



## 7. Water conservation & the National Water Policy (2012)

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### Introduction

Earth and every living organism on this planet require water for survival and without water there would be no life. Drinking water should be clean that means it should be free from microorganisms, free from harmful chemical and other pollutants. Consuming unsafe drinking water may lead to several water borne diseases, and other long term and chronic health problems. Water conservation encompasses the policies, strategies and activities to manage fresh water as a sustainable resource to protect the water environment and to meet current and future human demand. Water conservation in simple words, is an effort to save water and ultimately save the planet. Water conservation is needed to protect the ecosystem and to restore its fast deterioration and to overcome the threats of environmental degradation, to meet the unavoidable emergency of shortage for drinking and domestic water in near future.

Water is a finite resource and cannot be replaced or duplicated. Less than 3 percent of the water on Earth is fresh; much of that is unreachable in glaciers, icecaps, or deep in the earth. The ground water levels are declining very fast. Rainfall is unevenly distributed over time and space. Water resources are theoretically 'renewable' through hydrological cycle. However, what is renewable is only the quantity, but pollution, contamination, climate change, temporal and seasonal variations have affected the water quality and reduced the amount of 'usable water'. Increased demands in coastal areas are threatening the fresh water aquifers with seawater intrusion. In inland saline areas, the fresh water is becoming saline due to excessive withdrawal of ground water. It has been universally agreed fact that there should be provision of safe drinking water to each and every individual living in this planet. But unfortunately many developing and



underdeveloped nations are unable to provide safe drinking water to its citizens. Water conservation practices are needed as it can minimize pollution of surface and ground water resources.

India is a country that has been endowed with a rich and vast diversity of natural resources, water being one of them. Its development and management plays a vital role in agriculture production. Integrated water management is vital for poverty reduction, environmental sustenance and sustainable economic development. India has more than 18 % of the world's population, but has only 4% of world's renewable water resources and 2.4% of world's land area. There are further limits on utilizable quantities of water owing to uneven distribution over time and space. In addition, there are challenges of frequent floods and droughts in one or the other part of the country. With a growing population and rising needs of a fast developing nation as well as the given indications of the impact of climate change, availability of utilizable water will be under further strain in future with the possibility of deepening water conflicts among different user groups. Low consciousness about the scarcity of water and its life sustaining and economic value results in its mismanagement, wastage, and inefficient use, as also pollution and reduction of flows below minimum ecological needs. In addition, there are inequities in distribution and lack of a unified perspective in planning, management and use of water resources.

Water conservation is one of the major objectives of the National Water Mission which is one of the eight National Missions under the National Action Plan for Climate Change. This envisages conservation, minimising wastage and ensuring equitable distribution of water resources across and within states through integrated water resources development and management.

National Water Policy (2002) envisaged that the water resources of the country should be developed and managed in an integrated manner. Due to continuous growth in country's population, rapid industrialization, urbanization and continuous decline in per capita availability of water the pressure on the available water resources in the country has increased enormously. As per



report of standing sub-committee for assessment of availability and requirements of water for diverse uses in the country, the future water requirements for meeting the demands of various sections in the country for the year 2025 and 2050 have been estimated to be 1093 BCM and 1447 BCM respectively. The increasing gap between water availability and demand highlight the need for conservation of water. The National Water Policy also laid stress on conservation of water.

Asian Development Bank in its draft report on “Water Operational Framework 2011-2020”, explicitly cautioned that by 2030, water shortages are likely to aggregate 40% in developing Asia and that in India demand will exceed supply by 50%.

Water usage has been predicted to undergo significant change, by 89% in agriculture, 6% in industry and 5% in domestic use in 2000 to 81%, 11, & 8% respectively in 2025 and 71%, 18% & 11% respectively in 2050. The NCIWRD (National Commission on Integrated Water Resources Development) has estimated that the irrigation sector would consume about 79% of the available water resources in 2050. However, with focused attention to promote improved water management practices in irrigation projects suffering from operational deficiencies, even a 10% improvement in the water use efficiency in agriculture is likely to increase its availability by 40%.

