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, r**eplacing 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)**