Turning Agriculture into a Growth Engine for India

This editorial is based on "How agriculture can be an engine for growth" which was published in The Indian Express on 04/09/2024. The article highlights how Indian agriculture, despite its current low-tech and subsistence nature, has the potential to drive economic growth and job creation by addressing ecological, technological, and institutional challenges. It emphasizes the need for advancements in irrigation, crop diversity, and institutional innovations to enhance productivity and sustainability.

For Prelims: Indian agriculture sector, Pradhan Mantri Kisan Samman Nidhi (PM-KISAN), Pradhan Mantri Fasal Bima Yojana (PMFBY), Soil Health Card Scheme, Pradhan Mantri Krishi Sinchai Yojana (PMKSY), e-National Agriculture Market (e-NAM), National Mission on Sustainable Agriculture, Paramparagat Krishi Vikas Yojana (PKVY), Digital Agriculture Mission, Unified Farmer Service Platform (UFSP), National e-Governance Plan in Agriculture (NeGP-A), Mission Organic Value Chain Development for North Eastern Region (MOVCDNER)

For Mains: Current Status of the Indian Agriculture Sector, Issues Related to Indian Agriculture Sector.

The Indian agriculture sector, traditionally seen as **low-tech and subsistence-oriented,** has the potential to become a driver of growth and job creation. While agriculture currently employs **46% of the workforce and contributes 18% to GDP,** its growth is inconsistent and environmentally costly. To make agriculture a key engine for growth, it is essential to overcome **ecological, technological, and institutional challenges.** This includes regenerating water resources, expanding irrigation, embracing crop diversity, and adopting high-tech solutions like micro-irrigation **and climate-resilient farming methods.**

Moreover, the focus should be on creating synergy between **agriculture and the rural non-farm sector,** encouraging group farming models, and enhancing allied sectors like **fisheries and livestock.** Institutional innovations, such as **promoting smallholder cooperation through group farming,** have shown promising results, increasing productivity and empowering farmers, especially women. By embracing these changes, Indian agriculture can become more **technologically advanced, environmentally sustainable, and economically viable,** attracting educated youth and driving the country's growth.

What is the Current Status of the Indian Agriculture Sector?

- **Status:**
  - Economic Contribution: Agriculture and allied sectors contributed **18.8% to** India's Gross Value Added (GVA) **in 2021-22.**
    - The sector grew by **3.9% in 2021-22,** up from 3.6% in 2020-21, showing resilience during the pandemic.
  - **Employment**: Agriculture employs about 42% of India's workforce.

        - However, the sector's share in employment has been gradually declining, down from **81% in 1983.**
    - **Production**: India's foodgrains production touched a record **315.7 million tonnes** in 2021-22 despite climate change challenges. **(Economic Survey 2022-23)**
    - **Exports**: Agricultural exports grew by 19.92% in 2021-22, reaching **USD 50.21 billion.**
        - Major export items include **rice, wheat, cotton, and spices.**
    - **Organic farming**: The total area under organic certification process (registered under National Programme for Organic Production) is 7.3 mha (2023-24)
- **Recent Government Initiatives**:
    - Pradhan Mantri Kisan Samman Nidhi (PM-KISAN)
    - Pradhan Mantri Fasal Bima Yojana (PMFBY)
    - Soil Health Card Scheme
    - Pradhan Mantri Krishi Sinchai Yojana (PMKSY)
    - e-National Agriculture Market (e-NAM)
    - National Mission on Sustainable Agriculture
    - Paramparagat Krishi Vikas Yojana (PKVY)
    - Digital Agriculture Mission
    - Unified Farmer Service Platform (UFSP)
    - National e-Governance Plan in Agriculture (NeGP-A)
    - Mission Organic Value Chain Development for North Eastern Region (MOVCDNER)
- **Recent Technological Developments:**
    - **Drone Technology**: In 2021, the government approved subsidies up to 100% of the cost of agriculture drones for drone purchase by farm machinery training institutes.
        - The Namo Drone Didi scheme aims to provide drones to **15,000** selected women SHGs during the period **2023-24** to **2025-2026.**
    - **Satellite Imaging and Remote Sensing**: ISRO's RISAT-1A satellite, launched in 2022, is being used for agricultural assessment and improvement.
    - Happy Seeder **Technology**: Designed to address stubble burning in **rice-wheat systems,** it enables wheat sowing without removing paddy straw, reducing air pollution and improving soil health.
    - **PUSA Decomposer:** Developed by the Indian Agricultural Research Institute (IARI), this microbial solution rapidly decomposes crop residues when sprayed on stubble.
    - Nano Urea: Introduced by **IFFCO in 2021,** this liquid fertilizer with nanoscale nitrogen particles boosts nutrient use efficiency and reduces environmental pollution.

