



JULY
2023 EDITION



ANALYSIS REPORT
ON
**Sustainable Agriculture in
India**

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Overview

India is accelerating its quest to become a developed economy by 2047 where the agriculture sector will provide the necessary fuel to this growth engine. Being one of the largest sectors of the Indian economy, **this provides food security to more than 1.4 billion Indian population** along with supporting agricultural export across the globe.

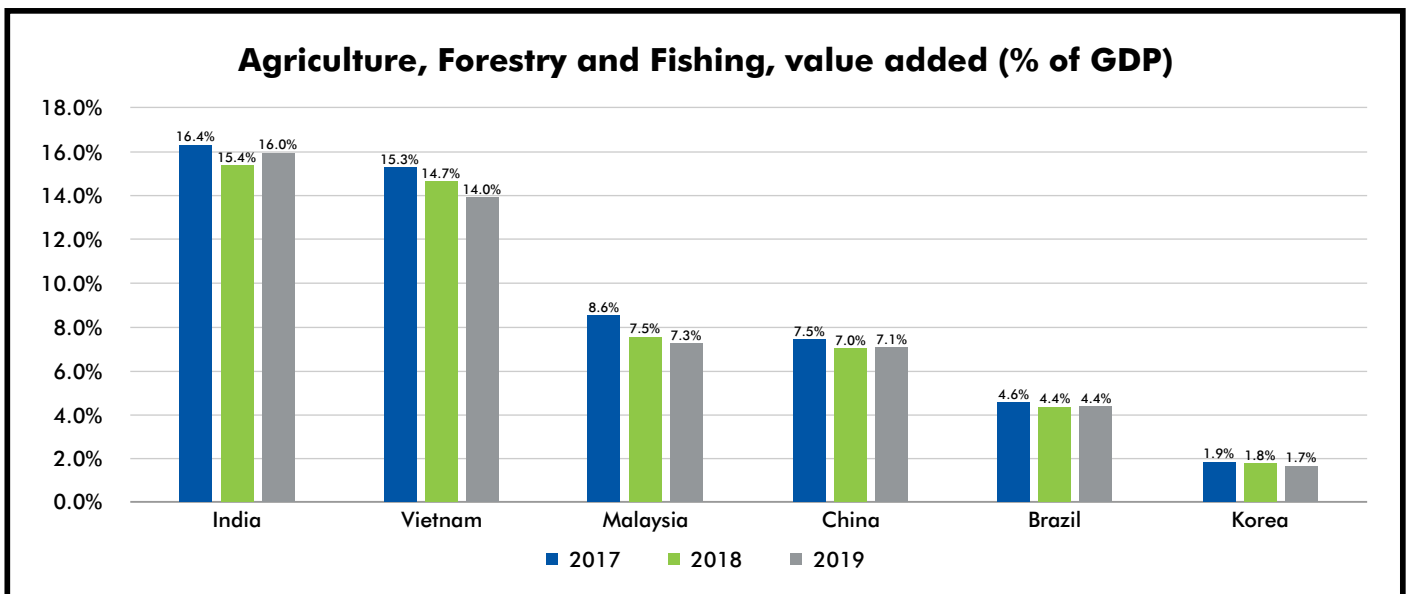
Yearwise Share of GVA of Agriculture and Allied Sector in India

Year	Share of GVA of agriculture and allied sectors in total economy (%) at current prices	Growth of GVA of agriculture and allied sectors (%) (at 2011-12 prices)
2020-21	20.3	4.1
2021-22	19.0	3.5
2022-23	18.3	3.3

Source: <https://www.pib.gov.in/PressReleasePage.aspx?PRID=1909213>


With the implementation of the National Mission on Sustainable Agriculture (NMSA) and supporting governmental policies and technological intervention, India is performing better than its peer economies over the year. This has proved the strength of India's traditional agriculture system and its continuous adoption of sustainable practices to produce better results in domestic food grain production as well as export.

Year wise Comparative Analysis of Indian Agriculture and Allied Sector with Peer Countries



Source: https://www.undp.org/sites/g/files/zskgke326/files/2022-08/India%20SDG%20Investor%20Map%20Report_Final%20%28Compressed%29_0.pdf

To counter the climate change scenario in agriculture and the allied sector, India is set to work on various dimensions of sustainable agriculture that can contribute to the conservation of critical habitats, biodiversity, and the environment together.



**Dimensions
of Sustainable
Agriculture**

- ★ Improved Crop Seeds, Livestock & Fish Culture
- ★ Water Use Efficiency
- ★ Improved Farm Practices
- ★ Pest Management
- ★ Soil Nutrient Management
- ★ Biodiversity Protection
- ★ Credit Support
- ★ Market Access
- ★ Technology Support
- ★ Access to Information
- ★ Energy Efficiency
- ★ Climate Change Resilience
- ★ Promotion to Circular Economy
- ★ Capacity Building

In this regard, the Sikkim model has made perseverance towards maintaining ecological balance through the promotion of organic farming and credited major investment in sustainable agriculture and other such industries and crafts to grow its economy. Thus, the Ministry of Agriculture and Family Welfare is also promoting the model **to adopt sustainable agriculture practices through various schemes and initiatives such as 'Har Medh Par Ped', and 'Per Drop More Crop', etc.** This all helps to achieve the goals of increasing farmers' income along with the nutrition security of its current population and coming generations at the ground level.

