



Sustainable Agriculture to Recover Groundwater

For Prelims: [Groundwater](#), [Rice cultivation](#), [Cropping patterns](#), [Intergovernmental Panel on Climate Change \(IPCC\)](#), [Global Warming](#), [sustainable groundwater management](#), [oilseeds](#), [Mission Organic Value Chain Development for North Eastern Region \(MOVCDNER\)](#), [National Mission on Sustainable Agriculture](#), [Paramparagat Krishi Vikas Yojana \(PKVY\)](#), [Sub-mission on AgroForestry \(SMAF\)](#), [Rashtriya Krishi Vikas Yojana](#).

For Mains: Challenges Related to Sustainable Agriculture in India, Government initiatives related to sustainable agriculture.

[Source: ET](#)

Why in News?

According to the Indian Institute of Technology Gandhinagar, Gujarat, **replacing around 40% of the area currently sown with rice** with other crops could help recover 60-100 cubic kilometers of [groundwater](#) lost in northern India since 2000.

What are the Key Points of the Study?

- **Key Highlights:**
 - The prevailing agricultural practices, particularly those centered around **rice cultivation**, heavily depend on groundwater resources for irrigation.
 - A continued rise in global temperatures have **contributed to the depletion of groundwater reserves**, with estimates indicating a potential loss ranging between 13 to 43 cubic kilometers.
 - Such unsustainable cropping patterns, if left unchecked, could significantly strain the **already overexploited groundwater resources**, further aggravating water security challenges.
 - The nexus between agricultural practices and groundwater depletion underscores the urgent need for **adaptive strategies in cropping patterns to mitigate the impending ecological crisis**.
- **Impact of Climate Change:**
 - In comparison, maintaining the **existing cropping patterns under global warming scenarios of 1.5 to 3°C** would result in a far lower recovery of groundwater, estimated between 13 to 43 cubic kilometers.
 - The **2018 Special Report by the Intergovernmental Panel on Climate Change (IPCC)** on [Global Warming](#) of 1.5°C warns that, if current trajectories persist, global warming is expected to reach 1.5°C between 2030 and 2050, with a potential rise to 3°C by 2100.
- **Recommendations:**
 - The report emphasises the urgent need to alter crop patterns, **particularly in Punjab, Haryana, and Uttar Pradesh**, to enhance groundwater sustainability while maintaining farmers' profitability.

- It recommends shifting towards cereals in Uttar Pradesh and **oilseeds** in West Bengal as alternatives to rice cultivation.
- These findings carry significant policy implications, suggesting that optimal **crop patterns must be identified for sustainable groundwater management in irrigated regions** of northern India while safeguarding farmers' livelihoods.
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Note:

- **Heavy Reliance:** Groundwater accounts for **62% of irrigation, 85% of rural water supply,** and 45% of urban water consumption .
- **Depletion Rates:** India's groundwater depletion rate could triple by 2080, primarily due to climate-induced over-extraction .
- **Over-Extraction:** Several regions, including **Rajasthan, Punjab, Haryana, and Delhi,** extract more groundwater than can be replenished, with withdrawal rates exceeding 100% of available resources.
- **Geographical Disparities:** The **Indo-Ganga-Brahmaputra plains** contain 60% of India's groundwater resources but cover only 20% of the country.
- **Agricultural Dependency:** Over 60% of irrigated agriculture relies on groundwater, putting immense pressure on resources, particularly in agricultural hubs .

What are the Challenges Related to Sustainable Agriculture in India?

- **Water Scarcity:** Over-reliance on **water-intensive crops and inefficient irrigation methods** have resulted in groundwater depletion and water shortages.
- **Climate Change:** Unpredictable **weather patterns, rising temperatures, and increasing frequency of extreme events** such as **floods and droughts** negatively impact crop yields and agricultural sustainability.
- **Fragmented Landholdings:** Small and fragmented farms make it **difficult to adopt sustainable agricultural practices, mechanization,** and efficient resource use.
- **Overuse of Chemical Inputs:** Excessive use of **chemical fertilizers, pesticides, and herbicides** has led to soil and water pollution, harming ecosystems and long-term agricultural productivity.
- **Inadequate Policy Support:** Insufficient **government policies and incentives** specifically promoting sustainable farming practices limit the transition to eco-friendly agriculture.

Government Initiatives Related to Sustainable Agricultural Methods

- [Mission Organic Value Chain Development for North Eastern Region \(MOVCDNER\)](#)
- [National Mission on Sustainable Agriculture](#)
- [Paramparagat Krishi Vikas Yojana \(PKVY\)](#)
- [Sub-mission on AgroForestry \(SMAF\)](#)
- [Rashtriya Krishi Vikas Yojana](#)

Way Forward

- **Promote Water-Efficient Practices:** Adoption of water-efficient technologies such as **drip irrigation and rainwater harvesting,** along with **crop diversification** towards less water-intensive crops, to address water scarcity issues.
- **Enhance Farmer Training and Awareness:** Conduct widespread training programs and workshops to educate farmers on sustainable agricultural practices such as **organic farming,**

agroforestry, crop rotation, and integrated pest management.

- **Strengthen Policy and Incentive Support:** Formulate and implement stronger policies that incentivize sustainable farming practices through subsidies, grants, and tax exemptions for adopting eco-friendly technologies and inputs.
- **Improve Access to Technology and Markets:** Facilitate access to modern sustainable agricultural technologies and create efficient supply chains and market linkages for farmers to sell organic and sustainably grown produce at fair prices.
- **Encourage Research and Innovation:** Invest in research and development focused on sustainable agricultural methods, climate-resilient crops, and affordable eco-friendly inputs, while promoting collaboration between government institutions, research bodies, and farmers.

Drishti Mains Question:

Discuss the significance of sustainable agricultural methods in addressing the groundwater crisis in India?

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims:

Q. In the context of India, which of the following is/are considered to be practice(s) of eco-friendly agriculture? (2020)

1. Crop diversification
2. Legume intensification
3. Tensiometer use
4. Vertical farming

Select the correct answer using the code given below:

- (a) 1, 2 and 3 only
- (b) 3 only
- (c) 4 only
- (d) 1, 2, 3 and 4

Ans: (a)

Mains:

Q. India is well endowed with fresh water resources. Critically examine why it still suffers from water scarcity. (2015)