# Fixing India’s Food Systems

This editorial is based on **“Food for Reform”** which was published in Indian Express on 15/04/2024. The article highlights the importance of future governments prioritizing the enhancement of agricultural productivity, expansion of processing and retailing operations, and the promotion of new technology adoption.

**For Prelims:** Minimum Support Price, e-NAM, Farmer Producer Organizations, National Seeds Corporation, Bt cotton, Protection of Plant Varieties & Farmers Rights Act, Intellectual Property Rights, Soil Health Card Scheme, Pradhan Mantri Fasal Bima Yojana (PMFBY), Micro Irrigation Fund (MIF), National Mission for Sustainable Agriculture (NMSA), Nano Urea, **Viksit Bharat@2047,** Asian Development Bank

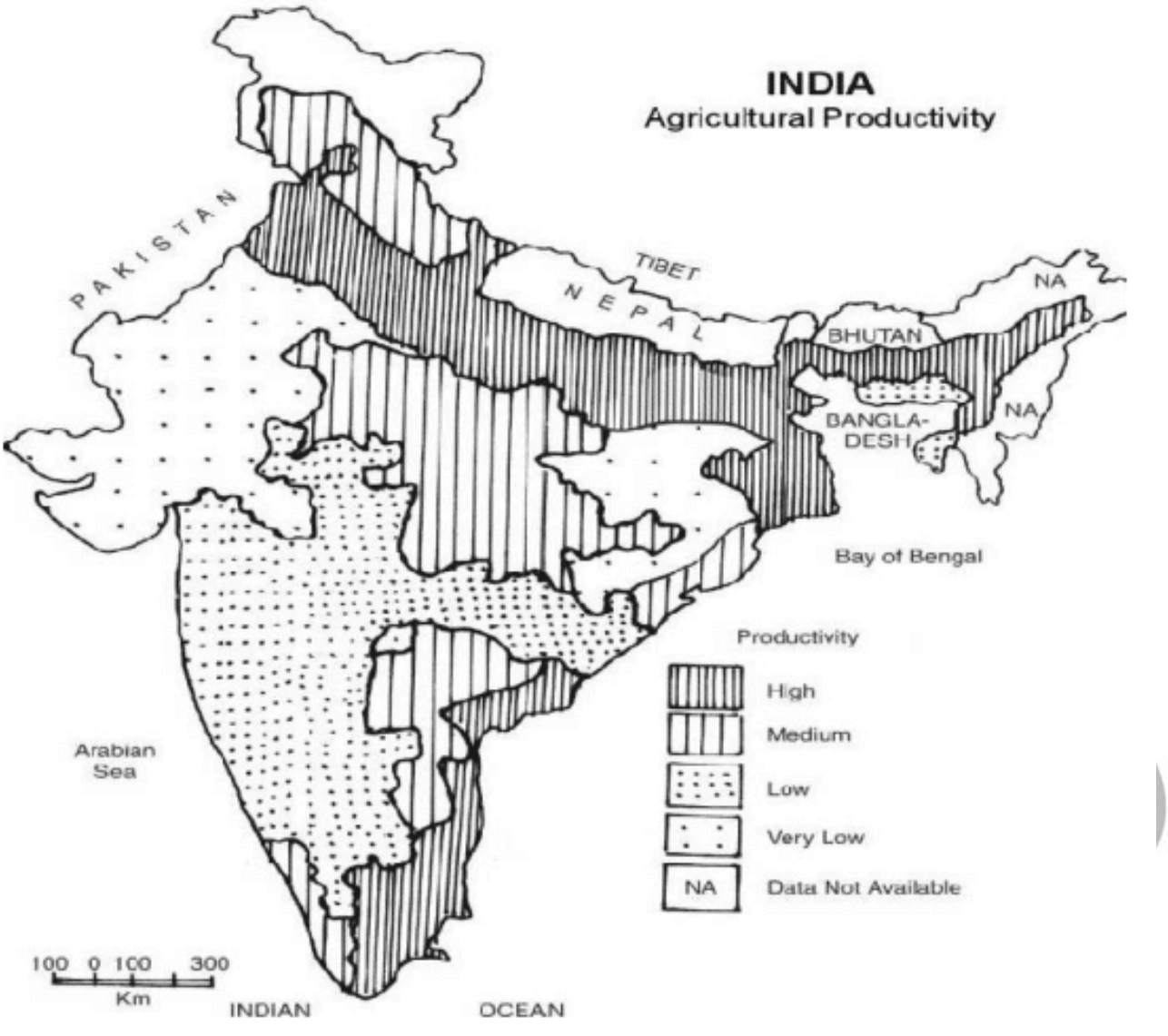
**For Mains**: Economically Viable Agriculture: Importance, Challenges and Way Forward