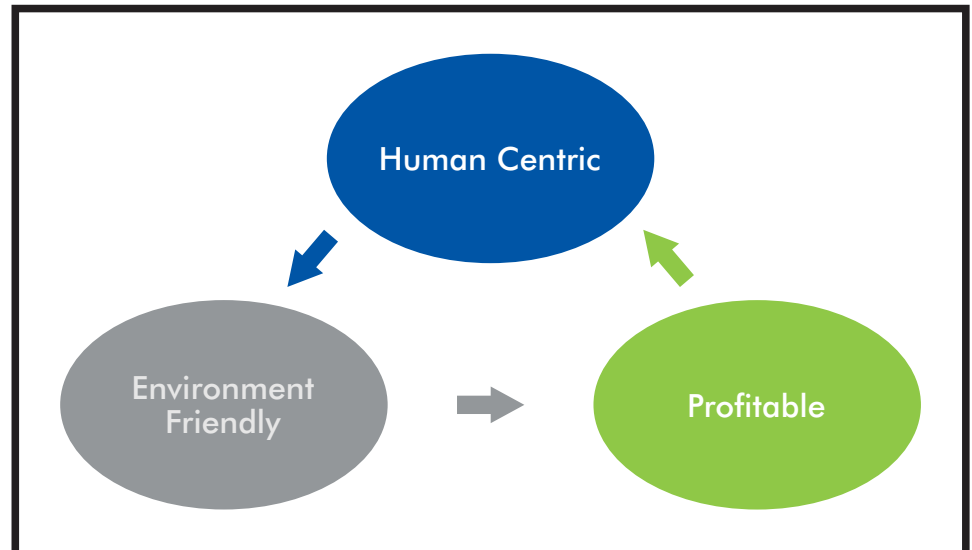


Principles of Sustainable Agriculture and NMSA

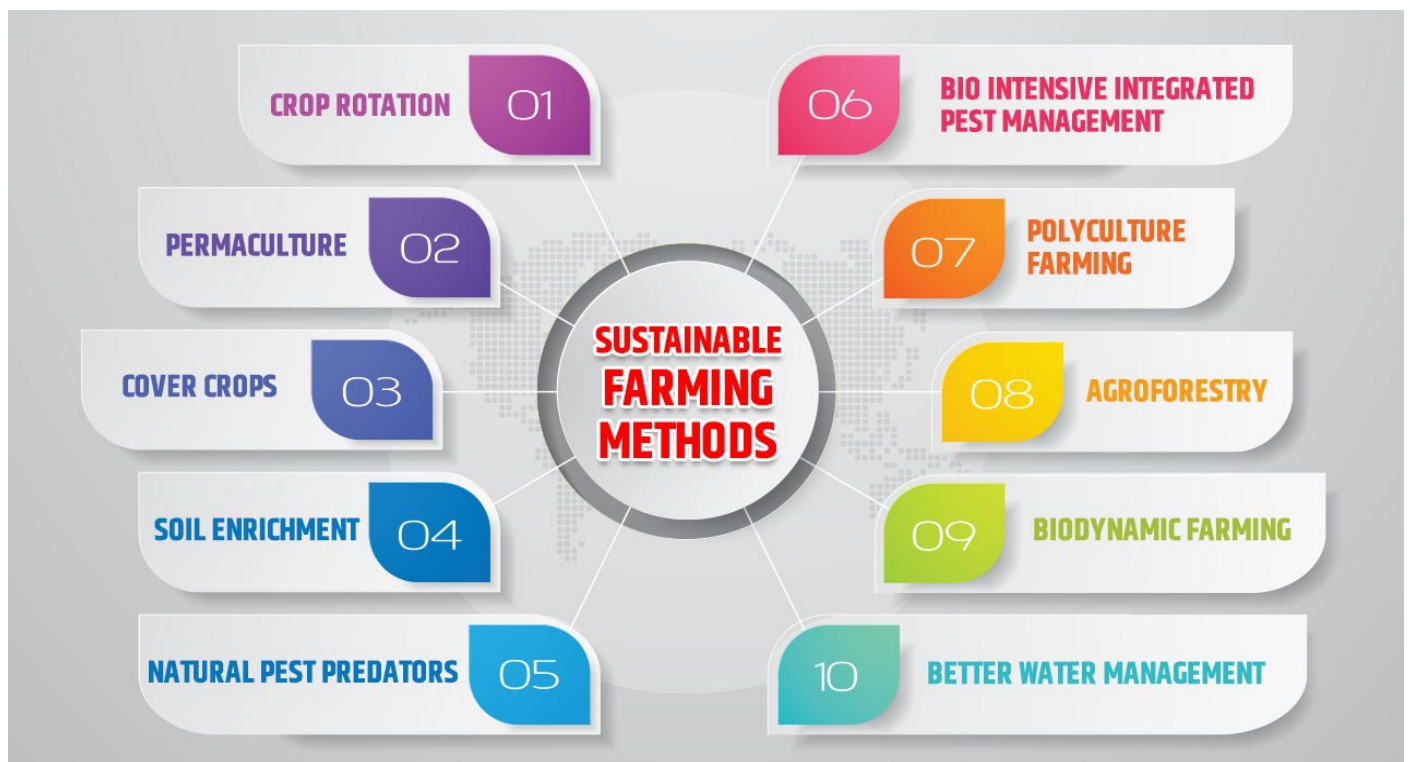
Sustainable Agriculture is an integrated system of farming where the conservation of the environment is on the central stage while expanding the optimal use of natural resources to satisfy people's needs through the implementation of economically viable solutions at the farm level. It serves the purpose of holistic development that must be profitable to all stakeholders equitably.

