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SUSTAINABLE ENVIRONMENTAL SANITATION AND WATER SERVICES

Water Resource Management - Crisis in 21st Century

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Key words : *Introduction, status of world water resources, Problems, Challenges Vs Management, Indian scenario, integrated management & conclusion.*

Introduction :

Water is a vulnerable, renewable, finite resource and elixir of life. The world's thirst for water is likely to become one of the most pressing resources issue of the 21st century for the humanity. Global water consumption rose six folds between 1990 to 1995, more than double the population growth. Major fresh water consumption realms are agriculture (70%), industry (20%) and community house hold (8%). It is estimated that by 2025 AD over three billion people of 65 countries, half the worlds population will be severely affected by water crisis and India will not be any exception.¹

Earth is called the blue planet because it contains 97.5% of the total available water in oceans, unfortunately as salt water, and the rest 2.5% only is fresh water again out of which 2.24% is contained in polar ice capes (Antarctica, Green Land etc.) glaciers and deep ground water. Only remaining 0.26% of world's water is accessible for use. Further it is estimated that water

consumption by different water users shall rise from 1250 Km.³ in 1960 to 2500 Km.³ by 2010 and about 2800 km.³ by the year 2025⁸. The United Nations laud and clear message remains "water is a scarce resource which is to be managed efficiently and protected properly". Embarrassing the above facts it now seems a close reality that we are on the verge of facing a major water crisis globally and if corrective majors are not taken immediately we may face a scrious water famine in 21st century.

Status of world water resources

Water is abundant globally but scarce locally. In every continent the availability of fresh water per head population has fallen dramatically in the last few decades and in the meantime water consumption is increasing tremendously. Agenda 21, the action plan from the "Riode Jenario" summit referred to the fact that "One in three people in developing countries does not have access to drinking water in sufficient quantity and qualities to cover their basic needs while in all parts of the world the availability of fresh water is declining fast.²

Availability of fresh water - (Per capita per year in different countries)

Availability of fresh water in different countries can be categorised as given below. (9)

| Category | Per capita availability M ³ /year | Countries (%) |
|----------|--|---------------|
| Very low | 1000 or above | 14 |
| Low | 1000 - 5000 | 37 |
| Medium | 5000 - 10000 | 14 |
| High | 10000 and more | 35 |

Trends in water consumption (km³/year)

Trends in water consumption by different continents are as given below.

| Continent | 1900 | 1950 | 1990 | 2000 | Percentage |
|---------------|--------------|---------------|---------------|---------------|--------------|
| Africa | 41.6 | 56.2 | 234.0 | 317.0 | 6.1 |
| North America | 69.4 | 286.0 | 724.0 | 796.0 | 15.3 |
| South America | 15.1 | 59.4 | 150.0 | 216.0 | 4.2 |
| Asia | 414.0 | 859.0 | 2440.0 | 3140.0 | 60.5 |
| Europe | 37.5 | 89.0 | 545.0 | 673.0 | 13.0 |
| Oceania | 1.4 | 10.4 | 37.0 | 48.0 | 0.9 |
| Total | 579.0 | 1360.0 | 4130.0 | 5190.0 | 100.0 |

At the start of the 21st century nine countries with around 35% of world population were believed to have less than 2000 Cum of renewable fresh water available / capita / year. This implied acute water scarcity. Nations in this list included India, Nigeria, Kenya and China. The situation has worsened over the year with water quality deteriorating due to unabated sewage discharge. This crisis can be averted by using technologies that offer potential for improving efficient use of fresh water. More than 60% of the water used in the world each year is diverted for irrigating crops. In Asia which has 2/3 of worlds irrigated land, 85% of water goes for irrigation.

Sector wise water usage in different countries - Sector wise water usage in some countries in billion cubic meter is as given below.⁴

| Countries | Usage in billion cum. | | |
|-----------|-----------------------|----------|----------|
| | Agriculture | Industry | Domestic |
| China | 404.6 | 94.6 | 26.3 |
| India | 460.0 | 15.0 | 25.0 |
| USA | 120.9 | 291.0 | 35.8 |
| Japan | 58.5 | 15.5 | 17.4 |
| France | 4.9 | 29.6 | 6.1 |
| Egypt | 47.4 | 4.4 | 3.3 |
| Brazil | 33.5 | 9.9 | 11.5 |
| Germany | NA | 39.8 | 6.5 |
| Argentina | 21.5 | 2.6 | 4.6 |
| UK | 0.3 | 7.2 | 1.9 |

Water analysts use the following thumb rule to categorise water scarce and water stressed countries.

| <u>Availability of fresh water</u> (cum / capita / year) | <u>Category</u> |
|---|-----------------|
| 1000-1600 | Water stressed |
| Less than 1000 | Water scarce |

Currently some 30 countries are considered water stressed out of which 20 are absolutely water scarce by 2020 the number of water scarce countries shall approach to 35.

