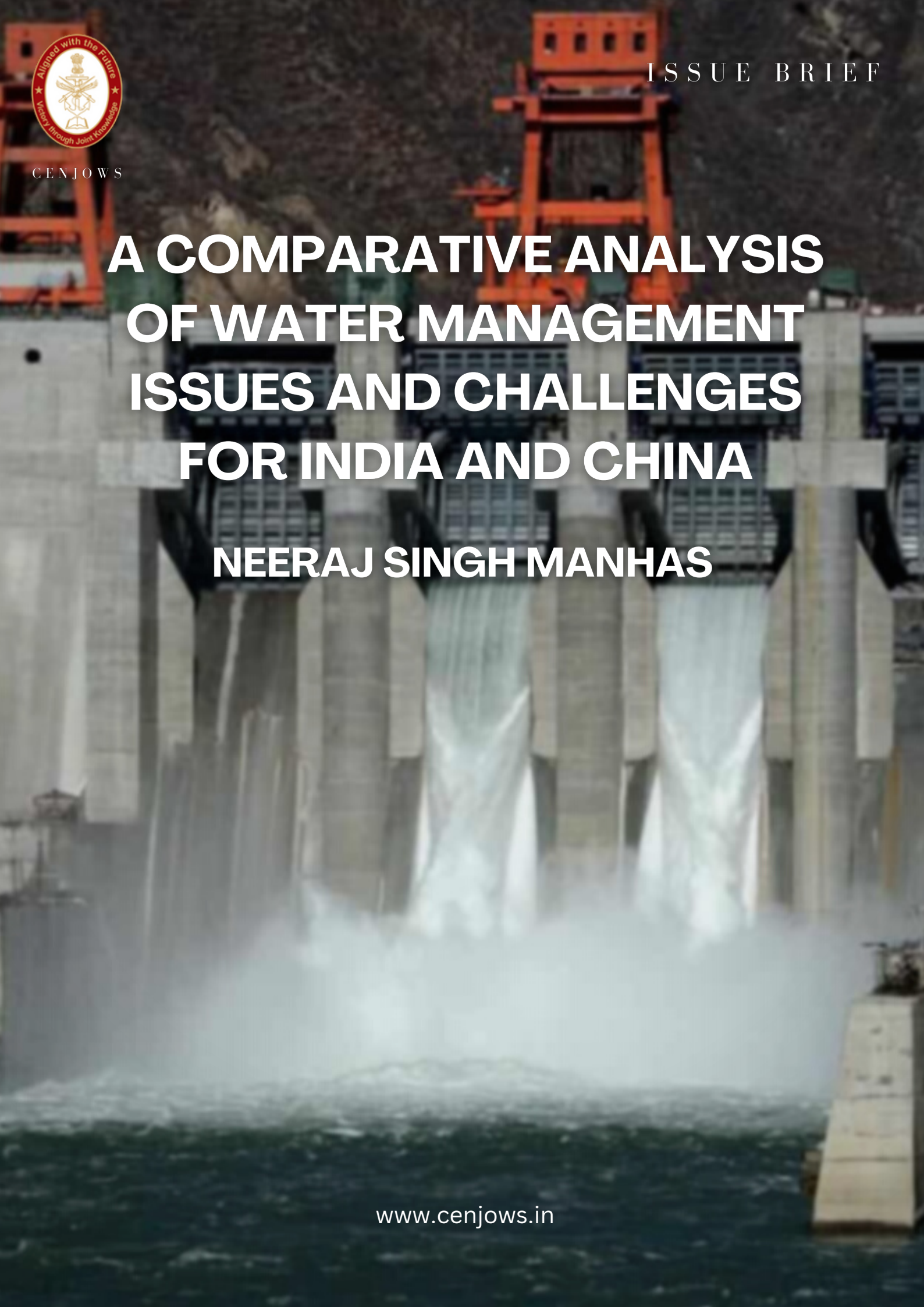

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ISSUE BRIEF

A COMPARATIVE ANALYSIS OF WATER MANAGEMENT ISSUES AND CHALLENGES FOR INDIA AND CHINA

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A COMPARATIVE ANALYSIS OF WATER MANAGEMENT ISSUES AND CHALLENGES FOR INDIA AND CHINA

