



Water Crisis and Its Economic Impact on Agriculture

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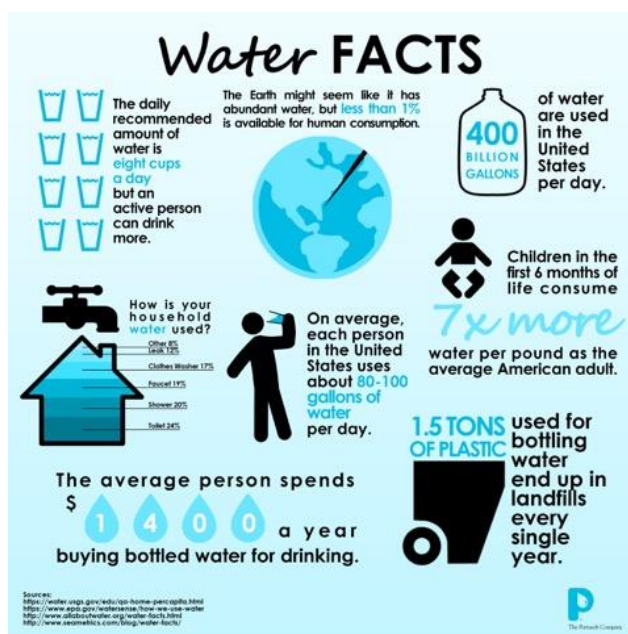
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INTRODUCTION

Water is one of the most vital natural resources for sustaining life and supporting agricultural production. Agriculture, being the backbone of many economies especially in developing countries like India depends heavily on water availability. However, the world is currently facing an alarming water crisis due to climate change, population growth, over-extraction of groundwater, and inefficient water management practices.

The water crisis is not just an environmental issue; it has become a major economic concern. Since agriculture consumes nearly 70% of global freshwater resources, any shortage directly impacts food production and rural livelihoods. This article explores the causes, consequences, and economic implications of water scarcity in agriculture.



2. Understanding the Water Crisis

Water crisis occurs when the demand for water exceeds its availability or when water quality is too poor for use. It can be categorized into:

- **Physical water scarcity:** Insufficient natural water resources
- **Economic water scarcity:** Lack of infrastructure to access available water

Rapid population growth and increased agricultural demand have intensified pressure on water resources. Excessive extraction of groundwater and declining rainfall patterns further aggravate the situation.

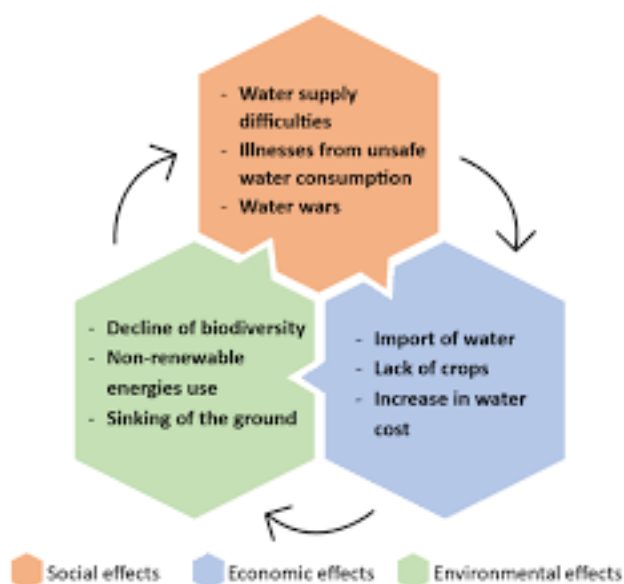
3. Causes of Water Crisis in Agriculture

3.1 Climate Change

Erratic rainfall, droughts, and rising temperatures have significantly reduced water availability. Extreme weather conditions disrupt irrigation schedules and crop cycles.

3.2 Over-extraction of Groundwater

Farmers increasingly depend on groundwater due to unreliable rainfall. Continuous pumping leads to depletion of aquifers and increased irrigation costs.



3.3 Inefficient Irrigation Practices

Traditional irrigation methods such as flood irrigation lead to excessive water loss through evaporation and runoff.

3.4 Population Growth and Food Demand

Increasing population demands higher food production, which in turn requires more water for irrigation.

3.5 Poor Water Management Policies

Lack of proper regulation and pricing of water resources results in overuse and wastage.