India is one of the largest growing economies in the world. Agriculture is the primary occupation of nearly half the population of the country. Over the past few decades, the **manufacturing and services sectors** have increasingly contributed to the growth of the economy, while the agriculture sector’s contribution has decreased. The unprecedented agrarian crisis in India has now been affecting farmers across the country for nearly a decade.

Agriculture and allied sectors are central to the Indian economy. Keeping this and a sustainable future in mind, the Indian government, quite rightly, promoted technology-enabled sustainable farming, including natural, regenerative and organic systems, during its **G20** presidency. The government has been taking various measures to address the problems faced by the farmers, such as low productivity, high input costs, market fluctuations, climate change, indebtedness, and lack of institutional support.

Keeping pace with the same, the incumbent government has asked various ministries to prepare plans that they would like to announce in the first 100 days of their third term. The ministries are contacting various experts to help them frame the right policy framework that is in sync with the vision of Viksit Bharat@2047.

//




## What are the Different Challenges in Ensuring Adequate Agri-Food Systems in India?

- **Overexploitation of Water Resources:**
  - With the marginal cost of using water being close to zero, farmers started growing water-intense crops in low-rainfall areas and adopted water-based practices and off-season cultivation. Though half of the agricultural area is rainfed and without access to irrigation, the sector uses close to 90% of the total water used in the country.
    - It is evident from the **emergence of monoculture of paddy** in traditionally groundnut and cotton growing areas in Punjab, Haryana and Rajasthan; expansion of sugarcane in Maharashtra and Uttar Pradesh; groundnut cultivation in peak summer time in Rajasthan and many such cases.
      - Thus, a new geography of crops appeared in complete violation of agro-climatic suitability of various agro-climatic zones in the country.
- **Disregard for Nature and Loss of Crop Diversity:**
  - Actual crop pattern and acreage allocated to various crops are at significant variance with what is suitable from the agro-climatic point of view. The deviation is mainly caused by policy support and disparities in advancement in technology for various crops.
  - Technological and policy bias in favour of **Green Revolution** technology and a few crops not only caused distortions in crop pattern, it also resulted in increased concentration of area under some crops and a sharp decline in crop diversity.
    - In the early 1970s, paddy cultivation was undertaken on 10.8% of the net sown

area in Punjab and 8% in Haryana in 2020s. This share has increased to 73.3% in Punjab and 39.5% in Haryana. Similarly, area under sugarcane cultivation quadrupled in Maharashtra and doubled in Uttar Pradesh after the onset of the Green Revolution.

