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Declining Water Resources and Agriculture

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SUMMARY

Water is one of the most essential substances on earth and its importance cannot be overstated. It is essential for the cultivation of crops that are used as animal feed as well as for the constant supply of water that cattle need to drink. Healthy crops cannot be sustained without water, and agricultural output cannot be maintained. Irrigation is required in dry and semi-arid areas to augment natural rainfall and supply adequate water for crops to grow. Due to its necessity for irrigation, crop production, and livestock, water is one of the most significant resources for the agriculture. Photosynthesis, the process through which plants turn sunlight into energy, depends heavily on water. Plants cannot produce energy without water, and they will eventually perish. Intake of nutrients and minerals from the soil, which are crucial for plant growth and development, also need water. Irrigation systems are crucial for supplying the consistent need of water for crop growth. Numerous techniques, such as flood irrigation, sprinkler irrigation, and drip irrigation, can be used for irrigation. Around 70% of all freshwater withdrawals are used for agriculture, which is the world's largest water user. Water is becoming less readily available for agriculture. Water scarcity is already a major problem in some areas, which puts agriculture in competition with other industries for irrigation systems. Water reuse and conservation techniques are therefore becoming more crucial to ensure that there will be enough water for agriculture in the future. Water quality not only influences crop growth but also has an impact on agricultural output. Contaminated water has an adverse effect on plant health and growth. Therefore, monitoring and managing water quality are also crucial factors in agriculture.

INTRODUCTION

Declining water resources means that there is less water available in a given area or region over time. Water scarcity raises major concerns on the sustainable future of humanity and the conservation of important ecosystem functions (GAEWS, 2018). Climate change is highly responsible factor for declining water resources. Through its effects on the water cycle, which change precipitation patterns and increase evaporation rates, climate change can lead to dwindling water resources. No doubt, this is going to be a daunting task given the fact that climate change will heighten the need to anticipate water shortages worldwide (Jaeger, 2017). Building a climate-resilient agriculture is the need of the hour. (Dev, 2016). As water consumption rises past the sustainable threshold of the available water supply, population growth and rising water demand may also result in declining water resources. Pollution can make water supplies useless owing to contamination, which can also decline the water resources. Water resources are also deteriorating by poor water management techniques like excessive groundwater extraction or poor upkeep of water infrastructure. When water resources are used excessively for domestic, industrial, or agricultural reasons, they can become depleted.

India is a nation where managing water resource is a serious challenge. Despite the country's several big rivers and abundant rainfall, many locations have water scarcity and poor water quality, especially during the dry season. India receives over 4,000 billion cubic metres (BCM) of rain annually, but only about 1,869 BCM of that is actually useful due to uneven distribution and inadequate storage facilities. The Composite Water Management Index (CWMI) 2018 research estimates that 600 million people in India experience moderate to severe water stress. Additionally, the population of India faces a serious health risk due to the contamination of approximately 70% of the country's water supply. Over 85% of rural drinking water and 60% of irrigation use groundwater, making India the world's largest user of this resource. Aquifers have been depleted in many areas due to excessive groundwater extraction, particularly in the northwest states. The Ganga, Yamuna and Brahmaputra are a few of the most polluted rivers in the world. Agricultural runoff, untreated sewage, and industrial effluents are the main causes of the decline in water quality. In order to provide water security for all of its population, India's management of its water resources requires considerable upgrades in terms of infrastructure, governance, and awareness-raising.

Loss of water from agricultural fields

Agricultural areas can lose water through a number of methods, including *evaporation*, *transpiration*, and *runoff*, etc. These processes have the potential to adversely affect crop yields, water availability, and the water balance in agricultural systems. Water is lost from the soil surface through a process known as evaporation as a result of the sun's heat. On the other side, transpiration is the method by which plants lose water through their leaves. Although both of these processes are normal and necessary for plant development, excessive losses can lower crop yields and cause water stress. Runoff happens when water travels over the earth's surface and picks up nutrients and soil particles in the process. This leads in the loss of water that could have been used for crop growth and can cause soil erosion and water contamination.