To effectively increase agricultural productivity and keep natural resources such as soil and water availability intact, Indian farmers are adopting various types of sustainable farming methods to support agriculture in India which is predominantly rainfed. Some of the basic practices followed by Indian farmers as part of traditional agriculture practices are crop rotation, agro-forestry, etc.

Principles of Sustainable Agriculture



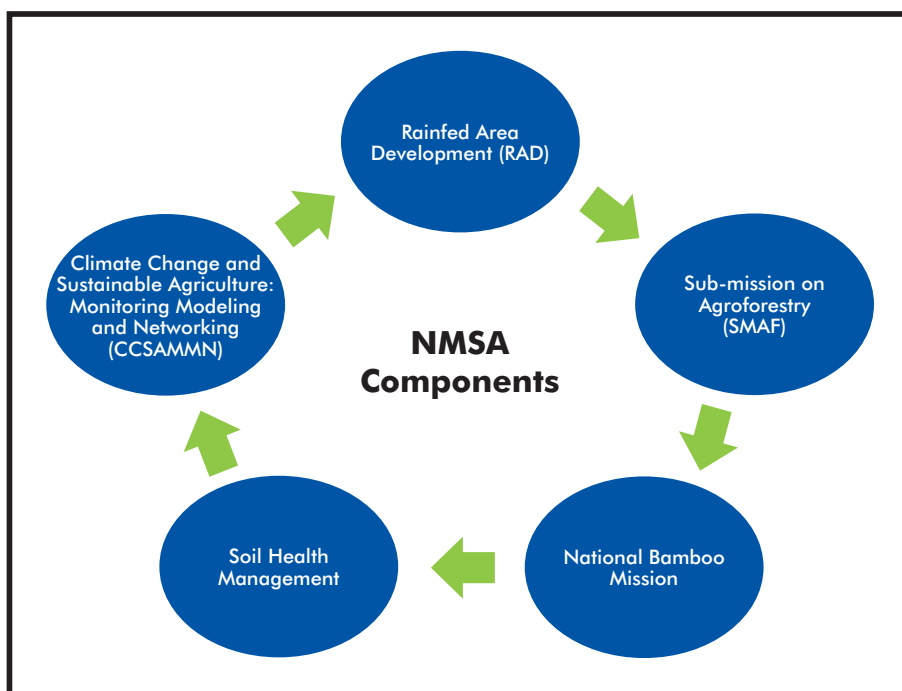
Sustainable Agriculture Methods



Source: <https://tractorguru.in/blog/sustainable-agriculture-in-india-types-benefits/>

Thus, to make **Indian agriculture more productive, sustainable, remunerative as well as climate resilient, the Government of India launched NMSA in 2014-15** as one of the eight missions under the National Action Plan on Climate Change (NAPCC). Its objective is to attain various commitments made by India on global platforms such as food security, end hunger, net zero emission, etc.

The performance of various components of NMSA is testimony to India's progress towards achieving sustainability in India's traditional system of agriculture. The RAD is working towards the development and conservation of the farm's natural resources. This also enables the development of agriculture as the combination of crop, fisheries, livestock management, and forestry to increase the revenue generation of Indian farmers by keeping the soil's nutrient levels intact.



Yearwise Performance under RAD Scheme

Year	Coverage under Integrated Farming System (In Hectare)		Expenditure (in Crore INR)	
	Target	Achieved	Target	Achieved
2015-16	42,380.6	35,543.1	152.2	123.5
2016-17	55,833.5	40,961.5	200.8	147
2017-18	72,518.3	50,075.8	270.1	180.2
2018-19	99,346.5	69,988.8	281.1	183.4
2019-20	50,114.6	45,270.5	191.1	66.6

Under SMAF, the government has enabled the availability of quality plant materials, and seeds to achieve quantifiable benefits in terms of an increase in tree cover to lower GHG emission levels. This will also promote improved livelihood opportunities for the rural population and the growth of sustainable agriculture through capacity building.

