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Water Wealth- Indian and Worldwide Scenario with Special Reference to its Demand and Possible Strategy for Conservation

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ABSTRACT

Water is the foundation for origin of life. It is the biosphere on which any life depends on the planet and presently is limited in availability. Water is such resource which is indispensable for the persistence of all life forms. Earth, Water, Fire, Air and Light these five basic elements are constituted the universe. Water bearing its unique property, make it necessary to sustain various life forms and all life have evolved from water. Over two thirds of earth's surface is covered by water and land, occupying more or less three-fourth of total surface area. The rapid increase of human population, growth of industry and unaccounted use of water is putting an ever –increasing strain on the planet's water resources though water covers 71% of the Earth's surface. On Earth, 96.5% of the planet's water is found existed in the form of oceans, 1.7% in groundwater, 1.7% in glaciers and the ice caps and 0.001% in the air as vapour, clouds. Only 2.5% of the Earth's water is fresh water, and 98.8% of that water is in ice and groundwater. Less than 0.3% of all freshwater is in rivers, lakes, and the atmosphere. In this paper an effort has been made to enumerate the present scenario and demand of water besides urgent need to conserve.

Key words: Water wealth, Conservation, Water budget, Rainfall, Water crisis

Water itself does not need any introduction. The benefits of water in economic growth of the country should not be underestimated. Anthropogenic activities like industrialization and urbanization which are mainly responsible for rapid replacing of natural resources, habitat degradation of terrestrial and aquatic ecosystems [1]. It is need less to mention that how water is an important aspect for both natural ecosystems and human development in the context of economic growth of a country directly or indirectly. This precious biosphere in our life which is becoming scarce in the universe due to increase in rapid growth of population, industries, and agricultural activities besides scatter rainfall and unrational use. River is water way to strategic importance across the world, providing main water resources for domestic, agriculture and industrial purpose [2]. Rivers, wetlands which are the freshwater resources play a vital role in integrating and organizing the landscape and moulding the

ecological setting of basin. In order to meet the water demands in the future, we will need to rationalize on various process of capturing and storing water including water harvesting as well. A good Proper management system may save the quality of water and protect it from downturn. The prime factors controlling the global water cycle and the hydrologic cycle are the freshwater resources. They which in turn is the prime dynamic agent of transport [3]. It often co-exists on the Earth with its solid state, ice, and gaseous state. Water is unequally distributed throughout the world, finite in quantity and tangible in nature. The stipulated objectives of the study are given below:

- To focus present global and Indian scenario of freshwater resource and its demand.
- To study throw idea on the effect of crisis to be held and need for conservation.
- Strategies to be undertaken to mitigate the crisis for future generation and society for sustainable development of the nation.

MATERIALS AND METHODS

The present investigation study was taken up for worldwide and India. As a whole the data on different variable were collected from the various issues of NITI Aayog, CGWB, NCIWRD and from other sources.

RESULTS AND DISCUSSION

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In the world about 50 million ha has been affected by salinity and waterlogging out of 250 million ha of irrigated land. In India, about 7 million ha area is salt affected and waterlogged. In U. P and Gujarat most of the land has also been turned into saline environment. Currently about 4.6 million-hectare areas exist as blackish water land in these states. More than 65 % of the Haryana state lies in the arid and Semi-arid tract with scanty and erratic in combination with brackish water. The underground water in major part of Haryana, about 60% are moderately to highly saline, due to inefficient utilization of surface water resources, there is rapid rise in water table and soil salinization in arid and semi-arid [4]. Water covers 71% of the Earth's surface, On Earth, 96.5% of the planet's water is found in oceans, 1.7% in groundwater, 1.7% in glaciers and the ice caps of Antarctica and Greenland, a small fraction in other large water bodies, and 0.001% in the air as vapour, clouds (formed of solid and liquid water particles suspended in air), and precipitation. Only 2.5% of the Earth's water is fresh water, and 98.8% of that water is in ice and groundwater. Less than 0.3% of all freshwater is in rivers, lakes, and the atmosphere, and an even smaller amount of the Earth's freshwater (0.003%) is contained within biological bodies and manufactured products. In the present context, it is observed that the rapid growth of Indian population and its expansion is one of the causes for sharp decline of per capita availability of fresh water from 3,000 cubic metres to 1,123 cubic metres over the past 50 years - demand is expected to rise further. Demand for water from freshwater resource has been increasing with the rise in temperature. As a result, water level is declining and putting more pressure on the freshwater natural resources. It is also observed that the demand and supply is mismatched and found is more severe in certain areas. In the case of urban areas, where the demand of freshwater 135 litres per capita daily (lpcd) is more than three times less the rural demand of 40 lpcd. According to projections by the United Nation, India's urban population is expected to rise to 50% of the total population by 2050 which mean 840 million people in the most water-starved parts of the country compared with 320 million today. The issue of

inequity in water availability has already proved to be great problem for several inter-state and intra-state disputes.

