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CONSERVATION OF WATER RESOURCE

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ABSTRACT :

Water distinguishes our planet compared to all the others we know about. While the global supply of available freshwater is more than adequate to meet all current and foreseeable water demands, its spatial and temporal distributions are not. There are many regions where our freshwater resources are inadequate to meet domestic, economic development and environmental needs. In such regions, the lack of adequate clean water to meet human drinking water and sanitation needs is indeed a constraint on human health and productivity and hence on economic development as well as on the maintenance of a clean environment and healthy ecosystems. All of us involved in research must find ways to remove these constraints. We face multiple challenges in doing that, especially given a changing and uncertain future climate, and a rapidly growing population that is driving increased social and economic development, globalization, and urbanization. How best to meet these challenges require research in all aspects of water management. Water Resources Research has played an important role in reporting and disseminating current research related to managing the quantity and quality and cost of this resource. This paper identifies the issues facing water managers today and future research needed to better inform those who strive to create a more sustainable and desirable future.

KEYWORDS : *foreseeable water demands , face multiple challenges , economic development, globalization, and urbanization.*

INTRODUCTION :

Conservation of water is the activity of planning, developing, distributing and managing the optimum use of water resources. It is a sub-set of water cycle management. It is like hydrology, but the scale of management is low here where hydrology involves the States or country, and conservation of water is at a city and district scale. The field of conservation of water generally deals with measures to control flow of water as is related to hydrological characteristics such as river discharge and sediment flow. Sustainable water management is important to conserve and protect water resources which are limited on the earth. So, in essence, what are water resources? – these are sources of water that are useful or potentially useful to humans, there are important because they are needed for life to exist.

Virtually all human uses require fresh water. Therefore, conservation of water involves how to use the available water efficiently minimizing the losses in reservoir and distribution network. Water allocation to various stakeholders, fixation of priority such drinking, industrial use and agricultural purpose are part of conservation of water. Presently, with more conversation on climate change and its

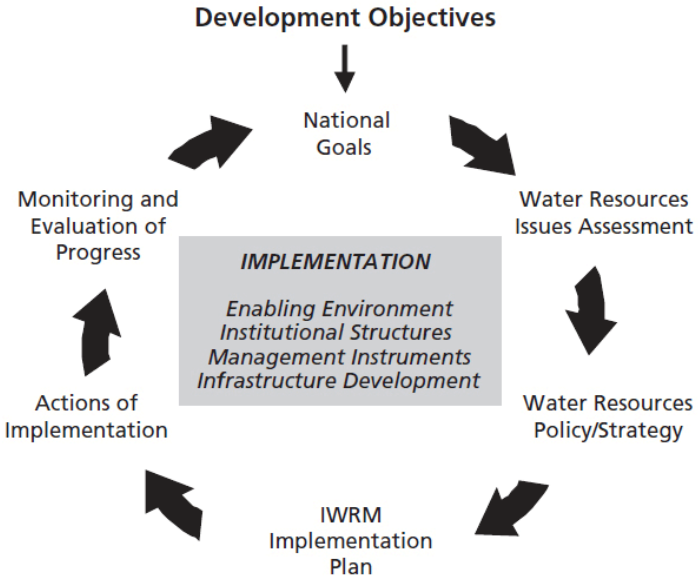
effects on water resources there has been continuous growth in the need for efficiency of water uses at various stages. It will involve higher level management of multiple watersheds or interconnected systems. Globally, conservation of water is through water resource management (WRM) and approached from a coordinated development and management of water, land and other related resources as is prescribed by the Global Water Partnership. The intended approach is to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

Components and techniques of water resource management

WRM components and techniques often take an integrated approach to implement the best strategies to tackle water shortage problems. There are two general approaches to planning and management. One is from the top-down (command and control) and the other is from the bottom-up (grassroots approach). Let us explain a bit more in detail the components of these techniques:

(1) **Top-down planning and management** – consists of a series of reports, complete with numerous appendices, describing all aspects of water resources management and use. The approach assumes one or more institutions have the ability and authority to develop and implement the plan. In modern day where public is calling for less government oversight, the top-down approach are becoming less desirable or acceptable.

