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Sustainable Water Management for Urban Areas: Challenge and Solution

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Abstract: Globally, over 1.1 billion individuals still lack access to clean, safe water and over 2.6 billion people do not have access to toilets and other adequate sanitation facilities.

The problem will be more magnified by rapid urban growth. In India, in 1950, there were 75 cities with a population in excess of 1 million; by 2025, that number is expected to rise to 650. India's urban population was 471 million in 2019. It is far greater than the total population of USA (328 million) in 2019! India is on the brink of an urban revolution with its population in towns and cities expected to reach 600 million by 2031.

The per capita water availability in India was 6008 cubic metres / year in 1947 and will be 1340 cubic metres / year in 2025. So far as the Earth is concerned, surface water is only 0.3 %.

It is becoming essential to avoid the impending wars for water as is indicated by the diminishing per capita water availability in India. United Nations analysis says that 35 billion cases of illness and 5.3 million deaths are caused each year by unsafe water. Present human-induced changes/variability in climate show a highly disturbing trend. The water disaster, following the covid-19 disaster will collapse the economies all over the world.

Urban waste water is to be cleaned and reused in a big way in all big, metropolitan cities. Sewage water cleaning and recycling will be essential to save human population on the urbanizing earth from extinction.

To avoid water wars, Water Reuse, Recycling and Rain-water harvesting will be the key solutions at every level, in the highly urbanized world. Urban watersheds development, demand management, life style changes and water audits will be necessary for sustainable urban areas, cities.

1. INTRODUCTION

Over 1.1 billion individuals still lack access to water from a clean, safe source and over 2.6 billion people do not have access to toilets and other adequate sanitation facilities.

The problem will be magnified by rapid urban growth. In 1950, there were 75 cities with a population in excess of 1 million; by 2025, that number is expected to rise to 650. India's urban population was 471 million in 2019. It is greater than the total population of USA (328 million) in 2019. India is on the brink of an urban revolution with its population in towns and cities expected to reach 600 million by 2031.

This lack of access is a primary cause of water contamination and water-borne diseases. Every 8 seconds, a child dies from a water-related disease. 80 percent of diseases in the developing world are caused by contaminated water. 20 percent of freshwater fish species have been pushed to the edge of extinction from contaminated water.

From an urban perspective, and especially in the developing world, challenges related to water and sanitation will magnify in the future due to an evergrowing city population needing to share already insufficient and poorly managed resources.

So far as the Earth is concerned, 97% of the water on it is salt water, with an average salinity of 35‰ (or 3.5%, roughly equivalent to 35 grams of salts in 1 kg of seawater and only 3% is fresh water, of which slightly over two thirds is frozen in glaciers and polar ice caps.

The remaining unfrozen freshwater is mainly found as groundwater, with only a small fraction present above ground or in the air. Surface water is only 0.3 %. The planet's little fresh water is very unevenly distributed.

The overall per capita water availability in India is diminishing day by day, as is evident from the following figures:

1947 6008 cubic metres / year

1951 5177 cubic metres / year

2001 1820 cubic metres / year

2025 1340 cubic metres / year

2050 1140 cubic metres / year

The water scarcity in river basins is growing fast with increase in urban population and persistent water shortages in some parts and annual floods in other parts of India are becoming a major challenge. 40 % water demand in Indian cities is met by ground water and the ground water table is also falling at an alarming rate (2-3 m / year).

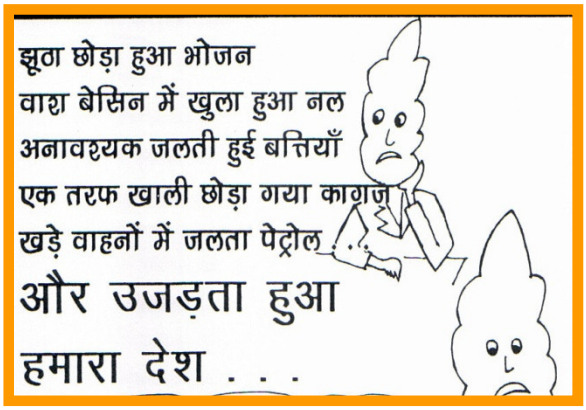
It is becoming essential to avoid the impending wars for water as is indicated by the diminishing per capita water availability in India. Every person needs a minimum of 20 litres of water per day to meet the minimum basic requirements. This undermines overall social and economic development of civilization.

