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Water Scarcity and Water Management in India

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Abstract: *A water crisis is a situation where the available potable, unpolluted water within a region is less than that region's demand. India is currently facing the major crisis in its history and it's not COVID-19. It is suffering from one of the world's worst national water crises. The water scarcity is mostly man made due to excess population growth and mismanagement of water resources. The problem is turning to be a nightmare in case of Maharashtra, Chennai and Punjab. The process of conservation means putting the water resources of the country for the best beneficial use with all the technologies at our command. Thus there is an urgent need to link the water demand–supply gap by improving the utilization of the water in the rain-fed regions and also the water which gets waste by running into drainage and rivers. The paper traces the issue of water scarcity In India and aims to sensitize the people towards taking simple initiatives at individual level to bring a positive change for the environment of the country.*

1. INTRODUCTION:

The increasing pace of industrial development and the larger weightage on agricultural development for inclusive growth has fetched in a number of environmental evils in the contemporary years in India. The concentration of industries in certain regions in India and the unequal distribution of rainfall have compounded the environmental problems.

In India human existence depends on water. The migration of population encounter water problem both on account of water pollution as well as exploitation of ground and the clustering of industries around the urban areas have augmented the demand for better and improved quality water for both industries as well as domestic needs. The over exploitation of water has particularly affected the availability of good quality of drinking water recharge techniques are being encouraged to make the village self-sufficient but they have limited potential.

At present more than half a billion of the world's population is facing water crises. It is been reported that two-thirds of the global population (4.0 billion people) live under conditions of severe water scarcity at least 1 month of the year[1]. Thus it's clear that each drop is precious for us hence we need to make sensible decision about the same. We are planting sugarcane to make ethanol for fuel but we can't feed our families with the same. We are constructing dams on rivers to produce electricity without taking cognizance of the locals downstream who are losing their livelihood as they can no longer practice fishing. Having a fight with neighbor over pumping the ground water is a common phenomenon. Academicians and researchers have termed it as food-water-energy nexus and consider it to be one of the leading problems encountered by liberalized, privatized, globalized, industrialized and thirsty world. According to a study on water resources and demand, by 2050, around 3.5 billion to 4.4 billion population across the globe will live with inadequate access to water, of which over 1 billion of them will belong to cities[2].

2. What is Water Scarcity?

Water scarcity means the dearth of adequate available water assets to meet the burdens of water requirement within an area or a region. More than 12000 lakh people lack access to clean drinking water. Water scarcity involves water pressure, water insufficiency or shortages, and water crunch. A water crisis is a situation where the existing drinkable, uncontaminated water within an area is lesser than the required demand of the area. Water scarcity is being

[1] **MEKONNEN & HOEKSTRA (2016). Four billion people facing severe water scarcity** https://www.science.org/doi/10.1126/sciadv.1500323#:~:text=We%20assess%20blue%20water%20scarcity,live%20in%20India%20and%20China.

[2] https://www.sciencenews.org/article/future-will-people-have-enough-water-live#:~:text=By%202050%2C%20some%203.5%20billion,analyzed%20water%20sources%20and%20demands.

determined by two congregating phenomena: growing requirement of freshwater and lessening of functional freshwater assets.

Definition: Water scarcity can be defined as the lack of availability of freshwater to meet the existing demand of the population. In case of India it is exhibited through limited or non-fulfillment of the demand, competition and conflict over acquisition and distribution of freshwater amongst states, irrevocable groundwater depletion and adverse impact.

Water scarcity can be a result of following:

1. **Physical (absolute) water scarcity:** physical water scarcity may result from insufficient natural water assets to fulfil a region's requirement,
2. **Economic water scarcity:** economic water scarcity may result from low and improper management of the adequate accessible water assets.

3. Water Crises in India:

Water is the most valuable natural resource as it is essential for human survival and life on earth. However, the availability of freshwater for human consumption is highly under stress because of a variety of factors. This crisis of water scarcity is most visible in India as well as in other developing countries. According to the recent data of Central Ground Water Board (from 2017)[3], around 256 of 700 districts in India have reported 'critical' or 'over-exploited' groundwater levels. India arrests only eight per cent of its yearly rainfall – which is among the lowermost in the globe[4]. India is already facing the battle over water between states like Karnataka and Tamil Nadu over distribution of Cauvery waters, between Gujarat and Madhya Pradesh over distribution of Narmada waters, between Andhra Pradesh and Telangana over distribution of Krishna waters, etc.