- **Low Efficiency and Price Led Growth:**
  - India's growth in agriculture sector, though impressive in most products and states, has remained lower than the potential.
    - Our productivity levels are lower than major agricultural countries. The sector is witnessing slow modernisation.
  - The much needed changes in technology, method of production and post-harvest value addition are not visible on a large scale.
    - Agricultural practices involving prolific use of inputs like broadcasting of fertilizer and flood irrigation are not showing any significant improvement.
- **Imbalances and Regional Disparities:**
  - Imbalances between demand and domestic production have been growing over the years. India has been accumulating a large surplus of rice, wheat and sugar, and this involves a huge cost to the state exchequer.
  - The underlying reason for this is the rise in output price by the centre and payment of bonus for rice, and rise in **fair and remunerative price (FRP)** for sugarcane by some states ignoring the **Commission for Agricultural Costs and Prices (CACP)** recommendations and, for that matter, demand and supply or market situations.
    - On the other hand, India's deficit in edible oil is rising year after year. The country meets 55% of its domestic requirement of vegetable oils by importing them.
    - There is, thus, a scope in domestic market to absorb 127% increase in domestic oilseed production.
- **Wasteful Investment:**
  - Investment in major, medium and micro irrigation constitutes a major share of public investment in agriculture. These investments were meant to increase area under surface water irrigation.
    - The country spent more than Rs. 30,000 crore each year after 2007-08 as **capital expenditure** and also a huge amount as operation and maintenance of canals, but area under canal irrigation is showing either stagnation or decline.
    - Several major irrigation projects even after incurring most of the expenditure are held up by minor obstacles like forest clearance in small pockets, catchment area development, construction of distributaries and field channels. Interstate and intra state disputes are another factor for delay in completion of some major irrigation works.
- **Technology Generation and Dissemination:**
  - Agricultural problems are becoming more complex, and research is turning more capital intensive. Climate change, share of agriculture in greenhouse emissions and sustainability concerns add to the challenges to be addressed by the research and development (R&D) system.
  - Scope for spillover from research in the developed world is shrinking, and **intellectual property right (IPR)** issues are complicating and making it costly for transfer of technology from the outside world and the private sector.
  - Though agricultural research and higher education is largely a responsibility of State Agriculture Universities (SAUs), the **ICAR** is required to respond to any challenges and issues concerning the agriculture sector. Public opinion at large holds ICAR responsible for any adverse development in the agriculture sector. As a result, the portfolio of ICAR has been getting bigger and bigger over SAUs with time.
- **Viability of Smallholders:**
  - Agriculture in India and most of Asian countries is dominated by small land holdings. According to Agricultural Census for year 2015-16, 68% farm holdings operate on less than 1 hectare land area. Further, 85% of farm households undertake farming on less than 2 hectares.
  - This size of land holding does not generate adequate income with the usual agricultural practices and products. Small holders also face the problem of scale economy in input as well as output markets that require different type of institutional help.
- **Nutrition, Food Safety and Health:**

- India's nutrition indicators and child health indicators are low. According to the **Food and Agriculture Organisation (FAO)** of the **United Nations**, the largest number of people who are hungry or undernourished live in India.
- According to the **Global Hunger Index**, India ranks low year after year on the hunger indices, even though the country has become the largest rice exporting country with about 15% of its rice production sold in overseas market. India represents a paradoxical situation of 'hunger in the midst of plenty'.

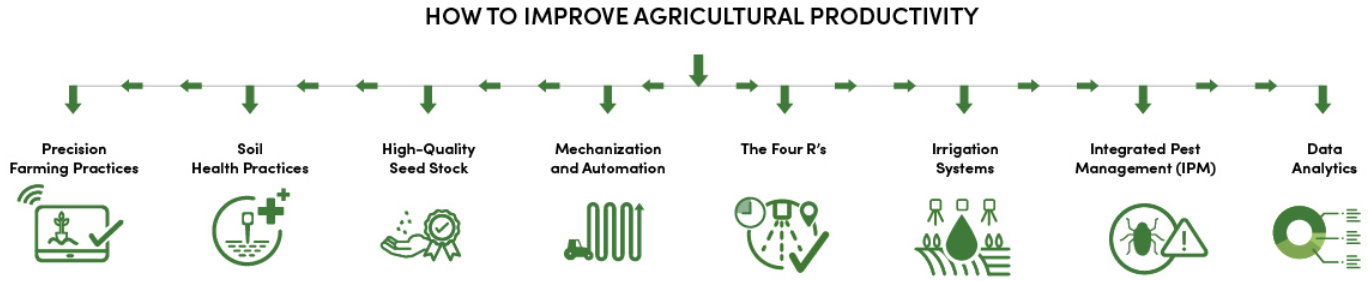
- **Mismatch between Structural Changes in Output and Workforce:**
  - As an economy develops, the share of agriculture in national **gross value added (GVA),** a measure of national income, and employment would experience a decline. Higher the growth of the economy, faster is the transformation in the structure of economy.
  - In India, between 1950-51 and 1970-71, the share of agriculture in national income at 2011-12 prices declined from 61.7% to 49.6%, whereas the sector's share in employment remained stuck at more than 69%. In the next two decades, the sector's share in employment declined to 59% and income to 35.1%.
  - After 1990-91, growth rate of economy accelerated which also resulted in faster decline in the share of agriculture. However, the decline in the share of agriculture in work force did not keep pace with the decline in the sector's share in national income. In 2010-11, agriculture had a share of 18.3% and 54.6%, respectively, in national income and employment.
- **Low Income of Farmers:**
  - Disproportionate share of agriculture in national income and employment implies disparity in per worker income in agriculture and non-agriculture sector. At the macro level, income per worker in non-agriculture is 3.75 times the income of an average agriculture worker which includes agricultural labourers and cultivators.
    - The small and shrinking land size, excess workforce, low productivity and poorly working markets are the main causes for low per farmer income in the country.

