India’s Rice Economy Rebalancing

Mains: *GSIII – Agriculture*

Why in News?

India’s rice export competitiveness raises concerns over groundwater depletion, and needs to shift from volume-based rice exports to value-based and resource-efficient production.

What is the India's Rice Production and Export Performance?

- **Production** – India produced an estimated 154.02 million tonnes of rice in 2025–26.
- **Major Producing States** – Uttar Pradesh, Telangana, West Bengal, Punjab, Chhattisgarh, Odisha, Madhya Pradesh, Bihar, Andhra Pradesh and Tamil Nadu.
- **Global Position** – ***India*** *has remained the world's largest rice exporter since 2012*, **accounting for 30–35% of global exports.**
- **Export Growth** – Rice exports increased from 17.73 million tonnes in 2020–21 to 21.57 million tonnes in 2025–26.
- **Export Earnings** – Export value increased from $8.82 billion to $11.54 billion during the same period.
- **Rice Exports – Value and Volume Differences** – India's rice export basket consists of two major categories:
  - **Basmati Rice** – Premium-quality rice with relatively higher export value per tonne.
  - **Non-Basmati Rice** – High-volume exports generating comparatively lower value per tonne.

What is the Hidden Resource Cost of Rice trade?

> ***Virtual Water*** *– It refers to the water consumed in producing goods that are subsequently traded internationally.*
>
> ***Green Water*** *– Rainwater used for cultivation, which places relatively less pressure on local freshwater resources.*
>
> ***Blue Water*** *– Water extracted from groundwater, rivers and reservoirs for irrigation.*

- **Groundwater exploitation** – Rice exports indirectly transfer India's scarce freshwater resources to importing countries.

- **Increase in Water stress**– Groundwater-intensive rice cultivation increases water stress, particularly in Punjab, Haryana and western Uttar Pradesh.
    - Groundwater-fed rice cultivation in several other States also adds to the pressure.
- **Future threats** – Excessive groundwater extraction threatens long-term agricultural sustainability and water security.

What is the relation between Rice Cultivation and Greenhouse Gas Emissions?

- **Methane Emissions** – Flooded paddy fields create anaerobic conditions that promote methane generation.
- **Nitrous Oxide Emissions** – Excessive nitrogen-based fertiliser application contributes to greenhouse gas emissions.
- **Energy Consumption** – Intensive irrigation, groundwater pumping and conventional agricultural operations increase energy consumption.

Sustainable Agricultural Technologies
• **Alternate Wetting and Drying (AWD)** – Periodically alternates flooding and drying to reduce water consumption and methane emissions. • **Direct-Seeded Rice (DSR)** – Establishes rice without conventional puddling and transplanting, potentially reducing water and labour requirements. • **Integrated Nutrient Management** – Optimises fertiliser application and improves nutrient-use efficiency. • **Note** – The effectiveness of these practices varies across soil types and agro-climatic conditions and requires context-specific implementation.

What are the Challenges in Making Rice Exports Sustainable?

- **Groundwater Depletion** – Water-intensive cultivation and subsidised electricity encourage excessive groundwater extraction.
- **Cropping Pattern Distortion** – MSP and procurement incentives encourage paddy cultivation even in water-stressed regions.
- **Environmental Externalities** – Methane emissions, fertiliser overuse and energy-intensive irrigation increase environmental costs.
- **Export Dependence** – High-volume exports can prioritise short-term foreign exchange earnings over long-term resource sustainability.
- **Technology Adoption** – Small and marginal farmers face financial, technical and institutional barriers in adopting sustainable cultivation practices.

What is the Way Forward?

- **Crop Diversification** – Encourage farmers in water-stressed regions to shift towards millets, pulses and other less water-intensive crops.
- **Water-efficient Irrigation** – Promote micro-irrigation, AWD and improved irrigation management.
- **Sustainable Rice Cultivation** – Expand DSR, integrated nutrient management and climate-smart agricultural practices.
- **Value Addition** – Strengthen quality, branding, traceability, processing and geographical indications to improve export earnings.

- **Agro-climatic Planning** – Align rice cultivation with local water availability, soil conditions and groundwater status.
- **Farmer Incentives** – Provide financial incentives for water conservation and sustainable agricultural practices.

What lies ahead?

- India's rice-export competitiveness must be balanced with water security, environmental sustainability and farmers' incomes.
- A transition from volume-based exports to value-based production is essential to achieve more crop per drop, more income per tonne and lower emissions per unit exported.
- The objective should not be to export less rice, but to export better rice with lower environmental and resource costs.

Reference

The Hindu| Rebalancing India’s Rice economy