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Abstract

Water is essential for life, as well as human survival and development. However, in recent decades, the consequences of population growth, industrialization, and urbanisation, as well as the associated consumerist culture, have disrupted the natural hydrological cycle of rainfall, soil moisture, groundwater, surface water, and storage of various sizes. As a result, our valuable water resources have been overused, exploited, and contaminated, as well as a disruption in water quality and natural cleansing ability. The growing scarcity and deterioration of water resources, as well as their management, have produced a variety of challenges that must be addressed. This is particularly true for India and China, where, as a result of increased urbanisation, water consumption is increasing across the board. Contaminated water has a significant negative impact on human health. Ecosystem services are being strained by urbanisation and increased water demands. Because water supplies are distributed unevenly, Variable rainfall, drought, and local water scarcity all have an impact on large areas of the country. Water supply, sanitation, and flood protection infrastructure are still unevenly distributed and these cause further issues. This paper seeks to analyse the problems and challenges in water management in both India and China and will do that

with due regard to the policies adopted by both countries. This analysis would help determine the fallacies in policies and solutions would be provided to ensure both countries can do better concerning water management, as well as identify areas wherein they can learn from each other.

Keywords: Water, India-China, Challenges, Comparative study, Management

Introduction

Water is the very cornerstone of life, as well as human existence and development. As a society, we have continued to evolve and adapt to the situation, despite there being less water availability at times. However, the effects of population increase, globalization, and heavy dependence on industries that use a lot of water have impacted the ecosystem and the way it functions. It has affected the natural hydrological cycle of rainfall and has affected every aspect of the hydrological cycle, as is evident with the way there is less rainfall in some places, while more in others; less soil moisture in some whereas greater in others; droughts against floods in some regions, etc. This has also resulted in the overuse of water, be it the industries that do so; exploiting available resources; wasting resources, be it at an individual or industrial or societal capacity, and has also resulted in fewer resources available to us (Kathpalia, 2020). Therefore, it is the need of the hour to ensure we have sufficient sources of water to meet our needs. This paper seeks to analyse water management in India and China and details what they can learn from each other.

