

Groundwater depletion may reduce winter cropping intensity by 20% in India

New study into the problems being faced by wheat farmers in India with respect to productivity and sustainability.

Rabi season in India:

- The Indian cropping season is classified into two main seasons—Kharif and Rabi.
- Rabi crops are also known as winter crops. The Rabi crops are sown in late October or early November and harvested in spring.

Important crops:

- Some of the important winter crops are wheat, barley, mustard, peas and gram with wheat being the most important crop of Rabi season.
- India is the second-largest producer of wheat in the world, with over 30 million hectares in the country dedicated to producing wheat in India.

Irrigation:

- Rabi crops require frequent irrigation because these are grown in dry areas.

•India's three main irrigation types on winter cropped areas include dug wells, tube wells and canals.

Concerns:

Sustainability issues with respect to cropping pattern:

•In the green revolution era, policy-supported environment led to a large increase in rice cultivation in north western India mainly in Punjab and Haryana which are ecologically less suitable for rice cultivation due to predominantly light soils.

•This policy-supported intensive agriculture led to unsustainable groundwater use for irrigation and in turn groundwater scarcity.

•There was also post-harvest residue burning to make way for the timely sowing of wheat. This has resulted in high levels of air pollution in NCT and adjoining areas which has cropped up as a major health challenge to India.

Water scarcity and impact on agricultural sector:

•The study found that 13% of the villages in which farmers plant a winter crop are located in critically water-depleted regions.

•The study notes that these villages may lose 68% of their cropped area in future if access to all groundwater irrigation is lost. The results suggest that these losses will largely occur in northwest and central India.

•The study notes that with severe groundwater depletion, the cropping intensity or the amount of land planted in the winter season may decrease by up to 20% by 2025.

•Groundwater depletion has already reduced yields and cropped areas in India over the last 20 years.

Unviability of alternative sources:

•The study into using canals as an alternative irrigation source and as an adaptation strategy to falling groundwater tables noted that switching to canal irrigation has limited adaptation potential at the national scale.

Possible impact of climate change:

•Climate change is likely to further adversely affect the future availability of groundwater resources given the dependence of India on Monsoons for its water resources.

Way forward:

Adaptation strategy: The farmers will have to adopt new or additional adaptation strategies like the following:

- Adoption of water-saving technologies like sprinkler, drip irrigation
- Switching to less water-intensive crops to ensure more effective use of the limited groundwater resources. Example- Shifting from crops like Rice and Wheat to crops like millets
- Growing crops suited to the local resource base and environment.

Promoting agriculture in eastern India:

- There are enough groundwater resources supported with higher monsoon rainfall in eastern Indian states like Bihar.
- But due to lack of enough irrigation infrastructure, farmers are not able to make use of natural resources there.
- Better policies in eastern India to expand the irrigation will not only help provide an impetus to agricultural activity and agriculture productivity in this region but will also release some pressure from north-western Indian states.

Water, the looming frontier

NITI Aayog and WaterAid have found that over 70% of India's surface and groundwater is contaminated by human and other waste and is likely to carry viruses.

The primary reason being excessive human activity leading to environmental degradation and pandemics.

1. Industrialized farming makes a zoonotic outbreak likely.

- The practice of keeping animals locked together for mass production of meat produces an artificial environment that can give birth to mutations in dormant viruses.
- Previously, wild animals were far away from human contact and habitats.
- With increasing interference of humans in the natural home of the animals, it has resulted in wild animals living closer to humans increasing the risk of virus transmission.

2. A source of virus

- Once the virus has found its way into the human population, it is bound to proliferate in wastewater.

Examples

- In England, Wales and Scotland, several wastewater samples were tested and were found to carry traces of SARS-CoV-2.
- Remnants of the virus have also been detected in raw sewage across Sydney.
- Research at the University of Stirling in Scotland indicates that the SARS-CoV-2 virus can spread through sewage water.

In India, such water is often discharged into water bodies.

- This should raise alarm as we do not know where and how these viruses can mutate and strike.
- Some water-transmitted viral pathogens are astrovirus, hepatitis A and norovirus.
- Unlike in the developed world, a huge section of the population in India uses polluted water from sources like rivers, lakes, or groundwater for drinking.

