₹80/-

FEBRUARY 2025

AGRICULTURE TODAY

The National Agriculture Magazine

VOLUME XXVIII | ISSUE 2 www.agriculturetoday.in

AGRICULTURE AS THE 1ST ENGINE

UNION BUDGET

The World BioProtection Forum
Innovation through collaboration

AGRICULTURE TODAY GROUP

IACG
International Agriculture Consulting FZ-LLC, Dubai

WORLD BIOAG Innovation Forum 2025

10 - 12 APRIL 2025 | DUBAI, UAE

BioAg World Expo 2025, Dubai

BioStimulants | BioFertilizers | BioPesticides | BioLogicals | BioControl

Save your dates , Scan for details

Policy | Regulation | Technology | Innovation | Business | Investment

FOR MORE DETAILS, PLEASE CONTACT :

Mr. Haris Khan | +91 - 9582871463, +971505163745 | ceo@agritodaygroup.com

Dr. Aakanksha Upadhyay | +91-7290031468 | aakanksha.upadhyay@agritodaygroup.com

www.worldbioag.agritodaygroup.com

Publisher & Printer – Dr. MJ Khan on behalf of M/s Concept Agrotech Consultants Limited, Published from 306 Rohit house Tolstoy Road New Delhi-110001 and printed by Everest Press E-49/8, Okhla Industrial Area-II New Delhi-110020
Phone No. 011-23731129 Fax No.011- 23731130
E-mail: editor@agriculturetoday.in
info@agriculturetoday.in

www.agriculturetoday.in
Page in the magazine: 60

BOOSTING AGRICULTURE AND RURAL DEVELOPMENT

The Union Budget 2025 extols Agriculture as the first Engine of development. Rightly addressed so, as 'Agriculture and Allied Activities' sector has long been the backbone of the Indian economy, playing a vital role in national income and employment. The sector contributes approximately 16 per cent of the country's GDP for FY24 at current prices and supports about 46.1 per cent of the population.

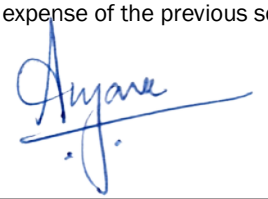
Motivated by the success of the Aspirational Districts Programme, the FM announced 'Prime Minister Dhan-Dhaanya Krishi Yojana' , which aims for a holistic development of 100 districts that are farthest on the scale of agriculture development. Also the 6-year "Mission for Aatmanirbharta in Pulses" with special focus on Tur, Urad and Masoor, is a much needed intervention considering our inability to bridge the gap between the demand and supply.

Any wish to increase productivity should entail a provision of supply of good quality inputs. The National Mission on High Yielding Seeds has addressed this as it is expected to strengthen the research ecosystem with targeted development and propagation of seeds with high yield, pest resistance and climate resilience. Another critical input is agriculture credit and on that front too, the FM has been quite lenient. Kisan Credit Cards (KCC) facilitate short term loans for 7.7 crore farmers, fishermen, and dairy farmers. The loan limit under the Modified Interest Subvention Scheme will be enhanced from Rs. 3 lakh to 5 lakh for loans taken through the KCC. This thoughtful move would indeed strengthen financial inclusivity and increase the flow of organization credit to the farming sector.

This budget has been very specific as it has singled out commodities and sectors, and worked on programmes to specifically benefit them. The Makhana Board to be established in Bihar targets to improve production, processing, value addition, and marketing of makhana. Mission for Cotton Productivity', a 5-year mission, will facilitate significant improvements in productivity and sustainability of cotton farming, and promote extra-long staple cotton varieties. A National Institute of Food Technology, Entrepreneurship and Management in Bihar is also on the cards, which will be providing a strong fillip to food processing activities in the entire Eastern region.

Despite the big announcements, the overall allocation to the Ministry of Agriculture and Farmers' Welfare saw an increase of barely 4 per cent — from Rs 1.32 lakh crore in the last budget to Rs 1.37 lakh crore. Budget has also remained shy on incentives towards climate resilient agriculture and climate smart technologies in agriculture.

Considering the previous years, the budget has introduced many new schemes. I hope it is not at the expense of the previous schemes.



CONTENT

VOLUME XXVIII | ISSUE 02 | FEBRUARY 2025

AGRICULTURE TODAY
The National Agriculture Magazine

AGRICULTURE TODAY GROUP

AGRI NEWS NETWORK

PRINT AND DIGITAL SUBSCRIPTION

SUBSCRIPTION TARIFF

S.No.	ONE YEAR 12 ISSUES	PRINT	DIGITAL
1.	Individual	800	400
2.	Student	500	250
3.	Organisation	1200	600
4.	Institute / Library	1200	600

To Keep Yourself Abreast with the Latest in Agriculture

Subscribe Now

Please call in +91 72900 88228 or Email : editor@agriculturetoday.in

| www.agriculturetoday.in/subscribe-magazine

AGRICULTURAL RESILIENCE AND INNOVATION IN INDIA

PROGRESS REPORT AND FUTURE OUTLOOK

The agricultural sector in India has progressed significantly over the past 75 years, overcoming numerous challenges. From facing food shortages in the 1950s, India has achieved a status of food surplus since 2010. This sector sustains approximately 42% of the population and contributes 18% to the nation's GDP at current prices. Over the past five years, it has maintained a buoyant growth rate of 4.18% annually at constant prices. The allied activities, such as livestock and fisheries, have outperformed traditional crops like cereals, now accounting for 30% and 7% of the Gross Agriculture GVA, respectively. In contrast, the crop sector's contribution to Agriculture GVA in the fiscal year 2022-23 was 55%, down from 62% in 2014-15 (Economic Survey, 2023-24).

Agricultural credit has significantly supported the sector's development, with disbursements reaching Rs. 25.48 lakh crore in 2023-24, surpassing the target of Rs. 20.00 lakh crore.

According to the 1st Advanced Estimates of Gross Domestic Product for 2024-25 (PIB, 7th January, 2025), the Real GDP at Constant Prices is expected to reach Rs. 184.88 lakh crore, growing by 6.4%. The Nominal GDP at Current Prices is likely to hit Rs. 324.11 lakh crore, marking a 9.7% increase. The Real GVA is projected to be Rs. 168.91 lakh crore in 2024-25, with a growth rate of 6.4%, while the Nominal GVA is anticipated to reach Rs. 292.64 lakh crore, increasing by 9.3%. The agriculture and allied sectors' Real GVA is expected to grow by 3.8% in 2024-25, up from 1.4% growth in 2023-24, comprising approximately 18% of the Nominal GVA.

Productivity

India is the second-largest producer of rice, wheat, and cotton, and the largest producer of milk, pulses, and spices. However, the productivity of these crops is considerably lower than other major producers and the global average. For instance, in 2021, the yield of paddy in India was 4,744 kg/ha, compared to the global average of 4,196 kg/ha. The yield for pulses stood at 759 kg/ha, below the global average of 952 kg/ha. Factors contributing to low productivity include small landholdings averaging 1.08 ha, limited irrigation coverage at 52% of the Gross Cropped Area (GCA), slow technology adoption, and poor soil and nutrient management, which collectively hinder GVA.

Agri Credit and Agri GVA

Indian farmers rely heavily on external borrowings for working capital and investments in farm machinery, irrigation, and storage. Agricultural credit has significantly supported the sector's devel-

About the **AUTHOR**

Dr G R Chintala is the Former Chairman, NABARD and Smita Mohanty, General Manager (Retired), NABARD

Table – 1 : Agri GVA vis-à-vis Agri Credit Disbursement - All India (Rs. Lakh Crore)

Year	Constant Prices - 2011-12		Current Prices		Agri Credit Disbursement		Share of Agri Credit in Agri GVA	
	Agri GVA	AGR (%)	Agri GVA	AGR (%)	Amount	AGR (%)	Agri Credit as % of Agri GVA at Constant Prices	Agri Credit as % of Agri GVA at Current Prices
2013-14	16.09		19.26		7.30		45.37	37.90
2014-15	16.06	-0.19	20.94	8.72	8.45	15.75	52.62	40.35
2015-16	16.16	0.62	22.28	6.40	9.15	8.28	56.62	41.07
2016-17	17.26	6.81	25.19	13.06	10.65	16.39	61.70	42.28
2017-18	18.40	6.60	28.30	12.35	11.62	9.11	63.15	41.06
2018-19	18.79	2.12	30.3	7.07	12.57	8.18	66.90	41.49
2019-20	19.94	6.12	33.68	11.16	13.93	10.82	69.86	41.36
2020-21	20.74	4.01	37.05	10.01	15.75	13.07	75.94	42.51
2021-22	21.70	4.63	40.99	10.63	18.63	18.29	85.85	45.45
2022-23	22.72	4.70	44.84	9.39	21.55	15.67	94.85	48.06
2023-24	23.05	1.45	47.25	5.37	25.48	18.24	110.54	53.93
AAGR		**3.69**		**9.42**		**13.38**		

Note : AGR : Annual Growth Rate; AAGR : Average Annual Growth Rate
Source : Agri GVA, NITI Aayog; Agri Credit, NABARD

opment, with disbursements reaching Rs. 25.48 lakh crore in 2023-24, surpassing the target of Rs. 20.00 lakh crore. Over the past decade (2014-15 to 2023-24), growth rates ranged from 8.1% to 18.3%, with an average annual growth rate of 13%. Comparing Agri GVA at Constant Prices (2011-12) with agricultural credit disbursement over the last ten years shows that the average annual growth rate of agricultural credit (13.38%) substantially exceeded the growth rates of Agri GVA at Constant Prices (3.69%) and Current Prices (9.42%). The proportion of agricultural credit as a percentage of Agri GVA has shown a consistent upward trend, with an average share of 71.22% at Constant Prices and 43.22% at Current Prices.

Though agri credit disbursement has exhibited substantial growth, there has been regional imbalance in credit disbursement vis-à-vis their share in Gross Cropped Area (GCA). Southern region with less than 20% share in GCA accounted for around 46% of the agri credit disbursement (2017-18 to 2023-24) whereas Central and (29% of GCA) and Western Region (18% of GCA) accounted for only 14% and 12% of agri credit disbursement, respectively.

The proportion of agricultural credit as a percentage of Agri GVA has shown a consistent upward trend, with an average share of 71.22% at Constant Prices and 43.22% at Current Prices.

Value Addition and Processing

Significant value addition in agriculture through agro and food processing can enhance GVA. This includes transforming raw products into finished goods, providing services such as packaging and labeling, and developing new products from agricultural inputs. A robust agro and food processing sector not only reduces wastage and enhances value addition but also promotes crop diversification, ensures better returns for farmers, increases employment, and boosts export earnings. A national study on post-harvest losses for 54 agricultural products across 292 districts in 15 Agro Climatic Zones conducted by NABARD Consultancy Services Pvt. Ltd (NABCONS) reported losses ranging from 3.89-5.92% for cereals to 6.02-15.05% for fruits (August 2022).

Regular supply of raw materials, increase in demand for food products and incentives offered by the Government has impacted Indian food processing sector in a positive manner. During the last 8 years ending 2022-23, Food Processing sector has been growing at an average annual growth rate of around 5.35% as compared to around 4.46% in Agriculture & allied sector (at 2011-12 prices). Food Processing Sector has also emerged as an important segment of the Indian economy in terms of its contribution to GDP, employment and investment. The sector constituted as much as 7.66% and 8.45% of GVA in Manufacturing and Agriculture sector respectively in 2022-23 (at 2011-12 prices) (Ministry of Food Processing Industries, Govt. of India, Annual Report 2023-24).

According to Study conducted by Deloitte on 'Level of Food Processing in India', processing levels were at 2.7% for vegetables, 4.5% for fruits, 15.4% for fishery, 21.1% for milk, and 34.2% for meat. Food processing industry contributes 32% to food market and is also one of the largest industries in the country, contributing 13% to total exports and 6% of industrial investment (Study to Determine the Level of Food Processing in India, Deloitte, July 2021).

According to the Viksit Bharat@2047 report, India's food processing sector will grow significantly, reaching US$ 1,100 billion by FY35, US$ 1,500 billion by FY40, US$ 1,900 billion by FY45, and US$ 2,150 billion by FY47.

Despite having tremendous potential, food processing sub sector faces a number of challenges in the form of inadequate primary processing and storage facility, seasonal availability of produce resulting in low-capacity utilisation, absence of reasonable quality and safety standards, limited product innovations, etc. Building of sustainable supply chains linking the farmer to the processing and marketing centers, on–farm cooling and grading arrangements

will enable the farmer to obtain a better price from the processors and also add value to his produce.

Agricultural Workers

The Indian labour market is gradually transitioning from low-productivity agricultural jobs to higher-productivity non-agricultural sectors. According to the India Employment Report 2024, a substantial portion of agricultural workers, both regular (74%) and casual (76%), did not receive the minimum wage in 2022 (India Employment Report 2024 - Youth employment, education and skills, International Labour Organization). MNREGA data as of 20 January 2025 shows that out of 14.46 crore job cards issued, 9.33 crore were active, The average wage was Rs. 235.63 per day per person in 2023-24. Only 38% of total expenditures were on Agriculture & Agriculture Allied Works, indicating potential for diversifying the workforce into agro/food processing for better wages.

Infusing new blood

Between 2000 and 2019, there was a significant shift of young workers from agriculture to the industrial and services sectors, with the share of youth in agriculture decreasing by 27% while increasing by 14.2% in the services sector and 12.8% in the industrial sector. The majority of youth workers in agriculture (99.9%) and construction (97.9%) held no-skill or low-skill jobs in 2022. There is a growing need to introduce fresh ideas and young minds into agriculture. Various agri-startups are enhancing efficiency in the value chain, including in areas like storage, warehousing, farm automation, precision agriculture, and more. These startups utilize modern IT tools such as AI, IoT, imaging, sensors, remote sensing, drones, data analytics, and blockchain technology to improve yield, efficiency, and profitability in the agriculture and allied sectors.

According to the Viksit Bharat@2047 report, India's food processing sector will grow significantly, reaching US$ 1,100 billion by FY35, US$ 1,500 billion by FY40, US$ 1,900 billion by FY45, and US$ 2,150 billion by FY47.

Way Forward for Viksit Bharat

- **Technology and Innovation** by introducing affordable and locally appropriate technologies can significantly help.
- **Community-Based Adaptation** by strengthening community groups and agricultural cooperatives can help share risks and pool resources for collective action, such as purchasing seeds or implementing small-scale irrigation projects.
- **Government Policies and Programs** can be redirected towards more sustainable agricultural practices.
- **Education and Training of famers** for adoption of new technologies and farming practices need to be imparted.
- **Market Access and Value Chains** need to be strengthened through development of infrastructure and supporting farmers to move up the value chain to increase their income and resilience.

Unlocking the True Potential of eNWR Pledge Financing

India's agricultural sector, which employs over 50% of the country's workforce, faces chronic liquidity challenges, particularly during the post-harvest season. A promising solution lies in electronic negotiable warehouse receipts (eNWRs), which enable farmers to access pledge financing against their stored produce. Despite their transformative potential, the utilization of eNWRs remains limited due to various systemic barriers.

Understanding eNWRs and Their Benefits

An eNWR is a digital receipt issued by WDRA-accredited warehouses, representing ownership of stored agricultural produce. The system is regulated to ensure safety and reliability, making it a secure instrument for obtaining loans.

Key Advantages for Farmers:

- **Access to Affordable Credit**: Farmers can pledge their stored produce as collateral, accessing loans without additional guarantees. This prevents distress sales during price lows.
- **Enhanced Liquidity**: Loans derived from eNWRs can help repay pre-harvest debts, purchase inputs for the next season, or meet other financial needs.
- **Market Timing**: Farmers can hold their produce until market prices improve, avoiding losses from low post-harvest prices.
- **Transparency and Reduced Fraud**: Digital receipts eliminate discrepancies and provide a clear record, bolstering trust among stakeholders.

An eNWR is a digital receipt issued by WDRA-accredited warehouses, representing ownership of stored agricultural produce.

The Role of Warehousemen as a Fulcrum in the Process

Warehouse service providers (WSPs) such as Ergos and Apnagodam are emerging as critical players in the eNWR ecosystem. Beyond traditional storage, these WSPs offer end-to-end solutions, acting as a fulcrum to connect farmers with financial institutions and markets. For example, Ergos' "Grain Bank" model allows farmers to deposit their produce, avail of financing, and sell at optimal prices through market linkages. Similarly, Apnagodam's digital platform integrates storage, financing, and trading, empowering farmers with greater control and visibility over their produce.

By providing these comprehensive services, warehousemen ensure that farmers can store their crops securely, access timely credit, and benefit from improved price discovery. Their role in aggregating produce also facilitates bulk sales, enhancing farmers' bargaining power. Such innovations demonstrate how WSPs can transcend traditional roles to drive financial inclusion and market efficiency.