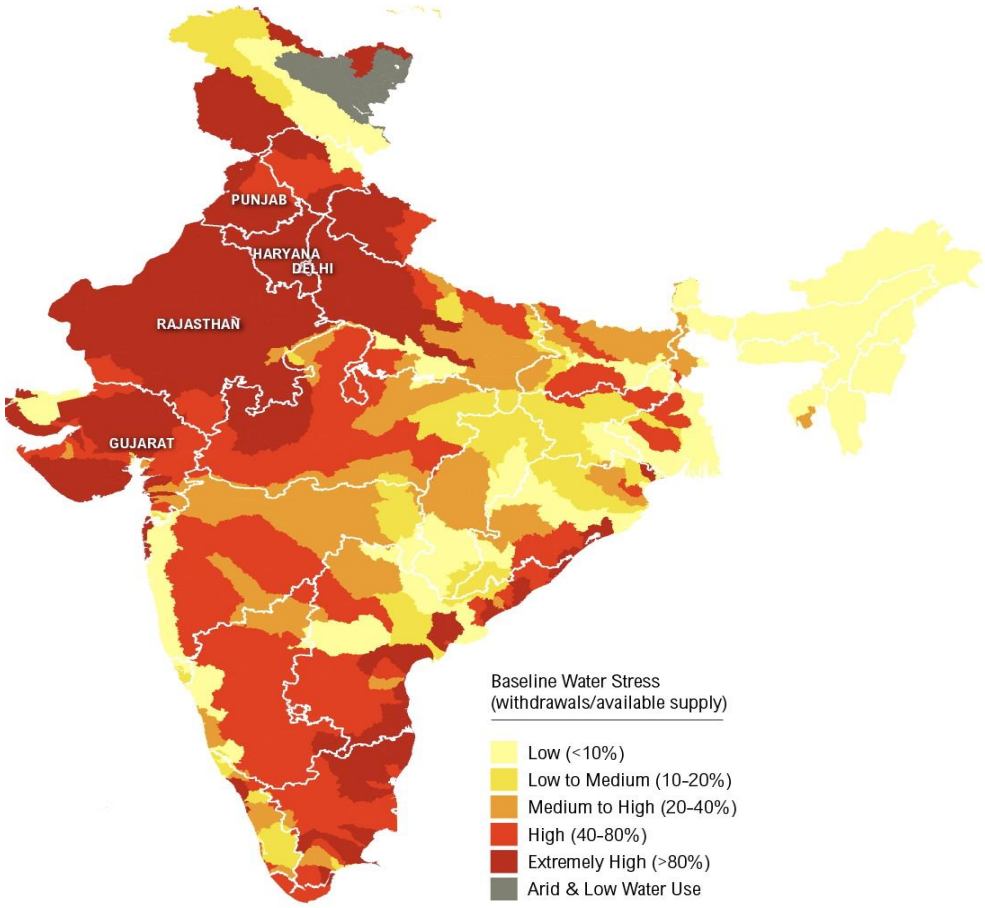
India

India is home to over a quarter of the world's people, being the second most populated country after China, but only has 4% of the world's water resources (Kumar & Bharat, 2014). Due to a restricted storage capacity of 36% of utilisable resources, approximately 50% of the rains that happen yearly are obtained in just about 15 days per year, which is not stored or used in the right manner (252 billion cubic meters out of 690 BCM) (Kumar & Bharat, 2014). Nearly half of all available water is wasted due to leaks and ill-management of the systems of storage and conservation

concerning water. The level of groundwater is dropping at a rapid and concerning pace of 10 centimetres per year and will continue to do so, or perhaps would happen at a faster rate. An estimate of more than 70% of our surface and groundwater resources have been poisoned, be it due to industrial activities or other calamities (Kumar & Bharat, 2014).It is also true that some portions of the country receive a lot of rain, to an extent where there are floods while other areas suffer from droughts. All of this has resulted in water scarcity in several sections of the country. (Kumar & Bharat, 2014)

Food grain output has continued to rise along with the increase in population as well as the different nutrition diets that come up and it cannot be denied that it will increase more and more in the coming years, particularly with the rise in population and needs. (Kumar & Bharat, 2014) It also cannot be denied that the way climate change is impacting our regions, the areas, particularly cultivable areas will end up getting impacted and this is of particular concern as when the needs increase, we will need to have the requisite resources to meet those needs and this should necessarily include means to deal with the cultivable areas. (Kathpalia, 2020) Wasteland and fallow land make up 42 million hectares of potentially cultivable area, whereas orchards and tree-covered land make up 11 million hectares. The development of the watershed as well as other resources on this 53 hectares of the culturable ground requires immediate attention (Kathpalia, 2020). A total rainfed area of 141 MHA needs additional attention for watershed improvement at this time (Kathpalia, 2020). We must also take into account the fact that while sea levels are rising, the drinking water levels will not arise unless there are salination procedures near every coastal area. These are great for using the ocean itself as a water resource but do require investments that have not been till now in many places. (Manhas, 2022)

Figure No. 1 Baseline Water Stress in India



Source: World Resources Institute

The existing legal framework in India for water is made up of several instruments, and legislation, which has been implemented both during the British era as well as after Independence. We also have judicial decisions and other policies that have been implemented, along with government schemes that seek to provide water access to all. However, all these are not necessarily corporative of each other or are efficient in handling and conserving our resources. The Government of India's first National Water Policy was implemented in 1987. The policy established the following water allocation priorities: drinking water; irrigation; hydropower; navigation; industrial and other purposes. (Kumar & Bharat, 2014)

However, over the next decade, it was evident that the policy was not sufficient to meet the growing needs and challenges of the country

concerning water and hence, the National Water Policy (NWP 2002) was implemented. (Kumar & Bharat, 2014) This was followed by the National Water Policy (NWP 2012) as it was evident that the 2002 policy was not doing its job and the new policy sought an integrated approach to water resource planning and management. (Kumar & Bharat, 2014) Such an approach would take into account local, regional, and national settings while also being environmentally friendly. To guarantee fair and sustainable development for all, the Policy explicitly specifies that water was a common resource of all and not people of particular regions or communities or States, and a unified method of conservation should be adopted. (Kumar & Bharat, 2014)

