

# 101: AGRICULTURE IN INDIA

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August 2022

# Acknowledgements

## About the Authors

This primer has been written by **Debaranjan Pujahari**.

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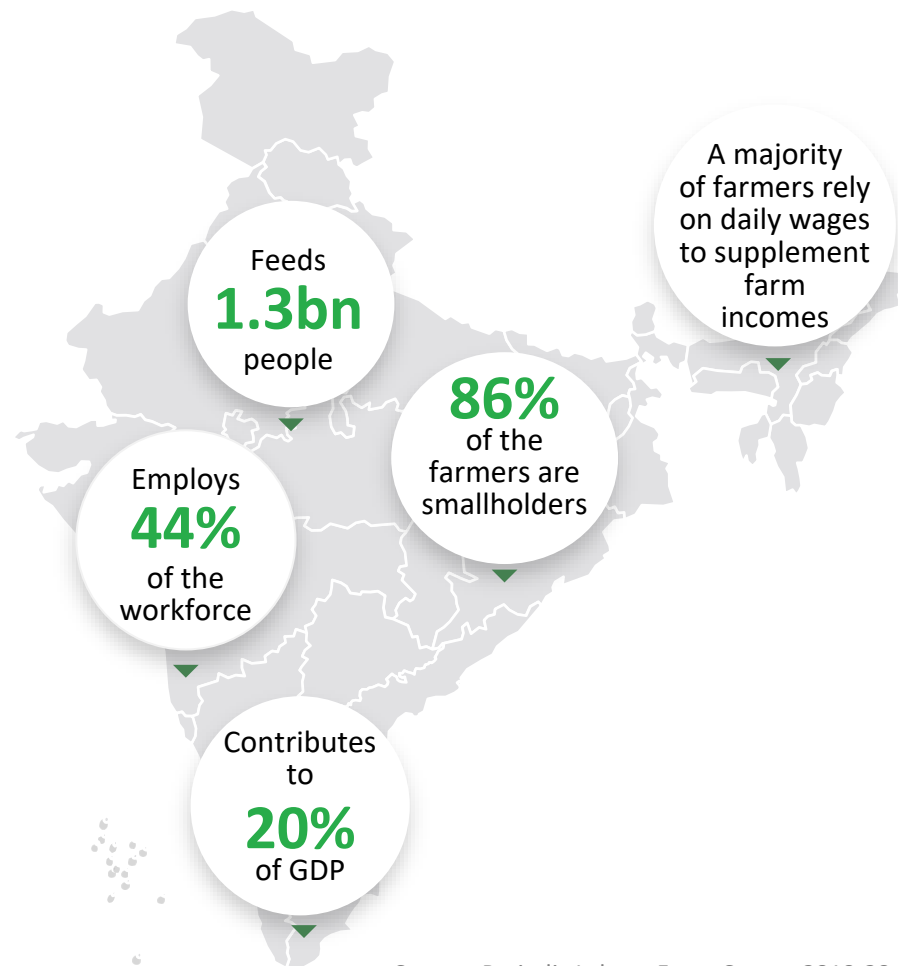
# OVERVIEW OF THE INDIAN AGRICULTURAL LANDSCAPE

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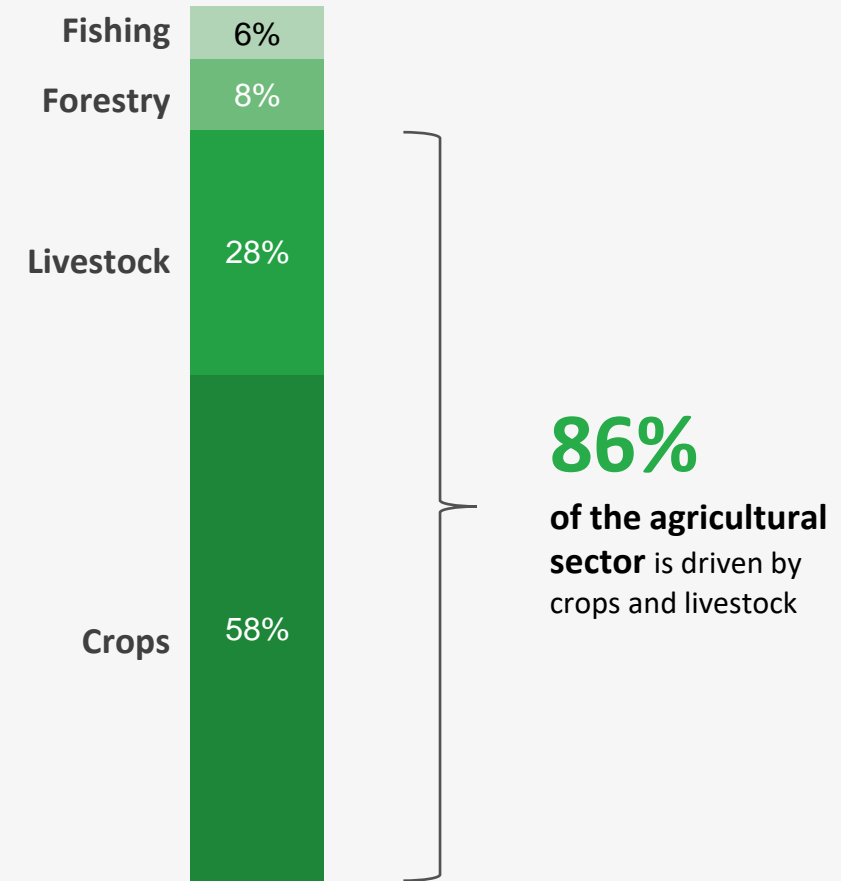