Current Landscape of eNWR-Based Financing in India

Adoption and Growth:

- Since its inception, close to 6 million eNWRs have been issued, covering approximately 54 million metric tonnes of agricultural commodities.
- The December 2024 report from NeRL highlights INR 419.87 crore pledged against eNWRs in one month alone, reflecting growing confidence in the system.

Farmer Participation:

- Of the 11,206 active clients utilizing eNWRs, 4,449 are farmers or Farmer Producer Organizations (FPOs), indicating increasing but uneven adoption.

Regional Trends:

- States like Gujarat, Maharashtra, and Rajasthan dominate in commodity deposits and pledges. Paddy, maize, and soybeans are among the top commodities.
- Warehouses in states such as Madhya Pradesh and Telangana play a pivotal role in eNWR issuance, link-

About the **AUTHOR**

Saurabh Khanna is MD & CEO, NeRL

ing farmers with credit.

Barriers Hindering eNWR Adoption

- **Limited Awareness and Digital Inclusion**: Many farmers remain unaware of eNWR benefits. Despite growing smartphone penetration, lack of digital literacy and connectivity hinders adoption.
- **Inadequate Warehouse Infrastructure**: Only a small percentage of total warehouses are accredited nationwide, insufficient for India's vast agricultural landscape.
- **Institutional Risk Aversion**: Financial institutions often hesitate to lend against eNWRs due to perceived risks, including enforcement challenges during defaults.
- **Market Volatility**: Price instability deters farmers from leveraging eNWRs, fearing losses despite financing.
- **Regulatory Bottlenecks**: Complex procedures for loan approvals and unclear guidelines create additional hurdles.

Empowering Farmers: A Roadmap to Unlock eNWR Potential

- **Educating and Building Awareness**: Targeted campaigns should educate farmers about eNWRs' financial benefits. Success stories of early adopters can showcase tangible benefits, inspiring wider participation.
- **Expanding Accredited Warehouses**: Investments in warehouse infrastructure, particularly in rural and underserved regions, are critical. Public-Private Partnerships (PPPs) can accelerate this process.
- **Encouraging Institutional Participation**: Simplifying CGS-NPF procedures will alleviate banks' risk concerns. Moreover, incentivizing financial institutions through better terms or guarantees can boost lending against eNWRs.
- **Implementing Price Stabilization Mechanisms**: Government initiatives such as Minimum Support Prices (MSP) and market intervention schemes can mitigate risks from price volatility.

Since its inception, close to 6 million eNWRs have been issued, covering approximately 54 million metric tonnes of agricultural commodities

- **Streamlining Regulatory Frameworks**: Simplifying processes for dispute resolution, loan recovery, and pledge execution will reduce inefficiencies and instill confidence among stakeholders.
- **Strengthening FPOs**: Empowering FPOs to act as aggregators can reduce individual transaction costs and facilitate access to warehousing and credit for smallholder farmers.

Successful Integration in Madhya Pradesh

Madhya Pradesh has emerged as a frontrunner in leveraging eNWRs for agricultural financing. In FY '24, farmers in the state deposited over 167,560 metric tonnes of produce, securing loans worth approximately INR 174 crore on the NeRL platform.

Key Drivers of Success:

- Robust Warehouse Network: Madhya Pradesh boasts a well-developed network of WDRA-accredited warehouses, ensuring that farmers have reliable storage options.
- Active FPO Involvement: Farmer Producer Organizations in the state have played a crucial role in educating farmers, aggregating produce, and facilitating access to warehouses and financing.
- Government and Institutional Support: The state's proactive policies and partnerships with financial institutions have reduced barriers to credit and increased farmer confidence in the eNWR system.

Impact:

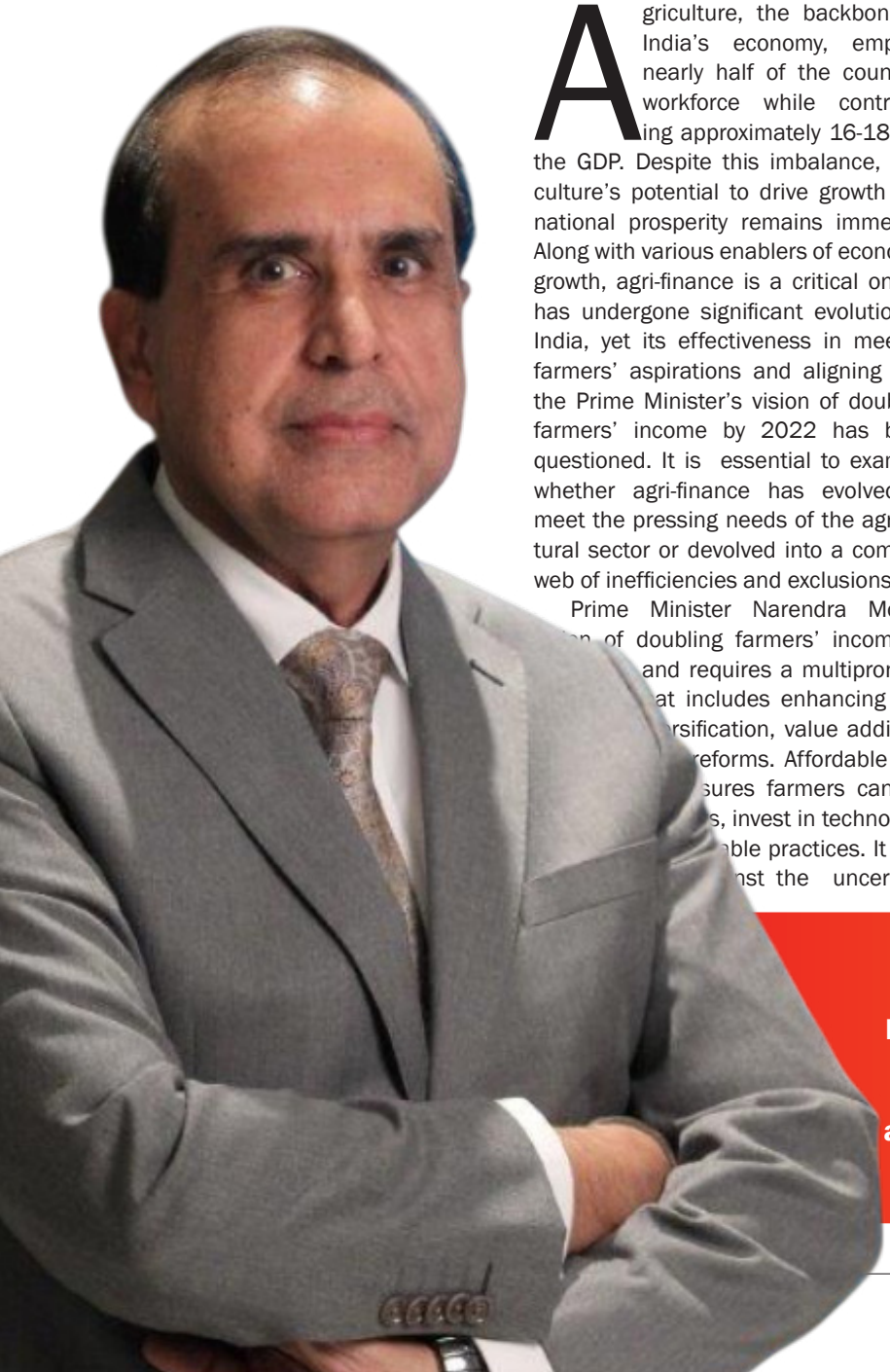
Farmers in Madhya Pradesh have benefited from improved liquidity, enabling them to avoid distress sales and invest in their next cropping season. The state's success serves as a model for other regions aiming to unlock the full potential of eNWR-based financing.

A Path to Agricultural Empowerment

The integration of eNWRs into India's agricultural credit system offers a transformative opportunity to enhance farmers' financial resilience and prevent distress sales. By addressing challenges in infrastructure, awareness, and institutional participation, stakeholders can unlock the full potential of this innovative financial tool. Warehouse service providers like *Ergos* and *Apnagodam* are pivotal in this journey, acting as the bridge between storage, finance, and markets. For India's farmers, eNWRs represent not just a mechanism for credit but a pathway to economic empowerment and sustainable growth.

Cultivating Financial Roots

AGRI-FINANCE AS A CATALYST FOR RURAL PROSPERITY



Agriculture, the backbone of India's economy, employs nearly half of the country's workforce while contributing approximately 16-18% to the GDP. Despite this imbalance, agriculture's potential to drive growth and national prosperity remains immense. Along with various enablers of economic growth, agri-finance is a critical one. It has undergone significant evolution in India, yet its effectiveness in meeting farmers' aspirations and aligning with the Prime Minister's vision of doubling farmers' income by 2022 has been questioned. It is essential to examine whether agri-finance has evolved to meet the pressing needs of the agricultural sector or devolved into a complex web of inefficiencies and exclusions.

Prime Minister Narendra Modi's
n of doubling farmers' income is
and requires a multipronged
at includes enhancing pro-
rsification, value addition,
reforms. Affordable and
sures farmers can ac-
s, invest in technology,
ble practices. It also
nst the uncertain-

According to NABARD's All India Rural Financial Inclusion Survey, about 30% of agricultural households rely on non-institutional sources like moneylenders, often at exorbitant interest rates.

ties of nature, fluctuating markets, and policy changes. In my experience working with both government and industry stakeholders, I have consistently observed that a robust financial system can bridge the gap between potential and actual performance in agriculture.

It has been widely acknowledged that India's agricultural economy needs to grow at 3-4% per annum to support the country's aspiration for double-digit GDP growth. This connection under-

About the **AUTHOR**

Rakesh K Chitkara, has been leading public policy practice for major corporations with specialisation in agriculture, infrastructure, chemicals and healthcare.

scores the strategic importance of addressing systemic gaps in agri-finance to sustain national economic ambitions. As a published report from NABARD states, "The revival of rural credit is essential to driving both agricultural and overall economic growth."

Evolution of Agri-Finance

Over the decades, agri-finance in India has seen notable milestones. Establishing cooperative credit societies in the early 20th century was the first institutional effort to meet farmers' credit needs. Post-independence, the nationalization of banks in 1969 ushered in priority sector lending, mandating banks to allocate a portion of their portfolio to agriculture. The creation of the National Bank for Agriculture and Rural Development (NABARD) in 1982 further institutionalized support for rural credit.

More recently, initiatives such as the Kisan Credit Card (KCC) scheme, financial inclusion through the Pradhan Mantri Jan Dhan Yojana (PMJDY), and digitization efforts have aimed to broaden access to credit. The advent of agri-fintech startups has also introduced innovative models of lending and risk assessment, leveraging data and technology.

Challenges - The Case for Devolution

Despite these advancements, several issues continue to plague the system, raising concerns about whether agri-finance is devolving rather than evolving.

- **Access and inclusion** is a most critical one. While formal credit penetration has increased, marginal and small farmers, who form the bulk of the farming community, still struggle to access institutional credit. According to NABARD's All India Rural Financial Inclusion Survey, about 30% of agricultural households rely on non-institutional sources like moneylenders, often at exorbitant interest rates.
- **Transaction costs** continue to be high. The procedural complexities and documentation requirements of institutional credit deter many farmers. Additionally, the lack of adequate rural bank branches exacerbates the problem. A significant portion of agri-credit is diverted to non-agricultural purposes, reflecting gaps in monitoring and a mismatch between credit disbursement and farmers' actual needs.
- **Climate risks and insurance** are vulnerable areas and add to the complexity. While the Pradhan Mantri Fasal Bima Yojana (PMFBY) aims to provide crop insurance, its implementation has been inconsistent, leaving many farmers without adequate risk mitigation.
- **Centre-State coordination** is critical in ensuring the seamless implementation of financial reforms. Variances in state-level policies often result in inconsistent access to credit and insurance across the country, undermining the broader goals of agricultural development.
- **Digital solutions** promise efficiency, but the digital divide in rural areas limits their adoption. Many farmers lack the technical literacy and infrastructure needed to benefit from fintech innovations.

The government must create an enabling environment by rationalizing interest rates, incentivizing rural banking, and promoting public-private partnerships.

Agri-finance reforms have shown measurable results in improving farm incomes in various parts of the world. For instance, in Kenya, the M-Pesa mobile money platform has revolutionized rural finance, enabling smallholder farmers to access loans, pay for inputs, and receive payments seamlessly. Similarly, Brazil's agricultural credit system has success-

fully integrated rural banking with crop insurance and marketing support, contributing to the country's emergence as a global agricultural powerhouse. India can draw valuable lessons from these examples to design context-specific solutions.

Path Forward

To truly evolve and act as an enabler, agri-finance must address these challenges through systemic reforms and innovations.

Strengthen Cooperative Credit Mechanisms: Cooperatives remain a trusted institution for many farmers. Strengthening their governance, operational efficiency, and integration with formal banking channels can enhance credit delivery.

Expand Digital and Mobile Banking: Leveraging mobile technology to simplify loan applications, disbursements, and repayments can reduce transaction costs and improve accessibility. Partnerships with agri-tech start-ups can create tailored financial products for different segments of farmers.

Customized Financial Products: Beyond traditional loans, farmers need access to diverse financial instruments, including leasing, venture capital for agri-entrepreneurs, and structured finance for value chain development. For instance, linking credit with market and value chain financing can help farmers realize better returns.

Revamp Crop Insurance: Insurance products need to be affordable, transparent, and easy to claim. Leveraging satellite imagery and AI for crop assessment can expedite claims and reduce disputes. Partnerships between private insurers and the government can enhance penetration and trust.

Promote Financial Literacy: Awareness campaigns and training programs are essential to educate farmers about financial products, schemes, and digital tools. In my conversations with rural communities, I've seen how empowering farmers with knowledge transforms their ability to make informed decisions.

Policy and Regulatory Support: The government must create an enabling environment by rationalizing interest rates, incentivizing rural banking, and promoting public-private partnerships. Regulatory frameworks should encourage innovation while protecting farmers' interests.

Agriculture employs nearly 43% of India's workforce. Ensuring their gainful employment through access to credit directly impacts rural livelihoods and socio-economic stability. Agri-finance, therefore, is not merely a tool for economic growth but a cornerstone of social equity.

Furthermore, integrating agri-finance with the government's flagship schemes, such as the Pradhan Mantri Krishi Sinchai Yojana (PMKSY) for irrigation and the National Agriculture Market (e-NAM) for marketing, can amplify their impact. For example, credit linked to irrigation infrastructure development can mitigate water stress and boost productivity.

The bottom line is…

Agri-finance must evolve into a dynamic, inclusive, and technology-driven system that addresses the needs of farmers across the spectrum. As someone deeply involved in policy discussions and industry collaborations, I've seen firsthand the transformative potential of a cohesive approach. By aligning financial systems with developmental goals, we can empower farmers to be resilient, entrepreneurial, and globally competitive.

The debate on whether agri-finance is evolving or devolving ultimately hinges on the urgency and intent of stakeholders to address systemic gaps.

As India aspires to be a $5 trillion economy, the agricultural sector cannot remain a laggard. By prioritizing reforms in agri-finance, we can not only realize the Prime Minister's vision of doubling farmers' income but also lay the foundation for a prosperous and equitable rural India. The time to act is now, and the path forward must be one of collaboration, innovation, and unwavering commitment to the welfare of India's farmers.

Empowering Rural India through Cooperative Economic Framework:

A PATH TO FINANCIAL SECURITY AND NATIONAL PROSPERITY

Cooperative economic framework has long been a cornerstone of India's rural development strategy, offering a platform for collective action, resource pooling, and equitable distribution of benefits. This model addresses the twin challenges of rural financial insecurity and national development. Over 65% of India's population resides in rural areas, making cooperatives a practical and inclusive mechanism for achieving sustainable growth while ensuring economic stability. Grounded in principles of shared ownership and inclusivity, cooperatives foster financial security by promoting financial inclusion, income stability, and employment generation.

Primary Agricultural Credit Societies (PACS), a critical component of this system, play an essential role in empowering rural communities. Catering to over 130 million farmers, PACS collectively disbursed Rs.2.69 lakh crore in short-term agricultural credit during FY 2022-23, underscoring their pivotal contribution to agricultural growth and resilience. Alongside credit services, cooperatives enable access to savings and insurance, providing rural communities with financial security against natural disasters, crop failures, and health emergencies.

The Three-Tier Cooperative Structure

India's cooperative system functions through a robust three-tier structure:

1. Primary Agricultural Credit Societies (PACS): These grassroots-level institutions serve farmers and local producers, addressing their credit, input, and storage needs.