The document of Government of India on “National Water Mission under the National Action Plan for Climate Changes” acknowledges the plethora of problems and risks associated with increasing water scarcity. Based on worldwide experiences, it aims at improving the water use efficiency through innovative management approaches, water conservation and watershed management initiatives. Since our agriculture has been severely dependent on availability of water, particularly monsoon rains, increased climate variability is expected to impact agricultural productivity.

Declaring water conservation a national mission, in June 2003, the Prime Minister of India, appealed to all countrymen to collectively address the problem of alarmingly progressive water



shortage, by conserving every drop of water and suggested for conducting water audit for all sectors of water use.

In 2005, a World Bank document recommended that 'If India is to have sustainable economic growth, the role of the Indian water state must change from that of a builder and controller to creator of an enabling environment and facilitator of the actions of water users large and small'. The document, inter alia, suggested 'stimulating competition in and for the market for irrigation and water and sanitation services'.

At the global level, about 60-70 percent of total annual water consumption is in irrigation sector. In India water use for irrigation is about 83 percent of current level of total water utilization. Thus apparently there is ample scope of water saving in irrigation sector. Central Water Commission has been carrying out performance evaluation studies of irrigation projects since 8th plan period and has now taken up initiatives for promoting the concept of benchmarking of irrigation projects in States and Union Territories since 2002 for undertaking comparative performance assessment of irrigation projects across the country and replication of performance of efficient irrigation projects among under performing projects for increasing the overall efficiency in irrigation sector. Water audit is an effective management tool for minimizing losses, optimizing various uses and thus enabling considerable conservation of water not in irrigation sector alone but in other sectors of water use such as domestic, power and industrial as well.

With per capita availability of water depleting at a faster pace, the Government of India declared the Year 2013 as Water Conservation Year under which awareness programmes are being launched among masses, especially children, on water conservation.

The National Water Policy, 2012 was adopted by the National Water Resources Council (NWRC) at its Sixth meeting held on 28th December, 2012. In order to suggest a road map for implementation of National Water Policy, 2012, a Committee was constituted under the





chairmanship of “Dr. S.R. Hashim, Former Chairman, UPSC and Chairman Former Member, Planning Commission.”

### **The National Water Policy (2012):**

The objective of the National Water Policy is to take cognizance of the existing situation, to propose a framework for creation of a system of laws and institutions and for a plan of action with a unified national perspective.

According to the National water policy -2012, the present scenario of water resources and their management in India has given rise to several concerns, important amongst them are;

(i) Large parts of India have already become water stressed. Rapid growth in demand for water due to population growth, urbanization and changing lifestyle pose serious challenges to water security.

(ii) Issues related to water governance have not been addressed adequately. Mismanagement of water resources has led to a critical situation in many parts of the country.

(iii) There is wide temporal and spatial variation in availability of water, which may increase substantially due to a combination of climate change, causing deepening of water crisis and incidences of water related disasters, i.e., floods, increased erosion and increased frequency of droughts, etc.

(iv) Climate change may also increase the sea levels. This may lead to salinity intrusion in ground water aquifers / surface waters and increased coastal inundation in coastal regions, adversely impacting habitations, agriculture and industry in such regions.

(v) Access to safe water for drinking and other domestic needs still continues to be a problem in many areas. Skewed availability of water between different regions and different people in the same region and also the intermittent and unreliable water supply system has the potential of causing social unrest.



(vi) Groundwater, though part of hydrological cycle and a community resource, is still perceived as an individual property and is exploited inequitably and without any consideration to its sustainability leading to its over-exploitation in several areas.

(vii) Water resources projects, though multi-disciplinary with multiple stakeholders, are being planned and implemented in a fragmented manner without giving due consideration to optimum utilization, environment sustainability and holistic benefit to the people.

(viii) Inter-regional, inter-State, intra-State, as also inter-sectoral disputes in sharing of water, strain relationships and hamper the optimal utilization of water through scientific planning on basin/sub-basin basis.