## India's agricultural sector is driven primarily by crop production and livestock raising.

### Overview of the Agricultural Sector in India



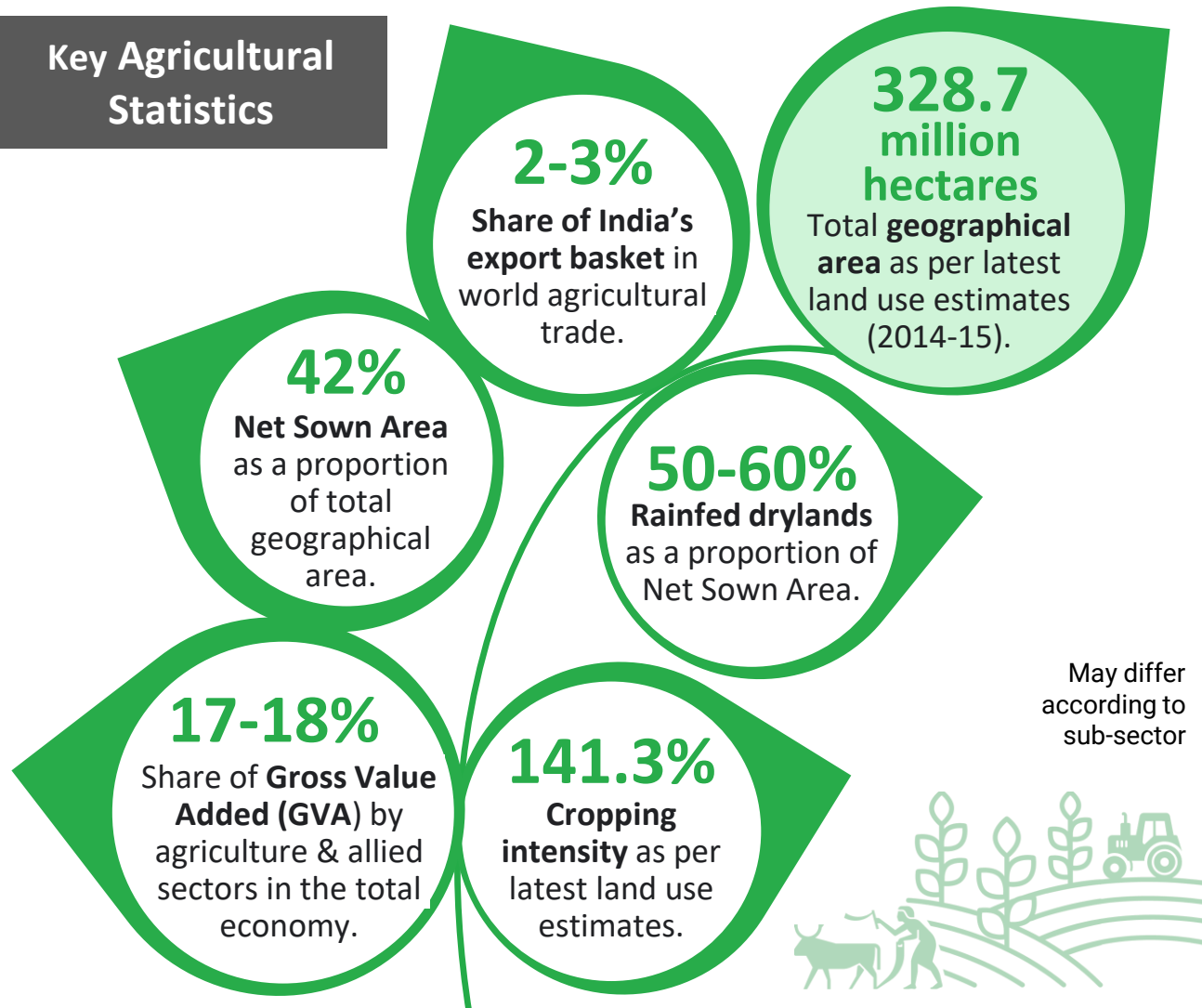
### Percentage Split of the Agricultural Sector (2017-18)



Source: Periodic Labour Force Survey 2019-20; Economic Survey of India 2017-18, 19-20, 20-21; NITI Aayog Sector Report: Agriculture, Animal Husbandry and Fisheries

Agriculture, currently valued at US \$370 billion, is one of the major sectors in the Indian economy.

## Key Agricultural Statistics



Sources: Ministry of Finance, Economic Survey 2020-21, Government of India

## Overview of Agricultural Value Chain



### Input Supply

- Smallholder farmers.
- Other input suppliers (seeds, cuttings, tools, fertilisers and more).



### Production

- Smallholder farmers.
- Medium and large-scale farmers.
- Labour-intensive sector.



### Collection

- Cooperatives and village associations.
- Traders.



### Processing

- Cooperatives and village associations.
- Medium and large scale processing companies.



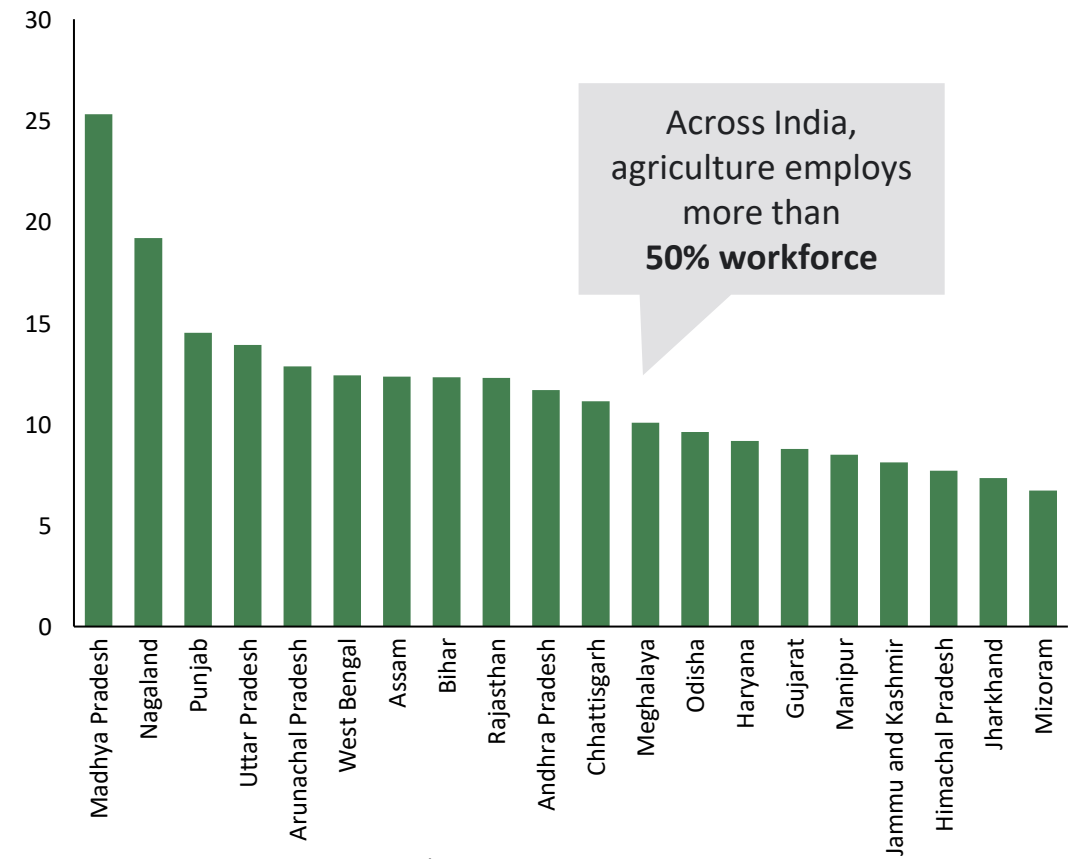
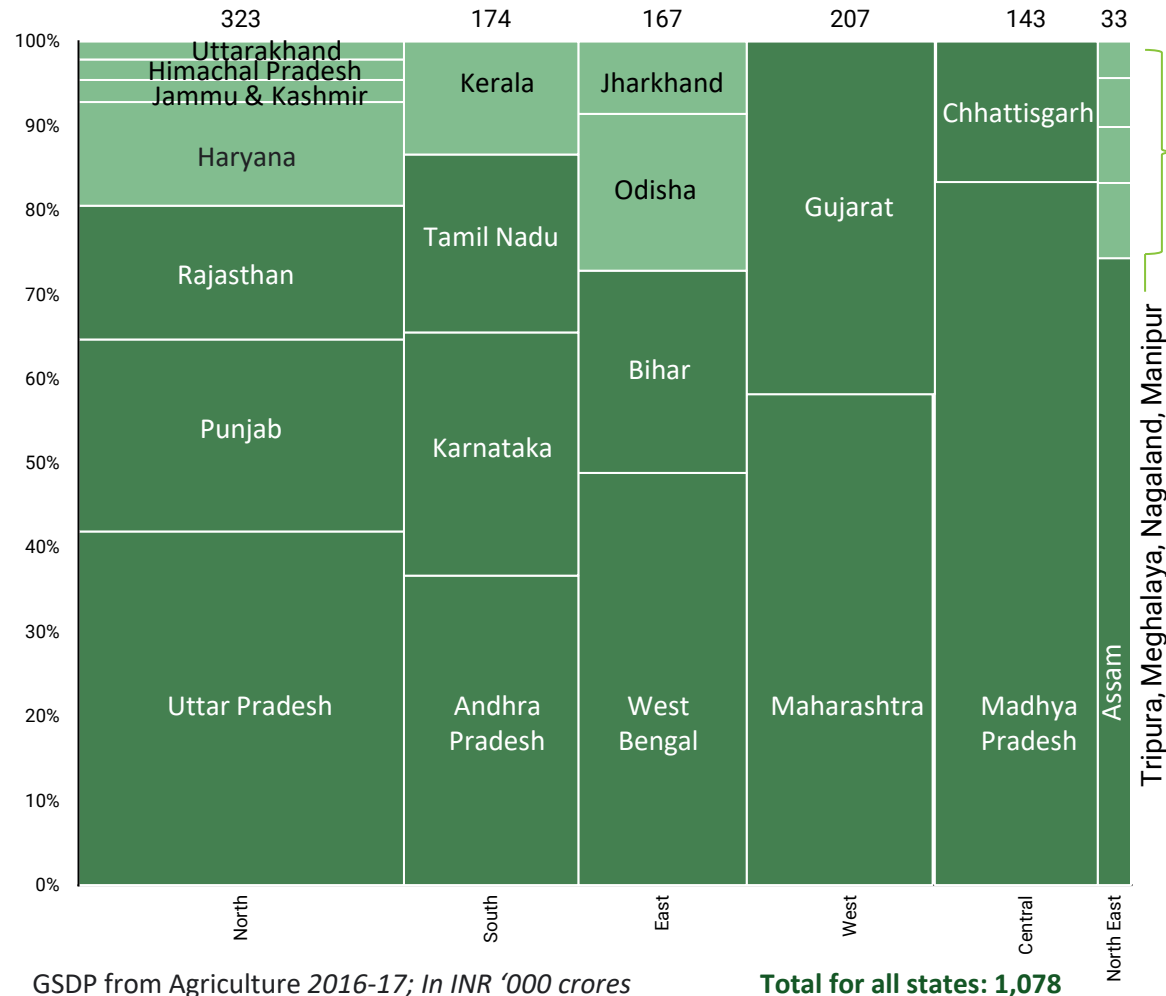
### Retailing