2. District Central Cooperative Banks (DCCBs): Acting as intermediaries, DCCBs facilitate resource mobilization and refinancing while ensuring efficient coordination between PACS and apex entities.

3. State Cooperative Banks (SCBs): At the apex level, SCBs formulate policies and provide long-term financial support, strengthening the overall cooperative ecosystem.

This structure creates a holistic system that meets the diverse financial needs of rural communities, ensuring their active participation in India's economic growth. Marketing cooperatives like Amul have showcased the model's potential by ensuring fair pricing and stable incomes for rural producers, especially in the dairy sector.

About the **AUTHOR**

Binod Anand is the Member of Hon'ble Prime Minister-High Power committee on Minimum Support price & Agri-Reforms, Government of India and Secretary General, Confederation of NGOs of Rural India CNRI. He is the Executive president, World Cooperative Economic Forum

The Amreli Model of the Three-Tier Cooperative Banking System

The Amreli model, spearheaded in Gujarat, exemplifies how the three-tier cooperative banking system can transform rural economies through transparency, inclusivity, and member participation. Developed under the visionary leadership of Shri Dileep Sanghani, this model has redefined cooperative governance by emphasizing grassroots empowerment and the integration of technology.

At its core, the Amreli model optimizes the synergy between PACS, DCCBs, and SCBs to create a seamless financial ecosystem. PACS address the immediate credit and input needs of farmers, while DCCBs facilitate refinancing and resource mobilization. SCBs oversee policy implementation and ensure long-term financial stability.

A distinctive feature of the Amreli model is its adoption of digital tools to improve operational efficiency. For instance, PACS in Amreli have digitized their loan disbursement processes, enabling faster access to credit and reducing inefficiencies. Additionally, this model has prioritized capacity-building programs to enhance the skills of cooperative leaders and members, ensuring effective decision-making at every level.

The success of the Amreli model demonstrates the transformative potential of cooperatives in empowering rural communities. By ensuring access to affordable credit, fair prices, and a sense of ownership, this model has sig-

nificantly improved the economic well-being of farmers and rural households in Gujarat.

Dileep Sanghani's Leadership: A Catalyst for Cooperative Transformation

Shri Dileep Sanghani, a veteran leader in India's cooperative movement, has played a pivotal role in modernizing the cooperative sector and aligning it with contemporary challenges. As the Chairman of the National Cooperative Union of India (NCUI) and a prominent figure in Gujarat's cooperative ecosystem, Sanghani has championed innovative reforms to make cooperatives more inclusive, transparent, and efficient.

One of his hallmark contributions is the promotion of digitization across all levels of the cooperative framework. Under his leadership, PACS and DCCBs in Gujarat have embraced digital technologies to streamline transactions, improve governance, and ensure better service delivery to members. Sanghani has also advocated for the diversification of cooperatives into non-agricultural sectors, such as renewable energy and agro-processing, making them resilient and adaptable to market dynamics.

A proponent of cooperative education, Sanghani has launched numerous capacity-building initiatives to enhance the skills of cooperative members and leaders. By fostering innovation and member-centric policies, his leadership in Gujarat's cooperative sector—particularly through the Amreli model—has become a blueprint for other states to emulate. His vision of strengthening the cooperative ecosystem aligns seamlessly with India's broader development goals, particularly the vision of Sahkar se Siddhi (Prosperity through Cooperation).

Government's 52 Transformative Reforms: Strengthening the Cooperative Sector

Recognizing the immense potential of cooperatives, the government has introduced 52 transformative reforms to modernize and revitalize the sector. These reforms aim to enhance transparency, efficiency, and inclusivity while aligning with the vision of Sahkar se Siddhi.

Recognizing the immense potential of cooperatives, the government has introduced 52 transformative reforms to modernize and revitalize the sector. These reforms aim to enhance transparency, efficiency, and inclusivity while aligning with the vision of Sahkar se Siddhi.

Key initiatives include digitizing over 63,000 PACS, creating a National Cooperative Database, and offering tax incentives to cooperatives. Enhanced credit flow for farmers, the formation of multi-purpose cooperatives, and the promotion of Farmer Producer Organizations (FPOs) have empowered small and marginal farmers to access economies of scale, advanced technology, and better market opportunities.

Export promotion policies for niche agricultural products have opened global markets for rural producers, boosting rural incomes. Moreover, these reforms prioritize transparency, ensuring that cooperatives operate with accountability while delivering measurable benefits to members.

Global Success Stories of Cooperative Banking Systems

India's cooperative sector can draw valuable insights from global examples of successful cooperative banking systems:

Germany's Raiffeisen Model

Germany's Raiffeisen cooperative banks are globally recognized for their resilience and effectiveness. Initially established to combat rural poverty, these banks have grown into a vital component of Germany's financial system, offering affordable loans and savings products while fostering rural self-reliance.

Canada's Desjardins Group

The Desjardins Group, one of the largest financial cooperatives in North America, demonstrates how cooperatives can thrive in modern economies. Known for its focus on financial literacy and community development, Desjardins has successfully introduced mobile banking services to reach remote rural areas, ensuring financial inclusion for all.

Kenya's SACCOs

Kenya's Savings and Credit Cooperative Organizations (SACCOs) have transformed rural economies by providing small farmers and microentrepreneurs with accessible credit and savings products. Their adoption of digital platforms has further enhanced service delivery.

Japan's Agricultural Cooperatives (JA)

Japan's JA cooperatives exemplify how cooperatives can integrate multiple functions, such as banking, marketing, and supply chain management. These cooperatives provide comprehensive support to farmers, ensuring stable incomes and access to global markets.

Coopreneurs: Transforming Rural Enterprises

Coopreneurs, individuals who innovate within the cooperative framework, are emerging as game-changers in rural India. By leveraging cooperative structures, coopreneurs create scalable solutions to address gaps in local markets, ensuring collective benefits for members.

Their contributions are particularly impactful in value addition, digital financial services, and supply chain optimization. For instance, a coopreneur might establish a processing unit within a cooperative to convert raw produce into high-value products, thereby increasing members' income. Supporting coopreneurs with training, technology, and financial resources is essential to achieving Sahkar se Siddhi.

Coopreneurs, individuals who innovate within the cooperative framework, are emerging as game-changers in rural India.

Revolutionizing Markets through Cooperative Commodities Exchanges

The establishment of commodities exchanges within the cooperative framework has the potential to transform rural markets. By enabling farmers to trade directly in competitive, transparent markets, these exchanges ensure fair pricing and reduce the role of intermediaries.

Digital platforms integrated with commodities exchanges facilitate real-time price discovery, efficient logistics, and access to larger markets. For example, cooperatives in Rajasthan have successfully used digital platforms to connect farmers with buyers nationwide. These exchanges also offer futures trading, allowing farmers to hedge against price volatility, ensuring income stability.

Building Financial Literacy in Aspirational Districts

Financial literacy is a key enabler of rural empowerment, particularly in India's 112 Aspirational Districts identified for focused development. Lack of awareness about financial products often prevents marginalized communities from participating in formal financial systems.

Cooperatives play a crucial role in addressing this gap by conducting financial literacy campaigns focusing on savings, credit, insurance, and entrepreneurship. Women-led Self-Help Groups (SHGs), for instance, are being trained in financial management and business planning, enabling them to establish microenterprises. Supporting startups in these districts through cooperatives aligns with the Hon'ble Prime Minister's vision of Viksit Bharat (Developed India).

National and Global Implications of Rural Financial Security

A financially secure rural India forms the backbone of national prosperity. Empowering rural households reduces income disparities, curbs migration to urban centres, and enhances food self-sufficiency. Globally, cooperative systems have contributed to sustainable development by fostering inclusive growth and building resilient communities.

The Path Forward: Modernizing Cooperatives for a Prosperous India

Despite challenges like resource constraints and digital divides, India's cooperative sector is well-positioned to drive rural transformation. By modernizing operations, promoting coopreneurship, and establishing cooperative commodities exchanges, India can unlock the full potential of its rural economy.

These efforts align seamlessly with the Hon'ble Prime Minister's vision of a self-reliant, prosperous, and developed India, where Sahkar se Siddhi becomes a reality. With sustained focus and innovation, the cooperative framework will continue to serve as a cornerstone of inclusive national progress.

EVOLUTION AND POTENTIAL OF WAREHOUSE RECEIPT FINANCE

In the early 2000s, India was at critical crossroads. Agriculture, the nation's backbone, urgently needed accessible credit to foster growth. The Reserve Bank of India (RBI) urged banks to prioritise agriculture by implementing Priority Sector Lending (PSL) norms, which included penalties for banks that failed to meet their priority sector lending targets. While banks faced pressure to comply with these PSL targets, they also grappled with the inherent risks of lending to a largely unfinanced and undocumented sector.

Emergence of Warehouse Receipt Finance

The challenge of lending to farmers was further complicated by the informal nature of India's agricultural economy. Farmers typically lacked formal financial documentation, such as audited balance sheets, income tax returns, or credit histories, which made assessing creditworthiness particularly difficult. Institutional lenders, accustomed to structured risk evaluation processes, found it hard to conduct credit assessments in the absence of standardised financial records. Additionally, many farmers were smallholders with limited landholdings, adding another complexity layer. Land records—often the only proof of ownership—were frequently outdated, disputed, or incomplete. This reliance on such inconsistent documentation increased the perceived risk for banks, discouraging them from extending credit. To make matters worse, agriculture's cyclical and unpredictable nature presented unique risks. Farming incomes were inherently unstable due to weather dependence, price volatility, and vulnerability to pests or diseases, further eroded lender confidence.

Warehouse Receipt Finance (WRF) is a valuable tool for farmers, allowing them to use their produce as collateral to secure loans quickly.

In this challenging environment, banks found themselves caught in a dilemma. They faced mounting regulatory pressure to meet PSL targets, while also dealing with the operational and financial risks of lending to a vulnerable and undocumented borrower base.

This conundrum led to Warehouse Receipt Finance (WRF), also known as Commodity-Based Finance. This innovation represented a significant shift in strategy: instead of assessing borrowers' creditworthiness, the focus shifted to the commodities offered as collateral. By transferring the risk from the borrower's financial history to the management of the commodity itself, WRF revolutionised agricultural financing. It emerged as a crucial link between the financial needs of farmers and the risk mitigation priorities of lenders.

This pivotal shift in approach from assessing credit risk of borrowers to managing commodity management risk not only addressed the challenges of the time but also laid the groundwork for a more inclusive financial ecosystem for farmers.

Why Warehouse Receipt Finance Matters for Farmers?

Warehouse Receipt Finance (WRF) is a valuable tool for farmers, allowing them to use their produce as collateral to secure loans quickly. This process eliminates the need for repeated visits to lenders and requires minimal documentation, typically only KYC (Know

About the **AUTHORS**

Anand Chandra is Co-founder and Executive Director, Arya.ag and Ann Thomas is the Head, Marketing And Communication, Arya.ag

Your Customer) and land records. For farmers, WRF is a significant advantage. Additionally, they are not required to provide security beyond KYC and a copy of their land records.

These loans are often disbursed within hours, helping to prevent distress sales. This allows farmers to meet their household needs, fund future crops, and hold onto their produce until market prices improve. The true value of WRF lies in the autonomy it provides.

The rise of agritech platforms has enhanced these opportunities, connecting farmers directly with buyers and enabling them to achieve better returns. On average, farmers can earn 15-20% more on their produce by utilising WRF, making it an essential instrument for economic resilience and growth. Overall, WRF empowers farmers by giving them the freedom to decide "when to sell" and, with the advent of agritech platforms, "whom to sell" to. This flexibility enables them to sell their produce when prices are favourable, ultimately increasing profits.

Over the past two decades, banks and financial institutions have disbursed more than 10 lakh crore under WRF, with cumulative losses amounting to less than 1,500 crore—far below the Reserve Bank of India's (RBI) provisioning norms.

The Growth of Warehouse Receipt Finance

In less than a decade since its inception, WRF has gained immense traction. Today, banks and financial institutions collectively disburse around Rs. 50,000 crore annually under this model. The success of this product owes much to Collateral Managers and Warehouse Service Providers such as Arya.ag, NCML, Star Agri, NBHC, Sohanlal, and GoGreen. These custodians play a pivotal role in safeguarding commodities, ensuring trust and efficiency.

Challenges Hindering the Scale-Up of WRF

Despite its notable success in enabling farmers and agricultural stakeholders to access credit, Warehouse Receipt Financing (WRF) faces several critical challenges that must be addressed to fully unlock its potential for driving agricultural growth and rural development.

Limited Access to Primary Markets

Currently, most WRF offerings are concentrated in secondary and tertiary markets, leaving a significant gap in primary production centres, the backbone of agricultural activity. This limited reach excludes grassroots-level producers, such as small and marginal farm-

ers, from fully benefiting from WRF's potential. Expanding the reach of WRF to these underserved regions is essential for promoting inclusivity, enhancing financial access, and empowering farmers to manage their produce and cash flow better.

High Transaction Costs and Storage Limitations

One of the key barriers to scaling WRF is the lack of adequate storage infrastructure, particularly in rural and semi-urban areas. The existing network of smaller warehouses often struggles with inefficiencies, limited capacity, and poor-quality standards, which reduce their usability for WRF. Additionally, the high transaction costs associated with collateral management, quality assurance, and logistics further deter both lenders and borrowers from engaging in WRF at scale. Addressing these storage and cost challenges through investments in modern infrastructure and technology is critical to improving efficiency and expanding WRF adoption.

Fraud and Perception Issues

Incidents of fraud related to pre-stored commodities or third-party warehouses have undermined the reputation of WRF, making lenders more cautious in their approach. These rare cases have created a perception of risk that is disproportionate to the actual safety of the product. Over the past two decades, banks and financial institutions have disbursed more than ₹10 lakh crore under WRF, with cumulative losses amounting to less than ₹1,500 crore—far below the Reserve Bank of India's (RBI) provisioning norms. This underscores the inherent reliability of WRF as a financing mechanism. However, addressing these perception issues through greater transparency, improved regulatory oversight, and the use of technology like blockchain for secure and tamper-proof record-keeping can restore confidence among stakeholders.

Way Forward for Banks, Financial Institutions, and Collateral Managers

To unlock the full potential of Warehouse Receipt Financing (WRF) and make it a truly scalable, inclusive tool for farmers, stakeholders must address several key challenges and adopt targeted strategies for growth:

Enhancing Disbursement Speed

Banks and FIs must leverage technology to reduce loan turnaround times to compete with local moneylenders significantly. Digital workflows, AI-powered credit assessment tools, and integration with eNWR systems can enable disbursements within minutes, meeting the urgent financial needs of farmers and making formal credit more attractive.

Strengthening Infrastructure in Primary Markets

Investments in smaller, rural warehouses are essential to extend WRF's reach to underserved areas. Modernising these facilities with cost-efficient storage solutions, improved logistics, and digital integration will enhance their functionality and profitability, benefiting both farmers and service providers.

Improving eNWR Inclusion

Revise eNWR regulations to include Corporate Collateral Managers and Warehouse Service Providers, recognising their expertise in operational efficiency and reliability. Their formal inclusion will strengthen the ecosystem, ensuring smooth operations and improved trust among stakeholders.

Rebuilding Trust Through Transparency

Employing advanced technologies like blockchain for tamper-proof record-keeping and real-time monitoring will help prevent fraud and improve transparency. This will rebuild confidence among banks, farmers, and other stakeholders.

Addressing Cost and Scale Challenges

Collaborative efforts between the government, financial institutions, and service providers are needed to subsidise initial costs, standardise processes, and promote innovations in storage and collateral management, especially in rural areas.

A Vibrant Future for Agriculture

Warehouse Receipt Finance has emerged as a game-changer for Indian agriculture, empowering farmers to break free from traditional constraints and achieve better financial outcomes. Scaling this product will enhance farmer incomes and inject vibrancy into agricultural markets. With the right focus on infrastructure, policy support, and operational efficiency, WRF can make Indian agriculture more inclusive, resilient, and profitable.

BIOECONOMY FINANCING

IMPACT ON INDIA'S SUSTAINABLE AGRICULTURE INITIATIVES

India's economic reliance on agriculture and the sector's high climate sensitivity, puts the country in a perilous situation. The costs of extreme weather events such as floods, heatwaves, and landslides, among others, which were witnessed on 93% of the days between January – September of 2024, are becoming steep with 3.2 million hectares of crop land being affected in the period. With there being an increase in the likelihood of such extreme weather events, the need to climate-proof the sector is evident.

India's agriculture sector remains climate vulnerable despite it contributing around 17-18% to India's GDP, and employing over 50% of the population.

Farmers often lack access to affordable financing to invest in bioeconomy-based innovations, such as biogas plants, biofertiliser production units, and precision agriculture technologies.