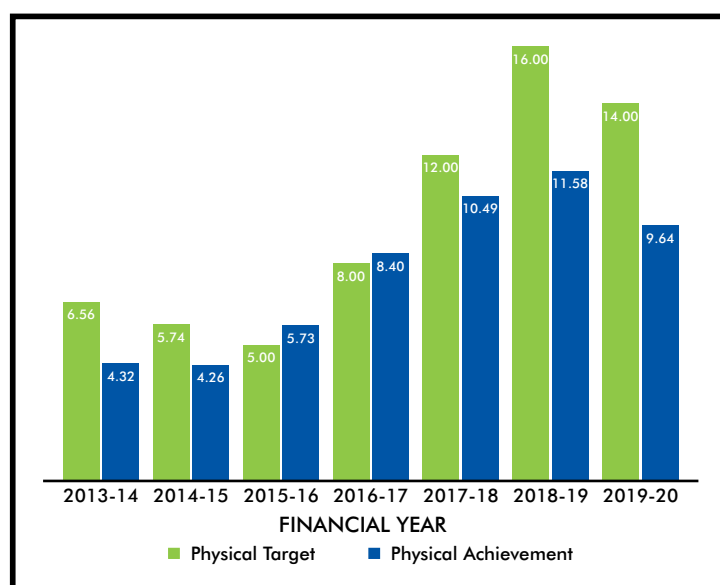
Yearwise Performance of Tree Plantation under SMAF

Year	Area Covered (Hectare)	Trees Planted
2016-17	373	4,63,159
2017-18	2,273	34,73,699
2018-19	2,819	19,37,075
2019-20	774	2,60,056

As changing climate is bringing a major threat to agricultural productivity, the Government of India through the micro irrigation scheme is working towards increasing the water use efficiency of Indian farmlands. Technological interventions such as drip & sprinkler methods are primarily promoting water conservation on Indian farms. **The initiatives like 'Per Drop More Crop' has also targeted to achieve on-farm water conservation** across the country.



Year wise Performance under Micro-irrigation Scheme



Source: https://sprf.in/wp-content/uploads/2021/02/05.06.2020_Indian-Agriculture_-_Policies-for-Sustainable-Transformation.pdf

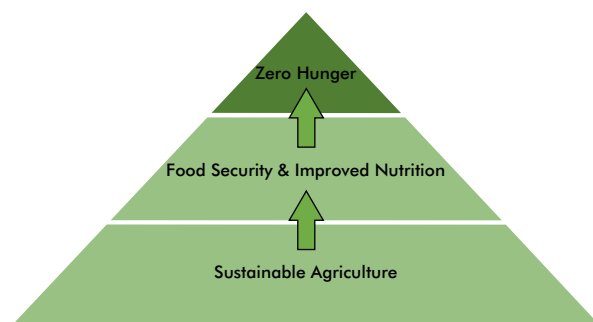
Through the effective accomplishment of these key deliverables, sustainable agriculture in India is providing economic and energy stability along with generating parallel sources of income for Indian farmers. Besides this, the sustainable practices adopted by these farmers are discouraging chemical pesticides and fertilizers while promoting crop rotation to keep the nutritional power of soil intact. As in changing climatic conditions, this is paramount to achieving food security for such a large population in the time to come.

Growth Drivers and Potential Challenges

India is leading the global agriculture landscape by securing the first position as a producer of milk, spices, and pulses along with the largest cultivating area under wheat, rice, and cotton crops in the world. **India's total cultivated area is around 195 mha out of which more than 60% is rainfed.** Thus, India has set its eyes on the climate change action plan while achieving the SDG targets which are closely knitted with agriculture and allied sector performance by adopting sustainability in farm practices.



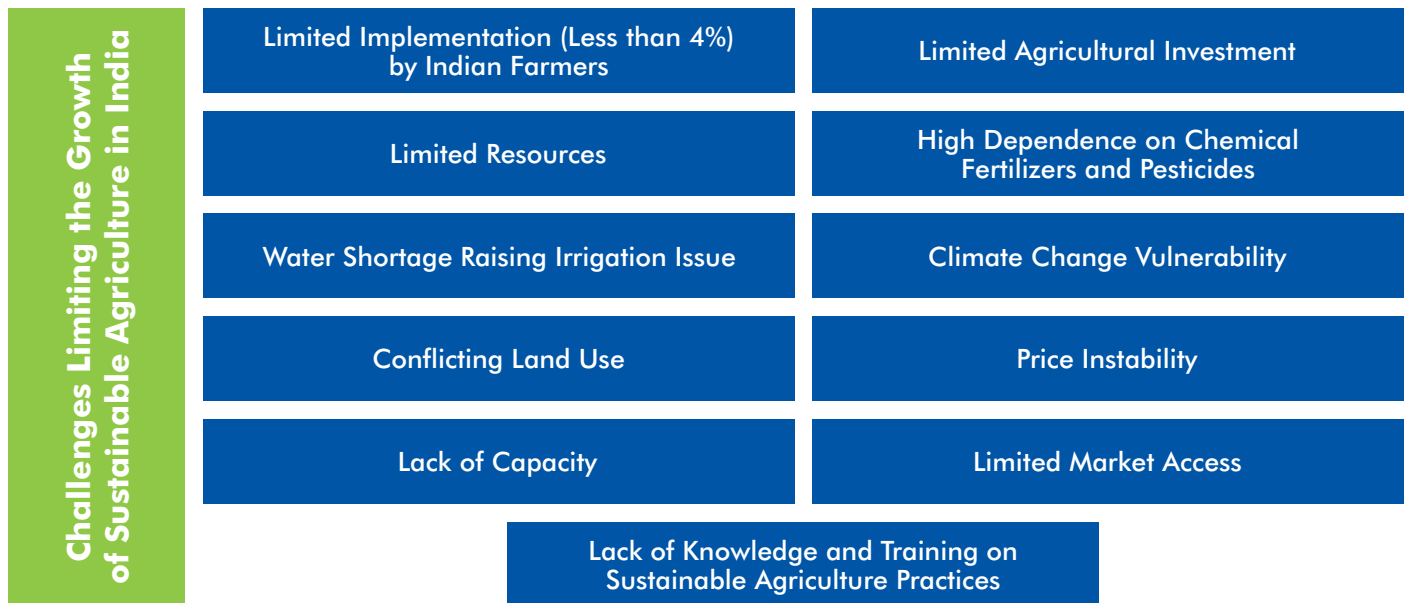
Sustainable Agriculture to Achieve SDG Targets



