An Efficient Water Resource Management:
Role of Administration in Preserving Water Resource

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Abstract: *India faces a major crisis of water as we move into 21st century. Water is an integral part of ecological system sustaining all forms of life at the same time it is a natural resource managed by the state for the benefit of mankind. Due to rapid growth of population and industry, water scarcity is increasing day by day adding stress on this grand resource, both quantitatively and qualitatively. Water security is widely recognized as one of the major challenges to India's social and economic development. With growing scarcity of water, deteriorating quality and slipshod use, water resources management in India is becoming more challenging with the passage of time. Billions of people continue to face the hardships that come with lack of access to clean water for drinking and sanitation. There is a serious water quality problem in our country arising from pollution in rivers and aquifers, chemical rich rainfall and non potable nature of tab water in most regions of country leading to non healthy environment. Climate change also imposes fresh challenge with its impact on hydrological cycle. Radical thinking on water has become necessary due to severe mismanagement of water in the country leading to unavoidable crisis situations many a times. Thus it becomes foremost duty on the part of administration to ensure the protection, preservation, conservation and management of water resource in an efficient manner and to protect ecological system of which it forms a part. Part 2 of this discourse deals with water problems in the world and draws apprehensions for depleting water quality. The government needs to adopt an integrated approach addressing both quality and quantity related issues in management the water resource paving the way for a water abundant paradigm. Part 3 of the article underlines the role of government for efficient management of water resource, stressing the need to create more effective linkages between governments at various levels, role of Panchayati Raj Institutions in water management, addressing issues such as enhancing water quality, augmentation and conservation of water; National Water Information System and prescribes policy measures for efficient management of this depleting resource. The paper also draws attention on the fact that Water policy and governance call for true interdisciplinary and a complete shift is required in principles and approaches animating water management in India.*

Keywords: *Water Management, Water Problems, Administration, Water Policy.*

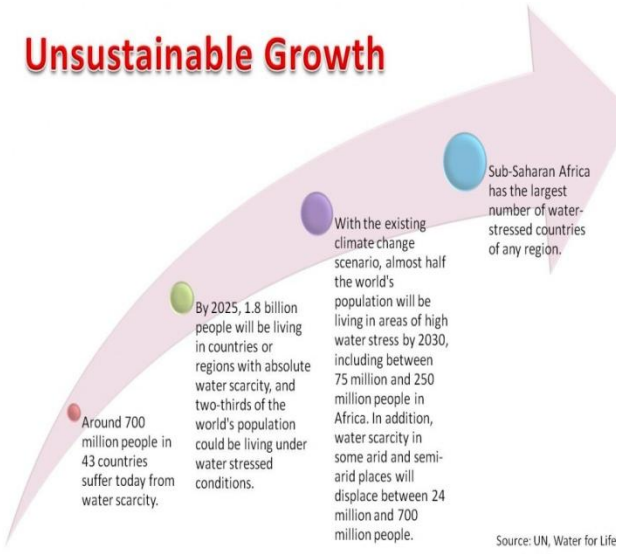
1. Introduction:

India faces a major crisis of water as we move into 21st century. Water is an integral part of ecological system sustaining all forms of life at the same time it is a natural resource managed by the state for the benefit of mankind. Due to rapid growth of population and industry, water scarcity is increasing day by day adding stress on this grand resource, both quantitatively and qualitatively. The widespread sense of water crisis grows with every use and misuse. Exploitation of water as a commodity is increasingly being questioned. With growing scarcity of water, deteriorating quality and slipshod use, water resources management in India is becoming more challenging with the passage of time. Billions of

people continue to face the hardships that come with a lack of access to clean water for drinking and sanitation. Water security is widely recognized as one of the major challenges to India's social and economic development.

As per the UN estimate, water scarcity already affects every continent. Around 1.2 billion people, or almost one-fifth of the world's population, live in areas of physical scarcity, and 500 million people are approaching this situation. Another 1.6 billion people, or almost one quarter of the world's population, face economic water shortage (where countries lack the necessary infrastructure to take water from rivers and aquifer.

Figure 1: Water Scarcity Situation in the World



1.1. Legal status of water in India

In Indian constitution water is a state subject and the role of central government is limiter to interstate water issues. Currently there are many water laws in India but water issues are addressed in response to the degree of emerging crisis and their significance to nation or state political governments and the resources available with them. In a union, policies must guide water management within different states (intra-state management) and among different states (inter-state management), giving consideration to existing historic water use practices and local cultural tradition of various communities. Considering India's breath and diversity, it is necessary that a legal framework enables uniform application of principles throughout the country.