Impact of declining water resources

Less water may be available for irrigation, which could prevent crops from receiving the necessary amount of water, resulting in slower growth and lower yields. Farmers may be forced to cultivate only a few crops that are better suited to dry climates due to limited water resources, which can affect agricultural diversity and the diet's overall nutritious content. Lack of water can cause soil to deteriorate, which makes it less fertile and less able to support subsequent crops. Farmers may rely more on groundwater when water is in short supply, which might cause the soil to become more salinised. This can make it harder for plants to absorb nutrients, which might lead to lower harvests. Lack of water causes crops to stress out and become more prone to illness. Agriculture may be significantly impacted economically by declining water supply, including decreased farmer income and higher food costs for consumers. The overall threat posed by lower water availability to agriculture and food security is significant, and it is crucial to manage water resources responsibly to ensure that agriculture can continue to feed expanding populations.

Water conservation

The water conservation is must for future irrigation and sustainable development of agriculture. By reducing consumption and adopting alternate water sources, reuse or conservation of water helps to recycle the ground water. This strategy uses recycled wastewater, groundwater depletion, grey water reuse, and irrigation of rains. In order to retain clean rainwater for use in times of scarcity, subsurface water recharging can be combined with rainwater harvesting. This is mostly accomplished by excavating pits in the earth and utilizing a filtration system. Water storage (e.g. reservoirs and ponds) and water-supply infrastructure (e.g. multipurpose dams, canals and green infrastructure) can be designed and managed in ways that more effectively serve the needs of water users for irrigation, livestock watering, homestead gardens, habitats for fish and other aquatic resources, transport, hydroelectric power generation and the environment (FAO, 2016). It is possible to make the Irrigation Departments autonomous and self-financing through increased water charges, improving collection rates and developing instruments to capture private sector investments in development and management (Dewangan, 2016). The Indian government has started a number of awareness initiatives to encourage water conservation and the value of water savings. The "*Jal Shakti Abhiyan*" seeks to educate people about the need of water conservation. In order to encourage water conservation, the government has also taken legal action. Among the laws passed by the government to control water usage and pollution are the Water (Prevention and Control of Pollution) Cess Act of 1977 and the Water (Prevention and Control of Pollution) Act of 1974.

Water conservation in agricultural fields

The government has been supporting water-efficient practices to reduce water usage in agriculture, which uses the majority of the water consumed in India. Several methods can be used to reduce water loss from agricultural fields:

- To keep up the momentum of growth, a careful economic valuation of inputs including irrigation is of considerable importance (Kiran, et.al 2009). Using irrigation techniques that minimise water loss, such as *drip irrigation*, *sprinkler irrigation*, *improving soil fertility*, *structure to decrease runoff* and increase water holding capacity.
- Water loss from evaporation or runoff is decreased with *drip irrigation*, which feeds water directly to the plant's root zone.
- Planting crops that are water-efficient and adapted to the local climate. Crops that can withstand drought can assist communities with limited water resources use less water.
- Using cover crops to prevent *runoff* and *evaporation*.

- Applying mulch around plants and trees to assist the soil retain moisture and lessen the need to water.
- To avoid evaporation and water loss, water your agricultural crops in the early morning or late evening.
- By keeping an eye on the weather and the moisture content of the soil, farmers can optimise their irrigation plans.
- *No-till farming*, *cover crops* and *composting* are some techniques that help enhance soil health and water retention.
- Crop rotation promotes the soil health less use of water.
- Applying mulch around plants and trees to assist the soil retain moisture and lessen the need to water.
- To avoid evaporation and water loss, water your agricultural crops in the early morning or late evening.
- Farmers should consider the weather and the moisture content of the soil to optimise their irrigation plans.
- *No-till farming*, *cover crops*, and *composting* are some techniques that help enhance soil health and water retention.
- Rotating your crops can help the soil get healthier and use less water.
- Reusing and capturing water from irrigation systems and other sources can help the farm use less water.

CONCLUSION

Water is a vital resource for agriculture, and the quantity and quality of it can greatly affect how successfully crops are produced. In order to maintain their efficient and sustainable usage, water resources must be carefully conserved. Implementing sustainable water conservation practices in agricultural fields is crucial to address the issue of decreasing water availability for agricultural use. Farmers can improve crop yields, water usage effectiveness, and contribute to a more sustainable agricultural system by using effective water conservation techniques. The Indian government is making a number of efforts to encourage sustainable methods of water management and water conservation. Additionally, people can be made aware of the value of water conservation for the advancement of agriculture through education and awareness-raising campaigns. To ensure the proper conservation of this priceless resource, however, ongoing efforts and collaboration between the public and private sectors, as well as between citizens, are required.

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