- Local markets and cross-border.
- Supermarkets, restaurants, animal feed suppliers and more.

# Despite being a mainstay of the economy and leading generator of employment, agricultural value is concentrated in top 10 states.

Top 10 states account for approximately 50% of India's total agricultural value.

Agriculture contributes to more than 10% of the Gross State Domestic Product (GSDP) in half of the states in India.



Share of agriculture in GSDP 2016-17; Top 20 states

\*At constant 2011-12 prices  
Source: Ministry of Statistics & Program Implementation (MoSPI)  
Ministry of Agriculture & Farmers' Welfare (MoA&FW)



# CURRENT CHALLENGES AND OPPORTUNITIES IN THE INDIAN AGRICULTURE SECTOR

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# The agricultural sector in India faces a multitude of challenges throughout the value chain.



## Pre-production

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- **Small and marginal** farmers with fragmented landholdings.
- **Degrading** soil quality and water stress.
- **Limited access** to technology, inputs, credit, capital and market for farmers.
- **Asymmetric** market information and knowledge.



## Production

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- **Low rate of mechanisation** compared with other developing countries.
- **Insufficient and inefficient labour**; seasonality of employment.
- **Underdeveloped** supporting infrastructure.
- **Lack of data** availability.



## Post-production

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- **Inadequate storage** and transportation facilities.
- Excessive layers of **middlemen**.
- **Inability to market** products efficiently.



# Agriculture and food systems in India need a **massive shift** to adjust to evolving challenges and leverage upcoming opportunities.

## Needs indicating potential for change



### Improving yield and income of Smallholder Farmers (SHFs)

- **86%** farmers in India have small land holdings (less than 2 hectares).
- India's farm yield is **30-50%** lower than that of developed nations.



### Improving inclusiveness and building resilience

- Women constitute over **42%** of the agricultural labour force India In India, but own less than **12%** of farmland.



### Need for Diversification of crops

- Dominance of the **wheat-paddy system**.
- Deceleration in productivity growth, drop in agricultural employment, overexploitation of groundwater resources, and decline in soil fertility (Sidhu and Johl 2002, Singh et al 1997).

## Opportunities

01

### Agri-tech innovation transforming ecosystem for SHFs

- A base of **56 crore** users (50% of them located in rural areas).
- High smartphone penetration.
- Artificial intelligence (AI) market valued at nearly **INR 51,100 crores**.

02

### Shifting consumption towards fruits, vegetables, and pulses

- Protein intake in Indian diet is expected to grow at a Compounded Annual Growth Rate (CAGR) of **8-11%**.
- High value crops like fruits, vegetables, pulses, and oilseeds could contribute to additional food demand of **approximately 400 million metric tonnes (MMT) per year** by 2025 (McKinsey 2017).

03

### Fast growth of cold chains and cold storage markets

- The cold chain market in India is expected to attain a value of **INR 286,500 crores** by 2027 (Expert Market Research 2021).
- Opportunity to reduce **wastage by 50% from current levels**.

# WAY FORWARD: EIGHT KEY THEMES FOR THE FUTURE

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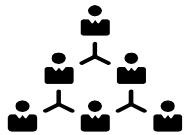
Looking ahead, there are **eight key themes** that will shape the Indian agricultural sector.

### Increasing incomes of SHFs



Improving farm productivity and market access

01



Enabling role of Farmer Producer Organisations (FPOs) and cooperatives

02

### Incorporating Sustainability



Optimising soil and water management

03



Increasing need to build climate resilience

04

### Enhancing Inclusiveness



Increasing trends towards gender inclusion

05



Increasing role of technology

06

### Stakeholder collaborations



Increasing government investment

07



Increasing role of Public-Private Partnerships

08



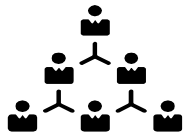
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## Accelerating improvement of productivity across all crops and sectors.

01

### Growth in agriculture is key to inclusive growth and combating agrarian stress

- The Government lays emphasis on **yield gap minimisation** to improve productivity by focusing on “production enhancement and income increase for farmers.” (*Approach in Doubling Farmers’ Income Committee Report Volume VIII*).
- **Low labour productivity** is a key reason for agrarian distress. Others are:
  - Poor irrigation facilities.
  - Overdependence on the vagaries of monsoons.
  - Lack of technology or farmer advisory services.

With fixed land resources, an increase in production has to come from an **increase in productivity**.