India is working towards Atmanirbharta and the agriculture sector played the epicentre of the Indian economy's growth in this direction. The government's continuous support towards uplifting, and empowering the farmers while providing financial stability to them, has a lot of potential hidden for future growth of this leading primary sector of the Indian economy.

The diverse socio-economic landscape along with the lower rural literacy rate brings a major setback to the sustainability efforts in the Indian agriculture system. With a maximum cultivating area as rainfed and poor infrastructure support, is posing challenges to the overall supply chain that impacts forward and backward linkages.





Thus, it is imperative to understand the future potential and importance of sustainable agriculture in the food security aspect. The progressively declining share of agriculture in the Indian economy due to rapid industrialization and urbanization should be addressed on priority. **Sikkim's model of Sustainable Development** can work as a live example to convey the enormous benefits of sustainable agriculture for Indian farmers, farmland, and the environment as a whole.



How You Can Tap The AG Group Expertise

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Technology 4.0 Empowering Sustainable Agriculture Landscape of India

India is looking forward to witnessing Agriculture 4.0 with the active involvement of digital farming techniques and incorporation of technology 4.0 like Artificial Intelligence, Machine Learning, Data Analytics, Drones, and Robotics to revolutionize the traditional Indian agriculture space. The rising innovation ecosystem has brought many growth opportunities for farmers to take advantage of technology for their benefit. **As per the report of WWF India, through innovative interventions in repulsing 86% of animals, a 60% surge in crop production has been recorded** where agri-tech startups have played a major role.

Impact of Technological Intervention on Foodgrain Production (in Million tonnes)

Year	2017-18	2018-19	2019-20	2020-21	2021-22
Production of food grains	285.01	285.21	297.50	310.74	315.72

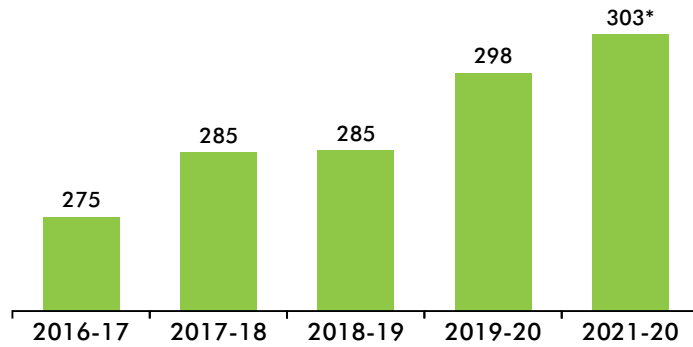
Source: <https://pib.gov.in/PressReleaselframePage.aspx?PRID=1884236>



The Government through various schemes and initiatives such as **AGNii Mission and National e-Governance Plan in Agriculture (NeGP-A)** is readily engaging the **startup and innovation ecosystem** of the country to increase crop yield and agricultural productivity sustainably. As per the NITI Aayog report, **AI in the Indian agriculture sector is predicted to grow with 22.5% CAGR by 2025 and become US\$ 2.6Bn worth** enabling better crops, resource-efficient farming, and improved overall farm productivity.

