

Forum: Environment Committee
Issue: Water scarcity in urban areas
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Introduction

Water is an indispensable natural resource, and it is “at the core of sustainable development and is critical for socio-economic development, energy and food production, healthy ecosystems and for human survival itself” (United Nations). However, due to factors like increasing global population, urbanization, and industrialization, water scarcity became one of the most pressing issues of our time, affecting millions of people worldwide. In fact, global urban population facing water scarcity is projected to “double from 933 million in 2016 to 1.693-2.737 billion in 2050” (He et al.). The rapidly increasing temperature of the earth further exacerbates the problem, leading to unpredictable weather patterns, droughts, and diminishing freshwater supplies in many regions. Slowly yet steadily, water, a natural resource that people once considered abundant, has become increasingly scarce, especially in urban areas where the competition for its use is intensifying. In fact, water scarcity poses a significant threat beyond daily life—impacting food security, economic stability, and even social harmony. Therefore, addressing the issue of water scarcity is a crucial step towards growth and stability.

Definition of Key Terms

Water scarcity

Water scarcity is to the lack of available water resources to meet the demands of a target population (He et al.). There are two main types of water scarcity: physical and economic water scarcity. Physical water scarcity happens because of mismanagement or poor governance of water services; it occurs when water resources can no longer meet the needs of the people. Economic water scarcity is a result of poor governance and limited human capacity and investment; it occurs in countries with adequate water resources, but where access remains poor.

Urban areas

Urban areas are regions surrounding a city. Inhabitants in these areas have non-agricultural jobs.

Water stress

Water stress is simply the result of water scarcity. It occurs when water scarcity leads to issues with poor water accessibility or quality.

Water scarce cities

Water scarce cities are cities that are struggling to meet the inhabitants' demand for water.

Urbanization

Urbanization is the process where cities develop, and the concentration of population increases as a result. Our world is increasingly urbanized, with more than half of the population residing in urban areas. Urbanization is most prominent in areas Latin America and the Caribbean regions, where more than 80 percent of the population is concentrated in the cities (“The Risks of Rapid Urbanization in Developing Countries”).

Sustainable solutions

Sustainable solutions are strategies that are environmentally friendly, socially equitable, and economically viable. They meet current needs without compromising the ability of future generations to meet their own needs.

Integrated Water Resource Management (IWRM)

IWRM is a “process that promotes the coordinated development and management of water, land and related resources in order to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems” (UN Environment Programme). It is a common water resource management strategy.

Background

Introduction

Water scarcity has emerged as one of the pressing challenges in urban areas globally, affecting millions of world population and presenting high risks to health, economic stability, and social equity.

Understanding Water Scarcity

Water scarcity can be categorized into two types: physical and economic. Physical scarcity often occurs in arid regions, such as, the Middle East and North Africa, as it happens “when there is not enough water to meet all the demands, including environmental flows” (Giordano et al). The results of physical water scarcity are demonstrated through visible environmental effects, such as drought, reduced crop yields, and lack of domestic water supply. However, on the contrast, it also happens in areas with abundance of water, due to inefficient water management and pollution of water resources. The former mainly focuses on the fragility of poor infrastructures, which can easily be broken and eventually disrupt the clean water environment. This can ultimately lead to water shortages in critical areas. The causes of the latter are industrial, agricultural, and urban runoff, which can easily pollute the freshwater without any proper treatment. Such problems can potentially create wastewater, which will soon contaminate freshwater sources, limiting useable water. On the other hand, economic water scarcity occurs due to insufficient water infrastructure in general or due to poor water management. Unlike physical water scarcity, economic water scarcity results from socio-economic factors that disrupt the utilization of water resources. It is a

“man-made condition” resulting from a wide range of factors, such as “poor water management, lack of investment in water infrastructure, political unwillingness” (“Ekopak - Physical and Economic Water Scarcity”).