### New lens of sustainability and local differences

- There is renewed focus and funding on **closing the yield gap** through reform of market regulations, crop insurance services, climate-resilient practices and facilitating better access to inputs.
- However, it is necessary to focus on **sustainability and pay greater attention to local conditions**.

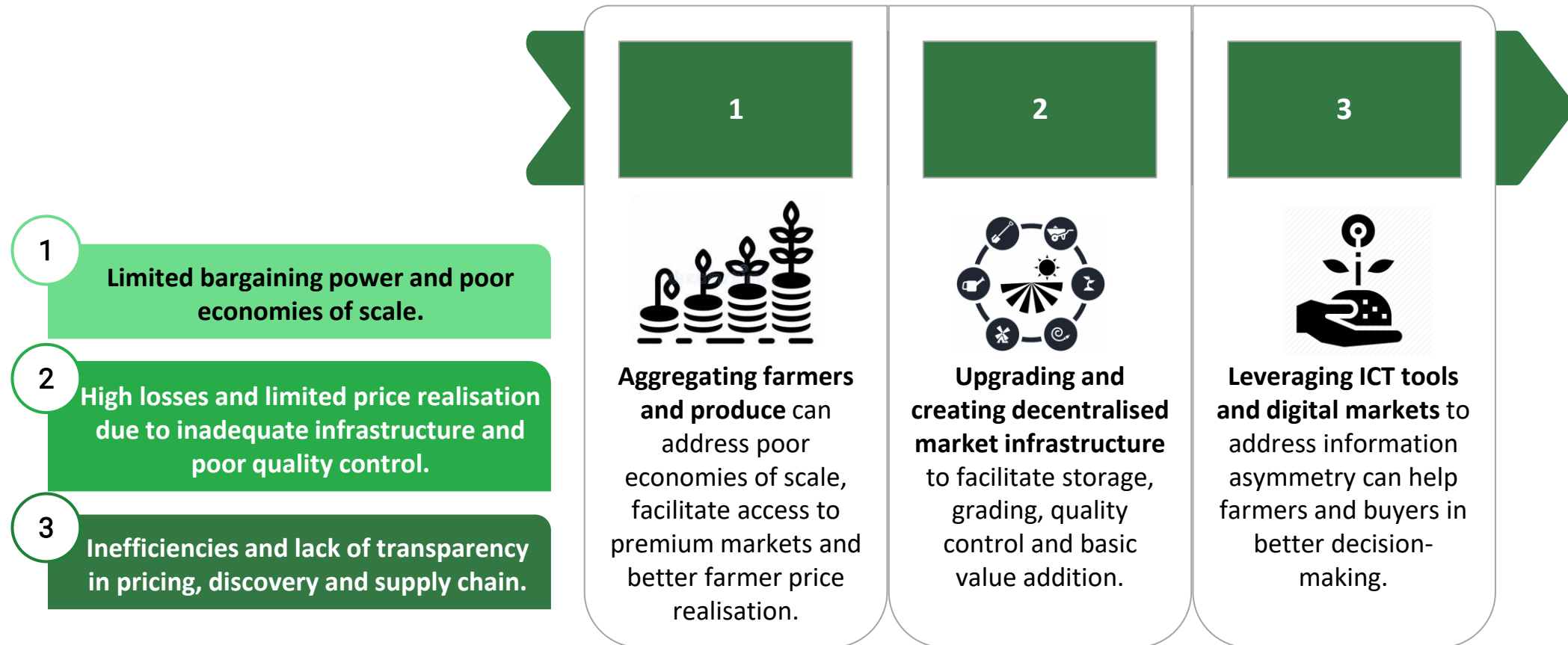
**“Enhancing productivity, crop intensification, directed diversification for high value commodities, better price realisation and change in terms of trade are the major pillars suggested for augmenting the income of farmers along with better opportunities in the non-farm sector in rural areas.”**

- NITI Aayog



## Facilitating market access for smallholder farmers.

01

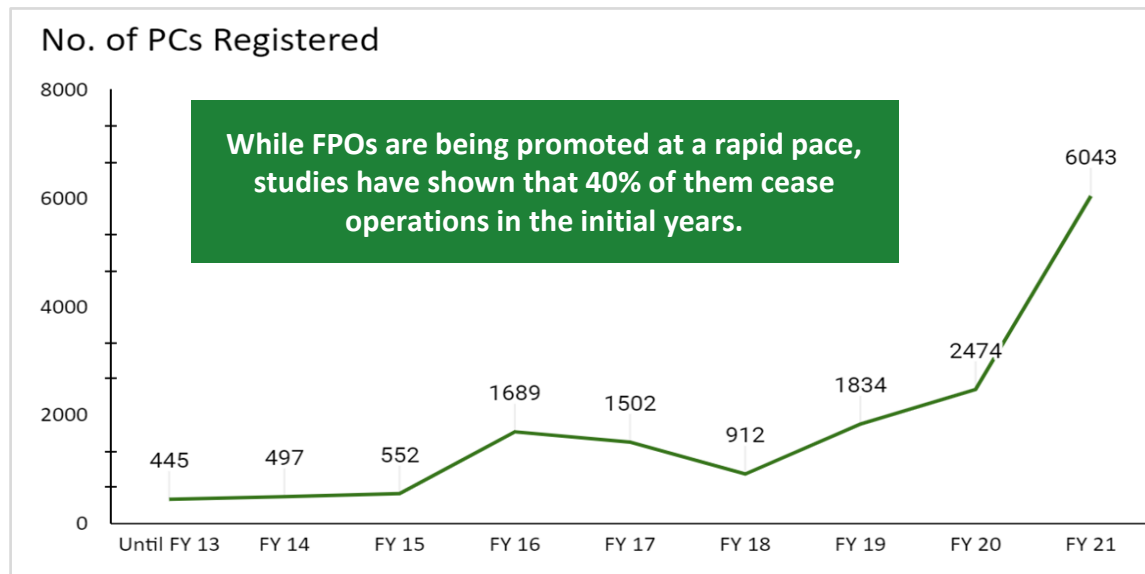


## Enabling FPOs and cooperatives.

02

### The government is actively promoting FPCs, FPOs, though yet to reach scale

- The amendment in **2002** to the Companies Act enabled **incorporation of cooperatives** as companies and created a new legal entity, **Farmer Producer Company (FPC), simply called Producer Companies (PCs)**.
- FPCs were originally developed to establish a **formal channel for agricultural farm advisory and increase farmer livelihoods**.
- Some agencies have been successful in creating FPCs as institutional platforms for farmer collectivisation but they have been **unable to establish them as a successful business entities**.



Source: Department of Agriculture and Cooperation; Agricultural Census Division; FAO; Ministry of Agriculture; Occupied Data taken from IFPRI 2012

### Promoting FPOs has gained traction in recent years

#### Exponential increase in the number of FPOs

During 2019-21, approximately 8000 producer companies have been registered, bringing the total to nearly 16,000, covering nearly 6-8 million producer households.

- **10,000 FPO schemes launched**
- **15,948 FPCs promoted**

#### Significant Government Investment

The Central Government's '**Formation and Promotion of 10,000 Farmer Producer Organizations (FPOs)**' Scheme has a budget of INR 6866 crores for 9 years, of which INR 2524 crores is for FPO promotion and capacity building.