(ix) Grossly inadequate maintenance of existing irrigation infrastructure has resulted in wastage and under-utilization of available resources. There is a widening gap between irrigation potential created and utilized.

(x) Natural water bodies and drainage channels are being encroached upon, and diverted for other purposes. Groundwater recharge zones are often blocked.

(xi) Growing pollution of water sources, especially through industrial effluents, is affecting the availability of safe water besides causing environmental and health hazards. In many parts of the country, large stretches of rivers are both heavily polluted and devoid of flows to support aquatic ecology, cultural needs and aesthetics.

(xii) Access to water for sanitation and hygiene is an even more serious problem. Inadequate sanitation and lack of sewage treatment are polluting the water sources.

(xiii) Low consciousness about the overall scarcity and economic value of water results in its wastage and inefficient use.

(xiv) The lack of adequate trained personnel for scientific planning, utilizing modern techniques and analytical capabilities incorporating information technology constrains good water management.



(xv) A holistic and inter-disciplinary approach at water related problems is missing.

(xvi) The public agencies in charge of taking water related decisions tend to take these on their own without consultation with stakeholders, often resulting in poor and unreliable service characterized by inequities of various kinds.

(xvii) Characteristics of catchment areas of streams, rivers and recharge zones of aquifers are changing as a consequence of land use and land cover changes, affecting water resource availability and quality.

It has been emphasized upon that, public policies on water resources need to be governed by certain basic principles, so that there is some commonality in approaches in dealing with planning, development and management of water resources.

These basic principles are:

(i) Planning, development and management of water resources need to be governed by common integrated perspective considering local, regional, State and national context, having an environmentally sound basis, keeping in view the human, social and economic needs.

(ii) Principle of equity and social justice must inform use and allocation of water.

(iii) Good governance through transparent informed decision making is crucial to the objectives of equity, social justice and sustainability. Meaningful intensive participation, transparency and accountability should guide decision making and regulation of water resources.

(iv) Water needs to be managed as a common pool community resource held, by the state, under public trust doctrine to achieve food security, support livelihood, and ensure equitable and sustainable development for all.

(v) Water is essential for sustenance of eco-system, and therefore, minimum ecological needs should be given due consideration.

(vi) Safe Water for drinking and sanitation should be considered as pre-emptive needs, followed by high priority allocation for other basic domestic needs (including needs of animals), achieving food



security, supporting sustenance agriculture and minimum eco-system needs. Available water, after meeting the above needs, should be allocated in a manner to promote its conservation and efficient use.

(vii) All the elements of the water cycle, i.e., evapo-transpiration, precipitation, runoff, river, lakes, soil moisture, and ground water, sea, etc., are interdependent and the basic hydrological unit is the river basin, which should be considered as the basic hydrological unit for planning.

(viii) Given the limits on enhancing the availability of utilizable water resources and increased variability in supplies due to climate change, meeting the future needs will depend more on demand management, and hence, this needs to be given priority, especially through (a) evolving an agricultural system which economizes on water use and maximizes value from water, and (b) bringing in maximum efficiency in use of water and avoiding wastages.

(ix) Water quality and quantity are interlinked and need to be managed in an integrated manner, consistent with broader environmental management approaches inter-alia including the use of economic incentives and penalties to reduce pollution and wastage.

(x) The impact of climate change on water resources availability must be factored into water management related decisions. Water using activities need to be regulated keeping in mind the local geo climatic and hydrological situation.

### **Water Framework Law**

Under the Constitution of India, states have the authority to frame suitable policies, laws, and regulations on water (Item 17 in List II of the Seventh Schedule or the State List). The New Water Policy 2012 proposes an overarching national legal framework of general principles on water that can use by states to draft their own legislation on water governance.

According to NWP-2012:

1. There is a need to evolve a National Framework Law as an umbrella statement of general principles governing the exercise of legislative and/or executive (or devolved) powers by the Centre, the States and the local governing bodies. This should lead the way for



essential legislation on water governance in every State of the Union and devolution of necessary authority to the lower tiers of government to deal with the local water situation.