Our dependence on Monsoon for the replenishing of water resources such as underground aquifers, lakes, rivers, and reservoirs poses a greater challenge to water crises since monsoon itself is vulnerable due to climatic factors. States like U.P and Himachal are states with surplus water on the other hand states like A.P, Rajasthan, Maharashtra are drought prone due to water scarcity.

4. The Need for Water Conservation:

The population of India is estimated the reach 1.5 to 1.8 billion by the year 2050. The annual average surface water flow in India has been estimated 1869bcm of which only 690bcm can be utilized if appropriate storages can be provided. Right to access the safe drinking water is still a dream for many, particularly for the majority of the people from countryside areas. India is positioned at 120th place at global quality index[5] level water between 122 countries since around 70 per cent of the water available is contaminated. It is estimated that half of the population in the country maybe living in urban areas by the year 2050 and then most of these urban areas will have multiple water related problems.
The method of water conservation thus means at positioning the water assets of the country for the best advantageous usage with all the skills at our knowledge. Water conversation actually means corresponding demand and supply. The tactics for water conversation and management can be adapted either as per the demand supply or can be adjusted as per the management requirements. The approach may differ depending upon the use for domestic irrigation or industrial use.

5. Reasons behind water scarcity in India:

The water scarcity is mostly man made due to excess population growth and mismanagement of water resources. Some specific causes for water scarcity are:

- Inefficient use of water for agriculture. India is one of the highest producers of agricultural crops across the globe and therefore the consumption and requirement of water for cultivation is amongst the utmost. Out dated procedures of irrigation cause highest water loss due to vaporization, drainage, filtration, water transportation, and superfluous use of groundwater. Since a major area rely on traditional means for irrigation, the strain for water required for

[3] https://www.downtoearth.org.in/blog/water/india-s-water-crisis-the-seen-and-unseen-76049#:~:text=As%20many%20as%20256%20of%20700%20districts%20have%20reported%20'critical,the%20water%20table%20has%20fallen.
[4] https://www.britannica.com/science/climate-meteorology/World-distribution-of-precipitation
[5] https://www.firstpost.com/tag/india-ranks-120th-of-122-countries-in-a-global-water-quality-index

other than cultivation remain the same. Unless we don't shift to better alternatives like micro irrigation, drip and sprinkler irrigation techniques.

- Reduction in traditional water recharging areas. In recent past there seems to be a sheer negligence in taking cognizance for traditional water bodies acting as a major source for recharging the ground level water. Thus there is an urgent need to revive our traditional means of ground water recharges along with introducing the new ones.
- To deal with the issue of sewage and waste water drainage into traditional water bodies, Government interference at the source is directly needed to arrive at a solution.
- Stringent watching and execution of regulations by the government, NGOs and social activists is obligatory to tackle the issue of discharge of chemical substances and emissions into rivers, streams and ponds and other water bodies.
- Lack of on-time de-silting operations in large water bodies that can enhance water storage capacity during monsoon. It is surprising that the government at state levels has not taken this up on priority as an annual practice. This action itself can ominously enhance to the water storing levels.
- Lack of effective water conservation and distribution of water amongst urban dwellers, the cultivation sector and industry. The government needs to improve its share in technology and include all patrons at the planning level to ensure optimization of existing resources.

6. Current scenario:

Presently, the yearly accessibility of water is 1123 bcm in the country and the requisite is around 750 bcm. However, by 2050 the yearly need for water will be 1180 bcm which will surpass the water availability which will have severe consequences for the country. Around fifty per cent of the country's population (around 600 million people) is prone to acute water scarcity with over 2 lakh people dying annually due to insufficient access to drinking water[6]. According to 2018 Composite Water Management Index (CWMI)[7] it is estimated that 6% of economic GDP will be vanished by 2050, while water request will surpass the existing stock by 2030. While 70% of the water in the country is contaminated, around 75% of the household do not have drinking water on its premises, nearly 54% of the country's groundwater is declining rapidly than it is being replenished, the water table is declining in most regions. Also, there is a presence of toxic elements like fluoride, arsenic, mercury, even uranium in our groundwater; hundreds of small and seasonal rivers are perishing permanently.