### Majority of the FPOs are still far from reaching their potential (Krishna et. al. 2021)

- Limited share capital: About 86% of FPOs have a share capital of less than INR 10 lakhs.
- Constraints in scaling up business with only 5% of FPOs having a turnover above INR 1 crore.
- Poor survival rates - 40% of the promoted FPOs are defunct.



Looking ahead, there are **eight key themes** that will shape the Indian agricultural sector.

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of SHFs



Improving farm  
productivity and  
market access

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02

Incorporating  
Sustainability



Optimising soil  
and water  
management

03



Increasing need  
to build climate  
resilience

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Enhancing  
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Increasing trends  
towards gender  
inclusion

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Increasing  
role of  
technology

06

Stakeholder  
collaborations



Increasing  
government  
investment

07



Increasing role of  
Public-Private  
Partnerships

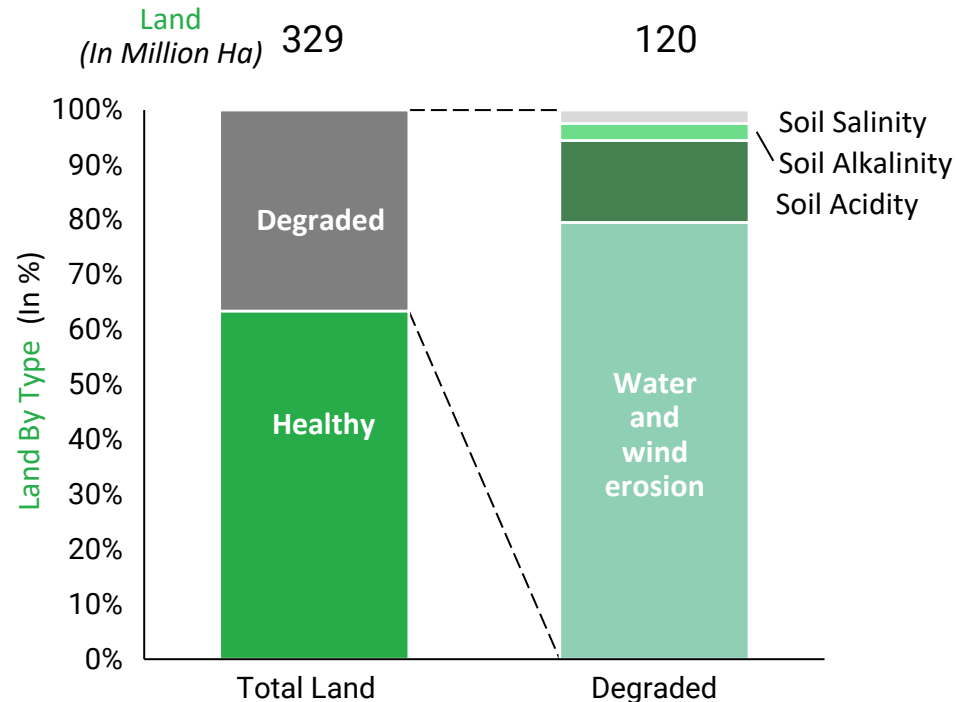
08



## Optimising soil and water management: declining soil health.

03

Almost 40% of the land is degraded,  
primarily because of erosion



Some states are in a worse position than others: **More than half of the land area is degraded** due to soil erosion in **Chhattisgarh, Jharkhand, Madhya Pradesh, Uttar Pradesh, Uttarakhand and the North Eastern Hill states.**

Absence of integrated land use policy suggests trend to continue

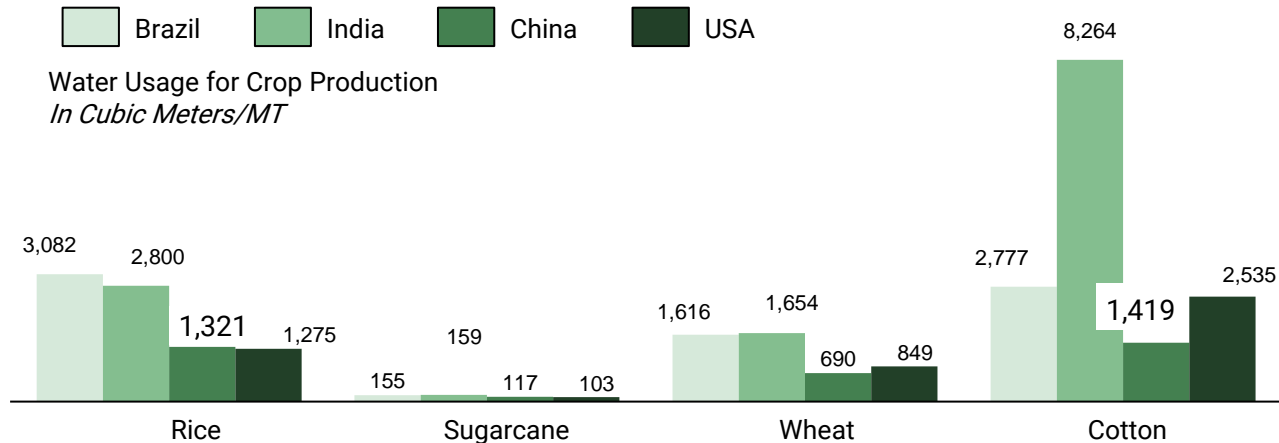
- Even amidst rapid industrialisation and urbanisation, **total net sown area has not been meaningfully impacted.**
  - Net sown area accounted for 46% of the total land in 1970, and was 43% till 2016-17.
  - However, fallow land has increased from 6% to 9% since 1970 (as in 2014-15), and land for non-agricultural use has increased from 6% to 9%. Conversely, the area of cultivable waste land and barren/uncultivable land has decreased over time.
- However, the quality of soil is **deteriorating rapidly.**
  - Key drivers of land degradation include over-grazing, non-adoption of adequate soil conservation methods, improper crop rotation, and indiscriminate use of agro-chemicals.
- **Soil health is prominent on the government's agenda**, but the success of programmes has been mixed.
  - In 2015, according to the Soil Health Card Scheme, more than 80% of tested soil samples in India have low or medium level of nitrogen.
  - However, the complexity in use and generic recommendations of fertilisers make it difficult to accurately prescribe them for soil health.

Source: "State of Indian Agriculture," Annual Report, 2015-16 GoI, ICAR study

## Optimising soil and water management: declining water availability and quality.

03

### Serious concerns about impending water crisis



India has been utilising water resources irresponsibly for producing crops, when compared with other countries

- Competition for water comes from various sources - increasing population, growing urbanisation and rapid industrialisation, against what is necessary for increasing agricultural productivity.
  - By 2050, per capita water availability in India will fall to 1,140 from 1,400 cubic metres per annum.
- Groundwater suffers from over-exploitation in most states.
  - 90% of water extracted in 2020 was used for irrigation.
  - Between 2000-10, groundwater in India got depleted by nearly a quarter.
- Furthermore, water quality has been declining due to dumping of untreated sewage and industrial wastewater as well as excessive use of fertilisers and pesticides.