Thus we see that floods and droughts affect vast areas of the country, transcending State boundaries. One-sixth area of the country is drought-prone. Out of 40 million hectare of the flood prone area in the country, on an average, floods affect an area of around 7.5 million hectare per year. Approach to management of droughts and floods has to be co-ordinated and guided at the national level.

2. THE PROBLEM

The impending world water crisis will be cumulative result of many factors. United Nations analysis says that 35 billion cases of illness and 5.3 million deaths are caused each year by unsafe water.

Present human-induced changes/variability in climate show a very highly disturbing trend.



Wastage of All Kinds : Biggest Problem

Save Water ! Respect Varun Dev !!

Humans are destroying the water, air and land environment not only through increasing pollution, population but also through greed, careless life-styles.

Over Pollution + Over Population + GREED + lavish, careless lifestyles of men has resulted in direct impact of climate change on vital areas such as water quantity and quality, agriculture, air, ecosystems and human health.

Under pressure from climate change, water problems and other problems will aggravate manifold. The laws of the water and land face numerous challenges. There is ongoing tension between the life and freedom of the other species and men.


एक हफ्ते और रही मानसून की
बेरुखी तो विकट होंगे हालात

त्राहि माम !

पहले ही आधे से ज्यादा सावन सूखा बीत चुका है। अब मानसून ने अगर एक हफ्ते भी और तरसाया तो प्रदेश के लिए मुश्किल खड़ी हो जाएगी। सूखे की आशंका और इससे निपटने की तैयारी में यूं तो सरकार भी सक्रिय हो चुकी है, मगर बारिश की बेरुखी जारी रही तो आम आदमी के लिए समस्याओं का ऐसा चक्रव्यूह खड़ा हो जाएगा, जिसे इंद्रदेव ही तोड़ पाएंगे।

1. बिजली के लिए हाहाकार
2. पेयजल की किल्लत शुरू होगी
3. बढ़ती गर्मी करेगी बेहाल

Disturbing News : Year After Year

Environmental degradation of water sources, in particular, reduced water quality and quantity due to pollution from urban or land-based activities is a major concern. Too little money and attention is paid to improve such basic infrastructures as water and wastewater systems. Many nations are spending profusely on war preparation than on water providing.

Further, improving the water and sanitation situation in an urban setting is not an easy task, as the required infrastructure, either new or upgraded, needs to be accommodated by already existing structures, such as roads or buildings.

2.1 Status of Water Resources in India:

India receives an annual precipitation of 4,000 billion cubic meter (BCM), equivalent to 4,000 cubic kilometers of which 75% occurs just in the four months of the monsoon period. From the annual precipitation, 1,869 BCM of water appears as runoff in various river basins.

The utilizable water resource has been assessed as 1,132 BCM. Rainfall in India is erratic and uneven that ranges from 11,000 millimeter annually in some parts of North Eastern India to 100 millimeter in Western India. Therefore, India is expected to face acute water problem in the coming years due to different precipitation patterns, wastage and mismanagement.

Out of 40 million hectares of the flood prone area in the country including States like Bihar, Bengal, Assam, Uttar Pradesh, Coastal Andhra Pradesh, Orissa, on an average, floods affect an area of around 7.5 million hectares per year. In general, India has water abundance in the north and east and water scarcity in the west and south.

The availability of water resources in various river basins of the country is highly uneven. While 32% of the total water resources are still available in the Brahmaputra basin, 28% of the total water resources in the Ganga basin, this availability is merely 0.2% in the Sabarmati basin.

Out of 12 major and 48 medium river basins in India, the government predicts that by 2025 the 8 deficit river basins will be Ganga, Subernarekha, Krishna, Mahi, Tapi, Cauvery, Pennar and Sabarmati.The surplus basins would be Brhamaputra, Barak, Narmada, Brahmani-Baitarani, Mahanadi, Godavari and Indus.

Gangaa (Water) – the elixir of life:

Today, water has been ignored globally as the engine for green growth. All rivers including Ganga turned into huge sewers! That's why Modi Mission – Swachha Bharat Abhiyyan, Clean Ganga Mission have been launched. It is to be noted that climate change has been mainly due to men.

Water is the prime need for the survival of all living things, whether it belongs to flora kingdom or fauna kingdom and industrial development. The demand on water for domestic, commercial, industrial and agricultural purposes is increasing significantly in the recent past.