Why is Indian Agriculture Underperforming Despite Employing the Majority?

- **Fragmented Land Holdings:** India's agricultural land is highly fragmented, with the average farm size decreasing from **2.3 hectares in 1970-71 to 1.08 hectares in 2015-16.**
    - As per India's Agriculture Census 2015-16, **86.1%** of Indian farmers are small and marginal (SMF) i.e., have a landholding size smaller than **2 hectares**
        - More than half of these live in five Indian states of **Uttar Pradesh, Bihar, Madhya Pradesh, Maharashtra and Andhra Pradesh.**
        - This fragmentation limits economies of scale, mechanization, and access to credit.
    - Such small plots make it challenging to implement modern farming techniques or invest in technology, leading to lower productivity and income for farmers.
- **Irrigation Challenges in a Changing Climate:** Despite having 18% of the world's population, India has only **4% of global water resources.**
    - Over Reliance on **monsoon rains,** coupled with inefficient irrigation practices, hampers agricultural productivity.
    - As of 2022-23, only **52% of cultivated land** has access to irrigation.
    - The Economic Survey 2017-18 estimated that climate change could reduce annual agricultural incomes by **15-18% on average**, and up to **25% in unirrigated areas.**
        - The **recent** heat waves **in 2022 and 2023,** which damaged wheat crops in several states, exemplify the vulnerability of Indian agriculture to climate variability.
- **Technological Lag, Innovation Gap**: While the Green Revolution significantly boosted productivity in the 1960s and 70s, Indian agriculture has since **struggled to keep pace with technological advancements.**
    - The adoption of **precision farming, drone technology, and AI-driven solutions**