### The Government is acting to address this issue, but results have been mixed

- State-specific success in **System of Rice Intensification (SRI) for paddy cultivation.**
  - Several farmers in Bihar and Andhra Pradesh have adopted SRI as a water-conserving method.
  - Assistance from Centre to make it a universal concept across states.
- Promotion of conservation techniques like zero tillage, raised-bed planting and drip irrigation.
  - Policies like Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) had sluggish progress and needs **improvement in the management of irrigation systems for better delivery.**
- Many **watershed development programmes have failed** to deliver sustainable results.
  - 'Project-centric' approach; few institutions/committees survive beyond the project period.

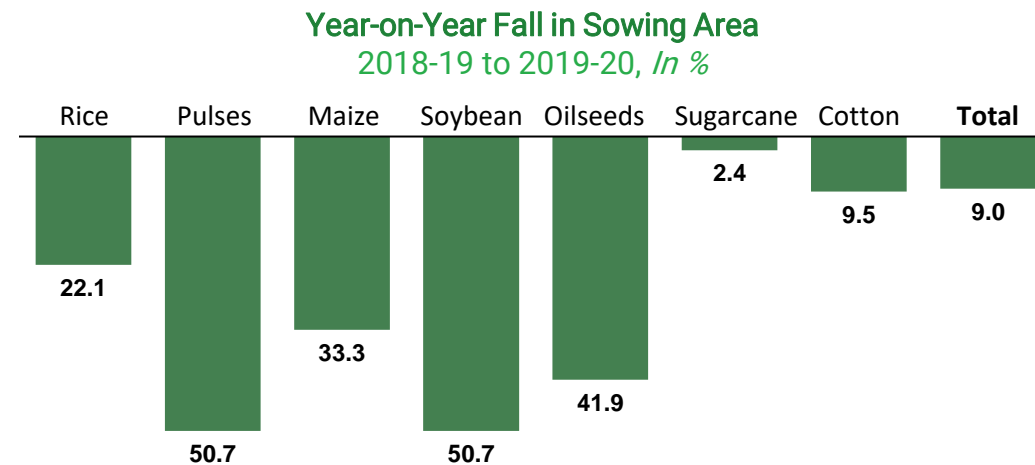
Source: Doubling Farmers' Income Volume VIII

## Increasing need to build climate resilience.

04

### The impact of climate change is accelerating year-on-year...

- A decline in southwest monsoons has been impacting the sowing area of crops.



- Regarding climate change and its impact of agriculture, the following trends are expected to unfold (Doubling Farmers' Income 2019):
  - Extreme temperature shocks reduce farmer incomes by 4.3% and 4.1% during the kharif and rabi season respectively, whereas extreme rainfall shocks reduce incomes by 13.7% and 5.5%.
  - Temperatures in India are likely to rise by 3-4 degrees Celsius by the end of the 21st century.

### ... and will vary greatly between states.

- Eastern regions are predicted to be highly impacted by increased temperatures, resulting in **relatively fewer grains and shorter grain filling\* durations.**
- **Odisha** for example, has been particularly **prone to natural disasters in the past**, and will likely continue to be impacted going forward (Indian Meteorological Department):
  - From 1901 to 1981, the state experienced 380 cyclones.
  - Between 1963 and 1999, Odisha experienced 13 major disasters, claiming 22,228 lives and rendering 34,21,000 people homeless.
  - The drought in 2009 was one of the worst in Indian history, displacing thousands of people.
  - In 2019, the cyclone Fani disrupted life in several districts in the state.
  - With rising sea levels, saltier inland water, and rising temperatures, these climatic shocks are expected to increase in the future.

\* Grain filling - due to high temperatures, grains are not fully developed - maybe half filled

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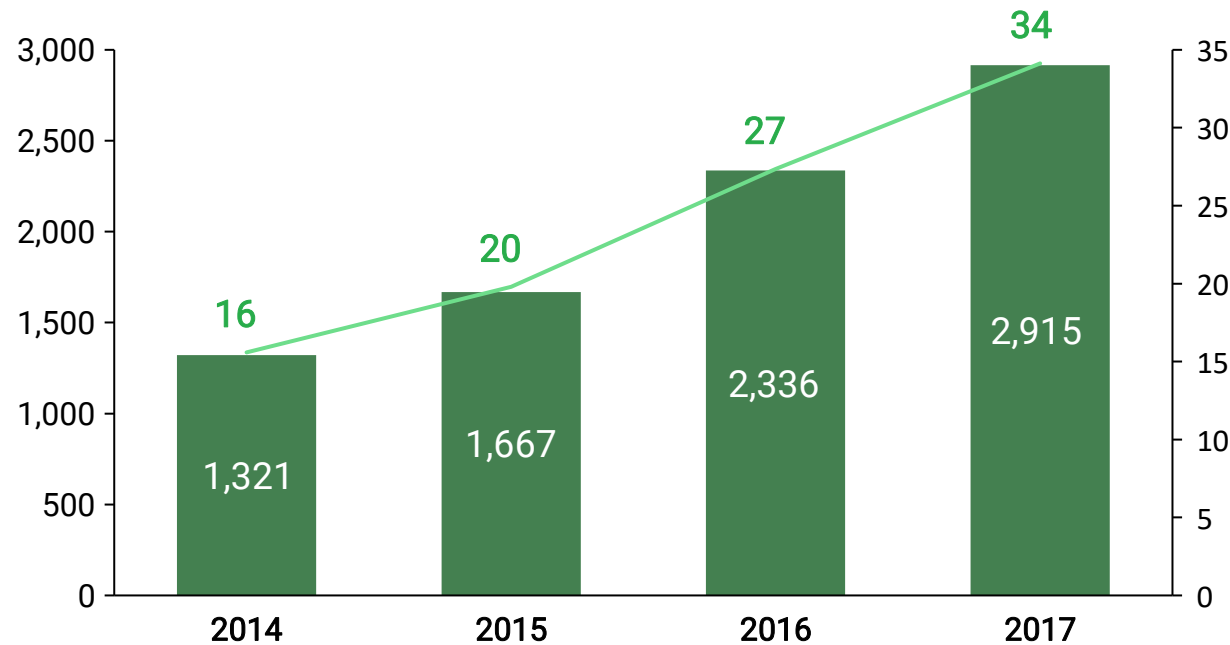
## Increasing trends towards gender inclusion.

05

### Coverage and expansion of National Rural Livelihoods Mission (NRLM)

2014 - 2017

■ Number of Self-help Groups (in 000s)  
— Number of Households (in million)



Village Organisations (Doubling Farmers' Income, 2019)	2014	2015	2016	2017
	61.6K	78.6K	114.3K	148.6K

### Role of women in agriculture

- 61% of women workers in rural India are engaged in crop-based agriculture and 11% are involved in allied agricultural activities (PLFS 2020).
- In contrast to their participation, women only own 13.9% of land holdings, excluding them from various development schemes of the government and limiting their access to institutional credit.