The situation is exacerbated by the growing population and urbanization, thereby there is a very high pressure on limited water resources. Less than 3% of the world's water is fresh (drinkable). Of which 2.5% is frozen in the Antarctica, Arctic and glaciers. Humanity must, therefore, rely on just 0.5% for all of ecosystem's and man's fresh water needs. The planet's little fresh water is very unevenly distributed.

For sustainability of human civilization, man has to manage his water. Water is the precious nectar around which the human civilization has developed. He has to seriously manage his wastewater, which is making the rivers, cities etc. a real hell on

this earth. Therefore, integrated water resource management is the need of the hour, to satisfy everyone's need.

There are many facets of the water maladies e.g. water and energy are intricately connected. Producing energy uses and pollutes large amounts of water. Likewise, providing and using water requires large amounts of energy.

On the other hand, agriculture uses approximately 70% of the world's freshwater supply. Agricultural water use is under growing pressure as demands for water increase; competition among cities, farmers and the environment.

1.3billion ton food is wasted every year! Almost 1 billion people are undernourished. Another 1 billion sleep hungry. This will make the water crisis worse.

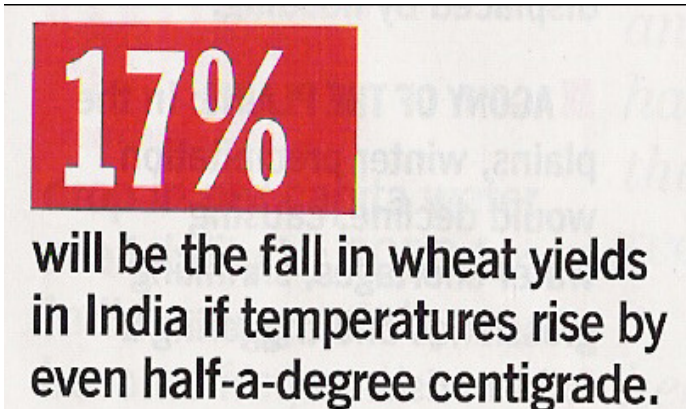
2.2 Situation of the World:

8 crore people are getting added to the world every year and some of the problems include shortage of water and other resources, war and conflict, overcrowding, health issues and problems in survival of other species of the ecosystem.

Overexploited stocks, unemployed farmers / fishermen, short-sighted structural policy– it is impossible to ignore that farm / fisheries management has failed in many respects. Our aim should be to conserve plant / animal/ fish species and ecosystems and take account of the social dimension.

Because of the scale at which water and all other essential resources on land are being depleted, mining in the ocean depths is becoming more intense. It will further worsen the situation with rising pollution levels.

Humans are destroying the land, air and marine environment not only through pollution, but also through greed. Global climate change has caused a gradual rise in the Earth's average temperatures, resulting into frequent crop failures.



Many of the Earth's ecosystems are nearing critical tipping points of depletion or irreversible change, pushed by high population growth, high pollution and wasteful lifestyles.

The story of the liquid of life i.e. water is not less alarming. On the one hand, the planet's little, fresh water is very unevenly distributed while on the other hand, many of our most important aquifers are being over-pumped, rivers, lakes over-used or polluted, causing widespread declines in over ground, groundwater levels.

Many major rivers no longer reach the sea in most years. On the other hand, our consumption and production patterns are becoming highly unsustainable. By 2050, if current consumption and production patterns remain the same and with a rising population expected to reach 9.6 billion, **we will need 3 planets to sustain** our ways of **living** and **consumption.**

In the coming years the rate of glacial melting will probably accelerate. Sea-level rise will become more rapid. Scientists anticipate that if greenhouse gas emissions continue unchecked, the sea level could rise by as much as 5 metres by the year 2300.

That will be a catastrophe for the only living planet and its inhabitants.

Thus we see that man has highly disturbed the mother nature due to uncaring (wrong) technology, waste full lifestyles. What will happen if we do not care & prevent misuse of our F.E.W. Resources (Food, Energy, Water resources)? The Environmental Crises, Food Crisis, Energy Crisis, Water Crisis will become more severe and more frequent.

Cost of not Caring the Mother (Earth) and the Mighty Himalaya will result into more severe and more frequent KAWAS (Barmer), KEDARNATH, KASHMIR (twice), KISAAN (suicides...) like destructions. Many such Development – Environmental Problems will crop up.