There should be a constitutional declaration on water incorporating right to water as fundamental right which should not be denied to any citizen or a group of citizen. The right to water related to the basic water requirements for life (i.e. water for drinking, cooking, washing and personal hygiene, and the essential water needs of livestock).

2. Water Problems in India and the World:

There is a serious water quality problem prevailing in the world arising from pollution in rivers and aquifers, chemical rich rainfall and non potable nature of tab water in most regions leading to non healthy environment. Water tables are falling and water quality concerns have come to forefront. As we drill deeper for water, groundwater gets contaminated with fluoride, arsenic and the fatal uranium. Climate change also imposes fresh challenge with its impact on hydrological cycle. The extreme rates of precipitation and evapo-transpiration increases floods and droughts.

There is a serious mismanagement of water in the country leading to near crisis arising from following predicament:

1. intermittent, unreliable, unsafe and inequitable supply of water in urban areas;
2. large number of people lacking access to safe drinking water and decent sanitation;
3. rivers turn into sewers or poison, and aquifers contaminated;
4. alarming depletion of aquifers in many parts of world;
5. inefficiency and waste in every kind of water use;
6. major and medium irrigation system in disarray, rendering poor and unreliable service and characterized by inequities of various kinds.

The 2011 census reveals that only 32.7% of urban Indians are connected to a piped sewer system and 12.6% roughly 50 million urban Indians still defecate in the open. Large parts of the modern cities remain unconnected to sewage system as they live in

unauthorized or illegal areas or slums where the state services do not reach. Thus in such a situation it is imperative the modern administration should invest in building affordable and scalable sewage system and its treatment. According to central pollution control board, the country has installed capacity to treat only 30 % of excreta it generates. The two cities Delhi and Mumbai which generate around 17% of country's sewage, has nearly 40% of country's installed capacity.

A recent assessment by NASA pointed out that during the 2002 to 2008, India lost about 109 cubic km of water, leading to a decline in water table to an extent of 3-5 cm per annum. Mihir shah holds that groundwater is being exploited beyond sustainable levels and with an estimated 30 million groundwater structures in play, India may be hurtling towards a serious crisis of groundwater over-extraction and quality deterioration. According to central groundwater Board's latest assessment, nearly 60% of all districts in India have problems related to either quality or quantity of groundwater or both at all India level. in Punjab , Haryana, Delhi and Rajasthan this level has crossed 100%, closely followed by Tamil Nadu (80%) and UP(71%).

Mihir shah in his article contends that nearly 80% of our water resources are consumed by irrigation, an increase in water use efficiency of irrigation projects by the twelfth plan goal of 20% will have a major impact on the overall availability of water not only for agriculture but also for other sectors of the economy. This situation shouts for large irrigation reform. Another problem is that sewage invariably goes into stream, ponds, lakes and rivers of the town, polluting the waterworks compromising health. Alternatively it goes into ground, contaminating the same water, which will be used by people for drinking. Surveys of groundwater are finding higher and higher levels of microbial contamination – a sign of sewage contamination. As surface water or ground water gets contaminated, the city has no option but to hunt for newer sources of its supply. Its search becomes more extensive and the cost of pumping and supply increases.

Radical thinking on water has become necessary due to severe mismanagement of water in the country leading to unavoidable crisis situations many a times. Thus it becomes foremost duty on the part of administration to ensure the protection, preservation, conservation and management of water resource in an efficient manner and to protect ecological system of which it forms a part.

3. Role of Government for Efficient Water Resource Management:

Water should be put to beneficial use, without waste in a sustainable manner such that water resource integrity has to be preserved for future generations. Every citizen has the right to safe and clean water for drinking and hygiene. In water allocation, safe drinking water and water for hygiene shall be the highest priority of the state. Allocation of water for industrial, agricultural and other economic need shall be based on thoughtful prioritization, constrained by making adequate supply of water available for maintaining the environmental health of ecological systems. Development of reliable sources of water like, storage reservoirs, lakes, ponds, rivers, irrigation canals etc. came to be regarded as an essential task of state. Role of state is crucial in bringing an eco-golden age of water.

There should be more effective linkages between governments at various levels, the institutional arrangements will have to cover three different kinds of functions:

- administrative or managerial,
- regulatory and
- adjudicatory

A state level water regulatory authority should be established which should be truly autonomous, professional, inter-disciplinary body, with managerial and adjudicatory capabilities; consultative and participatory in its composition and functioning. The representatives of civil society should be associated with it at all the levels. A water regulatory authority will be mainly concerned with regulating water-use in the interest of equity, social justice, ecological sustainability, and for avoidance or resolution of disputes.