Almost all the major perennial rivers remain stagnant. Cauvery and its streams haven't met the ocean for spans; the upstream dams choke its flows downstream, affecting people in Tamil Nadu. Krishna river runs dry in her delta region for most of the year. According to NITI Aayog's water quality index, India ranks 120th among 122 countries[8].

7. Recent Examples:

- Maharashtra is facing a water crisis of unprecedented proportions. Subsequently after ages of drought, the river flows have receded. Reduction of water levels in dams and depletion of water in reservoirs along with over exploitation of ground level water has led to grave concern amongst the environmentalists. Eventually as per the government estimation more than 19,000 populations in the villages had no access to water last year[9].
- Meanwhile, media reports claim IT firms in Chennai are asking employees to work from home. It is mainly due to the fact that they don't have sufficient water to endure their functions. It hasn't rained for almost 200 days in the city and it may not get adequate rain to get over the water crisis for the next 3 months.
- In North India, the people of arid Thar Desert of Rajasthan are spending an exorbitant amount of rupees two thousand five hundred for purchasing 2500 litres of water that too they share with their cattle.
- In regions of Maharashtra a large number of Peasant and Farmers suicide is attributed to sever water crises of the state.
- Dengalmal in Western Maharashta is trying to resolve the crises through resorting to Polygamy where males are having "Water Wives"

[6] https://www.iasexpress.net/water-crisis-in-india-upsc-essay/
[7] http://social.niti.gov.in/uploads/sample/water_index_report2.pdf
[8] http://social.niti.gov.in/uploads/sample/water_index_report2.pdf
[9] Bhel and Bhel (2021). India's water crisis: It is most acute for women https://www.downtoearth.org.in/blog/water/india-s-water-crisis-it-is-most-acute-for-women-78472#:~:text=In%20Maharashtra%2C%20India's%20third%2Dlargest,to%20be%20weaker%20than%20average.

- With Punjab facing the threat of desertification and the state struggling to break away from the wheat-paddy cycle, farmers in the state have been adopting a decade-old scheme to utilize underground pipeline system for irrigation.
- In light of this crisis, Central government on its part has created a Jal Shakti Ministry under a full-fledged cabinet minister to resolve the water crisis but a lot more needs to be done.

8. Urban nightmare:

The problem has accelerated with fast pace of concretization to meet the requirement of urbanization. It has led to blocking of ground water resources. Water is neither getting stored nor getting recharge for better utilization. The natural minerals and ingredients are losing existence into water and is severely affecting the availability of drinking water. It is indeed important to understand the origin of this disaster else the viable solution will not be possible.

The water aquifers and reservoirs and lakes planned and built by Nizams in Hyderabad are source of drinking water for more than hundred years. Additional migration of inhabitants to the city combined with unforeseen construction in all directions, resulted in blocking of traditional aquifers, which existed in and around the city. Despite receiving adequate amount of annual rainfall Hyderabad is grappling with severe water crises[10]. Ultimately the land is grasping for breath and is sucking the ground water aquifer dry. The tragedy is that the cost of it is to be borne by all human.

The increasing extraction of water by more than 50,000 bore wells under state and private operators is the major concern for reduction in ground water levels. It is important that these ground level water should be restored since the demand for water is overstressed and increasing day by day. This is the case with almost all major cities across the country.

9. Water Management in Indian Industries:

In the recent past urban areas are relying on dual pricing system whereby the water charges for domestic and commercial purpose is charged separately. A large number of industries have installed de-salination plant and are encouraged to rely on alternatives such as water harvesting and waste water recycling. This is been done in Rashtriya Chemicals & Fertilizers Ltd.

10. Management of drinking water:

- Rain water harvesting is one of the solutions where rain water is collected in large tanks constructed on roof tops, to be used when required.
- Ground water recharge techniques are being encouraged to make villages self-sufficient but they have limited potentials.
- Reuse of water helps to conserve potable water supplies, since reclaimed water is used in place of portable water for certain purposes to protect.