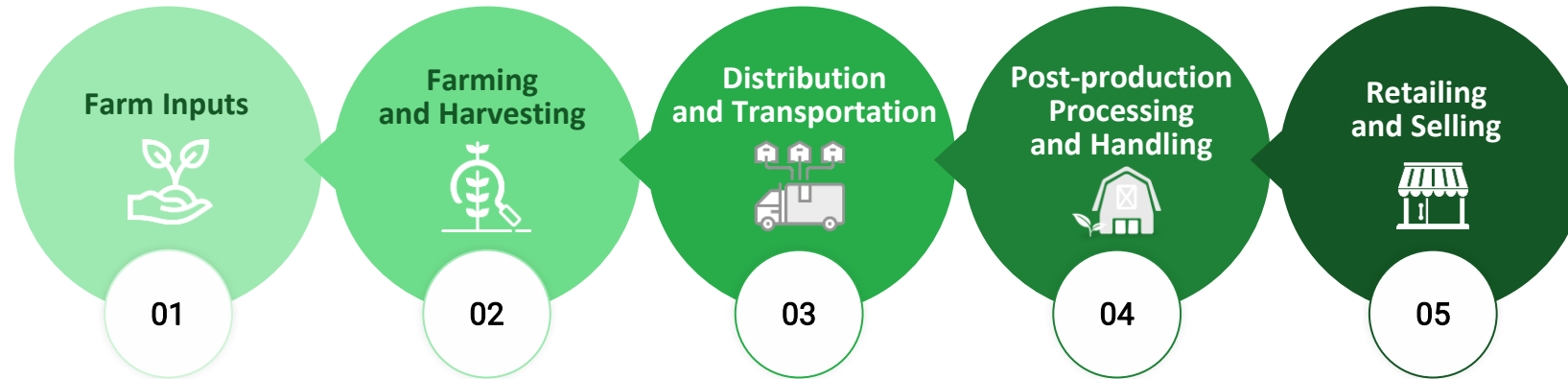
### Women-led collectives in agriculture

- Mahila Kisan Sashaktikaran Pariyojana (MKSP) implemented by the Ministry of Rural Development (MoRD) focuses on creating agriculture-based livelihoods for rural women.
- Lack of gender-segregated data on FPOs. Only 3% of women-run FPCs among the 7,374 formed in India till 2019.
- Early sign of success with women-led FPCs in Bihar (JEEViKA) through better technical assistance.
- Need for targeted approach on women-led FPOs and promotion of women-entrepreneurs.

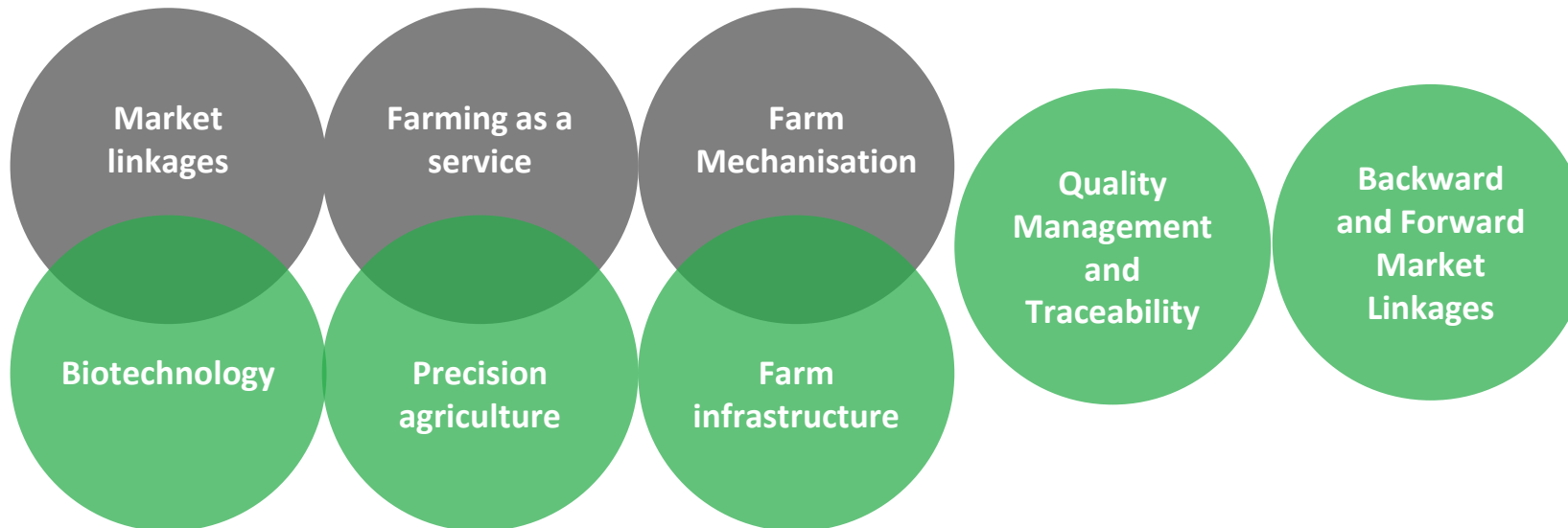
## Increasing role of technology.

06

Value Chain



Sectors



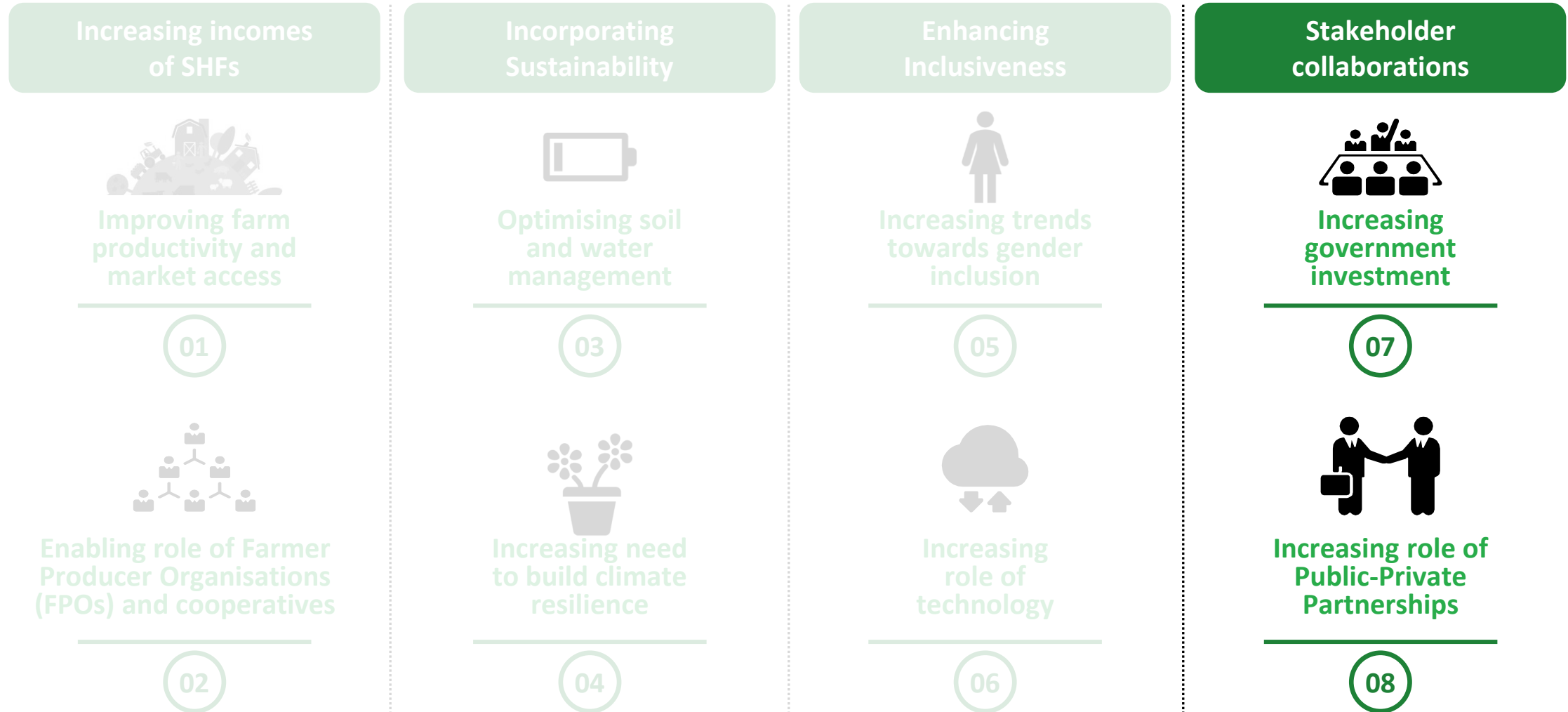
### Sectors that support broader agri-tech ecosystem