The devolution of functions of water management at the level of local government enshrined in 73rd and

74th amendments should be realized. Decisions should be taken at lowest appropriate level. Role of Panchayati Raj Institutions (PRIs) in water management should be accomplished, addressing issues relating to enhancing water quality. PRIs should be enabled and empowered to perform their constitutional role in relation to water by way of necessary financial provisions, staffing, capacity building; implementing 'local water governance' in all aspects. These must include local water augmentation, economy in water use, avoidance or resolution of conflicts, protecting water sources, ensuring water quality, preserving local knowledge and traditional /cultural systems and practices relating to water, and so on. Informal local groups and village watershed committees should be often engaged in rainwater harvesting and micro-watershed development activities. In such cases there should be good working relationships between them and PRIs. Such local efforts and initiatives, whether by informal village committees or by gram sabha or by PRIs must be inclusive, non-discriminatory, with space for all: rich and poor, privileged and disadvantaged, men and women, landowning and landless, upper caste and dalits, and so on.

There is a need of strong partnership among government departments, research institutions, gram panchayats, urban local bodies, industrial units, civil society organizations and the local community. The interface of civil society and research institutions with the government should be encouraged and programme for large scale capacity building of professionals at different level should be worked out. Action research interface to implement programmes and social regulation norms for water use and management should efficiently developed by the administration.

3.1. Concerns for privatization of water supply:

The citizen has the right to expect his or her elected representatives at the local level to be responsible for water supply to be an essential service and fundamental right. The privatization of water supply to an autonomous or local body should not debar the state of its ultimate responsibility. However the privatization of the service must not mean privatisation of the resource and it should be accompanied by certain conditions such as better water quality, longer hours of supply, better pipeline, renovation of the old system, provision of warm water in winters and better water quality and so on. On the issue of water pricing it is pertinent that a minimum quantum of water should be supplied free to all and at subsidized prices to poor.

3.2. National Water Information System:

There is need for comprehensive, coherent, structured, open and accessible national water information system which should cover all forms, aspects and manifestations of water; all decision making at various levels and by various agencies; and all relationships around water involving multiple disciplines. The data and information in the new information regime will emanate from various levels (local, district, state, national, regional); government sources (central ministries, state government departments and their agencies); non government bodies, academic and research institutions.

3.3. Policy measures for Efficient Management of Water Resource:

Sustainable management of water resources requires systemic and integrated decision-making at all the levels of government that recognises the interdependence in three core areas.

- First, decisions on land use also affect water, and decisions on water also affect the environment and land use.
- Second, decisions on our economic and social future currently organised by socioeconomic sectors affect the hydrology and ecosystems in which humans live.
- Third, decisions at the international, national, and local levels are interrelated.

Over the last few years innovative approaches across the country have blazed a trail on how this might be fructified. Indian cities and industries have to reinvent their water trajectory to both secure the water they need and do so in a way that minimizes the scope for conflict. There has emerged a need to find ways to grow with minimal water and minimal waste. Some measures have been suggested for augmentation, conservation and efficient management of water resource by the administration as:

- A new approach to rural drinking water and sanitation to be adopted with the provision of purified water storage tanks in every village which should be pipelined to all household in an efficient manner and kept under record by the district government. Rain water management system should be properly developed at the village level under the panchayati raj government to prevent breeding of mosquitoes, filth and sudden outburst communicable diseases. Government policy should encourage community initiatives in local mobilization for rainwater-harvesting or micro-watershed development.
- For the preservation of water resource, administration should identify groundwater recharge areas, resulting in protection and augmentation strategies. A scientific reporting of Groundwater assessment at the level of each aquifer in terms of groundwater storage and transmission should be prepared at the level of state and district administration.
- Regulatory options at the community level, including distance between the wells, drilling depth in regard to drinking water resource, cropping pattern that ensures sustainability of the resource should be well defined by the administration.
- A management system for ground water balance and crop water budgeting at a scale of village or watershed to be evolved.
- Total sanitation campaign launched in 1999 should be further augmented as demand driven community led programme with increase in resources and record of outputs.
- In the urban areas the current water supply system has enormous losses in distribution because of leakage and bad management which should be addressed in an effective way by the municipal governments. In the multi-floor multiplexes in metro cities, the problem of water supply is prominent. As per National Sample Survey (NSS) 65^{th} round, only 47% urban households have individual water connection and it is estimated that as much as 40-50% of water is "lost" in the distribution system. Most cities spend around 30% to 50% of water supply accounts on electricity to pump water. As the distance increases, the cost of building and maintaining the water pipeline and distribution network also increases. The end result is that the government finds it impossible to subsidies the supply of water to all and therefore does not deliver water as needed. The poor are worst affected since they do not have house connection and spend great deal of time and money to obtain water.
- In order to reduce wastage of water each city must plan car wash grids with the provision of recycling the used water in efficient manner for the purpose.
- Each city must protect the local water bodies in their area and consider them as the first source of supply. Any water projects to cities should be sanctioned on this precondition. Water scheme should also not be sanctioned without a sewage component.
- All municipal government should plan for reuse of waste water for affordability and sustainability. The diverse options for reuse should be delved out.
- For sustainable development of water resource it is extremely important that industry adopts the best international practices ensuring water efficiency. For achieving water use efficiency, the industry should:
    i. Reduce the consumption of fresh water through alternative water-efficiency technologies or processes in various manufacturing activities.
    ii. Reuse and recycle the waste water from such water intensive activities and making the reclaimed water available for use in the secondary activities within or outside the industry.
- The central and state governments should make it mandatory for the companies registered with them to include every year in