The NWP 2012 has dropped the water allocation priorities specified in NWP 1987 and 2002 in favour of addressing water as an economic good, in addition to taking necessary measures to ensure safe drinking water and sanitation for all. The NWP 2012 further emphasises that the State's role as a service provider must progressively transition to that of a regulatory body that regulates the way conservation takes place and is a facilitator for the growth of appropriate institutions. (Kumar & Bharat, 2014) We also have schemes that are introduced on a periodical basis to increase the access to clean drinking water for all, such as the National Water Mission which aims towards achieving some sustainable goals, such as ensuring all people have access to water for drinking purposes and other things based on their needs. Apart from the Central government, the State governments also bring about their measures to ensure their people have access to water, such as what Tamil Nadu did for rain-water harvesting.

Concerns for India

The increasing issues concerning water management and conservation require more effort than what is being taken at present. There needs to be a comprehensive effort by both the Central and State Governments vide policies and schemes to address all aspects related to the same. (Kumar & Bharat, 2014) In many sections of the country, poor water resource management has resulted in a grave scenario. Existing irrigation facilities are in poor condition and are poorly managed, resulting in resource waste

and underutilization. As a result, the gap between the actual potential for irrigation and one that happens, in reality, continues to grow.

Large portions of rivers, seas, and lakes around the country are extensively contaminated by untreated industrial effluents and municipal sewage and have a huge impact on the ecosystem of such seas, lakes, and oceans as well as the life of beings that depend on the same for their existence. (Kumar & Bharat, 2014). This has an impact on the supply of safe water, as well as posing environmental and health issues. There are several interstate disputes over river water sharing between states that need to be resolved quickly by revisiting existing institutional arrangements such as the Water Disputes Tribunal at the Centre (Kumar & Bharat, 2014). We also have several projects that deal with lake clean-ups but these are either executed badly or have not fallen through.