(2) **Bottom-up planning and management** – consists of the active participation of interested stakeholders, in this case those potentially affected by the decisions being considered and this happens through consensus building. Concerned citizens, nongovernmental organizations as well as professionals work together toward the creation of adaptive comprehensive water management programs, policies and plans.



Stages in IWRM planning and implementation

CHALLENGES OF WATER RESOURCE MANAGEMENT

The answer to this question bears many faces depending on the context. Nature takes care of water resources through replenishing them by precipitation, surface run-off and ground water levels. The biggest challenge when it comes to WRM are humans. Freshwater resources like river, lakes are polluted by human activity. If sustainable water management is not implemented there may be war in

future for fresh water. Water is an integral part of life and without which life is not possible on the earth. Acute water shortages because of drought which is attributed to climate change have hit most parts of the world. Many rivers are drying up, polluted and encroached. Now more than ever, the challenge is whether future generations will have enough freshwater for living? As humans we used freshwater for drinking, sanitation, watering, livestock, irrigation just to mention but a few. Humanity does have choices to make which is their role to play in WRM.

INCREASING GAP BETWEEN WATER AVAILABILITY AND DEMANDS

Population is the key determinant in water demand. As the population of India is increasing, lifestyles are changing and economic activities are increasing, the demand for water is also rapidly rising. Agriculture sector accounts for more than 85% of the annual water demand in the country. As there is no major trend in annual rainfall in India, the gap between demand and supply of water is increasing. In many regions, the demand is already much more than the supply, leading to water scarcity.

UNSUSTAINABLE WATER WITHDRAWALS

To meet the increasing water demands, progressively larger quantities of water are being withdrawn from surface and subsurface water bodies. Increasing withdrawals have adversely affected the health of many rivers in different reaches and some rivers in different stretches have stopped flowing round the year. This is highly detrimental to the river as well as the environment. Although groundwater use has provided the much needed drinking water and food security to India, due to unsustainable extraction at many places, water tables are falling resulting in wells going dry, rising pumping cost, falling base flows in the rivers, and entry of harmful substances (such as arsenic) in the water supply. A large number of districts in India have reported groundwater contamination of some form or the other. These include contamination due to fluoride, iron, salinity, arsenic, etc. Excessive withdrawal from groundwater also results in land subsidence, which may lead to a number of other harmful consequences. In the near future, India is likely to face a situation where water availability in an average year would be nearly the same or less than the demands. The situation will become really precarious in the years of below-normal monsoon.

CONSERVING FLOOD FLOWS:

As noted earlier, India has a monsoon climate and the rivers carry more than 70% of the annual flows during four monsoon months. Hence it is essential to conserve flood flows and use them to meet the demands in the lean season to a larger extent. In places with limited groundwater, management of river flows in accordance with crop water requirements is necessary to ensure food security for the nation, since the water and land productivity of rainfed agriculture is much lower compared with irrigated agriculture. Water can be stored on or below the surface. Actions are needed at various levels. At the macro level, it is important and essential to conserve surplus monsoon or flood flows, either in the storages on the ground or below ground, since the flows in the remaining months are inadequate to meet the various demands. To store water on the surface, storage reservoirs have to be developed. Good sites for storages are limited in the country and numerous problems arise due to the submergence of forests, displacement of population, threat to biodiversity, environmental issues, etc. To conserve water below the surface, suitable hydro-geology is a must and facilities for large-scale managed aquifer recharge need to be created.