About the **AUTHOR**

Ms Namita Vikas is the Founder & Managing Director of auctusESG

A study from the National Innovations in Climate Resilient Agriculture (NICRA) indicates that India could experience a 6-10% decline in key crop yields that include staples such as rice and wheat by 2050-2080 due to changing weather patterns. Over 30% of India's agricultural land is affected by soil degradation, leading to decreased soil fertility, crop yields and overall agricultural productivity, further exacerbated by unsustainable farming practices, such as the overuse of chemical fertilisers. In addition to this, the looming threat of water stress is escalated by unfavourable agricultural practices, since the sector consumes 90% of India's water resources. The sector is also a significant contributor to greenhouse gas emissions (carbon dioxide, methane and nitrous oxide), contributing to 13.72% of GHG emissions in 2020 in India.

In this context, the bioeconomy—an economic model built on the sustainable use of biological resources—offers transformative potential for enhancing

agricultural resilience and driving sustainability in India. With its focus on leveraging renewable biological resources, the bioeconomy intersects closely with agriculture, creating opportunities for innovation in sustainable farming, reducing environmental degradation, and addressing the growing challenges posed by climate change. By converting crop residues into bioenergy or compost and recycling agricultural by-products into bioplastics and biofuels, the transition to a circular bioeconomy enhances resource efficiency, reduces waste, and lowers carbon footprints. For instance, Brazil's use of sugarcane to produce ethanol showcases how agriculture can drive sustainability while reducing fossil fuel dependence.

India's Efforts Towards Fostering a Bioeconomy

India's bioeconomy sector has been booming, standing at a valuation of US $92 billion in 2022 and swiftly increasing to US $130 billion in 2024, further projected to reach US $300 billion by 2030. The country has undertaken significant measures to make its agriculture climate resilient. For example, in Rayanpet, Telangana, scientists have developed drought-tolerant rice varieties, helping farmers secure yields despite erratic weather. Government initiatives like the Galvanising Organic Bio-Agro Resources Dhan (GOBARdhan) scheme and the Godhan Nyay Yojana go beyond waste management to create value chains around organic waste. These initiatives stimulate rural employment, generate income for farmers, and foster a circular economy. Holistic policies like the National Mission for Sustainable Agriculture (NMSA), operationalised under the National Action Plan for Climate Change (NAPCC), and programs like NICRA focus on adaptive farming, water management, and soil health to climate-proof agriculture.

Efforts such as Paramparagat Krishi Vikas Yojana (PKVY) demonstrate how incentivising organic farming can shift agricultural practices toward sustainability. Meanwhile, crop insurance schemes like Pradhan Mantri Fasal Bima Yojana (PMFBY) protect farmers from climate-induced losses, acting as safety nets for vulnerable rural communities. Additional announcements on incentives on climate smart agriculture and climate-resilient seed varieties in cereals, pulses and oilseeds are expected in the upcoming Union Budget 2025-26, offering potential avenues for enhancing bioeconomy.

Despite these efforts, challenges persists such as Limited awareness of climate-resilient practices, inadequate infrastructure for irrigation and storage, scarcity of comprehensive and accurate data, and fragmented landholdings hinder large-scale adoption of sustainable techniques. Moreover, farmers often lack access to affordable financing to invest in bioeconomy-based innovations, such as biogas plants, biofertiliser production units, and precision agriculture technologies. As a result, adequate and targeted financing to the sector is critical to leveraging its full potential in transforming Indian agriculture. The sector heavily depends on public funding, such as subsidies and grants, but lacks a steady flow of capital, specifically private capital. Given the valuation and the massive economic potential of bioeconomy, private capital investments need to be tapped to unleash the true scope of the sector.

The Financing Angle: Opportunities to Unlock the Potential of Bioeconomy

There are several innovative financing mechanisms that can scale capital flows to this sector. Blended finance models—combining private, concessional and philanthropic capital—can play a pivotal role in supporting bioeconomy ventures by providing small-scale projects a bankable pipeline.

Thematic bonds have emerged as powerful tools for mobilising capital. Green bonds, for instance, can be directed toward funding large-scale biogas plants, bio-refinery projects, and renewable energy initiatives in rural areas. India's sovereign green bond framework, launched in 2023, also presents an opportunity to integrate bioeconomy initiatives within its scope. Expanding this framework to include agricultural bioeconomy projects can provide farmers and entrepreneurs with access to low-cost financing while attracting global

investors seeking sustainable opportunities.

Public-private partnerships (PPPs) are another vital mechanism for scaling bioeconomy projects and improving the delivery of existing schemes. By combining the resources and expertise of the private sector with public funding and infrastructure, PPPs can drive innovation in bio-based technologies while ensuring accessibility for smallholder farmers. For example, partnerships could focus on building decentralised biomass processing units, facilitating farmer collectives to monetise agricultural waste.

Outcome-based instruments, such as pay-for-performance models and sustainability-linked instruments, are gaining traction as a way to ensure accountability and impact. These models provide financial incentives for achieving predefined sustainability goals, such as improved crop yields through biofertilizers or reductions in water usage via precision agriculture. Sustainability-linked bonds (SLBs), for instance, tie funding outcomes to measurable sustainability performance, such as reductions in agricultural emissions or increases in soil carbon sequestration, thereby reducing greenwashing concerns in fighting climate change. Such approaches can align the interests of investors, governments, and farmers, ensuring that financing translates into tangible benefits.

Furthermore, technological innovations are enhancing India's capacity for climate adaptation. AI-driven weather forecasting tools are helping farmers make informed decisions, reducing debt and improving savings. These tools

Blended finance models—combining private, concessional and philanthropic capital—can play a pivotal role in supporting bioeconomy ventures by providing small-scale projects a bankable pipeline.

are part of a broader push to integrate climate-resilient technologies in agriculture, with the potential to transform food security across Asia, Africa, and Latin America. Additionally, bio-based practices, such as agroecology and biofertilisers, can significantly improve soil health, sequester carbon, and reduce the sector's carbon footprint, aligning with India's climate goals.

Lessons from Global Success Stories

Several developed and emerging economies provide valuable lessons in bioeconomy financing. The European Union's Bioeconomy Strategy has mobilised significant funding under Horizon Europe, supporting innovations in bio-based industries, including sustainable agriculture. Brazil's RenovaBio program has successfully financed biofuel production, benefiting its agricultural sector by creating demand for sugarcane and soybean-based biofuels. South Africa's bioeconomy strategy, supported by government grants and international aid, emphasises biotechnological innovations in agriculture and industry.

These examples demonstrate how tailored financing mechanisms can drive bioeconomy growth while addressing country-specific challenges. For India, adopting similar approaches and fostering international collaboration can unlock its agricultural potential while ensuring environmental sustainability.

India's bioeconomy, therefore, presents an immense opportunity to make agriculture more sustainable, resilient, and profitable. Expanding infrastructure for biogas and biomass energy generation, promoting public-private partnerships for bio-based research, and incentivising farmers to adopt bio-based technologies can catalyse this transformation. Creating farmer cooperatives and microfinance programs specifically targeting bioeconomy ventures can address funding gaps and enhance grassroots adoption.

Additionally, fostering international collaboration is essential. Partnerships with countries that have advanced bioeconomy strategies can bring technical expertise, best practices, and funding opportunities to India. For example, India can learn from the EU's approach to integrating bioeconomy goals into broader policy frameworks, ensuring alignment with climate and sustainability targets.

MICROFINANCE IN AGRICULTURE
BRIDGING THE FINANCIAL INCLUSION GAP AND FOSTERING SUSTAINABLE GROWTH

Microfinancing continues to be a game-changer for smallholder farmers and the member farmers of FPOs, providing them with timely access to capital and mitigating the lengthy documentation that was required earlier for loan processing, which considerably delayed the loan disbursement processes.

Despite being the backbone of India›s economy, with more than half of the workforce reliant on agriculture, the sector faces many critical gaps, among them access to credit, which hinders its growth and development. Without access to formal credit, smallholder farmers struggle to purchase inputs, invest in their farms, and mitigate risks, ultimately limiting their productivity and income. This lack of access to credit, coupled with the emerging issues of climate change, is hindering their growth and productivity. Hence, microfinancing, which has emerged as a critical solution, bridging the financial inclusion gap, also needs to evolve by incorporating technology and sustainable practices to address new challenges.

Exploring the Challenges

Much of the problem associated with agriculture financing stems from the fact that a majority of the landholdings are small and fragmented. As a result, they simply do not have the requisite collateral for availing loans for purchasing crops, pesticides, farming, or for agricultural operations, or even for other critical operations such as storage and trading. Another major concern is the gap that exists between the buyer and seller, particularly the extended credit period of 30 days which, while benefiting the buyer, impacts the ability of sellers to scale operations, capitalize on opportunities, and even purchase new stock and fulfill subsequent orders.

As we delve into the evolving landscape of financing challenges, we explore how innovative microfinancing solutions, along with sustainable initiatives, cutting-edge financial products, and working with Farmer Collectives are redefining the way farmers access capital. These solutions can be game-changers and beacons of hope for Indian farmers, playing a key role in realigning the prospects of the Indian farmer for a more sustainable and prosperous future.

Emergence of FPOs and Their Impact on Microfinance

The emergence and robust ecosystem of Farmer Producer Organizations (FPOs) have helped bridge the gap by providing a cooperative and collaborative environment that promotes resource sharing and collective action, thereby improving farmers' overall productivity and financial stability. The FPOs have transformed Indian agriculture's financing landscape. Between FY20 and FY22, the number of active FPOs grew from 510 to 15,948, a staggering 284% increase largely due to financing initiatives. By addressing financing challenges like limited capital, restricted credit access, skill gaps in business expertise and financial management, manpower shortages, and debt traps with timely and streamlined microfi-

About the **AUTHOR**

Sridhar Easwaran is the Head, Samunnati Foundation

nancing, FPOs have witnessed growth, achieved economies of scale, and become inclusive.

Specialized Credit Products - Widening the Loan Base

By facilitating quicker access to capital, preapproved loans go a long way in enabling Farmers who are members of FPOs to access capital in a targeted manner and gain formal access to credit that was not available to them earlier. By offering pre-approval, these loans help the members of FPOs gain formal access to credit that they might not have qualified for under traditional lending processes. This shift is particularly important as it enables FPOs to become recognized as creditworthy business entities and empowers them in their expansion plans to serve smallholder farmers more effectively and participate in the agricultural value chain with greater leverage.

However, the key challenge here is to inculcate responsible borrowing practices. Digital platforms streamline processes and improve efficiency and transparency while reducing administrative costs. With risk mitigation measures in place, such as credit checks and personal guarantees, these loans provide security for both the parties. Successful loan utilization can increase credit limits, enabling future growth and diversification into value-added services, strengthening long-term financial sustainability.

Carbon Markets: Incentivizing Climate-Smart Practices

Companies buy carbon credits from farmers to offset their emissions, enhance their sustainability image, potentially comply with regulations, and invest in the future of agriculture by incentivizing eco-friendly practices that benefit the environment and farmers alike. By 2030, the carbon offset market is expected to grow to a whopping $2 trillion worldwide. Carbon markets play a crucial role in incentivizing emission reduction and carbon sequestration. By implementing projects that remove carbon dioxide from the atmosphere or prevent its release, businesses and organizations can generate carbon credits. These credits can be traded, allowing entities to offset their emissions. Climate-smart agricultural practices and regenerative agriculture are emerging as vital tools in this context, offering a promising pathway to mitigate climate change impacts and build a more resilient agricultural sector.

By facilitating quicker access to capital, preapproved loans go a long way in enabling Farmers who are members of FPOs to access capital in a targeted manner and gain formal access to credit that was not available to them earlier.

Microfinancing: A Transformative Force Making the Agriculture Sector Future-Ready

Microfinancing continues to be a game-changer for smallholder farmers and the member farmers of FPOs, providing them with timely access to capital and mitigating the lengthy documentation that was required earlier for loan processing, which considerably delayed the loan disbursement processes. Today, with the culmination of technology, particularly Artificial Intelligence (AI), and strategic partnerships, there has been a sea change in the way smallholder farmers are able to avail credit. By leveraging the power of technology, particularly AI, Agri and SME lending businesses create high-accuracy custom credit models on demand, tapping the hidden potential of Indian agriculture and driving financial inclusion.

Financing Sustainable Agriculture - Fast Forwarding to the Future

Agriculture and carbon markets have great potential to both reduce climate change and give farmers new sources of income. However, achieving equal participation requires negotiating the digital divide and tackling issues that affect farmers directly. We can create a more impactful and inclusive carbon market system by adopting novel solutions like aggregator models, capacity-building initiatives, and low-tech MRV techniques. Collaboration between legislators, IT companies, non-governmental organizations, and most significantly, farmers themselves, is necessary for this change to happen. We can turn agriculture into an effective weapon for combating climate change by providing farmers with the information, resources, and just compensation they need. The cultivation of a more sustainable mindset is essential for the future of our world, and these initiatives present a compelling means of achieving this objective.

DRIVING FINANCIAL INCLUSION IN THE RURAL SECTOR VIA DIGITISATION

India has, in the last 10-15 years, leaped forward with respect to digital payments and financial inclusion, leading with historic innovations like the Unified Payments Interface (UPI).

However, if we specifically look at the rural and semi-urban ecosystem, which is dominated by the agricultural sector, there are several upcoming innovations focussed on digitisation and financial inclusion that are ripe to scale, including the Agristack, Jansamarth, e-Nam 2.0, Open Network for Digital Commerce (ONDC), Unified Lending Interface (ULI), among others.

This underlines the importance of rural & semi-urban sector in India, being a $1.6T economy, projected to grow at 9.5% to $3.4T by 2030, which will raise its GDP share in the overall economy from 47% to 50%. Constituting 64% of the adult population, the rural per capita spends are also expected to grow at 4.3X vs 3.5X in urban areas. Why is it then, that the rural economy still struggles with a largely cash economy & access to credit?

The Rural Challenge

India innovated the Kisan credit card (KCC), a game-changing Bank account solution with overdraft facilities for farmers. However, while the KCC penetration is approximately 50%, most of these farmers have their limits exhausted on an ongoing basis. Similar to the KCC excluded farmers, these farmers are also forced to go back to the local money lender or the Input retailer for credit at the beginning of the season, who end up taking advantage of the situation by lending at exorbitant rates or pushing high margin products that the farmer doesn't really need.

There are 3 key challenges preventing the further saturation of formal credit-

- Lack of farmer income data/ visibility, and income predictability due to cash-based transactions, lack of income filing & documentation in general
- Lack of product innovation by the Banks – there are almost No unsecured Ag credit products below 20% rate of interest aside from KCC, and
- Supply chain challenges – high cost of sourcing and collecting for low ticket loans.

India innovated the Kisan credit card (KCC), a game-changing Bank account solution with overdraft facilities for farmers.

For example, there is a farmer segment that can be referred to as the 'rural leaders', which can be represented as: farmers with 6-7 acres of land, avg. income Rs 150k+, good Banking history and KCC penetration, and *high willingness to adopt digital solutions*. They make up 25-30% of all farmers, yet 75% of them still sell produce at lower than market prices in order to get immediate payment, because they need the funds urgently.

About the **AUTHOR**

Himanshu Bansal is the Vice President, Head – Network & Strategy, Community Pass, Mastercard

Can digitisation solve it?

Digitisation has a critical role to play in helping address some of these challenges. While it has not been done at scale in any developing country, India has the right strategy and assets to take the lead. However, what is critical to understand is that the answer does not sit with credit digitisation alone, *one needs to digitise the entire complex Agri ecosystem*. We can do this by:

Digitising Data – Digitising the profile, land, and harvest data of 150M farmers and FPO members is not an easy feat, especially when you consider the multiple physical data sources where these details sit (or not sit), and linking it to a single farmer ID.

Commerce Digitisation – Digitising farmer produce sale, inputs purchases and other transactions will create valuable digital data on disposable incomes, allowing Banks to underwrite credit or even credit cards for farmers. It will also enable Banks to filter loan applications upfront, bringing down the cost of acquisition for small ticket loans. This data can be complimented by other 'surrogate' data such as past yields estimation, weather and pricing prediction etc, but should not end up replacing it as the underwriting core.

End Use Restriction - As most farmers will tell you, KCC gets used more for personal use cases than to purchase farming inputs. Ensuring end use restriction of credit funds via MCC codes

or closed loop wallets can ensure deployment of credit for productive purposes, thereby leading to higher yields, and boosting the repayment rate significantly.

Roles-based Digital Ecosystem

To take advantage of the Banking rural lending void, the ag-fintechs saw the opportunity and jumped in, with their a) data/tech platforms, b) higher risk credit products and c) last mile (supply chain) networks. But as we have seen so far, not many have scaled, or even showcased early successes at a unit level, as the cost economics don't work out, esp. when you are running on venture capital. The cost of each Ag-fintech running their own platform gets aggregated into the loan cost to the farmer, and value creation is minimized.