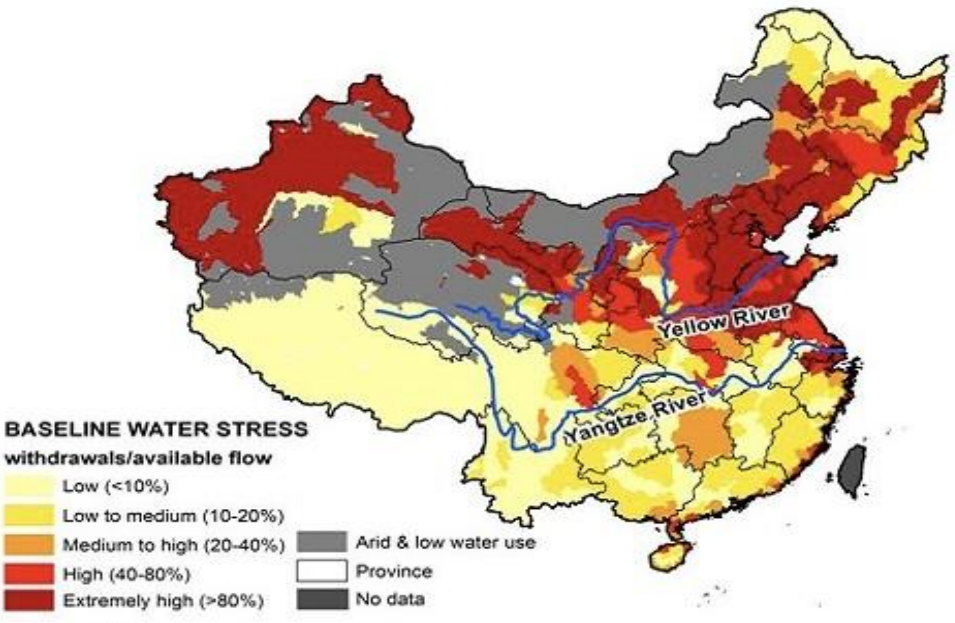
China

China's economic growth depends on effective water resource management. Despite the country already investing a large sum of money, the existing system is not sufficient to meet the needs of its growing population, as China is densely populated and needs continue to arise. This requires a strong and comprehensive policy and schemes that the country must take in both national and regional levels to ensure they can meet the growing needs and will be able to sustain in the future (World Bank, 2019). China will continue to need water for drinking purposes, sanitation, irrigation, cooking, industries, and other purposes and these must be kept in mind while framing policies.

China's resources for water are unevenly dispersed throughout space and time, with the richest reservoirs of water in the south and southwest. (Manhas, 2022). In many areas, rainfall is also quite erratic. Under the Three Red Lines, specific water usage controls in the energy and chemical manufacturing sectors are boosting efficiency and reducing withdrawals within expected limits. The Chinese government is becoming increasingly concerned about the increasing constraints on water resources, particularly in north China. We have also seen that due to climate change, some regions are being hit with heavy floods that have caused utter ruin in the region. While some regions do not face the same. These calamities

put a weight on the already existing burden on China's remaining resources.

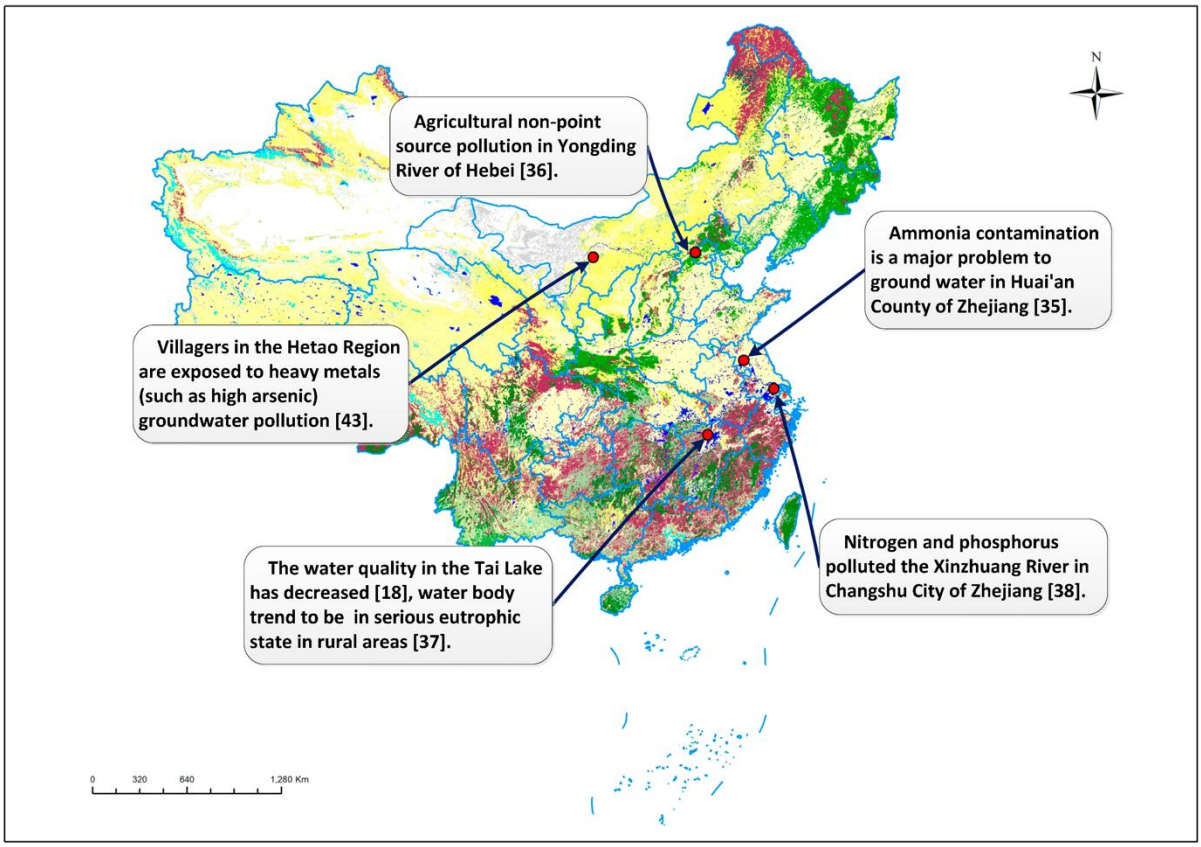
Figure No. 2 Freshwater Baseline Water Stress in China