## What Steps Need to be Taken to Improve Agricultural Productivity?

There are some of suggestions for the agri-food space. They are based on interactions with experts during the four-day forum organised by the **Asian Development Bank** on food security in the wake of climate change.

- **Raising Total Factor Productivity:**
  - Agriculture has to produce not only more food, fibre and even fuel **(biofuels)**, but it has to do so with fewer resources. India's population is likely to go to about 1.6 billion by 2047.
    - So, there are more mouths to feed. With gradually rising incomes, people will demand more and better food.
  - Efficiency in the use of land, water, labour, and inputs like fertilisers and farm machinery is going to be critical. In other words, we must aim to raise our total factor productivity.
    - This can be done by putting in more resources in agri-R&D, innovations and extension.
- **Creating Climate Resilient Agriculture:**
  - The production system is being threatened by extreme weather events triggered by **global warming.** The real solution lies in investing resources to create climate-resilient (smart) agriculture.
    - This would mean more investments in seeds that are heat and flood-resistant, and more investment in water resources not just in augmenting their supplies but also ensuring water is being used more wisely.
    - **"More crop per drop"** should not be just a slogan but a reality. Drips, sprinklers, and protected cultivation as part of precision agriculture will have to be adopted at a much larger scale than today.
- **Building Efficient Value Chains:**
  - By 2047, **more than two-thirds of India will be living in urban areas** — up from about 36% today. Migration from rural to urban areas in search of higher productivity jobs is a natural process that cannot, and should not, be wished away.
    - The implication of this is that much of the food will have to be moved from the hinterlands to urban areas.

        - This would require a massive logistics revolution, from transporting to stocking to processing and organised retailing.
        - This would open doors for large-scale investments, primarily by the private sector. The new government will have to facilitate this transformation by changing laws that are suitable for Bharat@2047.
- **Promoting Farmer Producer Organisations (FPOs) or Cooperatives:**
    - In this food systems transformation, while all players from the seed industry to farm machinery to processing and retailing are scaling up, farming is still fragmenting into smaller and smaller holdings.
    - The challenge is to ensure that these smallholders are brought together, through **Farmer Producer Organisations (FPOs)** or **cooperatives** (as was done in the milk sector, a la AMUL), to create a scale that is demanded by processors, organised retailers, and exporters.
        - This institutional innovation is the key to inclusive Bharat.