Causes of Water Scarcity

Causes of water scarcity are various: “demand for water may be exceeding supply, water infrastructure may be inadequate, or institutions may be failing to balance everyone’s needs” (United Nations). Other impactful factors include climate change and lack of data management. As climate is keep changing over time, it is extremely difficult for researchers to predict the water conditions. Also, inproficient water monitoring systems are disabling the researchers from overlooking the current condition, further disabling the need of balance between “the needs of communities and wider economy,” which are crucial to the understanding of water scarcity. Despite this pressing issue impacts globally, the detrimental effects are most likely targeted to the developing countries.

Economic Impacts of Water Scarcity

Agriculture and GDP

In some regions, like Central Asia, agriculture remains crucial for the growth of economy, as it heavily depends on its agricultural outputs. Therefore, water scarcity would have an inevitable impact on this sector by lowering the quality of the products and reducing the crop yields, contributing to the decline of agricultural GDP and agricultural productivity. GDP is significant as it shows the size of economy and the economic performance.

Social Impacts of Water Scarcity

Migration and urban precarity

As the rural areas get dried up, more population migrate to the cities, where infrastructures are well-equipped. A sudden increase in population might cause a high poverty rate and overloaded infrastructure, affecting health and quality of life.

Serious health impacts

Limited access to water might cause severe health problems, resulting from the lack of hygiene. Specifically, reduced water supply can induce poor handwashing practice, “which can lead to gastro-intestinal diseases and skin and eye infections” (“Drought and Water Scarcity”).

Case Study

Case study held at Cape town, South Africa

The Cape town normally experiences Mediterranean climate with dry summer and moisty winter. However, starting from 2015, Cape town started undergoing severe drought and dry winter due to the shortage of water. Ultimately, Cape Town, where the ground was desperately dry, focused on a “Day Zero” to address the water crisis in 2018. After the population increased, Cape town suffered from a high demand of water, which, combined with prolonged drought conditions and inadequate

infrastructures, led Cape town to solely rely on insufficient water on its surface level. As the The project aimed to implement water conservation strategies to reduce consumption and raise public awareness about the crisis. It aimed to improve infrastructure to minimize leaks and explore alternative water sources such as desalination and groundwater extraction. Though the project led anxiety and uncertainty among residents and businesses, impacting tourism and local economies, it succeeded in achieving their goal, as they eventually brought a significant behavior changes among residents, as more of them adopted sustainable water practices.

Major Parties Involved

United Nations Educational, Scientific, and Cultural Organization (UNESCO)

UNESCO is a major party involved in this issue as part of UNESCO's work is helping to address water scarcity through programs like the International Hydrological Program (IHP) which deals with implementing sustainable water management and supports research and policy forming.

United Nations Water (UN-Water)

UN-Water is a major party in solving this issue as UN-Water is a critical organization which coordinates multinational efforts in addressing water scarcity. It also works to support integrated water resource management and helps develop sustainable urban water solutions.

World Resources Institute (WRI)

WRI is a NGO dedicated to helping advocate for sustainable water management systems, and conducts vital studies and research on water scarcity issues.

United Nations Childrens Fund (UNICEF)

UNICEF is an important party as they deal with issues around water, sanitation, and hygiene for underprivileged children, which is particularly relevant since a large portion of those children live in urban areas.

World Bank

The World Bank is another important organization to consider when dealing with this issue as the World Bank works to provide monetary funding for water security related programs around the world that aim to solve this issue.

The Center for Water Security and Cooperation (CWSC)

CWSC is an important stakeholder in this issue as the CWSC aims to help create and provide innovative initiatives to help solve issues relating to water security and sanitation, especially in urban areas.

Egypt

Egypt is a major stakeholder in this issue as Egypt has experienced high rates of population growth, as well as the impacts of pollution and climate change on water security. Egypt is also an important stakeholder as they control the majority of the Nile River which is a major water source for countries in that region.

Australia

Australia is an important party in this issue because of the water security problems it faces, such as prolonged droughts, and poor water resource management history, especially in urban areas. Australia is also an important party because the expertise that Australia possesses in water scarcity solutions, as well as strong policy on water conservation.