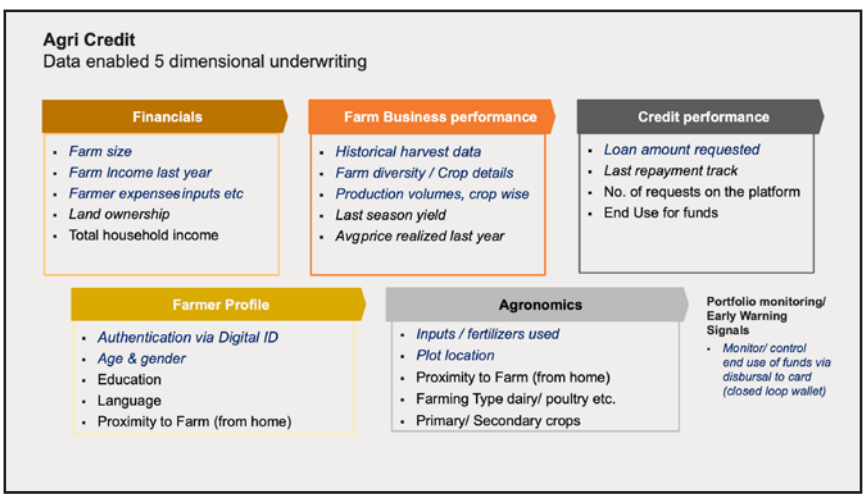
The problem can be broken down as below-

- Building tech platforms is expensive and distracts from the core purpose of engaging the farmers and digitising paper based data. This role should be passed on from ag-fintechs to public-private partnership-led ecosystem players.
- Ag-fintechs lack capital for lending and are dependent upon Banks through co-lending structures. Until the Banks recognise the need to innovate their products and move this activity beyond lip service and/or small pilots (having minimal balance sheet impact), it will not be able sufficient to impact the 146M credit hungry farmers in India. Most Private sector Banks have an 8-12% agri Priority Sector Lending (PSL) ratio today, against the stipulated 18%. Hence, this warrants a strong call to action from the regulators!
- Rural last mile networks are a tough (and expensive) challenge to solve for, and ag-fintechs don't have the expertise for it. There is a need for a commercially driven multi-product open loop rural agent network, that can serve rural consumers across agricultural, financial, and commerce needs. While some quasi-NGO entities have tried this out, the model works only if it is commercially viable at scale

Potential Pathways Forward

- **Get out of pilot mindset –** we need to incentivise the ecosystem players to build and deploy for commercial scale. Most agtechs seem to be in pilot mode. COVID was the watershed for fintechs, what will it be for agtechs?
- Innovate Products for scale – Modify PSL requirements that force Banks to innovate for scale. This could include Buy Now Pay Later (BNPL) products at Inputs merchants, along with regular credit. Today this PSL requirement is easily overcome by purchasing certificates, although is dampens your bottom line, but doesn't force the Bank to venture out into the risky smallholder farmer credit universe.
- Create binding partnerships via equity or incentives – We have seen so many MoU based partnerships that don't go anywhere. In most cases Banks look at agritechs as just another channel, with secondary priority afforded to such leads. The Govt and even the regulator should promote and incentivise hard partnership structures even within the Banking setup that allow for mutually aligned objectives and stronger synergies
- Compliment data with risk guarantees – It is tough for large Banks to build new products driven by new data points that were not available earlier, without assessing the correlation of this data to loss outcomes in great depth. Having credit guarantees supported by Govt entities can significantly accelerate the process.
- Build a commercial last mile entity – Scale will not come from limited time funded NGO driven agents, or part time kirana stores trying to push credit applications alongside Maggi, it needs the Private sector or Governments (or both) to put down a network of 500K dedicated agents trained to serve the rural segment. The CSC and even the India Post re-imagination is a good beginning in this direction
- Build open loop tech platforms to engage the entire ecosystem- Agtechs have launched several innovative solutions for the farmers; however, most haven't scaled due to their inability to integrate and work with other agtechs, and lack of an overall ecosystem approach. What is needed is a 360-degree solution for all rural stakeholders, and an ecosystem builder, that can converge various agtechs to a single platform

Mastercard's Community Pass digital ecosystem platform is one such solution that enables all of the above and can complement Government programs like ULI, e-nam 2.0 and Agristack. The platform works on- and off-line, without the farmers needing a smartphone or connectivity, to bring together all the stakeholders in the ecosystem, and enabling data flow to Banks.



Agriculture Finance And Crop Insurance: Need for Adapting to the New Trends

The Indian agriculture sector is undergoing a significant transformation. With the increasing predominance of fruits and vegetables, a shift in grain production, and evolving export compositions, it is imperative that agriculture finance and insurance adapt to these changes. Traditional funding practices, which focus heavily on pre-production in a conventional manner, are no longer sufficient to meet the dynamic needs of modern agriculture. However still we are continuously concentrating on the pre-production activities, more and more. There was a news post in Business standard dated 11th of January 2025 that Budget may raise the KCC limit to Rs5 lakhs when already almost about Rs 9 trillion outstanding is under KCC, and the product policy warrants a 10% auto increase each year, while the production in grains do not increase beyond 5% annually. In this context, this article explores the changing shape of Indian agriculture and underscores the need for a revamp in financial strategies, land laws, and the role of Farmer Producer Organizations (FPOs).

The traditional approach fails to consider the cash flow patterns and just focusses on a model of estimating scale of finance aided with an operative account with little of monitoring at the ground.

Changing Dynamics of Indian Agriculture

Indian agriculture has traditionally been dominated by staple crops such as rice, wheat, and pulses. However, recent years have seen a remarkable shift towards the cultivation of high-value crops like fruits and vegetables. According to the Ministry of Agriculture, the production of fruits and vegetables has grown at an annual rate of 4.8% over the past decade, compared to 2.1% for cereals. In fact, fruits and vegetable production has exceeded grain production, marking a significant shift in the agricultural landscape.

Similarly on the export front, composition has also seen a transformation. While in early 80s/90s cereals (mainly Basmati) contributed more to agricultural exports, this composition is changing, with a growing share of fruits and vegetables in the export basket. Fruits and vegetables have surpassed more than 10%, and in 2022-23, horticulture exports grew by 12%, contributing substantially to the agricultural export basket. This shift underscores the need for export-oriented financing models that

About the **AUTHOR**

Chattanathan D,
Co founder Arya.ag

cater to the specific requirements of horticulture.

Traditional Financing Practices: A Mismatch

Despite these changes, the financial practices in the agriculture sector remain largely traditional. The majority of agriculture financing still focuses on pre-production activities, such as seed, and fertilizer procurement mostly given by way of KCC as given herein above. These loans do not align with the needs of modern, diversified agricultural practices. For example, the cultivation of fruits and vegetables requires different financing models, as these crops have shorter cycles and higher post-harvest costs. Further mechanisation of farms needs more focus on precision farming and equipment's like drones which matter for managing such farms.

The traditional approach fails to consider the cash flow patterns and just focusses on a model of estimating scale of finance aided with an operative account with little of monitoring at the ground. Today it is technically possible with all advance methods of monitoring to follow a cash flow pattern, and separate risk profiles associated with modern agricultural activities, including horticulture and export-oriented farming. While I know it would not be a overnight change across but an attempt to fund farming based on cash flow methods have to be started somewhere.

Need for Innovative Financing Model

To address these challenges, there is a pressing need for innovative financing models that cater to the evolving needs of the agriculture sector. Here are some key areas that require attention:

Post-Harvest Financing: With the increasing production of perishable items like fruits and vegetables, there is a need for financing solutions that cover post-harvest activities, including storage, transportation, and marketing. Warehouse receipt financing can be a viable solution, enabling farmers to access credit against stored produce. While this could grow substantially

There is a need for customized insurance products that cater to the specific risks of high-value crops, climate change, and market fluctuations.

the reluctance is still there because of overlaying the operational risk in such finance, while controls have been better facilitated over period

Customizing EPC/FBD Models: Export-oriented farms should not be subject to non-export policies, as they require specialized financing models. Customizing Export Packing Credit (EPC) and Foreign Bill Discounting (FBD) models for farming can provide greater visibility of transactions and structure finance accordingly. This is particularly important for farms producing export-led crops, ensuring they have access to the necessary funds and risk management tools.

Risk Mitigation through Insurance: Traditional crop insurance schemes often fail to cover the diverse risks associated with modern agriculture. There is a need for customized insurance products that cater to the specific risks of high-value crops, climate change, and market fluctuations. Parametric insurance, which provides payouts based on predefined triggers like rainfall or temperature, can be an effective tool in this regard. While these are available tools either due to the cost structures associated or reluctance due to non-education are not paving enough way. Further the need for crop insurance claims to go through the crop cutting experiments, can be eliminated with farm level insurance mapped to the specific crop.

Reforming Land Laws for Congruous Cultivation

One of the significant barriers to efficient agricultural production in India is the fragmented nature of land holdings. Already with 84% of the farms being small and marginal and which is further going to increase only over period , there is a critical need to address this issue. Small and scattered land parcels make it challenging to adopt modern farming techniques and achieve economies of scale. To address this issue, there is a need to reform land laws to allow the swapping of lands between FPOs (Farmer Producer Organizations).Land swapping can enable FPOs to consolidate land holdings, facilitating congruous land cultivation. This approach can lead to better land management, higher productivity, and reduced costs. Looking a decade down, I feel there is a strong need for reforming land laws to address this issue.

Evolving Role of FPOs and Banks Adapting to the Changing Needs

FPOs have traditionally functioned as enterprises for aggregation, helping farmers access markets and negotiate better prices for their produce. However, there is a growing need for FPOs to evolve beyond mere aggregation and take on a more active role in farming.

By engaging directly in farming, FPOs can leverage their collective strength to adopt modern agricultural practices, invest in technology, and improve resource management. This shift can also enable FPOs to access better financing options, as they become more integrated into the agricultural value chain. The government's support in terms of policy and financial incentives can further accelerate this transformation.

Thus the changing landscape of Indian agriculture necessitates a fundamental shift in how agriculture finance and insurance are approached. Traditional practices are no longer sufficient to meet the diverse needs of modern agriculture. Innovative financing models, reformed land laws, and an evolving role for FPOs are crucial to ensuring that the agriculture sector continues to thrive in the face of changing dynamics. It is time for policymakers, financial institutions, and stakeholders to collaborate and create an enabling environment that supports the growth and transformation of Indian agriculture and move away from KCC alone as a concept.

CLIMATE FINANCE IN INDIAN AGRICULTURE: GREEN PATHWAYS TO RESILIENCE

Climate change is increasingly hindering India's development and threatening future economic growth. The 2021 Germanwatch Global Climate Risk Index ranks India 7th globally for weather-related losses and climate risks. Agriculture, which supports approximately 50% of India's population, is particularly vulnerable to climate change. Rising temperatures, especially in the Indo-Gangetic plains responsible for 14-15% of the global wheat yield, could cause a 50% decline in wheat production by 2050 and reduce crop gross margins by 11%.

Moreover, over 80% of India's population lives in districts highly exposed to hydro-meteorological disasters. Studies suggest that by 2040, India's poverty rate could rise by 3.5% due to declining agricultural productivity and higher food prices in a warming scenario.

Agriculture and Global Climate Action

While agriculture is one of the most climate-vulnerable sectors, it also contributes significantly to global greenhouse gas emissions. This dual role places agriculture at the center of global climate discussions. Over the years, initiatives under the UNFCCC (United Nations Framework Convention on Climate Change) and COP (Conference of the Parties) have emphasized the importance of integrating climate-smart agriculture into climate action:

- **COP 21 (Paris, 2015):** Launched the Global Alliance for Climate-Smart Agriculture (GACSA).

Estimates indicate that India's cumulative investment needs for adaptation-related interventions could reach at least INR 85.6 trillion annually through 2030.

- **COP 22 (Marrakech, 2016):** Promoted climate-smart agriculture (CSA).
- **COP 23 (Bonn, 2017):** Launched the Koronivia Joint Work on Agriculture.
- **COP 24 (Katowice, 2018):** Focused on financing mechanisms for CSA through funds like the Green Climate Fund (GCF).
- **COP 25 (Madrid, 2019):** Highlighted the role of carbon markets in incentivizing CSA adoption.
- **COP 26 (Glasgow, 2021):** Introduced the Agriculture Innovation Mission for Climate (AIM for Climate) to boost investment in climate-smart agricultural innovations.The Global Methane Pledge, launched at COP 26 (2021), includes 159 countries aiming to reduce global methane emissions by 30% by 2030 from 2020 levels. The agriculture sector contributes about 40% of methane emissions, mainly from livestock (enteric fermentation), rice paddies, and manure management. Given methane's potent short-term warming effect, reducing these emissions is crucial for meeting global climate targets.
- **COP 27 (Sharm El-Sheikh, 2022):** Prioritized climate finance for developing countries and launched the Food and Agriculture for Sustainable Transformation (FAST) initiative.

About the **AUTHORS**

Dr. Bishwa Bhasskar Choudhary, Scientist, ICAR-IGFRI, Jhansi
and Dr. Smita Sirohi, Principal Scientist, ICAR, New Delhi

Indian and Climate Finance

India has demonstrated progress in green finance, with domestic capital playing a critical role. According to the 2024 Climate Policy Initiatives (CPI) report, *Landscape of Green Finance in India,* finance for mitigation sectors reached INR 3,712 billion annually in FY 2021/22, while adaptation finance stood at INR 1,092 billion annually, primarily sourced from government budgets. However, a significant funding gap persists, with cumulative investment needs for adaptation-related interventions estimated at INR 85.6 trillion annually through 2030.

Taking cognizance, India is making progress in increasing green finance flows for both mitigation and adaptation,

with domestic capital playing a key role. According to the latest Climate Policy Initiatives (CPI) report (2024), finance for mitigation sectors reached INR 3,712 billion annually in FY 2021/22, primarily focusing on clean energy, transportation, and energy efficiency. Adaptation finance amounted to INR 1,092 billion annually, with government budgetary expenditure accounting for 97% of this total. For on-farm adaptation-related agricultural activities, the annual average was INR 265 billion, with 95% of this funding sourced from government budgets, indicating limited private sector involvement.

Crop insurance received 58% of finance to on-farm adaptation-related agricultural activities, with central and state government budgets accounting for the total flows. Resilient cropping systems (19%) and efficient irrigation systems (14%) were the other two subsectors that received the remaining major portion of finance to on-farm adaptation activities in agriculture.

These investments reflect India's commitment to making its agriculture more climate-smart; however, a significant funding gap remains. Estimates indicate that India's cumulative investment needs for adaptation-related interventions could reach at least INR 85.6 trillion annually through 2030. Therefore, it is crucial to significantly scale up green finance in the agricultural sector, and do so without delay.

Climate finance aggregation platforms can pool small-scale investments into larger portfolios, reducing transaction costs and attracting institutional investors.

Key Strategies for Scaling Climate Finance

To bridge this funding gap and make agriculture climate-resilient, we propose the following strategies:

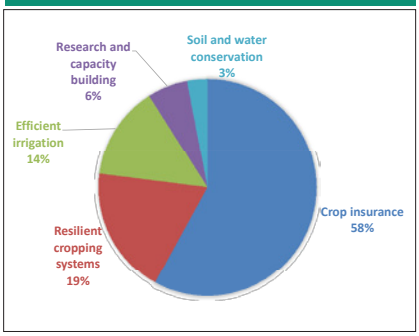
Tailored Financial Products for Climate-Smart Agriculture

Financial institutions must design products like low-interest loans, subsidies for sustainable technologies, and insurance against extreme weather events. Expanding programs like the Kisan Credit Card (KCC) to include climate-smart loans for solar-powered irrigation and rainwater harvesting can provide farmers affordable credit for adaptive solutions.

Risk-Sharing Mechanisms and Guarantees

Governments and development agencies should establish risk-sharing mechanisms to incentivize financial institutions to support agriculture. For instance, NABARD could collaborate with commercial banks to create a loan guarantee fund for climate-smart technologies. Additionally, expanding weather-indexed insurance schemes to cover a broader range of climate risks can encourage farmers to adopt resilient practices.