2. Such a framework law must recognize water not only as a scarce resource but also as a sustainer of life and ecology. Therefore, water, particularly, groundwater, needs to be managed as a community resource held, by the state, under public trust doctrine to achieve food security, livelihood, and equitable and sustainable development for all. Existing Acts may have to be modified accordingly.
3. There is a need for comprehensive legislation for optimum development of interstate rivers and river valleys to facilitate inter-State coordination ensuring scientific planning of land and water resources taking basin/sub-basin as unit with unified perspectives of water in all its forms (including precipitation, soil moisture, ground and surface water) and ensuring holistic and balanced development of both the catchment and the command areas. Such legislation needs, inter alia, to deal with and enable establishment of basin authorities, comprising party States, with appropriate powers to plan, manage and regulate utilization of water resource in the basins.

### **Use of water**

The NWP-2012 adopts the following methods to promote and incentivize the efficient use of water:

1. Water is required for domestic, agricultural, hydro-power, thermal power, navigation, recreation, etc. Utilization in all these diverse uses of water should be optimized and an awareness of water as a scarce resource should be fostered.
2. The Centre, the States and the local bodies (governance institutions) must ensure access to a minimum quantity of potable water for essential health and hygiene to all its citizens, available within easy reach of the household.
3. Ecological needs of the river should be determined, through scientific study, recognizing that the natural river flows are characterized by low or no flows, small floods (freshets), large floods, etc., and should accommodate developmental needs. A portion of river flows



should be kept aside to meet ecological needs ensuring that the low and high flow releases are proportional to the natural flow regime, including base flow contribution in the low flow season through regulated ground water use.

4. Rivers and other water bodies should be considered for development for navigation as far as possible and all multipurpose projects over water bodies should keep navigation in mind right from the planning stage.
5. In the water rich eastern and north eastern regions of India, the water use infrastructure is weak and needs to be strengthened in the interest of food security.
6. Community should be sensitized and encouraged to adapt first to utilization of water as per local availability of waters, before providing water through long distance transfer. Community based water management should be institutionalized and strengthened.

#### **Adaptation to the climate change**

The NWP-2012 specifies initiatives that need to be adopted to regulate the availability of water when it varies due to climate change. The policy highlights the need to enhance capabilities of local communities so they can adopt climate resilient technological options to increase the availability of water. Adaptation strategies include, among others:

1. Climate change is likely to increase the variability of water resources affecting human health and livelihoods. Therefore, special impetus should be given towards mitigation at micro level by enhancing the capabilities of community to adopt climate resilient technological options.
2. The anticipated increase in variability in availability of water because of climate change should be dealt with by increasing water storage in its various forms, namely, soil moisture, ponds, ground water, small and large reservoirs and their combination. States should be incentivized to increase water storage capacity, which inter-alia should include revival of traditional water harvesting structures and water bodies.



3. The adaptation strategies could also include better demand management, particularly, through adoption of compatible agricultural strategies and cropping patterns and improved water application methods, such as land leveling and/or drip / sprinkler irrigation as they enhance the water use efficiency, as also, the capability for dealing with increased variability because of climate change. Similarly, industrial processes should be made more water efficient.
4. Stakeholder participation in land-soil-water management with scientific inputs from local research and academic institutions for evolving different agricultural strategies, reducing soil erosion and improving soil fertility should be promoted. The specific problems of hilly areas like sudden run off, weak water holding capacity of soil, erosion and sediment transport and recharging of hill slope aquifers should be adequately addressed.
5. Planning and management of water resources structures, such as, dams, flood embankments, tidal embankments, etc., should incorporate coping strategies for possible climate changes. The acceptability criteria in regard to new water resources projects need to be re-worked in view of the likely climate changes