Source: China Water Risk

In the past few years, China has strived to take policies and measures to ensure there is sufficient water available for all. Three key control objectives, known as the Three Red Lines, were formed by the Strictest Water Resources Management System, and the development of an "ecological civilisation" has become one of the government's top policy priorities (World Bank, 2019). In October 2017, the 19th Party Congress reaffirmed the goal of creating a "beautiful China" to address the rising public demand for better environmental quality. China's central government oversees and manages the country's water resources (World Bank, 2019). The three red lines include limits on water usage that cannot exceed a certain limit, efficiently using the said water, and ensuring that conservation is in key focus, particularly where irrigation and other needs are considered, as well as ensuring pollutants are under control and these lakes and rivers are clean of the same by ensuring a maximum limit for pollutants in the water (He et al., 2020).

Figure No. 3 Locations of Surface Water and Ground Water Pollution in Rural China



Source: MDPI

A range of governmental rules, including soil and water conservation, drinking water standards, agricultural irrigation, wastewater discharge, and environmental protection, have been in place since the 1970s to manage and safeguard China's water resources (Kathpalia, 2020). The State Council of China stated in 2011 that the goals of China's water resources management are to develop a system that optimises the distribution and efficiency of the country's water resources, ensures the health of rivers and lakes, mitigates the effects of floods, droughts, and other natural disasters, and values the advancement of water science and governance by prioritising municipal water supply, implementing comprehensive water resources management, and maintaining people-waiver infrastructure (He et al., 2020). The phalanx of canals and pipes, officially termed the South-to-North Water Diversion project, is said to be one of the largest and the most expensive infrastructures in China since 1949. Chinese policymakers have praised the project's apparent success in providing water to Beijing, as it transfers water from the South to the North as the water resources in China are heavily based on a particular location, rather than being evenly

spread out in the region. Some of these laws and policies have been successful.

Concerns for China

Rationing and water efficiency measures have been advocated by the government, but they are insufficient to address the problem. Guangzhou and Shenzhen, two large cities in the comparatively water-rich Pearl River Delta, are expected to experience severe drought in the next years, according to Chinese authorities. There are about 20 central government departments in China responsible for managing the country's water resources. These entities, frequently have overlapping tasks and a lack of coordination, resulting in higher transaction costs and delays in policy creation and execution. They must make contingencies to adapt to the growing needs and must focus on constructive measures, apart from merely distributing water from one region to another or building dams, as it will not sustain or be sufficient in the long run.

India and China – Common Solutions for Sustainable Living

For India, ever since 1995, the World Bank has continued to provide support for India by funding major projects that have resulted in building a series of dams and other resources that have been highly beneficial for India (World Bank, 2019). This kind of measure taken by the World Bank to ensure the development of developing countries has continued to support these nations and has helped in better management of water in these nations (Kumar & Bharat, 2014). While the governments can provide financing, information, and another form of assistance, water by its very nature requires active participation on the part of individual and community users. Whether for home or agricultural use, water usage techniques have distinct connotations based on local culture and habits. Better and more effective management necessitates the creation of community institutions to assist in the development and propagation of better local practices, as well as the use of social pressure to ensure correct regulation, minimise waste, and increase efficiency.