Finance to on-farm adaptation activities in agriculture subsectors in India



Data Source: Climate Policy Initiatives, 2024 (available at: climatepolicyinitiative.org/publication/landscape-of-green-finance-in-india-2024/)

Public-Private Partnerships (PPPs) for Climate Finance

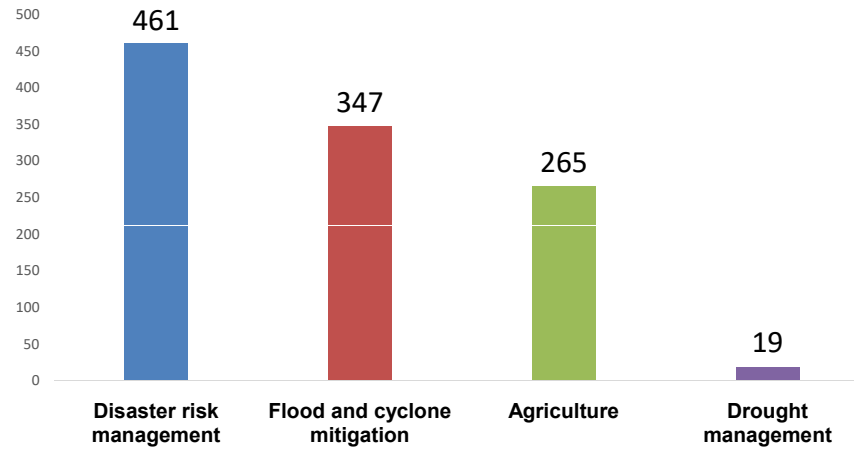
Blended finance models can effectively mobilize private investment for climate-smart agriculture. For example, public funds could offer guarantees against weather-related losses, while concessional loans could reduce capital costs for farmers adopting sustainable practices. Initiatives like the India Climate Collaborative (ICC) demonstrate the potential of PPPs in mobilizing resources for climate solutions.

Green Bonds and Climate Finance Aggregation Platforms

Green bonds can raise funds for sustainable agricultural projects like water-efficient irrigation systems and drought-resistant crops. Climate finance aggregation platforms can pool small-scale investments into larger portfolios, reducing transaction costs and attracting institutional investors. For instance, the Climate Finance Innovation Lab in India could aggregate investments in solar-powered irrigation systems or organic farming.

**Views expressed are personal*

Finance for adaptation in FY 2021/22 (INR bn)



Data Source: Climate Policy Initiatives, 2024 (available at: climatepolicyinitiative.org/publication/landscape-of-green-finance-in-india-2024/)

STRENGTHENING FARM CREDIT
SCHEMES AND PROGRAMMES FOR AGRI CREDIT EXPANSION

Agriculture constitutes an important economic sector in terms of employment. Access to credit has remained one of the important challenges of the sector and the Government of India has therefore initiated several policy measures to improve the accessibility of farmers to the institutional sources of credit. Through several policies and schemes the government has keenly emphasised on progressive institutionalization for providing timely and adequate credit support farmers.

Over the past decade, agricultural credit has consistently grown at an average rate of 13 per cent. In FY25, it is anticipated to reach around Rs 27-28 trillion in agricultural credit, higher than growth rates in other sectors. The informal credit sources is declining significantly and this shift indicates a trend towards the formalisation of rural credit. In FY24, Rs 25.1 trillion (provisional) has been disbursed, surpassing the target of Rs 20 trillion by 25 per cent. Following are a few important schemes that have played an important role in expanding agri credit.

Kisan Credit Card Scheme

The Kisan Credit Card scheme aims at providing adequate and timely credit support from the banking system under a single window with the flexible and simplified procedures to the farmers for their cultivation and other needs. As of June 30, 2023, the KCC scheme has over 74 million active accounts, with a total outstanding credit of Rs 8.9 trillion.

Modified Interest Subvention Scheme (MISS)

The Interest Subvention Scheme (ISS) provides concessional short term agri-loans to the farmers practicing crop husbandry and other allied activities like animal husbandry, dairying and fisheries. ISS is available to farmers availing short term crop loans up to Rs.3.00 lakh at an interest rate of 7% per annum for one year. Additional 3% subvention is also given to the farmers for prompt and timely repayment of loans thus re-

ducing the effective rate of interest to 4% per annum. The benefit of ISS is also available for post-harvest loans against Negotiable Warehouse Receipts (NWRs) on crop loans for a further period of six months post-harvest to small and marginal farmers having Kisan Credit Cards (KCCs), on occurrence of natural calamities and severe natural calamities. As on 05-01-2024, 465.42 lakh new KCC applications have been sanctioned with a sanctioned credit limit of Rs. 5,69,974 crore as part of the drive.

Pradhan Mantri Kisan Samman Nidhi (PM-KISAN)

PM-KISAN is a central sector scheme launched on 24th February 2019 to supplement financial needs of land holding farmers, subject to exclusions. Under the scheme, financial benefit of Rs. 6000/- per year is transferred in three equal four-monthly installments into the bank accounts of farmers' families across the country, through Direct Benefit Transfer (DBT) mode. Till now, Rs.2.81 lakh crores have been transferred through Direct Benefit Transfer (DBT) to more than 11 crores beneficiaries (Farmers) through various instalments.

Pradhan Mantri Kisan MaanDhan Yojana (PM-KMY)

Pradhan Mantri Kisan Maandhan Yojna (PMKMY) is a central sector scheme launched on 12th September 2019 to provide security to the most vulnerable farmer families. PM-KMY is contributory scheme, small and marginal farmers (SMFs), subject to exclusion criteria, can opt to become member of the scheme by paying monthly subscription to the Pension Fund. Similar, amount will be contributed by the Central Government. The applicants between the age group of 18 to 40 years will have to contribute between Rs. 55 to Rs. 200 per month till they attain the age of 60. PMKMY is taking care of the farmers during their old age and provides Rs. 3,000 monthly pension to the enrolled farmers once they attain 60 years of age, subject to exclusion criteria. So far 23.38 lakh farmers have enrolled under the scheme.

Pradhan Mantri Fasal Bima Yojana (PMFBY)

PMFBY was launched in 2016 in order to provide a simple and affordable crop insurance product to ensure comprehensive risk cover for crops to farmers against all non-preventable natural risks from pre-sowing to post-harvest and to provide adequate claim amount. The scheme is demand driven and available for all farmers A total of 5549.40 lakh farmer applications were insured under the scheme since 2016-17 and Rs 150589.10 crore has been paid as claim.

Agriculture Infrastructure Fund (AIF)

In order to address the existing infrastructure gaps and mobilize investment in agriculture infrastructure, Agri Infra Fund was launched under Aatmanirbhar Bharat Package. AIF was introduced with a vision to transform the agriculture infrastructure landscape of the country. The Agriculture Infrastructure Fund is a medium - long term debt financing facility for investment in viable projects for post- harvest management infrastructure and community farming assets through interest subvention and credit guarantee support. The Fund of Rs. 1 lakh crore under the scheme will be disbursed from FY 2020-21 to FY2025-26 and the support under the scheme will be provided for the duration of FY2020-21 to FY2032-33. As on 31-12-2023, Rs.33.209 Crores have been sanctioned for 44,912 projects under AIF, out of this total sanctioned amount, Rs 25,504 Crores is covered under scheme benefits. These sanctioned projects have mobilized an investment of Rs 56.471 Crores in agriculture sector.

Formation & Promotion of new 10,000 FPOs

The Government of India launched the Central Sector Scheme (CSS) for "Formation and Promotion of 10,000 Farmer Producer Organizations (FPOs)" in the year 2020. The scheme has a total budgetary outlay of Rs.6865 crores. Formation & promotion of FPOs are to be done through Implementing Agencies (IAs), which further engage Cluster Based Business Organizations (CBBOs) to form & provide professional handholding support to FPOs for a period of 5 years. FPOs get a financial assistance upto Rs 18.00 lakh per FPO for a period of 03 years. In addition to this, provision has been made for matching equity grant upto Rs. 2,000 per farmer member of FPO with a limit of Rs. 15.00 lakh per FPO and a credit guarantee facility upto Rs. 2 crore of project loan per FPO from eligible lending institution to ensure institutional credit accessibility to FPOs. As on 31.12.2023, total 7,774 FPOs were registered under the scheme in the country.

Credit Guarantee Scheme for e-NWR based Pledge Financing (CGS-NPF)

This scheme introduced in 16 DEC 2024, provides a corpus of Rs 1,000-crore for post-harvest finance availed by farmers against electronic negotiable warehouse receipts (e-NWRs) after depositing commodities in Warehousing Development and Regulatory Authority (WDRA) accredited warehouses. The scheme is a significant initiative as a guarantee cover for the loans availed by farmers/ traders against electronic negotiable warehouse receipts (e-NWRs). CGS – NPF Scheme has been introduced to instill confidence in bankers, encouraging the extension of pledge finance against electronic Negotiable Warehouse Receipts (e-NWRs) for farmers /traders who store their agricultural / horticultural produce in warehouses registered with the WDRA. This scheme majorly focuses on Small and Marginal Farmers, Women, SC, ST and Divyangjan (PwD) farmers with a minimal guarantee fee. Besides, small traders (MSMEs), FPOs are also benefited under this scheme. Loans extended to small and marginal farmers up to Rs. 75 Lakhs will have coverage of 80 to 85% and loans extended to MSMEs/FPO 's /traders up to Rs. 200 Lakhs will have coverage upto 75% under the scheme.

These schemes have benefitted the farming community at large. If followed by a robust monitoring framework they can to a large extent mitigate the associated risks of farming in India. With these efforts for expanding agricultural credit, deepened scope of crop insurance and creation of a social security mechanism dedicated to farmers alone, the farming community's risk taking potential will be enhanced and that will undoubtedly be reflected in the agriculture output of the country.

TRADING IN CARBON CREDITS

The global push for sustainable development and climate action has emphasized the need for solutions to reduce greenhouse gas (GHG) emissions. Among these, carbon credits have emerged as a mechanism that enables countries and corporations to meet their Nationally Determined Contributions (NDCs)(Commitments made by signatory nations to cap rise in temperatures) under the Paris Agreement. Recent analyses reveal that trading in carbon credits could lower the cost of implementing NDCs by over 50%, saving as much as $250 billion by 2030, equivalent to approximately 25,000 crore Indian rupees.

However, the carbon market is fraught with challenges, including inefficacies, lack of regulation, and questions about the credibility of many offset projects.

India's voluntary carbon market is valued at over $1.2 billion, with 1,451 projects registered or under consideration at leading carbon registries.

Understanding Carbon Credits and Their Market Structure

A carbon credit represents the reduction or removal of 1,000 kilograms (1 ton) of CO☐ or its equivalent from the atmosphere, effectively offsetting emissions generated elsewhere. Carbon credits are generated through various projects, such as renewable energy,

The carbon trade market operates through two primary avenues:

Compliance Markets

Compliance markets are governed by regulatory frameworks under national, regional, or international carbon reduction schemes. These markets use a cap-and-trade system, where governments or authorities set an emissions cap for industries and allow the trading of emission allowances or credits.

India's National Carbon Market, developed under the Perform, Achieve, and Trade (PAT) scheme, is a prime example. This initiative aim to curb energy consumption in energy-intensive sectors by setting benchmarks and encouraging efficient practices.

Voluntary Carbon Markets (VCM)

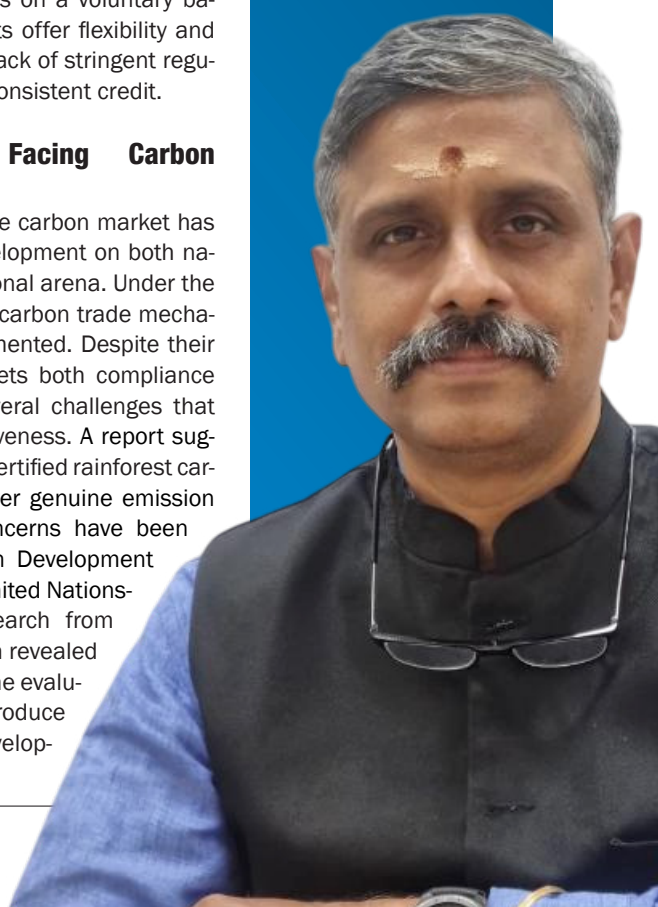
VCMs operate outside regulatory compliance, enabling companies and individuals to purchase carbon offsets on a voluntary basis. While these markets offer flexibility and support projects, their lack of stringent regulation often leads to inconsistent credit.

The Challenges Facing Carbon Markets

In the last few years, the carbon market has seen considerable development on both national and the international arena. Under the Paris Agreement, more carbon trade mechanisms are being implemented. Despite their potential, carbon markets both compliance and voluntary face several challenges that undermine their effectiveness. A report suggests that over 90% of certified rainforest carbon offsets fail to deliver genuine emission reductions. Similar concerns have been raised about the Clean Development Mechanism (CDM), a United Nations-backed initiative. Research from the University of Munich revealed that more than half of the evaluated projects failed to produce real emission cuts. Develop-

About the **AUTHOR**

Aditya Sesh, Member of the Expert Committee, Ministry of Agriculture & Farmers Welfare

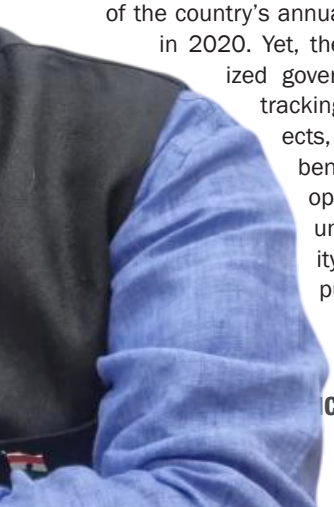


ers often design projects to maximize carbon credits rather than prioritize genuine emission reductions. Critics argue this approach undermines the mechanism's credibility.

My own experience is that of a 10KW solar panel that can almost reduce 10 tonnes of carbon a year. The quality of carbon reduction accounting has come under scrutiny. Due to pandemic restrictions, validation bodies have endorsed projects without conducting on-site inspections, raising concerns about data accuracy. Households that receive these devices frequently revert to traditional cooking methods due to limited engagement and high costs, rendering the initiative ineffective. Carbon finance disproportionately benefits large corporations, with a mere 3-5% of renewable energy project costs covered by carbon credits during the initial crediting period. This skewed distribution of benefits marginalizes local communities, leading to questions about the overall fairness of these markets.

Another concern has been that by purchasing credits from developing countries, developed nations can evade reducing their own emissions. For voluntary markets**,** there are unique challenges such as weak regulation and fluctuating prices. This allows low-quality projects to proliferate and fluctuating prices can lead to windfall profits for developers while leaving communities questioning the value of their contributions.

India's voluntary carbon market is valued at over $1.2 billion, with 1,451 projects registered or under consideration at leading carbon registries. By mid-2023, carbon credits issued to Indian entities accounted for nearly 10% of the country's annual GHG emissions in 2020. Yet, there is no centralized government database tracking voluntary projects, their prices, or beneficiaries. Developers often operate under confidentiality clauses, limiting public accountability.



However

Projects with verifiable, long-term benefits should be prioritised and a pricing mechanism that can reflect the true value of carbon reduction efforts should be made.

In India due to political will and policy foresight, Solar and Wind at 5.8% and 4.5% of actual power generated have exceeded Nuclear energy at 3% of the total 1,624 terra-watt hours of power generated. In fact, in Solar power generation, we are close to the global average. The credit for which must go to our government.

What can be done?

Projects with verifiable, long-term benefits should be prioritised and a pricing mechanism that can reflect the true value of carbon reduction efforts should be made. Along with this, the share of carbon finance allocated to community-focused initiatives can be increased and policies to curb profiteering by developers and ensure equitable benefit distribution can help restore the faith in carbon credits and reduce greenwashing by companies.

As the world navigates the complexities of carbon credits, efforts are underway to expand and deepen markets by encouraging the listing of carbon credits, promoting market makers, and enhancing two-way liquidity. In addition to ensuring rigorous due diligence by OTC buyers to validate the carbon emissions saved by producers, stringent verification processes are essential for both compliance markets (such as the European Union Emissions Trading System (EU ETS), California Cap-and-Trade Program, and China's National Carbon Market) and voluntary markets (including Verra, Gold Standard, and platforms like Climate Impact X). Mandating public disclosure of project data, pricing, and beneficiaries is crucial to ensure that carbon credits fulfill their intended purpose effectively. In Parallel, Local communities should be actively involved in project design and implementation and ongoing support should be provided to encourage behaviour changes, such as incentives for adopting clean technologies. Finally, fundamentally the intent needs to be real!