### **Enhancing Water Available For Use**

India's average annual precipitation is about 4,000 Billion Cubic Meter (BCM). Of this, only about 1,123 BCM is utilizable. This limited availability of water will not meet the rising demand caused by population growth, rapid urbanization, industrialization and economic development. According to the NWP-2012:

1. The availability of water resources and its use by various sectors in various basin and States in the country need to be assessed scientifically and reviewed at periodic intervals, say, every five years. The trends in water availability due to various factors including climate change must be assessed and accounted for during water resources planning.
2. The availability of water is limited but the demand of water is increasing rapidly due to growing population, rapid urbanization, rapid industrialization and economic



development. Therefore, availability of water for utilization needs to be augmented to meet increasing demands of water. Direct use of rainfall, desalination and avoidance of inadvertent evapo-transpiration are the new additional strategies for augmenting utilizable water resources.

3. There is a need to map the aquifers to know the quantum and quality of ground water resources (replenishable as well as non-replenishable) in the country. This process should be fully participatory involving local communities. This may be periodically updated.
4. Declining ground water levels in over-exploited areas need to be arrested by introducing improved technologies of water use, incentivizing efficient water use and encouraging community based management of aquifers. In addition, where necessary, artificial recharging projects should be undertaken so that extraction is less than the recharge. This would allow the aquifers to provide base flows to the surface system, and maintain ecology.
5. Inter-basin transfers are not merely for increasing production but also for meeting basic human need and achieving equity and social justice. Inter-basin transfers of water should be considered on the basis of merits of each case after evaluating the environmental, economic and social impacts of such transfers.
6. Integrated Watershed development activities with groundwater perspectives need to be taken in a comprehensive manner to increase soil moisture reduce sediment yield and increase overall land and water productivity. To the extent possible, existing programs like MGNREGA may be used by farmers to harvest rain water using farm ponds and other soil and water conservation measures.

### **Demand Management & water use efficiency**

The NWP-2012 states the following methods to promote and incentivize the efficient use of water:

1. A system to evolve benchmarks for water uses for different purposes, i.e., water footprints, and water auditing should be developed to promote and incentivize efficient use of water.





The 'project' and the 'basin' water use efficiencies need to be improved through continuous water balance and water accounting studies. An institutional arrangement for promotion, regulation and evolving mechanisms for efficient use of water at basin/sub-basin level will be established for this purpose at the national level.

2. The project appraisal and environment impact assessment for water uses, particularly for industrial projects, should, inter-alia, include the analysis of the water footprints for the use.
3. Recycle and reuse of water, including return flows, should be the general norm.
4. Project financing should be structured to incentivize efficient & economic use of water and facilitate early completion of ongoing projects.
5. Water saving in irrigation use is of paramount importance. Methods like aligning cropping pattern with natural resource endowments, micro irrigation (drip, sprinkler, etc.), automated irrigation operation, evaporation-transpiration reduction, etc., should be encouraged and incentivized. Recycling of canal seepage water through conjunctive ground water use may also be considered.
6. Use of very small local level irrigation through small bunds, field ponds, agricultural and engineering methods and practices for watershed development, etc, need to be encouraged. However, their externalities, both positive and negative, like reduction of sediments and reduction of water availability, downstream, may be kept in view.
7. There should be concurrent mechanism involving users for monitoring if the water use pattern is causing problems like unacceptable depletion or building up of ground waters, salinity, alkalinity or similar quality problems, etc., with a view to planning appropriate interventions.