India's Food Grains Production

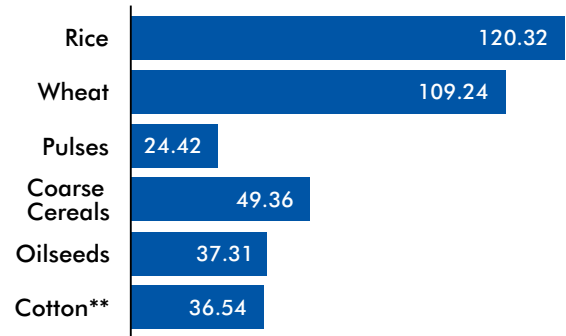
(Million tonne)



*Second advance estimate

Crop Output

Crop year (Crop year, July-June)
(2020-21, million tonne)



**In million bales of 170kg each

Source: <https://www.investindia.gov.in/team-india-blogs/digitalisation-agriculture-india>

As per the Economic Survey 2022-23, more than 1000 agri-tech startups have helped the Indian agriculture sector to grow by 4.6% in the last six years. The continuous upgrade in agricultural infrastructure is playing the catalyst with increasing opportunities for livelihood and business in the agriculture and rural sector. To address the rising challenge of food security, the digitalization of Indian agriculture will play a pivotal role and empower Indian farmers to leverage the potential association of technology to improve sustainability.



Sustainable Agriculture and Climate Change Scenario

Climate change is impacting the world economy at an unprecedented speed. The Indian agriculture sector is also going to experience a great impact by changing climate conditions as the maximum cultivated area is rainfed. **As per the Government of India Climate Assessment Studies, the expected reduction in rice and wheat yield is 20% and 19.3% in 2050 respectively.** The global climate change scenario is leading to continuous warming of the earth and within 50 years, the expected changes in rising temperature, and sea levels, are going to impact the agricultural landscape beyond imagination. It will significantly alter crop productivity, soil nutrient levels, livestock, and pest management.



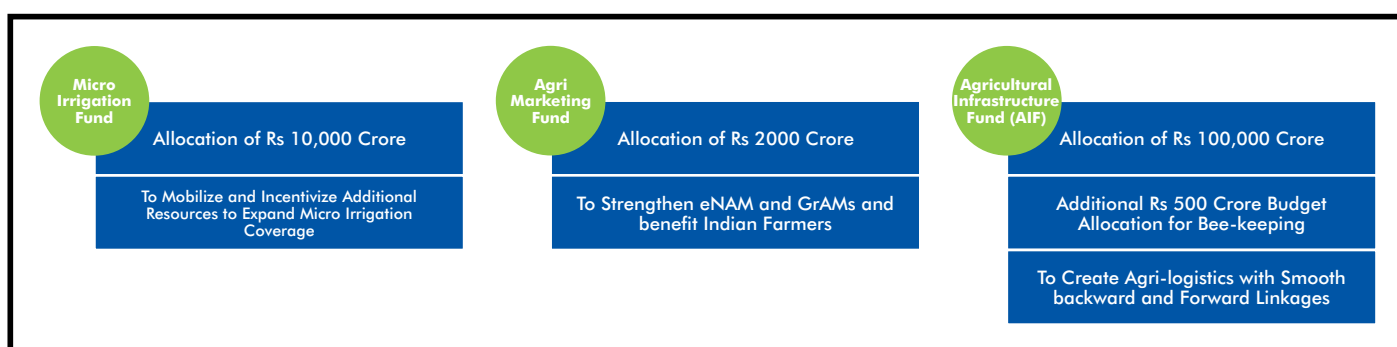
Source: <https://agriinvest.dac.gov.in/>

Thus, adopting sustainable practices in the sector can help in limiting the detrimental effects of climate change on India's food security. The promotion of environmental conservation along with protecting human health from pathogens, toxins, and chemical fertilizers by incorporating livestock waste as part of sustainable farming methods can address the soil health issue as a priority. The CCSAMMN under NMSA is also mandated to raise awareness and knowledge among farmers to adopt climate-smart practices such as sustainable agriculture to better adjust to changing agro-climatic conditions for improved crop yields, higher farmer income, and higher production of climate-resilient crops such as millets in the years to come.

Investment Landscape

The increasing budget allocation under **Union Budget 2023-24 towards green agriculture through policy support such as National Mission on Natural Farming (NMNF)** has mandated to bring behavioural change in Indian farmers to shift focus towards sustainable agricultural inputs such as cow-based fertilizers in place of chemical ones. Besides various national missions to promote sustainability in Indian agricultural practices, the Government of India has also set up various funds to develop the sector in an integrated form.