UNDERSTANDING THE CARBON-CREDIT MARKET

HOW THEY WORK AND WHO BUYS THEM

The carbon credit market is a landmark financial instrument in the world's fight against climate change. By encouraging organizations, governments, and enterprises to participate in greenhouse gas emission reduction activities, the credits incentivize them to adopt environmentally sustainable practices. With the increasing concern about climate change globally, it is very important to know how the carbon credit market operates and identify its key players.

Carbon Credit Market

The carbon credit market is mainly divided into two broad types, namely compliance markets and voluntary markets. Compliance markets are those markets that have been set up and regulated by the state so that some industries are subjected to prescribed emission reduction levels compliance. Such emissions are bought or sold allowances among firms as required. For example, if a business is less gaseous than what it should emit under the cap, the excess amount may be sold to another company that has exceeded the limit.

By putting a financial value to reducing emissions, innovation, funding, and development of low-carbon technologies will be incited and developed.

For example, under the PAT Scheme under the Bureau of Energy Efficiency, the Indian scheme should be considered very effective. Thirteen energy-intensive sectors were covered, varying from 2012 to 2023, achieving energy savings of 17.9 million tonnes of oil equivalent and significant emission reductions. Furthermore, India will now likely set up its compliance carbon market by 2026, covering 11 key sectors such as steel, cement, and power generation, against an intensity approach for emissions limits.

In fact, through voluntary carbon markets, companies, governments, or even individuals may purchase carbon credits voluntarily outside mandatory regulatory systems to offset their emissions. Such voluntary credits are usually put to use by organizations in their strategies for corporate sustainability, as evidence of their leadership in tackling climate change, although not required by law to do so. Voluntary markets are populated mainly by sectors like airlines and technology companies that want to give the public an idea of their attainment of a low-impact environment through this alternative financing to sustain certain environmentally beneficial projects.

About the **AUTHOR**

Dr. Sat Kumar Tomer is the Founder & CEO of Satyukt Analytics

Sources of Carbon Credits

Some common sources of carbon credits include reforestation and afforestation undertakings, renewable energy schemes, and capture and storage technologies. For example, trees absorb carbon dioxide from the atmosphere making reforestation projects the pivotal means to earn credits by quantifying the CO☐ removed via tree planting. Renewable energy projects include things like solar and wind farms. Between 2021 and 2023, for

example, India added over 15 GW of annual solar capacity, so that by 2023, the total installed capacity was 71.6 GW. Likewise, carbon capture and storage (CCS) technologies are also gradually becoming popular. In India, CCS is still in its infancy, but pilot projects such as CO☐ capture from industrial plants have been taken up for study. These initiatives are additionally subjected to very rigorous validation and verification processes so that their results are certified to be accurate, indefinite, and on an individual basis, private ones also start buying carbon credits to offset their carbon emissions. Travel by air, energy consumed at home, or activities in between, many consumers are mindful of their impact on the environment and will take measures to balance it with support from such credits.

This is what the carbon credit market does, it builds financial incentives for industries and countries to invest in renewable energy, energy efficiency, and otherwise climate-oriented projects. By putting a financial value to reducing emissions, innovation, funding, and development of low-carbon technologies will be incited and developed. At the same time, the companies will be able to meet their regulatory and corporate sustainability objectives of offsetting emissions when direct reduction is too expensive or difficult.

Challenges

Carbon markets can deal with emission reduction problems, but still, many barriers exist, such as issues of transparency and verification of how reductions are achieved, equitable access to resources, and investments aligning with measurable and permanent climate benefits. As an example, from 2021 to 2023, India's efforts to establish a compliant carbon market faced hurdles in verifying emission reductions in the sectors of steel and cement, which contribute now more than 20 percent to national emissions.

To say that India has been able to address the barriers through the PAT scheme would be an understatement as PAT saved a staggering 17.9 million tonnes equivalent of oil energy from 2012 to 2023, but the challenge remains on real measurable impacts since pilot projects always need strong monitoring frameworks and standardized reporting systems to verify claims.

In conclusion, the carbon credit market has become an essential part of the global fight against climate change. By enabling governments, corporations, investors, and individuals to offset carbon emissions, this system not only fosters innovation and climate action but also promotes sustainability worldwide. With proper governance, technological innovation, and collaboration, the carbon credit market will likely continue to grow, offering an important pathway toward achieving a greener, more sustainable future.

BOOSTING PLEDGE LOANS IN AGRICULTURE

Priority sector lending is an important part of India's banking landscape – working capital, pledge loan, and term loan are some major products to achieve the priority sector lending target that is 40% of adjusted net bank credit (ANBC). While bankers are pushing kisan credit card or crop loans to attain the PSL target through a direct lending route, pledge loans against agri commodities could be developed as a safe product for banks and financial institutions, which can buoy up 'organic lending' to agriculture. However, pledge lending quantum has yet to gain momentum.

To this end, central government has unveiled the Credit Guarantee Scheme for electronic negotiable warehouse receipt (eNWR)-based pledge financing (CGS-NPF) with ₹1,000 crores corpus in December 2024. It is a welcome move to boost pledge loans in agri commodities insuring eligible financial institutions' credit risk.

What are the salient features of the scheme? The scheme included a cap of ₹75 lakhs and ₹2 crores pledge loans for agri and non-agri commodities.

Eligible lenders, mainly scheduled commercial banks (SCBs) and cooperative banks, must pay an annual guarantee fee of 0.40% for farmers and 1.0% for non-farmers to insure credit risk. The scheme will extend 85-80% guarantee cover for ₹3 to ₹75 lakhs of pledge loans for agri commodities and 75% for non-agri commodities.

However, how this scheme will insure warehouseman risk is unclear. As the scheme excludes NBFCs as eligible lenders, how will it boost pledge lending volume from ₹4,000 crores in 2023–24 to whopping ₹5.5 lakh crores in 2033–34? How will the scheme secure bankers to lend 'more' in agri-commodities? Will this scheme promote inclusive and equitable lending – covering smallholders who do not have stellar business turnover, security money, or a credible credit utilization history or repayment track record?

Pledge finance as a short-term loan meets farmers' and agri-value chain actors' liquidity needs and helps them fetch a remunerative price by selling commodities at the right time and repaying loans.

What is Pledge Finance?

Pledge finance has been in vogue since the nationalization period of Indian banking. Banks or financial institutions perfect a security interest on collateral, a negotiable warehouse receipt containing the commodity valuation or stock report, depositor, name of the warehouse and the location, etc. In other words, collateral is an asset or third-party commitment that a collateral taker or lender accepts to secure an obligation of the collateral provider or borrower.

So, banks lend to depositors against the pledge or insert a security interest on collateral. In the case of default, banks liquidate the stocks deposited in a warehouse in association with the warehouse service provider/ collateral management agency and recover the outstanding loan dues. So, a key issue emerges: are banks capable of dealing with the market, operational, and credit risks arising from pledge lending? What are the enablers mediating pledge fi-

About the **AUTHORS**

Kushankur Dey & Indrajit Banerjee
Kushankur Dey is Associate Professor at IIM Lucknow and Indrajit Banerjee is Academic Associate of IIM Ahmedabad.

nance or commodity-based structure finance?

Key Enablers

The regulatory environment is an essential enabler to boosting pledge finance. For example, warehousing business and physical delivery of agri-commodities enabled by the commodity exchange-traded derivative markets came under regulatory oversight after the Warehousing (Development and Regulation) Act was promulgated in 2007. The act established the Warehousing Development and Regulatory Authority (WDRA) as a statutory body to oversee the warehousing business.

Warehouse service providers (WSPs) and collateral (commodity) management agencies (CMAs) are enablers of pledge finance as they perform several activities, namely commodity inspection, commodity valuation, stock preservation, and management, clearing, and settlement, which eventually manage banks' credit risk. WSPs charge a monthly warehouse space utilization fee, while CMAs charge 1% of pledge loans outstanding by financial institutions.

It is worth noting that WDRA-registered warehouse capacities are only 128 lakh MTs compared to the state-wise warehouse capacities reported at 367.49 lakh MT in March 2024 (see Charts 1 & 2 below). Therefore, push must come from the WDRA to increase WDRA-registered warehouses to buoy up pledge loan volume.

Negotiable warehouse receipts as collateral are critical enablers in pledge finance, which banks pledge while lending.

Negotiable warehouse receipts as collateral are critical enablers in pledge finance, which banks pledge while lending. National-level repositories (NERL and CCRL) are the central record-keeping agencies of eNWR, which infuse trust, traceability, and transparency in the pledge finance and warehousing ecosystem. However, the number of eNWRs against quantities of commodities issued has been skewed to Maharashtra, Karnataka, and Rajasthan, producing and trading high-value commodities (see Chart 3).

Policy suggestions

Pledge finance as a short-term loan meets farmers' and agri-value chain actors' liquidity needs and helps them fetch a remunerative price by selling commodities at the right time and repaying loans. Thus, the government should promote a vibrant warehousing ecosystem as an enabler of pledge finance.

The WDRA can rationalize security deposit, registration, and renewal fees for lower-capacity (500–1,000 MT) warehouses utilized by farmer collectives (FPOs). Repositories can also reduce eNWR charges to increase farmers' access to pledge loans.

Second, banks are more interested in non-agri-commodity lending, while a few commercial banks with specialized agri-lending divisions continue to agri-commodity lending. The banks' motivation for commodity lending depends on the cost of funds, appraisal costs, and credit risk coverage. Since the scheme extends credit risk coverage of 80-85% for agri commodity loans of ₹75 lakhs and 75% for non-agri commodities of ₹2 crores, banks have to weigh their cost of funds and appraisal costs and realize a positive net interest margin over lending costs.

Third, banks often prefer to lend to traders or resource-rich farmers. However, priority sector lending targets would compel banks to onboard smallholder farmers or their agencies, FPOs, as potential borrowers for pledge loans of at least ₹3-₹5 lakhs. Interest subvention and prompt repayment incentives applicable to crop loans or KCC would improve farmers' bankability and timely credit access.

Fourth, the scheme can attract new eligible lenders to venture into agri-commodity lending. e-Kisan Upaj Nidhi, an online platform, will reduce lending transaction costs as the platform will facilitate discovery, matching, and transactions between borrowers and lenders.

Fifth, the government must set up an independent agency or incorporate a trust to implement and manage the scheme effectively. The agency must ensure that there is no duplication of guarantee funds that banks use to insure credit risk of pledge loans through CGS-FPOs and CGS-NPF.

To sum up, although the corpus is small relative to ₹60,000 crores market size of pledge finance reported in 2023–24, the scheme can push bankers to lend more in agri-commodities if a vibrant agri-warehouse ecosystem is created and help them achieve priority sector lending target.

**Views are personal.*

Unified National Agricultural Market in India

A diverse country, with 127 agro-climatic zones as per the NARP classification, India is home to large number of varieties of different crops and is largely self-sufficient for consumption demands, besides having exportable surplus in some barring the few types of pulses and oilseeds. This situation is cause of large volume of trade within country with estimated about 40,000 local agricultural markets in a country of over 6,50,000 villages for a population of about 140 billion people, if periodic markets are taken into consideration. According to estimates of India Brand Equity Foundation, the size of agricultural marketing in India is to reach USD 24 Billion by 2025. About 70% of India's agricultural and food market is estimated to be in retail segment.

Current System of Commodity Procurement

Traditionally and till recent time, the agricultural procurement has hovered around the market places run by local Agricultural Produce Marketing Committees (APMCs) or Mandis. The farmers bring their produce to AMPCs, where the locally licensed commission agents bid for the produce and theoretically through the competitive bidding the produce is expected to be sold at best price obtained. In practice however at different locations due to limited number of licensed commission agents operating in the market, often a cartel of bidders is formed which tends to check the prices from rising and thus depriving farmers of the rightful dues. There is Government system of procurement at Minimum Support Price, their reach is however limited to a smaller number of commodities.

Government of India in 2016 launched the scheme of e-NAM, with a vision to make a Unified Single Market for Agricultural Commodities, where any market participant with a single license, can operate in any Mandi on pan-India basis.

The Commission Agent or 'Arhatiya System', has however certain advantages too. Given the condition of reach of formal credit system, where the large group of farming community, particularly the small and marginal farmers find it difficult to go through the maze of documentation and find it difficult to approach the local bank officials, the local familiar Arhatiya often doubles up as provider of credit support in times of need besides as logistics support provider to collect the produce from farm gate and also as a provider of input supplies for the next crop. This relationship has in several cases strengthened over time.

The relationship between the farmers and Commission Agents however more often than not leaves the farmers at the receiving end, in most cases depriving them of remunerative prices. Realizing this, the Government of India in 2016 launched the scheme of e-NAM, with a vision to make a Unified Single Market for Agricultural Commodities, where any market participant with a single license, can operate in any Mandi on pan-India basis. This was given to give the farmers an all India access for their produce so as to get realization of the best prices for the produce and reduce their dependence on local commission agents only, through the nationwide electronic trade and associated logistics support.

The Government is providing a financial support of Rs. 75 Lakhs for APMCs who integrate with e-NAM so as to cover the infrastructural and other requirement of the scheme. As per data avail-

About the **AUTHOR**

Kamlendra Srivastava is Managing Director & Chief Executive Officer Managing Director & Chief Executive Officer of Countrywide Commodity Repository Limited and Executive Director, NAFED

able, so far 1260 APMCs have integrated with e-NAM out of over 7300 APMCs and their submarket yards in the country as per the records of Govt. of India. As per estimates even after about 7 years since inception, however trade volume recorded on e-NAM is a small fraction of total estimated trade in agricultural commodities happening in India.

Implementation of the desire of the National Agriculture Market is however is not a cakewalk due to the following major challenges:

Institutional Challenges

Marketing of farm produce in India is a state subject, meaning that the State Governments have overriding powers in the domain. The scheme promoted by the Central Government has not found takers amongst some State authorities due to various reasons. Thus, there are few States & UTs in the country who are yet to integrate their markets with the e-NAM network by adopting legislative framework required. The resistance from the powerful block of commission agents seeing it a threat to their livelihood is also a factor hindering the growth of the scheme.

Infrastructural Challenges

Electronic trading in real time basis is the essence of the system, which has certain infrastructural requirements in terms of continuous availability of power supply during the trading hours as well as good communication network for trade to happen speedily on real time basis. In some areas where the scheme has been implemented this still remains a challenge.

Assaying Infrastructure Requirement

Determination of quality parameters for the stock that has been put in block for the trade is a major input for the price discovery. Availability of credible assaying infrastructure to quickly determine quality parameter of the produce and to upload it online on the real time basis on the trading system still remains a challenge. In absence of the same, the quality parameters data upload in offline mode after physical assaying of the stock, suffers from credibility issues, as there are chances of variation in the actual parameters and data uploaded on the system in offline mode. Thus, the buyer of the commodity at location of the country away from the market place is not able to take a decision on the actual quality parameters and resultant price quotes for particular commodity. In such cases the buyer continues to depend on the information provided by the locally available trading partner, who is more often than not the local commission agent.

As per data available, so far 1260 APMCs have integrated with e-NAM out of over 7300 APMCs and their submarket yards in the country as per the records of Govt. of India.

Linkages with the local Warehouses, Cold Storages and Logistics Network

Some commodities particularly the horticultural produce which are highly perishable in nature, require immediate logistics support in terms of their movement and if required, storage in the local cold storages or warehouses. Given the state of non-uniform spread of storage networks across the country, this also will remain a major bottleneck in the implementation of National Agriculture Market till resolved suitably.

Interoperability with other Electronic Trading Platforms

Parallel to e-NAM there are other privately promoted electronic trading platforms which are fairly successful though mostly on regional basis. Their interoperability with the e-NAM system has been a challenge till recently. However, with action taken by the concerned authorities in the direction of late, this issue is expected to be resolved in near future.

Thus, we can conclude that the National Agricultural Market, a scheme very well conceptualized for the benefit of Indian farmers can do wonders for the uninhibited nationwide trade of agricultural commodities and for stakeholders related to it. The above-mentioned issues particularly in the field of assaying are however major roadblocks which need to be resolved for the effective implementation and thus for the long-term benefit of agricultural community and consequently Indian economy as a whole.