Major Criteria Responsible For water Crisis :
Major criteria responsible for water crisis are

- Natural resource water is not unlimited
- It is unevenly distributed by nature
- It has no substitute unlike oil.
- Inseparable from other resources

- Human behavior
- Conventional method neglected
- Riparian rights forgotten
- Recycling not followed

The annual amount of renewable fresh water on earth to day is in the order of around 7000 Cum / capita / year which is more than enough to meet average needs however due to its uneven distribution some areas receive a surplus and other relatively little⁷. To assure adequate health, people need a minimum of 100 ltrs. / day for drinking, cooking and washing, in Industrialized countries people are using as much as 450 ltrs. / day while in developing countries the consumption is as low as 20 ltr. / day

Approaches for solution :

A solution is possible if the water management starting from catchment area to consumers point is taken of successfully, Management of water in transmission, treatment and storage as per demand with a proper check can avoid wastage. The major approaches are -⁶

- Restoration of ecological balance.
- Recharging.
- Control of pollution.
- Reviving traditional methods.
- Change of outlook.
- Peoples participation.

Challenges vs management :

Major challenges to be faced in near future are

- Ground water depletion.
- Water quality deterioration.
- Low water use efficiency.
- Expensive new water sources.
- Resource degradation.
- Water related / borne diseases (Health).
- Massive subsidies and distorted incentives &
- Development of new water sources.

Mainly there are two strategies used to meet challenges on water resources, these are supply and demand management and the main features are -³

| Supply management | Demand management |
|-------------------------------|--|
| Inter basin transfer of water | Improved water use practices & technologies. |

| | |
|--|--|
| More storage structures Waste water utilization | Crop diversification. Bring large areas under micro irrigation. Introducing sprinkling and drip irrigation. Use of saline water for irrigation by selecting suitable crops. Implementing regulatory measures on over exploitation of surface and ground water. |
|--|--|

- Andhra Pradesh has spent a sum of Rs. 149.96 crores for impounding water to the tune of 68 - 67 x 10⁹ cum through water harvesting activities under "Neeru Meeru" programme funded by world bank.

Conclusion :

The Rio-declaration on Environment and development adopted in UNCED-in-1992 stated - Eradicating poverty and reducing disparities in living standards in different parts of the world are essential to achieve sustainable development and meet the needs of the majority of the people. Therefore we have no option but to depend on the available sources of water and have the responsibility to save, conserve and strengthen them without fail because as long as there is life on Earth demand for water is going to increase.

World water forum (WWF), the biggest International gathering has discussed recently on very title making water every body's business. "Water, Water every where but not a drop to drink" lamented in coleridge poem should not happen in the best welfare of humanity. The nightmare of water crisis should be reversed by turning our wavey water dreams into reality.

Indian Scenario :

India has water resources which is 4% of global availability. In India it is estimated that per-capita availability of land and fresh water is 0.2 ha. and 2000 cum. as against world average of 0.27 ha. and 7000 cum. respectively. The climatic variation in India is very high. It ranges from extreme cold, and aridity to excessive humidity and rain fall. There is also wide variation in precipitation from 100mm. in western Rajasthan to 12500 mm in Cherapunji (Maghalaya) -².

Integrated Management :

The planning commission had proposed in 2000 an integrated management approach to conserve natural resources like water, soil, bio-diversity and forest besides a well organized monitoring evaluation process. This was proposed with the aim to bring the natural resources under one umbrella, and for adoption of an integrated approach -⁸.

Recent Development :

Panipaanchayats - Mainly for irrigation system which solves drinking water problems at no extra cost implementing the equitable distribution of water through people's participation. The Gram Ganrav Pratisthan (GGP) and Marathwada Seiti Satya Mandal (MSSM) of Maharashtra in an eye opener on this Issue. In Orissa the system is implemented since - Sept. 2000.

Voluntary agencies :

Tarunbharat Sangh - Sri Rajendra Singh of TBS - and NGO in Rajasthan was awarded "Magayasaya" award for outstanding work in rainwater harvesting in Rajasthan (Alwar district).

Public Participation & Govt. Initiatives :

- Paniroko Abhiyan Madhya Pradesh has created additional water impounding capacity of 9487 x 10⁸ cum through 7,06,304 water harvesting structures (both new & renovation of tanks, wells field bunds and contour trenches spending Rs. 415 crores out of which Rs. 99.35 crores were from people.

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