South Africa

South Africa is an important stakeholder in solving this issue as they are a major leader in Africa in water management systems and strategies which have been developed as a result of suffering heavy droughts. South Africa also faces challenges with urbanization and water access equality.

Brazil

Brazil is also an important party when debating this issue because Brazil is a key player in South American water governance because of the influence it asserts through control of large portions of the Amazon River. Brazil is also an important stakeholder because of the urban water supply issues it faces, and the effect deforestation has on water security in Brazil.

India

India has a major stake in this issue as India is home to a very large population, and therefore is experiencing severe water stress. They are also very important part in international water dialogues. India also struggles with rapid urbanization, and heavy pollution of water sources.

Previous Attempts to Resolve the Issue

Singapore's Water Management Strategy

Singapore's water management strategy is the highly successful "Four National Taps" plan. The "Four National Taps" are diversifying water sources, desalination, water recycling, and imported water. This plan ensures a sustainable supply for Singapore's population. Singapore now sources 40% of its water from desalination and recycled water.

Mexico City's Rainwater Harvesting Initiative

Mexico City has an initiative where rain-harvesting systems are installed in more water-scarce areas. These systems collect rainwater for household use. This lowers Mexico City's dependence on ground water. This plan has been moderately successful as while it has lowered ground water usage in some areas, the city still struggles with overextraction of ground water.

Cape Town's Day Zero Plan

In an effort to combat a severe drought in 2018, adopted a water-saving strategy. This plan included campaigns, reduced agricultural water use, and investment in desalination plants to prevent overuse of groundwater. The plan was mostly successful in achieving its goals, but water security issues still remain a challenge in Cape Town to some extent.

Australia's Water Efficiency Programs

Due to prolonged droughts in Australia, Melbourne, and other cities around Australia implemented water saving strategies and measures. These measures included awareness campaigns, household water restrictions, and promotion of water-efficient appliances. These plans were successful as Melbourne and other cities were able to substantially reduce water usage, and many of these measures help aid Australia's water security strategies today.

China's Sponge City Initiative

China adopted the Sponge City initiative in an effort to bolster urban water management by developing infrastructure to capture, absorb, and reuse rain water to help and reduce flooding risks and deepen water reserves during droughts. The program has seen mixed success, as it has reduced flooding and bolstered water security in some cities, the costs and challenges of implementation has limited its effectiveness.

Possible Solutions

- **Recycling Greywater:** Treating and recycling wastewater from sinks, laundries, and showers for uses like toilet-flushing and agriculture to help lower the demand of fresh water.

- Smart Water Grids: Developing AI-based smart grids to improve efficient water management and distribution, improving supply availability, detecting leaks faster etc.
- Green Infrastructure: Improved urban planning, including permeable pavement and green roofs to help manage rain/stormwater more effectively.
- Desalination Technology: Further developing desalination technology, especially using renewable energy, to make seawater another sustainable source of water.
- Public Awareness: Public awareness campaigns on water-saving and conservation can be very important tools for promoting the sustainable and responsible use of water resources.
- Water Efficient Infrastructure: Device such as efficient irrigation systems, water-efficient appliances, and low-flow faucets can a help decrease water consumption and wastage in homes and businesses.
- Groundwater Recharge: Replenishing groundwater reserves artificially using techniques like Managed Aquifer Recharge (MAR) to bolster water storage to help during dry periods.
- Non-Centralized Water Systems: Smaller, local water treatment and supply systems allow the burden to be shifted from a centralized urban system to a smaller, more efficiently allocated local system.
- Rainwater Capture and Collect Systems: Cities and local governments can implement plans to capture stormwater and recycle it to use as another supply of water, generally non-potable however.
- Pricing and Policy Development/Reform: Reconsidering water pricing and strategies for subsidies for technologies that can help to solve these issues. Stronger and more effective law making on the matter of water security would also help in solving this issue.

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