MANAGING FLOODS:

To satisfactorily manage floods, a range of actions is required. High flows likely to cause damage may be temporarily stored in reservoirs and subsequently released at lower rates. A number of storage reservoirs have been created in India to control floods – Hirakud, Rihand, Tehri, and so on. Since the development of storage projects is becoming progressively difficult and these cannot provide

complete flood protection, we also need to develop robust systems for flood forecasting and warning so that people, livestock, and movable assets can be relocated to safe locations before a flood strikes.

RATIONALIZING CROPPING PATTERNS:

Analysis of data shows that in the past five or six decades, cropping patterns across the country have dramatically changed. Sugarcane which requires a large quantity of water is being cultivated at many regions of low rainfall where it was not grown earlier. Similarly, rice is also cultivated in many such places. Therefore, to control agriculture water demands, it is essential to review the cropping patterns, particularly at places where annual rainfall is below, say 600 mm, or annual pumping from groundwater exceeds recharge and yet high water-consuming crops such as sugarcane and paddy are being grown. However, a major change in cropping pattern will be difficult to implement

Recycle and reuse:

At present, very little quantity of water supplied is recycled and a considerable amount of water is wasted in urban water supply networks due to leakages and thefts. Estimates show that about 40% of water from municipal supply for drinking purposes is lost due to leakage or theft in some cities.

Climate change

India is highly vulnerable to impacts of climate change on water resources due to its unique climate, geography and topography. Warming of the lower atmosphere will impact snowfall. glaciers and snow cover, and crop water requirements; increase in extreme weather will impact incidence of floods and droughts; rising sea levels will increase flooding in coastal areas and seawater intrusion; rising temperatures will impact the quality of water in rivers and lakes, and so on.

IMPORTANCE OF CONSERVATION AND MANAGEMENT OF WATER RESOURCES:

Climate change is redistributing where water is rare and where it is plentiful, making management of water resources increasingly important. Water conservation enables water to be moved from areas of excess to areas of drought provided there is a distribution channel that can be connected amongst the areas from the source to the need. Water as a freshwater resource is in dire shortage and better local water use, particularly in agriculture can result in huge water conservation. In as much as it is often overlooked, the use of water for dust control can strain its use in other areas of importance especially in areas within the vicinity of mining operations. The importance of water conservation can be put into effect through use of dust control products that reduce or replace the amount of water used with regards to efficacy of dust control and longevity in performance of the area that requires dust suppression. In some parts of the world, there are wind traps that extract water from air as a form of water harvesting. Its importance is in replenishing reserves that boost the water situation in the areas where it is implemented. With the abundance of sea water, desalination of seawater is an alternative to boost efforts of management of water resources. The efficiency of existing process would need to be improved, but there exists a great potential in desalination. The reprocessing of so-called “gray water” as a substitute to tap water could add value in the efforts of water conservation. The rebirth of the local capture and storage of rainwater are of great importance to conservation and WRM. As climate change continues to disrupt existing water supplies the importance of conservation and management of water resources is core to survival and sustainability.

Water resources planning and management activities are usually motivated by the realization that there are problems to solve and opportunities to obtain increased benefits by changing the management and use of water and related land resources. These benefits can be measured in many ways. The best way to do it is often not obvious. Whatever way is proposed may provoke conflict. Hence there is the need for careful study and research, in the search for the best compromise plan or management policy. The global shift in WRM is currently happening with transition from a mainly supply-oriented, engineering-biased approach towards a demand-oriented, multisectoral approach, often labeled an integrated WRM.

Above facts conclude that people must make lifestyle and economic trade-offs to actively participate in finding sustainable solutions to water resource management. So, for example high demanding water crops of no big nutritional value might have to compromise on irrigation which means they might not grow well or generally for their consumers they must compromise and consume less. Efforts to conserve water by reducing surface evaporation through transporting it in canals or pipelines but with consequences on local groundwater, surface aquifers, flora and fauna. What seems to be a solution for humans comes with a dire problem for nature and the challenge is that nature will always be at the peril of human activity and behavior complicating lives for future generations to come. It starts with inherent choices to how we manage our water consumption.

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