- **Moving Beyond Simple Food Security to Nutritional Security:**
    - On the consumption front, there is need to move beyond simple food security to nutritional security. The malnutrition numbers, especially for children below the age of 5, are worrying and stunting today stands at 35%.
        - For this to improve, besides sanitation, women's education and immunisation, there is also need to fortify our staples with micro-nutrients.
    - The government has made a beginning with zinc-rich rice and wheat, but is shying away from golden rice with **beta carotene (Vitamin A rich)**, when Australia, New Zealand, Canada, and the US have declared it safe, and even Bangladesh and Philippines have allowed its trials.
        - Rice is our first crop, and most of those children who are malnourished today consume a lot of rice. This needs to be fortified with high nutrition.
- **Need For Public Private Partnership:**
    - Public-private partnerships are the way to go. The private sector can build efficient value chains and also produce seeds that are climate-resilient and more nutritious.
    - The government has to provide a conducive policy framework. When the government can devise **PLI-type schemes** for industry, it should also be done for food systems transformation for tomorrow.
- **Shift from Growth to Efficient-Growth:**
    - This requires upgradation of agricultural technology, application of modern skills in farm practices, new innovation in farming, and lowering wastages in use of fertilizer, water and other inputs.
        - This will also require change in input pricing policy to discourage prolific and indiscriminate use of inputs like water and fertiliser, and promote their optimum use.
    - Digital technology can also play a significant role in improving efficiency through easy dissemination of technology and knowledge to farmers.
- **Surplus Management:**
    - Domestic absorption of food has grown at a lower rate than domestic production. In the early 1980s, India produced and consumed a little more than 1 kg food per person per day. The production has gradually increased to 1.73 kg in recent years, whereas domestic absorption increased to 1.59 kg. This shows that food surplus has been continuously

increasing for the last 35 years.
    - This requires a complete shift in food policy from shortage management to surplus management. This also indicates that much of the under nutrition in India is not due to non-availability of food, but it is due to low food intake. India has to look for overseas market to dispose the surplus food produce.

## How Does Technology Contribute to Improving Food Systems and Agricultural Productivity?

- **Enhancing Productivity:**
    - **Precision Farming:** Utilizing **GPS,** sensors, and drones to optimize planting, watering, and fertilizing processes, leading to higher yields and reduced resource wastage.
    - **Mechanization**: Introduction of machinery such as tractors, harvesters, and planters, reducing manual labor and increasing efficiency in farm operations.
    - **Biotechnology:** Development of **genetically modified crops** with enhanced resistance to pests, diseases, and environmental stresses, improving yield and quality.
- **Improving Resource Management:**
    - **Water Management:** Implementing technology for efficient irrigation systems like **drip and sprinkler irrigation,** conserving water and improving crop yield.
    - **Soil Health Monitoring:** Using sensors and imaging technology to assess soil health and nutrient levels, enabling targeted fertilization and soil conservation practices.
    - **Weather Forecasting:** Accessing real-time weather data for better planning and management of farming activities, reducing risks from weather-related disasters.
- **Facilitating Market Access:**
    - **Digital Platforms:** Utilizing online marketplaces and mobile applications for farmers to access markets, negotiate prices, and sell produce directly to consumers, eliminating middlemen and increasing profits such as **e-NAM portal.**
    - **Supply Chain Management:** Implementing technology for tracking and monitoring produce from farm to market, ensuring quality control and reducing wastage.
- **Promoting Sustainability:**
    - **Empowering Smallholder Farmers:** Technology has the potential to empower smallholder farmers by providing access to information, markets, and financial services.
        - Mobile applications and digital platforms offer valuable agronomic advice, market prices, and weather forecasts, enabling farmers to make informed decisions and improve their livelihoods.
    - **Renewable Energy:** Using solar panels and bioenergy sources to power farms, reducing reliance on fossil fuels and mitigating carbon emissions.
    - **Data-driven Decision Making:** Analyzing data from sensors, satellites, and drones to make informed decisions on crop management, leading to more **sustainable farming** practices.
        - For instance, predictive analytics can help farmers anticipate pest outbreaks or identify optimal planting times, enabling proactive management strategies and minimizing risks.

## Conclusion

A significant and sustained increase in farmers' income and the transformation of agriculture require a paradigm shift in the entire approach towards agriculture sector. Changes in archaic regulations and liberalisation of the sector are a must for creating an enabling environment for a modern and vibrant agriculture. Advancement in science led technology, an enhanced role of private sector in both pre and postharvest phases, liberalised output market, active land lease market and emphasis on fficiency will equip agriculture to address the challenges of 21st century and contribute towards the goal of a new India.

***Drishti Mains Question:***

Discuss the role of technology and sustainable practices in enhancing agricultural productivity in India. How can these be integrated for inclusive growth?

## 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)**

---