Measures to be taken

- The government has announced a ₹3 lakh crore 'Nal se Jal' scheme to provide drinking water connections to every rural household by 2024.
- Since most of the water sources are contaminated, the only way to purify water is through Reverse Osmosis (RO).
- But though RO removes contaminants, it also takes out all the healthy minerals and nutrients required by the human body. This is an unhealthy and exorbitantly priced proposition.
- To neutralize the virus, we would need at least an ultraviolet aquaguard treatment.
- While this won't take out chemical contaminants, it is also costly.

So, what is the solution?

- We must conserve and use our natural living resources judiciously.
- The water beneath our forests is as good as natural spring water. We must safeguard it for our own lives and for future generations.

- We have destroyed our natural living resources in our rush for development.

Freshwater sources

There are two unpolluted freshwater sources left in the country.

- The first is the water lying below our forests; the second is the aquifers that lie below the floodplains of rivers.

- Both these sources provide natural underground storage and are renewable - the rains provide natural recharge year after year and it is this recharge that can be used to water our cities and towns. But we should use only a fraction of the annual recharge.

Way forward

- It is important to remember that these water resources, once lost, will be lost forever.

Therefore, forests and floodplains must be declared as water sanctuaries.

* Shift focus to demand management of water

- India's previous **National Water Policies** were in **1987, 2002, 2012**.
- New upcoming **National Water Policy**
11-member drafting committee under **Mihir Shah**
- Water insecurity in India due to-

India's share in global population	16%
% of global fresh water resources in India	4%

- Half of the national demand for water will remain unmet by 2030 if the current pattern continues in India.
- Climate change leading to changing patterns and intensity of precipitation
- Deteriorating water quality

— Recommendations by Mihir Shah—

1. Demand side management and not just endlessly increasing supply of water by

- Diversifying of cropping pattern to include less water-intensive crops
- Lowering the industrial water footprint by reducing fresh water use
- Shifting to recycled water
- Use of treated wastewater for all non-potable uses, such as flushing, fire protection, vehicle washing, landscaping etc

2. Improving supply side efficiency:

- By rejuvenation of catchment areas.
- Thrust on local rainwater harvesting.
- Revival of traditional local water bodies in both rural & urban areas making a blue-green infra for improved water levels and quality, as also flood mitigation.

3. Nature based solutions:

·For storage, supply of water in India

·Given their low cost characteristic and also the enviro sustainability of such an approach.

4. Differential water pricing:

·Concessional rates should be provided only for vulnerable social sections.

* Finding a way out of India's deepening water stress

- Use of groundwater sources -

1. Rural Areas	→ 80-90% of drinking water ↳ 75% of water used for Agri
2. Urban Areas	→ 50-60% of water supply. → Rest is from surface water resources.

- Water crisis in India -

(1) Composite Water Management Index (2019)

by NITI Aayog

↳ 21 major cities (incl. Delhi, Bengaluru, Chennai & Hyderabad) on brink of exhausting groundwater resources.

↳ Affecting ~ 100 mn people

↳ Demand for water projected to be twice of available supply by 2030

(2) Crisis in Chennai in 2019

↳ Parts of the city went w/o piped water for months

↳ life came to a standstill.

↳ Reasons for water crisis in Chennai

1. 50% less than normal rainfall
2. City built by encroaching floodplains, lakes & wetlands → These help in recharging groundwater
3. Lack of space for water to percolate underground.
4. Loss of green cover (Green cover helps in water retention) for infra projects

↳ Above are also the factors for flooding during normal rainfall due to stagnation & also drought like situation due to lack of underground water storage.

(3) Acute water crisis in Punjab

↳ CGWB report ⇒ Punjab could become a desert in next 25 years.

↳ There are 109 'Overexploited' groundwater blocks in Punjab out of 138.

↳ Ground water extraction rose to 70% post Green Revolution, which was 35% earlier.

↳ Cultivation of water intensive crops like paddy

Way Forward -

- Effective land & water zoning regulations
 - ↳ to protect urban water bodies, groundwater sources, wetlands, green cover.
- Enhance waste water recycling
- Water recharge activities targeting aquifers & wells through rain water harvesting
- Sustainable agri practices.
- Cooperation b/w various Ministries & Depts involved like Jal Shakti, Urban Development, Local Self-Govt, Enviro etc.
- Conservation of surface waters.
- Jal Shakti Ministry's Jal Jeevan Mission
 - ↳ to provide Functional Household Tap Connection (FHTC) to every home by 2024.
 - ↳ Protecting & conserving water resources should be priority rather than promising water supply.
- A new National Water Policy rooted in realities & allows greater flexibility.