- Financial services, loans, credit facilities for input procurement, equipment and more
- Insurance or reinsurance of crop.

Information platforms-  
online platforms for agronomic, pricing, and market information.



Looking ahead, there are **eight key themes** that will shape the Indian agricultural sector.





## Increasing government investment.

07

Agricultural spending is growing at ~6%, with a focus on integrated value chain development with attention on post-harvest management

### Proportion of Public Sector Expenditure in Agri and Allied Sectors

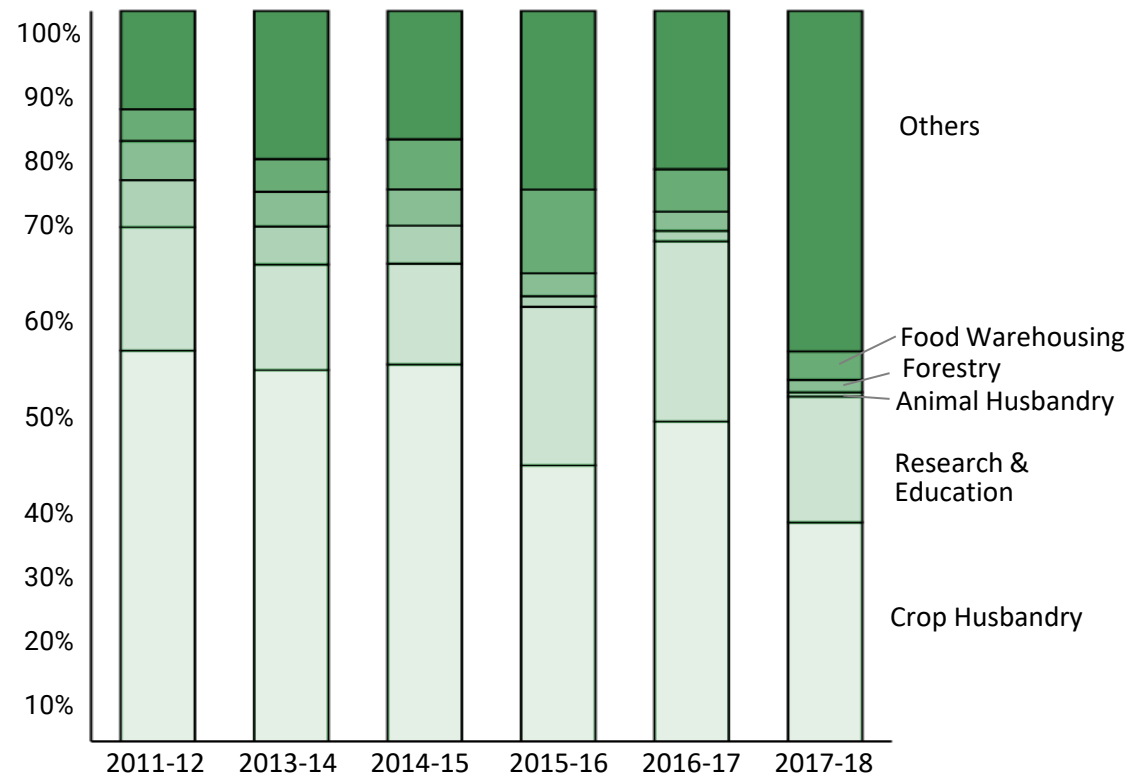


Image Source: Agriculture Statistics At A Glance 2017

Data Source: Production Linked Incentive Scheme for Food Processing Industry, 2022

Note: Crop husbandry includes funding for Rashtriya Krishi Vikas Yojana (RKVY) and extension (including promotion of seeds, fertilisers, farm mechanisation etc.)

- The Government has a clear focus on the **food processing** industry to reduce wastage of agricultural produce and minimise post-harvest losses.
- **Production Linked Incentive Scheme for Food Processing Industry (PLISFI)**
  - Supports creation of global food manufacturing champions and Indian brands of food products in the international markets with an outlay of INR 10900 crore from 2021-22 to 2026-27.

#### Pradhan Mantri Kisan Sampada Yojana

1. Creation of infrastructure for Agro Processing Clusters (APC Scheme).
2. Creation and Expansion of Food Processing & Preservation Capacities (CEFPPC/Unit Scheme).
3. Integrated infrastructure for cold chain and value addition.
4. Setting up and upgradation of food testing laboratories.

## Increasing the role of **Public-Private Partnerships (PPPs)**.

08

### The Government is actively promoting PPPs in farm advisory and post-harvest management

- The Government is **explicitly calling for public-private participation**, not only in technology development but also agricultural farm advisory.
- It is facilitating investment in **storage, post-harvest facilities, and contract farming**.
- It is **unlocking potential to bring synergies** in knowledge, experience and finances for **triggering greater competitiveness in agribusiness**.
- The World Economic Forum, and **The Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ)** can create localised models for implementation of PPPs at a national level through a country-wide platform (WEF Blogs).

### Some states have independently pursued new PPP frameworks

- In April 2012, the Maharashtra Government initiated the **PPP for Integrated Agriculture Development (PPP-IAD)** under the World Economic Forum's **New Vision for Agriculture** initiative.
  - Grew to include 33 value chain projects with more than 60 participating companies.
  - Within three years, the programme scaled up to 500 thousand farmers and improved incomes by 10-30 per cent (Doubling Farmers' Income Volume IV 2019).
- In **December 2015**, the Karnataka Government launched a **Public-Private Partnership for Integrated Horticulture Development (PPPIHD)** to improve horticultural value chains through **technology interventions and marketing solutions**.
- Other states such as **Telangana, West Bengal, Madhya Pradesh, Meghalaya and Tamil Nadu** are evincing **interest in this PPP model** to strengthen collaboration and investment in value chains.

"...With agriculture being a state priority in India, a more concerted emphasis is warranted to engage the private sector in agriculture through PPPs."

- **WORLD BANK**



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