Artificial recharging projects should be done so that aquifers are recharged with more water than is withdrawn. The National Water Mission emphasises the importance of sensitising local communities, community leaders, and public officials in overexploited areas about the scope of the problem, as well as MGNREGA investments in water conservation through groundwater recharging. Cities are failing to promote the recharge of groundwater, which remains a missing link in their water accounting. This issue must be addressed through a combination of regulatory and tariff-based approaches. Farmers are harvesting rainwater under programmes like MGNREGA, but the planning and execution quality needs to be significantly improved to get the desired results. PRIs must be capacitated to properly execute the functions that are expected of them under MGNREGA. (Kumar & Bharat, 2014)

The usage of surface and groundwater in tandem should be encouraged. Water use efficiency in agriculture, both in groundwater extraction and lift irrigation, needs to be promoted by adequate energy price. Regional water audits of agricultural water consumption on a sample basis should be formalised to identify policy and management shortcomings that may be addressed. Each state should establish a Water Regulatory Authority (WRA) (Kumar & Bharat, 2014). The authority will be in charge of determining and regulating water tariffs for all users, not just irrigation. Where another agency has legislative responsibility for tariffs, the WRA must be consulted, and its suggestions must be given significant weight, to guarantee acceptable uniformity in tariff policy and management across the state. Tariffs can be imposed on a volumetric or minimum basis, or a combination of the two. When determining tariffs, the authorities should consider development, administration, operations, and maintenance costs.

Climate change is without a doubt the most pressing issue soon. We must prepare ourselves to deal with the impacts of climate change, such as further floods and droughts, rising sea levels, and migration and must determine how we will be able to tackle the same. Having robust water conservation and recycling system will go a long way in ensuring that we have remaining water resources. The budget for clean-ups should be increased, as well as the measures for doing it effectively and monitoring it post the clean-up. Any person found polluting resources must be punished heavily. Desalination plants have to be set up in other coastal regions so that we can use the ocean as a water resource and this would be useful

for years and years in the future. We must also focus on rainwater harvesting, particularly in areas where it is expected to rain heavily due to the impact of climate change.

Similarly, for China, there is a need to improve the legal framework for water governance. The Water Law, which was implemented in 2002, needs to be brought to the modern-day requirements and needs to be fixed according to the growing needs. Many water quality standards have been created in China, but enforcement and cross-jurisdictional difficulties still need to be addressed (World Bank, 2019). The market has a significant impact. Improve water governance at the national and basin levels. Because water is cross-sectoral, China may consider establishing a high-level inter-agency structure with members from the major ministries responsible for various areas of water regulation (World Bank, 2019).

This would aid in the coordination of policy activities, the development of consensus, the identification of national strategic priorities, and river basin planning. River basin agencies manage water resources, the water ecological environment, and the watershed landscape as a whole, and they should be given more authority and clarity in the critical areas of planning, coordination, implementation, enforcement, and funding. Increase the amount of data collected and the amount of information shared. The paper advocates for more public awareness and participation, which will assist in the monitoring process and make it way easier to handle and at the same time ensure the community is involved in the process, but will also help achieve the objective of a "water-saving society." (World Bank, 2019) Further, the government must actively take measures to counter climate change and ensure that they are making the best out of the situation. This involves taking measures for rainwater harvesting in areas where there are floods, recycling water, building better sewage systems as well as setting up desalination plants in the region.

Conclusion

A new approach is required to address the serious freshwater difficulties that humanity will face over the next 50 years (Global Water Partnership, 2013). India and China must recognize the fact that they are very similar in terms of their population, available resources, the disparity in access, as

well as proximity to coastal areas. They must learn from each other and strive to ensure they can provide their people with the basic needs they have. Adaptive water resource management benefits include effective stakeholder cooperation, an effective organisational framework, and strengthening the decision-making process. In a nutshell, the adaptive governance framework is designed to address the complex water resources system by repeating a cycle of identifying, monitoring, assessing, coping, and altering a set of activities. By continuously adjusting the water resource management mode and allocation plan, the water resources system can promote the development, utilisation, and protection of water resources, as well as constantly adapt to coordinated and sustainable development from economic, social, ecological, and other perspectives.

CERTIFICATE

The paper is author's individual scholastic articulation. The author certifies that the article is original in content, unpublished and it has not been submitted for publication/ web upload elsewhere and that the facts and figures quoted are duly referenced, as needed and are believed to be correct.

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