## **Water Pricing**

1. Pricing of water should ensure its efficient use and reward conservation.
2. Equitable access to water for all and its fair pricing, for drinking and other uses such as sanitation, agricultural and industrial, should be arrived at through independent statutory Water Regulatory Authority, set up by each State, after wide ranging consultation with all stakeholders. In order to meet equity, efficiency and economic principles, the water charges should preferably / as a rule be determined on volumetric basis. Such charges should be reviewed periodically.
3. Recycle and reuse of water, after treatment to specified standards, should also be incentivized through a properly planned tariff system.
4. The principle of differential pricing may be retained for the pre-emptive uses of water for drinking and sanitation; and high priority allocation for ensuring food security and supporting livelihood for the poor. Available water, after meeting the above needs, should increasingly be subjected to allocation and pricing on economic principles so that water is not wasted in unnecessary uses and could be utilized more gainfully.
5. Water Users Associations (WUAs) should be given statutory powers to collect and retain a portion of water charges, manage the volumetric quantum of water allotted to them and maintain the distribution system in their jurisdiction. WUAs should be given the freedom to fix rates subject to floor rates determined by WRAs.
6. The over-drawal of groundwater should be minimized by regulating the use of electricity for its extraction. Separate electric feeders for pumping ground water for agricultural use should be considered.

## **Conservation of river corridors, water bodies and Infrastructure**

1. Conservation of rivers, river corridors, water bodies and infrastructure should be undertaken in a scientifically planned manner through community participation. The storage capacities of water bodies and water courses and/or associated wetlands, the flood



plains, ecological buffer and areas required for specific aesthetic recreational and/or social needs may be managed to the extent possible in an integrated manner to balance the flooding, environment and social issues as per prevalent laws through planned development of urban areas, in particular.

2. Encroachments and diversion of water bodies (like rivers, lakes, tanks, ponds, etc.) and drainage channels (irrigated area as well as urban area drainage) must not be allowed, and wherever it has taken place, it should be restored to the extent feasible and maintained properly.
3. Urban settlements, encroachments and any developmental activities in the protected upstream areas of reservoirs/water bodies, key aquifer recharge areas that pose a potential threat of contamination, pollution, reduced recharge and those endanger wild and human life should be strictly regulated.
4. Environmental needs of Himalayan regions, aquatic eco-system, wet lands and embanked flood plains need to be recognized and taken into consideration while planning.
5. Sources of water and water bodies should not be allowed to get polluted. System of third party periodic inspection should be evolved and stringent punitive actions be taken against the persons responsible for pollution.
6. Quality conservation and improvements are even more important for ground waters, since cleaning up is very difficult. It needs to be ensured that industrial effluents, local cess pools, residues of fertilizers and chemicals, etc., do not reach the ground water.
7. The water resources infrastructure should be maintained properly to continue to get the intended benefits. A suitable percentage of the costs of infrastructure development may be set aside along with collected water charges, for repair and maintenance. Contract for construction of projects should have inbuilt provision for longer periods of proper maintenance and handing over back the infrastructure in good condition.



8. Legally empowered dam safety services need to be ensured in the States as well as at the Centre. Appropriate safety measures, including downstream flood management, for each dam should be undertaken on top priority.

### **Project Planning and Implementation**

1. Considering the existing water stress conditions in India and the likelihood of further worsening situation due to climate change and other factors, water resources projects should be planned as per the efficiency benchmarks to be prescribed for various situations.
2. Being inter-disciplinary in nature, water resources projects should be planned considering social and environmental aspects also in addition to techno-economic considerations in consultation with project affected and beneficiary families. The integrated water resources management with emphasis on finding reasonable and 9 generally acceptable solutions for most of the stakeholders should be followed for planning and management of water resources projects.
3. Considering the heavy economic loss due to delay in implementation of projects, all clearances, including environmental and investment clearances, be made time bound.
4. Concurrent monitoring at project, State and the Central level should be undertaken for timely interventions to avoid time and cost over-runs.
5. All components of water resources projects should be planned and executed in a pari-passu manner so that intended benefits start accruing immediately and there is no gap between potential created and potential utilized.
6. Local governing bodies like Panchayats, Municipalities, Corporations, etc., and Water Users Associations, wherever applicable, should be involved in planning of the projects. The unique needs and aspirations of the Scheduled caste and Scheduled Tribes, women and other weaker sections of the society should be given due consideration.



7. All water resources projects, including hydro power projects, should be planned to the extent feasible as multi-purpose projects with provision of storage to derive maximum benefit from available topology and water resources.