11. Discussion:

India is currently facing the major crisis in its history and it's not COVID-19. It is majorly affected from one of the global wickedest nationwide water crises. However lawlessness, total misuse of our current water resources and incorrect spurs has been the major cause for the current crisis[11]. Moreover, it is imperative to comprehend that climate change would worsen India's current water scarcity in the coming decades. In fact, it has put our lives, livelihoods, and futures hang in the poise. We all are well aware that this problem can't simply be solved with frenzy fad of installing water pumps, water purifiers and packed drinking water. It has a worsening consequence not only on society but on economy too. Infect, the National Institution for Transforming India (NITI Aayog[12]) described it as "the worst water crisis" in India's history.

It is indeed important to accept the fact that we treasure land over conserving our water resources which are vanishing or getting dry to sheer negligence. The metropolitan cities like Mumbai and Delhi tend to have better access to water than the smaller cities and rural belts of the country. It is also being reported time and again how the urban areas have

[10] https://www.republicworld.com/initiatives/har-ek-boond/subhash-chandra-reddy-is-working-to-avert-hyderabads-growing-water-crisis.html
[11] https://www.fao.org/3/t0800e/t0800e0a.htm
[12] https://www.niti.gov.in/

been beneficiaries of the dam and other water sources whereas the indigenous population continues to engage in daily struggle for water.

Thus there is an urgent need to link the water demand–supply gap by improving the utilization of the water in the rain-fed regions and also the water which gets waste by running into drainage and rivers[13].

12. Solutions to overcome problem of water scarcity

In the year 2019, Prime Minister Narendra Modi has initiated the Jal Jeevan Mission. Since it's launched in August 2019, the aspiring scheme intends to make potable water available through taps to the 191 million rural households by 2024 (current statistics show that only one out of six households have access to direct water within the household[14]. However following simple steps on the part of a common men can help in bringing a drastic change.

- A simple addition of a separate flush in our homes can save well over 25,000 liters of water, per home per year. The old-fashioned flush requires around six liters of water per usage. If all members including of the house use the small button of flush instead of pulling the traditional flush, the collective impact on the demand for water will reduce significantly. There should be stringent laws to deal with along with sensitization amongst the masses.
- The quantity of water that is commonly misused while dish washing and washing clothes at home is noteworthy. There is an urgent need to bring about change in our washing pattern to reduce our water consumption. A simple initiative by people can bring a significant change.
- Every independent home/flat and group housing colony must have rain water harvesting facility. If efficiently designed and properly managed, this alone can reduce the water demand significantly.
- Waste water treatment and recycling for non-drinking purposes. The housing societies and institutions can install low cost technological equipment.
- It is common for one to observe water leakages at housing societies and water pipes in public area leading to loss of huge amount of water. Except we don't realize the significance of water in our lives the change is impossible.

13. CONCLUSION:

Looking at the current situation, there is a need for a paradigm swing. We instantly require a switch from this 'supply-and-supply-more water' provision to methods which lead towards improving water use productivity, reducing leakages, recharging/restoring local water bodies as well as applying for higher tariffs and ownership by various stakeholders. Water should be preserved as an economic asset. Water probably can lead to future conflict across the countries of the globe.

It is extremely essential to adopt a recovery-based closed loop system where by water can be recharged. Thus we should develop a decentralized method to deal with the situation with key focus on water conservation, source sustainability, storage and reuse wherever possible. It is important for us to understand that managing the water situation is not the job of only engineers but all stakeholders including hydro-geologists, economists, planners and most importantly, communities themselves.

It is indeed important to bring change in the nuanced and multifaceted behavioral approach amongst people. The civil society and various voluntary organizations have a great role to play. Each one of us has to act responsibly by keeping a stringent check on our own action, usage and consumption. We just need not aim to find technological solutions but think and act in the direction of changing our attitude and perception. Indeed we need to develop new schemes to ensure sustainability in our water policies.

If we start considering that the water has value in our ecosystem for our existence and survival hence need immediate attention – We can surely bring in a sustainable change……..

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