remains low.
    - This technological lag contributes to lower yields compared to global standards - **India's rice yield is less compared to China's.**
- **Market Inefficiencies**: The Agricultural Produce Market Committee (APMC) system, while intended to protect farmers, has often led to exploitation by intermediaries.
    - Farmers **typically receive only 15-20% of the retail price of their produce.**
    - The **recent farm laws of 2020 (now repealed**) attempted to address this issue but faced significant opposition.
    - E-NAM (Electronic National Agriculture Market) launched in 2016 aims to create a unified national market, but as of **February 2024,** only about **1.77 crore** farmers were registered on the platform.
- **Credit Crunch- The Debt Trap**: Limited access to formal credit forces many farmers to rely on informal lenders who charge exorbitant interest rates.
    - According to NABARD's All India Rural Financial Inclusion Survey 2017, **only 30.3%** of agricultural households availed credit from institutional sources.
    - According to the latest **'Situation Assessment of Agricultural Households and Land Holdings of Households in Rural India, 2019', ** over half of India's agricultural households were in debt, with an average outstanding amount of **₹74,121.**
    - This debt burden often leads to a cycle of poverty and, **in extreme cases, farmer suicides.**
- **Policy Paralysis-The Subsidy Conundrum**: India's agricultural policy has long been dominated by subsidies, which often distort market dynamics and resource allocation.
    - The Government recently estimated that total subsidy on fertilizer could touch **₹2.25-lakh crore during FY24.**
    - While these subsidies aim to support farmers, they often lead to **overuse of inputs like water and fertilizers, c**ausing environmental degradation.
    - The Minimum Support Price (MSP) system, while providing a safety net, has led to overproduction of certain crops like wheat and rice at the expense of more nutritious and environmentally suitable alternatives.
        - This policy-induced cropping pattern **mismatch affects both agricultural sustainability and farmers' incomes.**
- **Post-Harvest Losses**: India loses a significant portion of its agricultural produce due to inadequate storage and transportation infrastructure.
    - According to the **ICAR-Central Institute of Post-Harvest Engineering and Technology, a**nnual post-harvest losses are estimated at ₹92,651 crore.
    - The cold storage capacity in India can **only accommodate about 11% of the country's total produce.**
    - This leads to distress sales by farmers during harvest seasons, further reducing their income potential.
- **The Knowledge Deficit:** Despite employing a large workforce, Indian agriculture suffers from a significant skill gap.
    - This lack of formal training hampers the adoption of modern agricultural practices and technologies.
    - For example, the **improper use of pesticides** not only reduces crop yields but also poses health risks.
    - The Pradhan Mantri Kaushal Vikas Yojana **(PMKVY)** has tried to address this, but its impact on the agricultural sector remains limited.
- **Diversification Dilemma:** Indian agriculture remains heavily focused on staple crops like rice and wheat. This lack of diversification not only affects soil health but also limits farmers' income potential.
    - High-value crops like **fruits and vegetables**, which can potentially increase farmers' incomes. However, **only 17% of arable land** is being utilized for the cultivation of horticultural crops
    - The recent push for **millets (2023 being the International Year of Millets)** is a step towards diversification, but widespread adoption remains a challenge.
- **Gender Disparity-The Invisible Female Farmer: Women constitute 42% of the agricultural labor force in India**, yet they own only 14% of agricultural land.
    - This gender disparity in land ownership affects access to credit, inputs, and decision-making power.

- According to an **FAO report of 2011-12,** women farmers could increase farm yield by **20-30%** , which could raise agricultural output in developing countries by 2.5-4% and reduce hunger by **12-17%** if they had the same access to productive resources and training as men.
- Initiatives like the Mahila Kisan Sashaktikaran Pariyojana aim to empower women farmers, but progress has been slow.

Key Case Studies Related to Agriculture Across the Globe

- **United Kingdom: GrowUp Farms** excels in **vertical farming**, offering year-round fresh produce in controlled environments.
- **The Netherlands: Rijk Zwaan** utilizes advanced **greenhouses** with climate control and LED lighting for high-quality vegetable production, and the Dutch government promotes circular agriculture through **biogas energy and recycled materials.**
- **China: Zhongguancun Science Park (Z-Park) in Beijing,** China is a growing hub of innovation in many areas including bio-medicine.

What Measures can be Adopted to Enhance the Productivity of the Agricultural Sector?

- **Precision Agriculture-Farming by the Numbers**: Implementing precision agriculture techniques can significantly boost productivity.
  - This involves using **GPS-guided machinery, IoT sensors, and data analytics** to optimize resource use.
  - A pilot project in Maharashtra using precision agriculture techniques reported significant increase in crop yield and a significant reduction in water usage.
  - Scaling this nationwide could potentially save billions of liters of water and increase overall agricultural output.
- **Crop Diversification-Beyond Wheat and Rice**: Encouraging farmers to diversify crops can increase income and improve soil health.
  - The government's recent push for millets is a step in this direction.
  - States like **Odisha** have successfully implemented crop diversification programs. This not only improved farmer incomes but also enhanced nutritional security.
  - Expanding such programs nationwide, with a focus on **region-specific high-value crops, can transform agricultural productivity.**
- **Farmer Producer Organizations (FPOs):** Promoting and strengthening FPOs can help small and marginal farmers achieve economies of scale.
  - The **Sahyadri Farmers Producer Company in Maharashtra** has increased farmer incomes by 25-30% through collective bargaining and direct market access.
  - Replicating this model across India, with **adequate support and capacity building**, can significantly enhance farmer incomes and agricultural productivity.
- **Climate-Smart Agriculture**: Implementing climate-smart agricultural practices is crucial for long-term sustainability.
  - This includes promoting drought-resistant crop varieties, water conservation techniques, and climate forecasting tools.
  - For example, the flood-tolerant rice variety **Swarna-Sub1** has shown yield advantages.
  - The Indian Prime Minister recently unveiled **109 varieties of 61 crops**, comprising 34 field crops and 27 horticultural crops, is a step in the right direction.
- **Agri-Tech Startups:** Fostering a vibrant agri-tech startup ecosystem can drive innovation in the sector.
  - Startups like DeHaat, which provides end-to-end services to farmers, have shown promising results.
  - Creating a **supportive ecosystem for such startups** through incubation centers, funding, and policy support can accelerate technological adoption in agriculture.
- **Minimizing Waste, Maximizing Value:** Investing in post-harvest infrastructure, including **cold storage, food processing units, and efficient transportation,** can significantly reduce losses