### **Management of Flood & Drought**

1. While every effort should be made to avert water related disasters like floods and droughts, through structural and non-structural measures, emphasis should be on preparedness for flood / drought with coping mechanisms as an option. Greater emphasis should be placed on rehabilitation of natural drainage system.
2. Land, soil, energy and water management with scientific inputs from local, research and scientific institutions should be used to evolve different agricultural strategies and improve soil and water productivity to manage droughts. Integrated farming systems and non-agricultural developments may also be considered for livelihood support and poverty alleviation.
3. In order to prevent loss of land eroded by the river, which causes permanent loss, revetments, spurs, embankments, etc., should be planned, executed, monitored and maintained on the basis of morphological studies. This will become increasingly more important, since climate change is likely to increase the rainfall intensity, and hence, soil erosion.
4. Flood forecasting is very important for flood preparedness and should be expanded extensively across the country and modernized using real time data acquisition system and linked to forecasting models. Efforts should be towards developing physical models for various basin sections, which should be linked to each other and to medium range weather forecasts to enhance lead time.
5. Operating procedures for reservoirs should be evolved and implemented in such a manner to have flood cushion and to reduce trapping of sediment during flood season. These procedures should be based on sound decision support system.



6. Protecting all areas prone to floods and droughts may not be practicable; hence, methods for coping with floods and droughts have to be encouraged. Frequency based flood inundation maps should be prepared to evolve coping strategies, including preparedness to supply safe water during and immediately after flood events. Communities need to be involved in preparing an action plan for dealing with the flood/ drought situations.
7. To increase preparedness for sudden and unexpected flood related disasters, dam/embankment break studies, as also preparation and periodic updating of emergency action plans / disaster management plans should be evolved after involving affected communities. In hilly reaches, glacial lake outburst flood and landslide dam break floods studies with periodic monitoring along with instrumentation, etc., should be carried out.

### **Water Supply and Sanitation**

1. There is a need to remove the large disparity between stipulations for water supply in urban areas and in rural areas. Efforts should be made to provide improved water supply in rural areas with proper sewerage facilities. Least water intensive sanitation and sewerage systems with decentralized sewage treatment plants should be incentivized.
2. Urban and rural domestic water supply should preferably be from surface water in conjunction with groundwater and rainwater. Where alternate supplies are available, a source with better reliability and quality needs to be assigned to domestic water supply. Exchange of sources between uses, giving preference to domestic water supply should be possible. Also, reuse of urban water effluents from kitchens and bathrooms, after primary treatment, in flush toilets should be encouraged, ensuring no human contact.
3. Urban domestic water systems need to collect and publish water accounts and water audit reports indicating leakages and pilferages, which should be reduced taking into due consideration social issues.
4. In urban and industrial areas, rainwater harvesting and de-salinization, wherever techno-economically feasible, should be encouraged to increase availability of utilizable water.



Implementation of rainwater harvesting should include scientific monitoring of parameters like hydrogeology, groundwater contamination, pollution and spring discharges.

5. Urban water supply and sewage treatment schemes should be integrated and executed simultaneously. Water supply bills should include sewerage charges.
6. Industries in water short regions may be allowed to either withdraw only the make up water or should have an obligation to return treated effluent to a specified standard back to the hydrologic system. Tendencies to unnecessarily use more water within the plant to avoid treatment or to pollute ground water need to be prevented.
7. Subsidies and incentives should be implemented to encourage recovery of industrial pollutants and recycling / reuse, which are otherwise capital intensive.

### **Institutional Arrangements**

1. There should be a forum at the national level to deliberate upon issues relating to water and evolve consensus, co-operation and reconciliation amongst party States. A similar mechanism should be established within each State to amicably resolve differences in competing demands for water amongst different users of water, as also between different parts of the State.
2. A permanent Water Disputes Tribunal at the Centre should be established to resolve the disputes expeditiously in an equitable manner. Apart from using the “good offices” of the Union or the State Governments, as the case may be, the paths of arbitration and mediation may also to be tried in dispute resolution.
3. Water resources projects and services should be managed with community participation. For improved service delivery on sustainable basis, the State Governments / urban local bodies may associate private sector in public private partnership mode with penalties for failure, under regulatory control on prices charged and service standards with full accountability to democratically elected local bodies.



