37	14	1	0	0	0	-
	<b>Total States</b>	<b>5705</b>	<b>4067</b>	<b>71</b>	<b>546</b>	<b>10</b>	<b>226</b>	<b>4</b>	<b>837</b>	<b>15</b>	
<b>Union Territories</b>											
1	Andaman & Nicobar	1	1	100	0	0	0	0	0	0	-
2	Chandigarh	1	1	100	0	0	0	0	0	0	-
3	Dadra & Nagar Haveli	1	1	100	0	0	0	0	0	0	-
4	Daman & Diu	2	0	0	1	50	0	0	1	50	-
5	Lakshadweep	9	6	67	3	33	0	0	0	0	-
6	Pondicherry	4	2	50	0	0	0	0	1	25	Rest I Region - Saline
	<b>Total Union Territories</b>	<b>18</b>	<b>11</b>	<b>61</b>	<b>4</b>	<b>22</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>11</b>	<b>-</b>
	<b>Grand Total</b>	<b>5723</b>	<b>4078</b>	<b>71</b>	<b>550</b>	<b>10</b>	<b>226</b>	<b>4</b>	<b>839</b>	<b>15</b>	<b>-</b>

**Note**

Blocks-Bihar, Chhattisgarh, Haryana, Jharkhand, Kerala, Madhya Pradesh, Manipur, Mizoram, Odisha, Punjab, Rajasthan, Tamil Nadu, Tripura, Uttar Pradesh, Uttaranchal, West Bengal.  
Mandals (command/non-command) – Andhra Pradesh  
Talukas – Goa, Gujarat, Karnataka, Maharashtra  
Districts – Arunachal Pradesh, Assam, Delhi, Meghalaya, Nagaland  
Districts (Valley) – Himachal Pradesh, Jammu & Kashmir  
State – Sikkim  
Island – Lakshadweep  
UT – Andaman & Nicobar, Chandigarh, Dadra & Nagar Haveli, Daman, Diu, Pondicherry

**Source:** CGWB Report 2010

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