In India, 90 per cent rainfall takes place from June to August during the short period of three months. There is a great fluctuation in the number of rainy days in India. Average number of rainy days on the western coast is 137. Average number of rainy days whereas in Rajasthan it is reduced to less than 10. There is a variation in the nature of rainfall also. The rainfall may be continuous and heavy in the areas of more rainfall whereas the rainfall may be intermittent and low in the areas of less rainfall. Therefore, there is a great alteration in the regional distribution of rainfall. Approximately, 8 percent areas of the country receive more than 200 cm rainfall, 20 per cent areas receive rainfall between 125 to 200 cm and remaining 30 per cent areas, receive less than 75 cm rainfall. Uneven distribution of rainfall is the cause for the uneven distribution of underground and surface water.

It is estimated that the average annual precipitation received in India is 4,000 km³, out of which 700 km³ is immediately lost to the atmosphere. 1,150 km³ flows as surface runoff and 2,150 km³ soaks leaches into the ground. In the country the total water resources have been estimated as 1,953 km³. Of the total water resources nearly 62% or 1,202 km³ is available in the Ganga-Brahmaputra-Meghna basin. The remaining 23 basins have 751 km³ of the total water resources [5]. In terms of utilizable water resources in India the annual water availability is 1,122 km³. Besides this, the quantity of 123 km³ to 169 km³ additional return flow will also be available from increased use from irrigation, domestic and industrial purposes by the year 2050.

Water use is increasing everywhere every year. On an annual basis 69 percent of all water withdrawn for human use is soaked up by agriculture, including irrigation. Domestic use (household, drinking water, sanitation) accounts for about 8% and industry accounts for 23 percent. Three global averages vary a great deal between regions from 23 percent of water use for industrial purposes. Low-income countries: 8% of total water use. High income countries: 59 percent of total water use (Table 1).

Table 1 Water demand for various fields in India

Sectors	Water demand in Km ³ (or BCM)		
	2010	2025	2050
Irrigation	557	611	807
Drinking	43	62	111
Industry	37	67	81
Energy	19	33	70
Others	54	70	111
Total	710	843	1180

Source: National Commission on Integrated Water Resources Development (NCIWRD) 2010

With the increase trends of water demand by various user sectors and decrease in the resource, sharing concept is coming up and is becoming complicated too. Conflicts related to water users are increasing everywhere by social, economical and ecological values. Per capita availability of water in 1950 is expected to reduce to 60% in developed countries and in developing countries it is 30% in 2000 and will be reduced to 57-58% in developed countries and 23-24% in developing countries in 2025 [6]. It is found that most of the studies estimate the water resources of India as 1880 BCM [7], while the total utilizable water resources vary. The NCA has estimated the total utilization as 1050 billion cubic metre (BCM). Water resources of India that has been utilized,

according to the CWC are 1110 BCM while NCIWRDP estimated the same as 1086 BCM plus additional return flows (123 BCM) for low demand scenario or 169 BCM for high demand scenario). In according to NCIWRDP, the total utilizable water resources of 1086 BCM would be further enhanced to 1209 or 1255 billion cubic metre (BCM) depending upon low or high demand scenario. Water resources in India are represented in (Table 2).

Water budget

The balance between the available water in the country and the water under use is said to be water budget. As estimated the reserves under groundwater and our earth

surface are about 23840 billion cubic metres. Out of the estimated, only 10860 billion cubic metre (BCM) water is

required for use. Cubic metre or hectare metre is the unit of measurement of the amount of water [9].