4. Integrated Water Resources Management (IWRM) taking river basin / sub-basin as a unit should be the main principle for planning, development and management of water resources. The departments / organizations at Centre / State Governments levels should be restructured and made multi-disciplinary accordingly.
5. Appropriate institutional arrangements for each river basin should be developed to collect and collate all data on regular basis with regard to rainfall, river flows, area irrigated by crops and by source, utilizations for various uses by both surface and ground water and to publish water accounts on ten daily basis every year for each river basin with appropriate water budgets and water accounts based on the hydrologic balances. In addition, water budgeting and water accounting should be carried out for each aquifers.
6. Appropriate institutional arrangements for each river basin should also be developed for monitoring water quality in both surface and ground waters.
7. States should be encouraged and incentivized to undertake reforms and progressive measures for innovations, conservation and efficient utilization of water resources.

#### **Trans-Boundary Rivers**

1. Even while accepting the principle of basin as a unit of development, on the basis of practicability and easy implementability, efforts should be made to enter into international agreements with neighbouring countries on bilateral basis for exchange of hydrological data of international rivers on near real time basis.
2. Negotiations about sharing and management of water of international rivers should be done on bilateral basis in consultative association with riparian States keeping paramount the national interest. Adequate institutional arrangements at the Center should be set up to implement international agreements.

#### **Database & Information System**

1. All hydrological data, other than those classified on national security consideration, should be in public domain. However, a periodic review for further declassification of data may be





carried out. A National Water Informatics Center should be established to collect, collate and process hydrologic data regularly from all over the country, conduct the preliminary processing, and maintain in open and transparent manner on a GIS platform.

2. In view of the likely climate change, much more data about snow and glaciers, evaporation, tidal hydrology and hydraulics, river geometry changes, erosion, sedimentation, etc. needs to be collected. A programme of such data collection needs to be developed and implemented.
3. All water related data, like rainfall, snowfall, geo-morphological, climatic, geological, surface water, ground water, water quality, ecological, water extraction and use, irrigated area, glaciers, etc., should be integrated with well defined procedures and formats to ensure online updation and transfer of data to facilitate development of database for informed decision making in the management of water.

### **Research & Training Needs**

1. Continuing research and advancement in technology shall be promoted to address issues in the water sector in a scientific manner. Innovations in water resources sector should be encouraged, recognized and awarded.
2. It is necessary to give adequate grants to the States to update technology, design practices, planning and management practices, preparation of annual water balances and accounts for the site and basin, preparation of hydrologic balances for water systems, benchmarking and performance evaluation.
3. It needs to be recognized that the field practices in the water sector in advanced countries have been revolutionized by advances in information technology and analytical capabilities. A re-training and quality improvement programme for water planners and managers at all levels in India, both in private and public sectors, needs to be undertaken.



4. An autonomous center for research in water policy should also be established to evaluate impacts of policy decisions and to evolve policy directives for changing scenario of water resources.
5. To meet the need of the skilled manpower in the water sector, regular training and academic courses in water management should be promoted. These training and academic institutions should be regularly updated by developing infrastructure and promoting applied research, which would help to improve the current procedures of analysis and informed decision making in the line departments and by the community. A national campaign for water literacy needs to be started for capacity building of different stakeholders in the water sector.

#### **Implementation of National Water Policy**

1. National Water Board should prepare a plan of action based on the National Water Policy, as approved by the National Water Resources Council, and to regularly monitor its implementation.
2. The State Water Policies may need to be drafted/ revised in accordance with this policy keeping in mind the basic concerns and principles as also a unified national perspective.

#### **References:**

1. Document, General guidelines for water audit and water conservation, December 2005, Central water commission evaluation of water utilisation directorate.
2. National Water policy 2002
3. National water policy 2012