their annual report, details of their water footprints for the year which includes:

i. The volume of fresh water used by them in various production activities.
ii. The volume of water recycles and reused (activity –wise).
iii. Annual reports showing year-wise reduction the water footprint (activity-wise) by way of water conservation technologies.

- Administration should focus on massive tree plantation drives in flood prone areas and building of more and more embankments. Part of water logged areas could be used for construction of small multi-purpose farm ponds.
- There is a need for serious reconsideration of canal irrigation. Reforms such as 'participatory irrigation management' are not successful which need serious re-examination by the government. 'Participatory Irrigation Management' should be meticulously furthered to bring efficiency in water management.
- Depletion that has already occurred could be offset to some extent by artificial recharge of groundwater where ever feasible. However care should be taken that augmentation should not be overcome by profligate or careless use. The political difficulties in regulating ground water use have to be overcome by government itself.
- A dual supply system can be introduced, separating water from drinking and cooking from water from other uses. In human waste, liquid waste and solid waste may be separated and water for some uses can be extracted from treated liquid waste. The use of fresh water for transportation of human waste will have to be greatly reduced by replacing flushing toilets by alternative systems, as in other developed countries.
- 'Polluter pay principle' often advocated as a means of minimizing pollution, is a smart strategy of letting the pollution down. It would apply to all citizen and the administering authorities may perhaps develop revenue from such fines and payments.
- Pollution of water bodies from cultural and religious practices such as immersion of idols, throwing of garlands and flowers into rivers, disposal of dead bodies and cremation near water bodies should be checked by the administration in order to preserve the water bodies from getting contaminated.
- Bioremediation as a method of cleaning rivers should be encouraged by the administration. River health index and aquifer health index should be introduced. A national level campaign involving government and NGOs to revive dead rivers, rescue dying rivers and prevent other rivers from dying is a called for.
- Untreated or partially treated effluents are polluting many rivers. Industry should be forced to recycle and reuse the effluents, it will stop the pollutants from reaching the river.
- Environmental impact assessment studies must be made mandatory and more reliable, more rigorous, comprehensive, objective, more independent and more professional than they are at present. There should be a regulatory authority in each state to look into the issues of sustainability of water resource and environmental needs.
- Interdisciplinary research need to be encouraged and promoted. There is some research related to specific projects or programmes related to water, but there is need for more research with a wider perspective. Government should provide greater public funding for water related research.

4. Conclusion:

Water, like other natural resources, is one of the most basic requirements of life and its conservation is as necessary in order to sustain life on this planet and improve the living of inhabitants in different continents. Preservation and conservation of water as a grand resource lies both in the hands of government

and the citizen alike. However the administration should bring out ways and means of its conservation and implement them conscientiously.

Along with grandfathering of existing water resources, there is a serious need of awareness of critical role of water in the functioning of environment, ecosystem and human habitat which can be addressed through dedicated public education at all levels by the government from the lay person to children in school, from institutions of higher learning and research to the general society. Materialization of new order of regulation, use and conservation is the utmost task of government in which cooperation of civil society, academia, the administrative machinery and local communities is required, who would work together in a close collaboration to successfully achieve water abundant regime. Moreover water policy and governance calls for a truly interdisciplinary paradigm. Water science must include environmental sciences, ecology, hydrology, administrative sciences, policy making, economics, financial analysis, sociology, glaciology, meteorology and so on. Further financial and political difficulties in implementing water policies should be overcome by administration. There should be frequent, regular monitoring of water quality, and mandatory proactive public disclosure of results. Thus the slogan for the century is the harmonious, just and wise use of water and call for major transformation in our ways of living and perceptions of water use.

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