4. Impact of Water Crisis on Agriculture

| S. No. | Impact of Water Crisis on Agriculture | Description |
|--------|---------------------------------------|--|
| 4.1 | Reduced Crop Productivity | Water scarcity directly affects plant growth, leading to lower yields and poor crop quality. It limits nutrient uptake and reduces photosynthesis. |
| 4.2 | Crop Failure | Severe drought conditions can result in complete crop failure, especially in rainfed agricultural systems. |
| 4.3 | Change in Cropping Patterns | Farmers shift from high water-demand crops (like rice and sugarcane) to low water-demand crops (like millets), often resulting in reduced income. |
| 4.4 | Soil Degradation | Insufficient water can cause soil salinity and decrease soil fertility, further reducing agricultural productivity. |

5. Economic Impact of Water Crisis on Agriculture

5.1 Decline in Farm Income

Reduced crop yields directly decrease farmers' income, making agriculture less profitable.

5.2 Increased Cost of Production

Farmers spend more on:

- Pumping groundwater (fuel/electricity costs)
- Irrigation infrastructure
- Drought-resistant seeds

5.3 Rise in Food Prices

Lower agricultural production leads to reduced supply, causing an increase in market prices of food commodities.

5.4 Impact on Agricultural Exports

Water scarcity reduces crop output and quality, affecting export potential and national income.

5.5 Increased Debt and Farmer Distress

Low income and high costs often push farmers into debt, leading to socio-economic stress and migration.

5.6 Impact on Rural Employment

Agriculture provides employment to a large rural population. Reduced productivity leads to unemployment and migration to urban areas.

6. Broader Economic Consequences

| S. No. | Broader Economic Consequences | Description |
|--------|---------------------------------|--|
| 6.1 | Food Security Threat | Water scarcity threatens global food production, with a significant portion of output at risk due to limited water availability. |
| 6.2 | Impact on GDP | Agriculture contributes significantly to GDP in many countries; reduced agricultural output can lead to economic slowdown. |
| 6.3 | Effect on Agro-based Industries | Industries dependent on agriculture (such as food processing and textiles) suffer due to reduced availability of raw materials. |
| 6.4 | Inflation and Poverty | Rising food prices increase inflation and disproportionately affect low-income populations, leading to |

7. Case Example: South Asia and India

India is one of the largest users of groundwater for irrigation. Increasing dependence on tube wells, declining water tables, and erratic monsoon patterns have worsened the situation.

- Groundwater depletion is severe in states like Punjab, Haryana, and Rajasthan
- Farmers face rising costs of irrigation
- Crop yields are becoming unpredictable

This situation highlights the urgent need for sustainable water management.

8. Technological Solutions to Water Crisis

Micro-irrigation systems such as drip and sprinkler methods significantly improve water use efficiency while minimizing wastage in agriculture. Rainwater harvesting further supports sustainable water management by capturing and storing rainwater, which helps

recharge groundwater and provides additional irrigation resources. The use of advanced technologies like AI and GIS plays an important role in modern farming by enabling monitoring of soil moisture, predicting crop water requirements, and optimizing irrigation schedules. In addition, precision agriculture, which involves the use of sensors, drones, and satellite data, ensures efficient management of both water and nutrients, leading to improved productivity and resource conservation.

9. Sustainable Water Management Practices

- Adoption of water-efficient crops
- Recycling and reuse of wastewater
- Integrated water resource management
- Promotion of conservation agriculture

Water Conservation Methods:

Conserving water is crucial for sustaining life and protecting our planet's precious resources.

Reuse Water:

Reuse water for secondary purposes like watering plants or washing vehicles; collect shower water as it heats up, and repurpose pet water bowls, fish tank water, and leftover cooking water for houseplants.



Reduce Usage:

Turn off faucets when not in use, take shorter showers, run full loads in the dishwasher/washing machine, and fix leaky faucets.



Drought Resistant Landscaping:

Choose drought-tolerant plants, group by water needs, mulch to retain moisture, and implement water-saving practices to reduce usage and help solve the global water crisis.



Rainwater Harvesting:

Install rain barrels to collect rooftop runoff for irrigation, and larger systems can be used for community water supply and even potable water.



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10. Government Policies and Initiatives

Governments are implementing schemes such as:

- Pradhan Mantri Krishi Sinchai Yojana (PMKSY)
- Subsidies for drip irrigation
- Watershed development programs

These initiatives aim to improve water use efficiency and reduce dependency on groundwater.

CONCLUSION

The water crisis is one of the most pressing challenges facing agriculture today. It not only

affects crop production but also has far-reaching economic consequences, including reduced farmer income, increased costs, food insecurity, and economic instability. Since agriculture is the largest consumer of water, improving water management is essential for sustainable development. Adopting modern technologies, efficient irrigation systems, and sustainable practices can help mitigate the impact of water scarcity. A coordinated effort involving farmers, policymakers, scientists, and communities is necessary to ensure water security and agricultural prosperity in the future.