3. THE SOLUTION

Water crisis will be the burning problem sooner than later. Understanding and managing water and other precious resources is, therefore, critical to the public and decision-makers in the government, industry and hazard mitigation. It is essential to manage the water bodies for the present and future generations.

Therefore, short-term and long-term solutions need to be sought to mitigate water stress carefully and on a planned, continuous basis for humanity specially cities for sustainability of life.

This calls for strong legislation, guidelines, and building codes, which can only be instituted and monitored by national and local governments.

Cities cannot be sustainable without ensuring reliable access to safe drinking water and adequate sanitation. Coping with the growing needs of water and sanitation services within cities is one of the most pressing issues of this century. Sustainable, efficient and equitable management of water in cities has never been as important as in today's world.

Water Reuse, Recycling and Rain-water harvesting will be the key solutions in the highly urbanized world.

Urban waste water is to be cleaned and reused in a big way in all big, metropolitan cities. Sewage water cleaning and recycling will be essential to save human population on the urbanizing earth from extinction.

Rain-water harvesting on ground around the urban areas and roof water harvesting in the cities would have to be taken up on a very large scale, specially in western and southern India and similarly situated geographical areas on this globe.

We need to improve, clean and protect all types of our water sources very carefully through utmost understanding and responsibility. The urbanizing civilization needs local to international, thorough and long-lasting approach to solve its water problems.

Objective of Rajasthan "MUKHYA MANTRI JAL SWAWALAMBAN ABHIYAN" is to make people self-reliant on water front.

Another dimension of high importance is that we need to save cow and of course all fauna and flora for averting Climate Refugee Class Creation! It is to be noted that a large section of climate refugee population would be women and children. Therefore, the Green and Clean economy must include **Gauri (women)** in a big way for revolutionizing a positive change in the water and the whole eco-system for betterment of all.

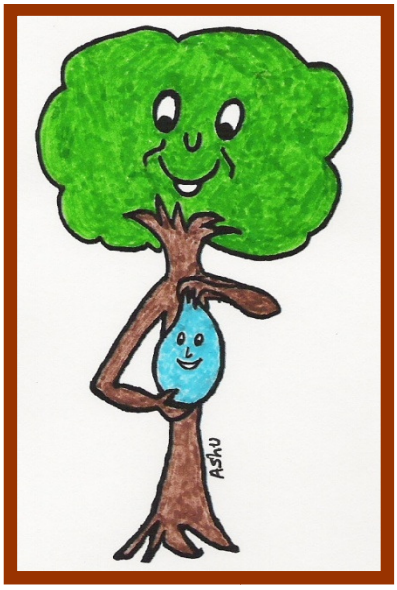
To avoid the water and food crisis resulting from climate change catastrophe, there are several things we can do to solve the twin problem of Water Crisis and Climate Change. One solution is to stop producing C02. We can do this by switching from oil, coal and gas to renewable energy. Another solution is to plant more trees.

Trees absorb carbon dioxide and produce oxygen, which is not a greenhouse gas. A third solution is to use less energy and to recycle more products. Generating electricity is one of the main sources of carbon dioxide. If we use less electricity, we will produce less C02.

To reduce pressure on hydro-plants, electricity can be generated from sunlight which can be substituted for non-renewable forms of energy. Photovoltaic cells can be used to convert light to electricity and can be used to charge devices such as calculators or power entire house. Solar thermal power plants are another source of energy where electricity is generated by highly pressurized steam from sunlight using power turbines.

4. CONCLUSION:

Urban watersheds development, demand management and water audits are necessary for sustainable cities. Integrated urban water resource management (IUWRM) should be applied to the entire urban water cycle, including rainwater, desalination, ground and surface water, etc., as well as storage and distribution, treatment, recycling and disposal, and the protection, conservation and storage of water resources.



Save Water to Save the World !

If we do not promote and practice judicious use of our precious water resources, it will turn into a human-ecological-economic disaster, more dangerous than Covid-19 Crisis.

This will collapse the economies all over the world. It is essential to learn from past experiences so as not to commit the same mistakes all over again and face similar environmental disasters which take another few centuries to recover from.

The entire globe's and India's natural water cycle need to be understood and respected like the Ganga Maa. We have to be very sensitive to avoid over-use, misuse, wastage of the liquid of life – water.

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