Various Government Funds to Support Sustainable Agriculture in India

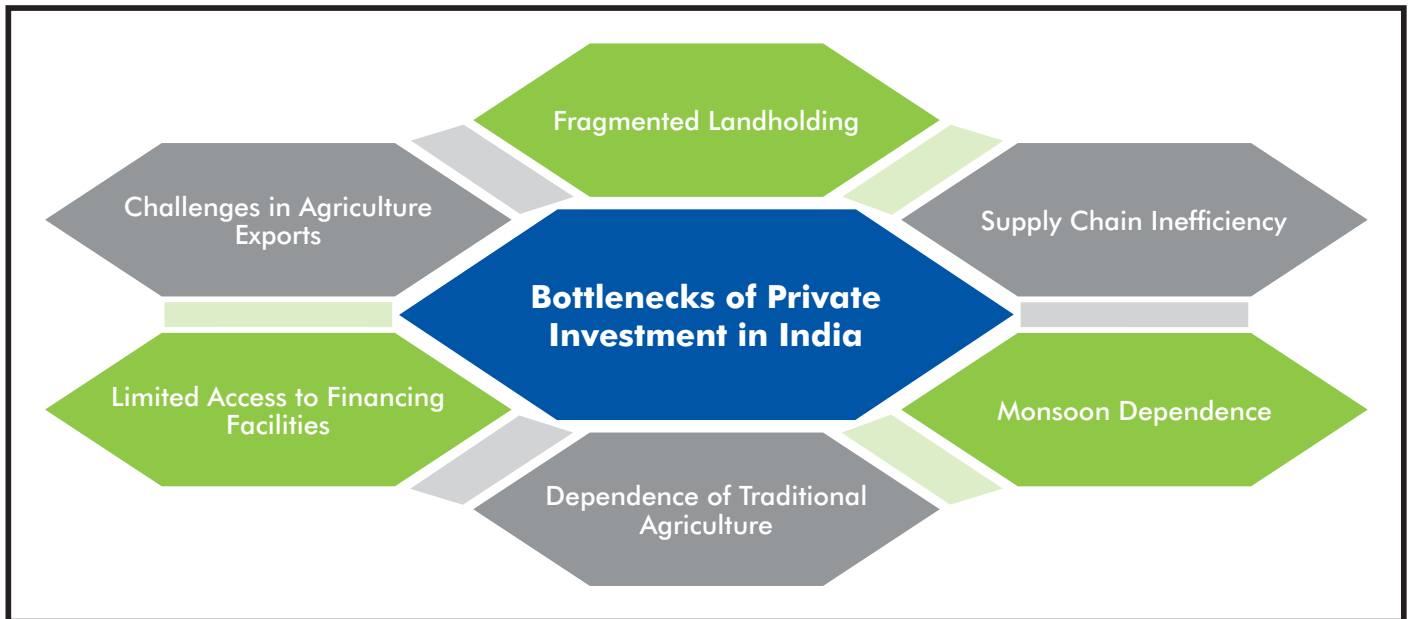


India is one of the leading producers of food grains across the globe but in the changing climatic conditions, it is important to pour in additional investment in the sector and promote sustainable practices among farmers through continuous landholding, training, and awareness workshops. **As per the estimations for 2018-19, the average monthly income of an agricultural household in India has been recorded as Rs 10,218/-** through which integrating sustainable practices at the farm level is a big challenge. To bridge this gap, **the Ministry of Agriculture & Farmer's Welfare through its investment portal 'Agri Invest'**, finds industry partners and private investors who are committed to building a sustainable future for Indian agriculture.

Objectives of Agri Invest

- 01 Hand holding the Investors to Ease Investment in Agriculture Sector
- 02 Tap the Investment Potential of Sub-sectors of Agriculture
- 03 To Guide and Assist Investors in Major Infrastructures
- 04 Support Investors to Leverage Government Schemes, Policies, and Incentives

But to infuse large amounts of private capital in the sector has **been challenged by limited infrastructure support, lack of education and skills among farmers, small land holdings, and long gestation periods** of such projects. The changing climate conditions and unpredictable crop production because of the primary dependence on monsoons for irrigation purposes can discourage private investment and limit the growth of sustainable agriculture in India.



Despite the challenges, **the rising agricultural exports, improvement in access to rural credit, and supporting government policy framework** are opening new avenues of investment in the sector to grow further and ensure food security for the people of India.