Table 2 Water Resources in India

Water resources	Quantity
Annual precipitation	4000 BCM
Available water resources	1869
Utilizable	1122
a) Surface water (Storage and diversion)	690
b) Groundwater (Replenishable)	432
Present utilization (Surface water 63%, groundwater 37%)	605
Irrigation	501
Domestic	30
Industry, energy and other uses	74

Source: Bhattacharya *et al.* [8]

Future projection breakup: The requirement of water for various sectors has been assessed by the National Commission on Integrated Water Resources Development (NCIWRD) in the year 2010. On the basis National Commission on Integrated Water Resources Development (NCIWRD), major fields for water demand in India are

irrigation, drinking water, Industry etc., detail shown in (Table 1): According to the Ministry of Water Resources, industrial water use in India stands at about 50 billion cubic meters or nearly 6% of total freshwater abstraction - demand is expected to increase dramatically in the next decade, given the forecasts of 9% growth.

Table 3 Geographic breakdown of water abstraction

Content	Percent
Asia	55%
North America	19%
Europe	9.2%
Africa	4.7%
South America	3.3%
Rest of the world	8.8%

Source: Thomas [10]

Crisis and effect

The demand for water is increasing day by day; on the other side supply of water either remains constant or decreasing due to global warming. The unadjustment of the demand and supply of water could cause water crisis and the resultant cause would be:

- Inadequate access to safe drinking water. Inadequate access to water for sanitation and waste disposal.
- Groundwater over drafting (excessive use) leading to diminished agricultural yields.
- Overuse and pollution of water resources harming biodiversity.
- Regional conflicts over scarce water resources.
- Waterborne diseases.
- In addition of human population, Vegetation and wildlife will be the victims.
- India is facing water stress. In addition, due to contamination of water sources and poor water treatment facility. It is often difficult to get safe drinking. Therefore, there is an urgent need to utilize this valuable resource in an efficient way and more and more water saving techniques waterless urinals, waterless car washes, rainwater harvesting etc. should be used in order to save water for future.

Facts

Groundwater is the major source of drinking water in urban and rural India besides pocket for agricultural and the

industrial sectors. Developing country like India possesses about 432 BCM of groundwater replenished yearly from rain and river drainage, but only 395 BCM are utilizable. Of that 395 BCM, 82% goes to irrigation and agricultural purposes, while only 18% is divided between domestic and industrial. Total static groundwater available is approximately 10,812 BCM and increasingly is pumped from lower and lower levels which is much faster than rainfall to replenish it. The average groundwater recharge rates of India's river basins are 260 m³/day. The *Delhi Jal Board* estimates that water tables are dipping by an average of 0.4 meters a year [11].

Need for conservation

Growing economic activities spurred by urbanization and consumerism, have been generating environmental stress upon natural water resources for quite long. As a fall out, major aquatic eco-systems, a natural capital asset, have been subjected to loss and degradation which needs serious conservation intervention. Besides, indifferent nurturing and care, the natural water resources stand out as a unique life supporting. Water conservation in peri urban, urban and rural regions is immediately needed for upliftment of socio-economic development of the attached community besides up gradation on livelihood of the populace. The EKW is

commonly regarded as the lungs of Kolkata as the area is the prime source of oxygen producer zone to supply to Kolkata city. Therefore, it is the responsible of the citizens

apart from the responsibility of Govt. to conserve the ecosystem for the welfare of mankind. Care should be taken to use the specific water for specific purpose without any wastage. Say, drinking water should not be used for washing and bathing. Use of Ground water strictly restricted to the drinking purposes generally, not for agricultural and horticultural fields. Rainwater harvest is another option to conserve which is also a cost-effective process especially for rural areas.

Strategies

Recycle and reuse of water

Recycling of water is not practiced in India and there is considerable scope and incentive to use this alternative. They estimated that recyclable water is between 103 and 177km³/year for low and high population projections. There

should also be a balance between water demand and water supply. As desalinization costs are now coming down and it is about Rs.50/m³ the aforesaid technologies may be followed in coastal areas enormously.

CONCLUSION

Water management generally receives little social and policy attention in comparison to water supply challenges, especially in contrast of water scarcity. Over exploitation of ground water is the major concern for water crisis besides loss of wetlands, river basins, reservoirs and other natural water resources due to urbanization, population explosion and industrialization. Effluents from the industries should be flown on to lands and into rivers / sea after proper treatment with permissible limit of contaminants to save aquatic lives and biodiversity for healthy water.

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