and increase farmer incomes.
    - For instance, the **mega food park in Rayagada, Odisha**, has benefited a large number of farmers by providing processing facilities for their produce.
    - Establishing similar infrastructure across the country, especially in major producing regions, can help **reduce the estimated annual post-harvest losses of ₹92,651 crore.**
- **Agricultural Education and Extension:** Strengthening agricultural education and extension services can bridge the knowledge gap in farming communities.
    - The **PRAGATI** (Promoting Risk Aware Governance and Technology Infusion) scheme aims to revamp agricultural extension services.
    - Scaling such innovative extension models, coupled with modernizing agricultural universities, can create a **more skilled and knowledgeable farming workforce.**

Conclusion

To transform **Indian agriculture into a robust engine of growth,** it is crucial to address the sector's multifaceted challenges. Embracing precision agriculture, expanding crop diversification, and investing in post-harvest infrastructure are essential steps. **Strengthening farmer cooperatives and leveraging advancements in agri-tech** can enhance productivity, sustainability, and economic viability, ensuring that agriculture becomes a more dynamic contributor to India's economic development.

Drishti Mains Question:

Agricultural productivity is critical for ensuring food security and supporting economic growth in developing countries. Discuss the major challenges faced by India in enhancing agricultural productivity.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Prelims:

Q. In the context of India's preparation for Climate -Smart Agriculture, consider the following statements: (2021)

1. The 'Climate-Smart Village' approach in India is a part of a project led by the Climate Change, Agriculture and Food Security (CCAFS), an international research programme.
2. The project of CCAFS is carried out under Consultative Group on International Agricultural Research (CGIAR) headquartered in France.
3. The International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in India is one of the CGIAR's research centres.

Which of the statements given above are correct?

(a) 1 and 2 only

(b) 2 and 3 only

(c) 1 and 3 only

(d) 1, 2 and 3

Ans: (d)

Q. Consider the following pairs: (2014)

Programme/Project	Ministry
1. Drought-Prone Area Programme	Ministry of Agriculture

2. Desert Development Programme	Ministry of Environment and Forests
3. National Watershed Development Project for Rainfed Areas	Ministry of Rural Development

Which of the above pairs is/are correctly matched?

(a) 1 and 2 only

(b) 3 only

(c) 1, 2 and 3

(d) None

Ans: (d)

Q. In India, which of the following can be considered as public investment in agriculture? (2020)

1. Fixing Minimum Support Price for agricultural produce of all crops
2. Computerization of Primary Agricultural Credit Societies
3. Social Capital development
4. Free electricity supply to farmers
5. Waiver of agricultural loans by the banking system
6. Setting up of cold storage facilities by the governments

Select the correct answer using the code given below:

(a) 1, 2 and 5 only

(b) 1, 3, 4 and 5 only

(c) 2, 3 and 6 only

(d) 1, 2, 3, 4, 5 and 6

Ans: (c)

Mains:

Q. Given the vulnerability of Indian agriculture to vagaries of nature, discuss the need for crop insurance and bring out the salient features of the Pradhan Mantri Fasal Bima Yojana (PMFBY). **(2016)**

Q. Explain various types of revolutions, took place in Agriculture after Independence in India. How these revolutions have helped in poverty alleviation and food security in India? **(2017)**