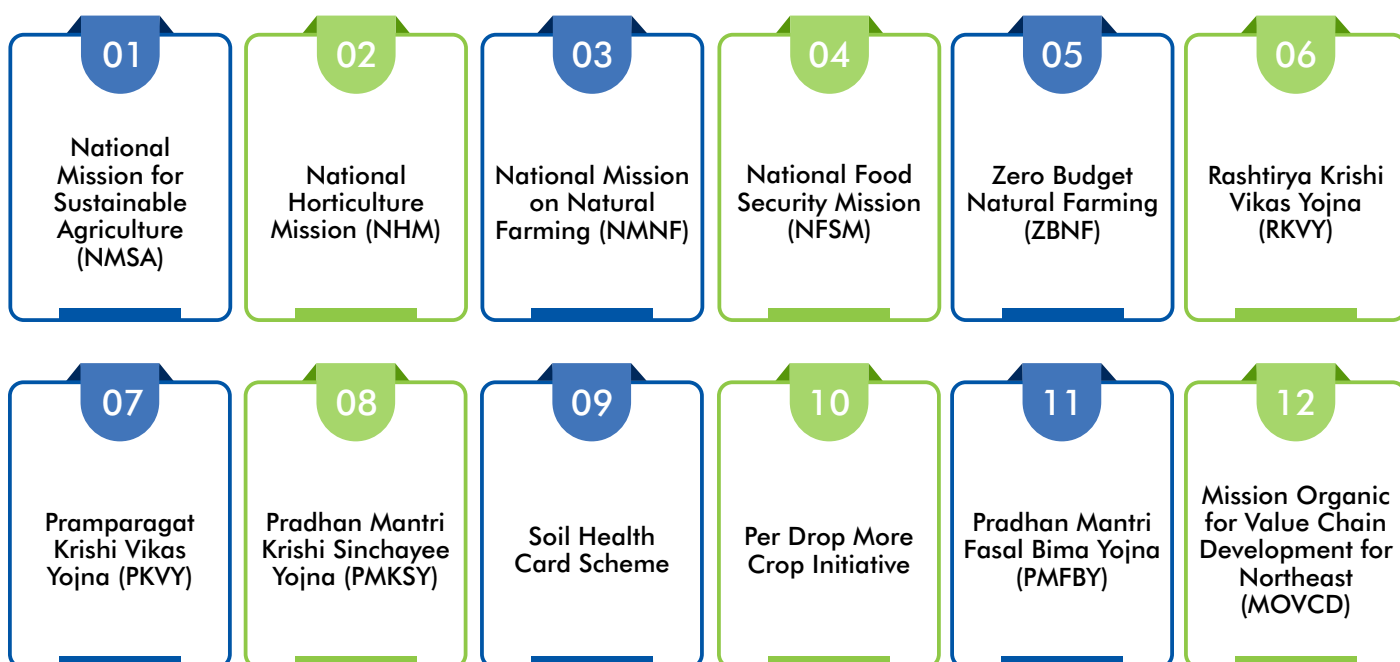
How AG Group Can be a Help

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Government Initiatives Encouraging Sustainability in Agriculture

The Government of India is promoting sustainable agriculture through various initiatives that work on **multiple dimensions such as improved crop seeds, livelihood diversification by enlarging the landscape of crop rotation, water use efficiency, and soil health managements part of NMSA**. With increasing budgetary allocation, the government is promoting resource utilization in an integrated manner through the adoption of technologies using drones, artificial intelligence, etc

Major Government Initiatives to Promote Sustainability in Agriculture



The government is promoting Farmer Producer Organizations (FPOs), to enable smooth supply chain linkages along with the creation of various funds such as the Micro Irrigation Fund, and Agricultural Infrastructure Fund to support sustainable agriculture. **The 2023-24 Union Budget with a total allocation of rs 1,25,036 crore** has kept a close eye on farmers' welfare and managing agricultural inputs while promoting Agriculture research and education to find new avenues to counter climate change scenario sustainably. **It was a sharp 5% rise on the revised budget estimates for 2022-23.**



Yearwise Budget Allocation to the Ministry of Agriculture and Farmers' Welfare (in Rs Crore)

	21-22 Actuals	RE 22-23	BE 23-24	% Change (RE to BE)
Farmers' Welfare	1,14,468	1,10,255	1,15,532	5%
Agriculture Research	8,368	8,659	9,504	10%
Ministry	1,22,836	1,18,913	1,25,036	5%

Source: <https://prsindia.org/budgets/parliament/demand-for-grants-2023-24-analysis-agriculture-and-farmers-welfare>

These integrated efforts have resulted in **the achievement of the historic target of US\$ 50 billion in the financial year 2021-22 in various categories such as rice, wheat, sugar, meat, etc.** The constant encouragement to use innovation and technology for farmer welfare and increase agricultural productivity has also brought transparency and made agriculture a more profitable business for the stakeholders especially small farmers in the last few years.

Way Ahead

Currently, the Indian agriculture sector is experiencing a revolutionary transformation with a sharp rise of innovative solutions and the involvement of technology to make it sustainable and resource-efficient. These changing farm practices with a sharp interest in increasing millet production are in line with the changing climate scenario. These are also limiting the impacts on ecology and biodiversity through the promotion of various sustainable farm practices to increase agricultural production and environment conservation.

Various demand and supply-side interventions through government policies will bring new avenues of growth in the sector while keeping a check on food security, food inflation, and price volatility. The long-term adoption of sustainable farm practices and knowledge sharing by industry and academia to enrich R&D in the agricultural sector will bring a brighter future for India with prosperity to farmers, and conservation of the environment through integrated livestock management at the farm level.

MODERN AGRICULTURE ALTERNATIVES



SUSTAINABLE FARMING METHODS

Eminent's Insight

India will enable farmers to respond to current and future crises by improving their access to inputs, technology and markets. India is committed to further the economic well-being of its farmers by organizing small and marginal farmers into groups, promoting agri-startups and investments in agricultural infrastructure, launching the world's largest crop insurance programme and conducting various activities like facilitating digitization of agriculture. The Innovation in Adaptive Agriculture Project has been launched at the national level, with an aim to develop climate-smart farming practices. India is playing an important role in agricultural trade today. There was a time when India was an importer of food grains, but now under the leadership of Prime Minister Shri Modi, agriculture sector has been turned sustainable.

Shri Narendra Singh Tomar
Union Minister of Agriculture and Farmers Welfare
Government of India

Resources

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Aviation	IT & Telecom	Irrigation	Tourism	SDG
Ropeway	Power & Renewable Energy	Agriculture	Education	Carbon Credit
Electric Vehicle	Infrastructure: Highway/Tunnels	Animal Husbandry	Healthcare	Climate Change
Traffic Management		Horticulture & Forestry		

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