INFINITE GRIT UNDER INCESSANT PERILS: A TALE OF RESILIENCE FROM THE FLOOD-PRONE PADDIES OF ASSAM

In the absence of adaptation measures, the yields of rainfed rice in India are projected to reduce by 20 percent in 2050 and 47 percent in 2080: Bhagirath Choudhary, Minister of State for Union ministry of Agriculture and Farmers Welfare, reported in Loksabha on July 30, 2024. Assam tells a story of resilience, where a poor state with developmental lag and severe climate aberrances is exhorting its farmers to adopt climate-resilient rice varieties to adapt, through state-led efforts.

A recently published article in one of the journals from the nature portfolio group argues that excessive and deficit rainfall reduces rice yield in India by 33.7% and 19%, respectively. Last year, during the G20 technical workshop on climate resilient agriculture, the policymakers highlighted findings from an ICAR study that projected a 47 % reduction in the yield of rain-fed rice by 2080, if climate change adaptation measures are not practiced.

For small-scale farmers with limited rain-fed lands and fewer assets, especially from underprivileged states like Assam in the rice belt of North-East India, the climate crisis is extremely dire. The state's agricultural policy landscape is primarily shaped around the demand-supply paradigm of rice, as the crop contributes to over 90 % of the total cereal production and consumption in the state. Notably, 80% of the gross cropped area under rice is dedicated to *Sali* paddy/winter rice, which is predominantly rainfed. This is to say that every year, the soils and the farmers of Assam await pre-monsoon and monsoon showers with bated breath. Yet, many times, instead of ushering in relief and a bountiful harvest, the raging waters bring death, destruction, and irreparable losses, more so in the context of aggravating climate crises.

With rice at the heart of food security and rice-based farming systems forming the major livelihood option for at least 20 lakh farm families in the state, weather abnormalities and associated decline in production would be ravaging.

The official estimates on the flood-related perils in the state paint a grim picture. According to the National Commission on Floods, 40% of the total land area in Assam is prone to floods, constituting almost 10 % of the nationally flood-prone regions. Floods, or more aptly submergence, remain the prepotent threat for rice as well. As per estimates made by the International Rice Research Institute (IRRI), out of the total 2.3 m ha (gross cropped) rice area in the state, 1.05 m ha is moderately, and 0.36 m ha is chronically flood-prone. Shockingly, since 1954, the state has lost 3,800 square kilometers of farmland, around half the size of Sikkim, to floods.

The Nexus of Floods, Poverty, and Food Security

Floods are cataclysmic, and so is poverty. Populations exposed to both high levels of poverty and flood risk tend to reside in regions experiencing compounded threats from socio-political instability, climate change, and resource constraints impeding effective risk management. As the poor lack the means to cope with large shocks, these weather abnormalities tend to put the vulnerable in a persistent poverty trap. A 2013 study conducted in Lakhimpur and Dhemaji, the two most flood-prone districts of Assam, reported that 83% of the households in these districts are

About the **AUTHORS**

Dr. Lisa Mariam Varkey is a Senior Specialist: Socio-Economics in IRRI who worked in APART and Dr. Virendar Kumar is an Agronomist and was Resident Co-ordinator for IRRI-APART program.

vulnerable to poverty due to flood. In a 2022 study, Assam was identified as one of the three Indian states where climate hazards have the highest potential to disrupt local food supply.

With rice at the heart of food security and rice-based farming systems forming the major livelihood option for at least 20 lakh farm families in the state, weather abnormalities and associated decline in production would be ravaging. For the resource-poor farmers of the state, low-cost, scale-neutral technologies that are easy to adopt yet minimise risks are the best undemanding solutions to this perennial conundrum. Amid diverse rice innovations offered in the last 5 years, this is the reason why submergence tolerant rice varieties were adopted on a magnificent scale in the state.

Standing tall amidst the inundation: The winning case of stress-tolerant rice varieties (STRVs)

In the past, the region was dominated by long-duration high-yielding rice cultivars which would perish in the standing water. Farmers in these stress-prone areas used to apply little inputs for fear of losing not only crops, but also the applied inputs in case there is flood/drought. To ensure that these production constraints are overcome with minimal externalities, the state needed access to varieties that would perform better under water stress, are not input intensive and/or are early-maturing, and therefore better adapted to changing rainfall patterns. In 2018, a mega developmental project titled APART, funded by the World Bank, was initiated in the state which paved the way for the introduction of 9 stress-tolerant (flood/drought) rice varieties over a period of 5 years. The state agencies led by Assam Agricultural University and DoA, Assam, with technical support from IRRI, played a crucial role in scaling and positioning these varieties.

This was achieved through:

- Creating awareness and demand among farmers through demonstrations
- Engaging stakeholders and establishing connections through participatory events and wider dissemination by reaching out to key contacts and informal leaders
- Building capacity for localized quality seed increase
- Establishing strategic early-generation seed linkages with state-based seed multiplying agencies as opposed to NARES breeding sources
- Strengthening existing and alternative seed institutions, processes, and infrastructure

In Assam's landscape, where no meal is complete without rice and floods never stop surging, STRVs as a composite would never cease to be relevant.

In the field demonstrations, when the non-STRVs mostly succumbed to floods, these climate-resilient varieties stood tall with 92% and 74% survival rates at 3-7 days and 14-16 days, respectively. While ~56 % yield gain was observed under flood conditions, a yield increase of 9.5 % under the no flood scenario also vouched for their trait of no yield penalty even in a normal scenario.

Follow-up studies have reported an average yield gain of 0.5 t/ha with the adoption of STRVs alone and 1.1 t/ha through crowded-in effects (complementary use of best management practices), translating into an average income gain in the range of Rs 10,000-15,000/ha for the adopters. As of 2023, the state, through formal and informal dissemination, is estimated to have brought in 0.5 million ha, *i.e,* 20% of rice GCA, under these varieties. For every 1 rupee invested by the state on seed systems and complementary best management practice packages in the last 5 years, a return of 10 rupees is estimated on net present value (NPV) terms (IRRI). 85 % of the quantity of breeder seed demanded for *Kharif* rice 2024, is currently constituted by STRVs. With the state machinery engaged in quality seed production ably supported by an invigorated community-based quality seed supply system operated through 15 FPCs, the state has also built a sustainable system to meet the future seed demand.

In Assam's landscape, where no meal is complete without rice and floods never stop surging, STRVs as a composite would never cease to be relevant. Nevertheless, with rising weather aberrancies and changing consumer preferences, old cultivars need to be consistently replaced with new cultivars with enhanced capabilities, such as varieties that can withstand prolonged submergence, combat multiple stresses, are Zn-rich and/or of low and ultra-low glycemic index. With risk minimisation and stable income experienced over time, the varietal adoption should also be transformative towards increasing uptake of agronomic practices, post-harvest technologies and ICT and decision tools that can ably complement/supplement the gains experienced. In the context of agricultural technology-adoption puzzle often reported from rainfed stress-prone areas, Assam stands as a testament to what collective will can achieve. The foundation has been laid, the fort may be strengthened in the coming times.

ECO-FRIENDLY BACTERIAL CONSORTIUM TO CLEAN-UP POLLUTED SOILS

In a recent study, published in the journal 'Environmental Technology & Innovation', by Prof. Prashant Phale, along with his team, discovered that a combination of bacterial strains, isolated from contaminated soils, can break down harmful aromatic pollutants as well as promote plant growth.

The world population is expanding rapidly, leading to increase in food demand requiring increase in crop productivity multi-fold. Post-green revolution, farmers have been using chemical/synthetic pesticides and fertilizers to increase the crop yields. These man-made chemicals are toxic and do more harm than any good. Soil contamination caused by pesticides (insecticides and herbicides), particularly aromatic compounds, is a significant challenge for the agriculture industry. These compounds are toxic to biota including soil microbiome, crop plants and are known to inhibit seed germination, plant growth and decreased crop yield. Repeated application of these compounds lead to poor soil health and fertility thus lowering the crop productivity severely. Numerous aromatic pollutants, including Carbaryl, naphthalene, 2,4-dichlorophenoxyacetic acid, atrazine, phthalates isomers, etc. are widely used in pesticide formulations and are also released as by-products from various industries such as cosmetics, textiles, construction, food and feed preservatives, dyes, petroleum and plastics. Traditional strategies for clean-up of these pollutants, such as chemical treatments or soil removal are often expensive, temporary solutions and insufficient to fully resolve the issue.

To address this problem, researchers from IIT Bombay have developed an innovative, eco-friendly solution to combat soil pollution which also enhance agricultural productivity. A unique consortium of bacteria is developed, which provides a sustainable and natural way to address two of the biggest challenges in modern agriculture: soil contamination and declining crop yields.

In a recent study, published in the journal 'Environmental Technology & Innovation', by Prof. Prashant Phale, along with his team, discovered that a combi-

About the **AUTHORS**

Dr Prashant Phale is the Professor, IIT Bombay and

Sandesh Papade, Ph D Research Scholar, Dept of Biosciences and Bioengg, IIT Bombay,

Treatment with bacterial mixture reduce toxicity of pollutants to mung bean plants grown in contaminated soil and enhanced plant growth

plants grown in non-contaminated soil | Plants grown in contaminated soil | Plants grown in non-contaminated soil and treated with bacterial mixture | Plants grown in non-contaminated soil and treated with bacterial mixture | plants grown in non-contaminated soil | Plants grown in contaminated soil | Plants grown in non-contaminated soil and treated with bacterial mixture | Plants grown in contaminated soil and treated with bacterial mixture

nation of bacterial strains, isolated from contaminated soils, can break down harmful aromatic pollutants as well as promote plant growth. These pollutants, commonly found in pesticides and industrial waste, have long posed a threat to soil health and agricultural productivity. The bacteria in the consortium break down these toxic compounds, turning them into harmless by-products, while also enriching the soil with essential nutrients like nitrogen, phosphorus and iron.

The researchers found that the bacteria not only detoxify the soil, but also improve soil fertility by making nutrients more accessible to plants. In addition, these bacteria produce growth-promoting substances like indoleacetic acid, which helps plants grow stronger and healthier.

Bacterial Team: A Boost for Soil and Crops

One of the key findings of this study is effectiveness of using a bacterial consortium i.e. multiple species of bacteria working together, rather than single bacterial species. This collaborative approach was found to be much more effective because different bacterial species specialize in different tasks.

Each bacterium in the consortium brings its own unique strengths to the table. Some strains excel at breaking down pollutants while others are better at promoting plant growth or defending against fungal diseases. By combining them, a powerful team was created that works synergistically to produce better results. The treatment of bacterial consortium to crops such as wheat, mung beans and spinach, led to a significant increase in plant growth, with crop yields boosting by 30 to 45%.

One of the key findings of this study is effectiveness of using a bacterial consortium i.e. multiple species of bacteria working together, rather than single bacterial species.

A Natural Defence Against Fungal Pathogens

The potential of this bacterial solution extends beyond soil detoxification and plant growth promotion. The bacteria also serve as a natural defence against harmful fungal pathogens that infect the crops worldwide. By producing substances like lytic enzymes and hydrogen cyanide, the bacteria can effectively inhibit the growth of fungi responsible for crop diseases. This makes them an eco-friendly alternative to traditional pesticides.

Toward Real-World Applications

With promising results in the laboratory, the next step for this research is to scale up the technology and test it in real-world agricultural settings. The aim is to develop bio-formulations (products that combine the bacterial consortium with natural, eco-friendly materials) making it easy for farmers to use and store.

Farmers facing soils contamination issues or seeking natural alternatives to chemical fertilizers and pesticides could greatly benefit from such bacterial solution, offering a sustainable approach to improving soil and crop health.

However, widespread adoption is still a few years away. The team is focused on improving the bacterial formulations, ensuring that they can be used effectively in diverse environments and under varying climatic conditions.

A Sustainable Future for Agriculture

This innovative approach represents a significant step toward more sustainable agriculture. Unlike synthetic fertilizers and pesticides, which can damage the environment and pollute water sources, these beneficial bacteria work in harmony with nature. They improve soil health, restore ecosystems and reduce the dependency on chemical fertilizers.

AGRICULTURE FINANCE – THE LAST FRONTIER OF FINANCE

This title may sound ironic considering over Rs 20 lakh crores of agricultural finance is reported by banks under priority sector lending. Questions remain, what is the penetration of agriculture credit? Is it adequate and timely for small holder or SMF (Small and Marginal Farmers) which is around 85% for farmer households, why are they still dependent on informal credit? What structure or model does agricultural finance fall in, is it retail lending, is it SME, supply chain finance or Micro finance or is it a separate category by itself?

In order to answer these questions, let's look at the perquisites for lending in general. Lending for credit quality and cost efficiency requires

1) predictable and visible cash flows for accurate assessment and efficient collections

2) Tangible assets that can be registered, valued and easy to liquidate as a security of fallback options.

If cashflow predictability and visibility is high lenders can go unsecured as in Personal loans and credit cards, if collaterals are strong then products like Loan against shares, jewelry loans and mortgage loans work. However, agriculture has neither organized cashflow nor collateral. Then are there any alternatives, surrogates, can technology leap frog these issues?

The reality is technology works through data, in agriculture there is no accurate data. It is common knowledge that agri supply chains are disorganized and go back a century or more. The industrial era mechanization and information technology has bypassed small holder farmer supply chains. What is more shocking is that Agricultural lending products are not developed even in the developed world despite modernization of production and supply chains. Why is this?

Efficient lending to SMF / Small holder farmers cannot be done in isolation.

Consider the dairy sector in India, dairy has been a well-developed supply chain since 1970. Small farmers with 4-5 cattle, pour milk daily at the village milk collection centers equipped with a Bulk Milk Chilling (BMC) unit, the milk processing company or cooperative collects the chilled milk via refrigerated trucks daily. The milk poured by farmers is checked for quality and quantity and a receipt is generated. The farmer gets a payment once in 10 days. Most milk collection centers are computerized with historic data records of every farmer. Farmers get paid once in 10 days and this payment is increasingly done in their bank accounts. Sounds like a good model for lending so why do so many lenders fail in this segment?

It's all about Biology

The answer lies in the biological process of how milk is produced. Milk is produced by cows that have delivered a calf. Cows are artificially inseminated (AI) to get preg-

About the **AUTHOR**

Michael Andrade id the Co-founder & CEO of Samaaru Finance Pvt.Ltd., Pune

nant and deliver a calf after 9 months, once the calf is born the cow enters the milking cycle till it runs dry in about 6 months. This milk cycle is repeated over the adult milking life of the animal. This poses its own set of challenges arising from AI success, animal health, heat and cold stress, feed & fodder quality which in turn is subject to climatic conditions to name a few. While these do not impact credit worthiness of the farmer it does impact on time EMI payments. Financial systems worldwide are not designed to handle these variations in the payment cycle either by technology or accounting and regulatory standards. In almost all businesses, the production process can be controlled. In agriculture production is dependent on additional biological and climatic factors that are untamed. Given this scenario, standard industrial lending models fall short of managing risk and collection efficiency. The insurance sector has developed climate index-based products. We can we build crop –climate index-based applications that can be used for both lending and insurance. There is no dearth of technology to do this the challenge remains who is going to pay for it?

Supply chain upgrade

There is no shortcut to this. It is tempting to think that the wheel can be reinvented by well-funded companies trying to modernize supply chains on their own. Their limited success is well known and they are unable to compete with the informal sector. The dairy milk collection model shows us how the informal sector can be modernized and digitized with finance. This approach does not displace existing stakeholders, rather it enhances their capability. The formal sector cannot easily replace the invisible bond between farmers and the informal supply chain. Is this replicable? The answer is yes with the right kind of investment and forward market linkages. For example, grains can operate via aggregator or commission agent based Micro-Silo operations. Pack-house operations for fresh produce, Bio-digesters for production and organization of manure from cow dung, Silage bailing & storage units for green fodder. The equipment will cost 40-50 lakhs approximately (200MT farm Silo), 25 lakhs 10Mt per day silage machine etc... The operators already have farmer networks, can provide collateral but will require some knowhow.

Current lending models work on exclusion, they assess borrowers individually have very high operating costs.

The ATM model is a good example of how such infrastructure may be financed, deployed, serviced, removed and reinstalled elsewhere. Manufactures are generally ready to provide maintenance service, repossession and refurbishment for resale / relocation.

Ag-tech / Bio-tech. These technologies can be a game changer in enhancing and de-risking agricultural production. However, farmer affordability and lack of guarantees from service providers limit their use. Financing these services will help farmers and players alike. Financing also puts the onus on the lender to evaluate the service before financing which in turn protects farmer borrowers

Finance as the Orchestra conductor. Efficient lending to SMF / Small holder farmers cannot be done in isolation. There are ecosystem/supply chain actors that need modernization and organization through finance and know how. There are technology (IT, Ag-tech, biotech, climate tech, farm tech & service) actors and insurance providers that need to be paid and jointly develop farm friendly products.

The financial products should bundle such services and their delivery. Farmers need to have skin in the game and should have a margin contribution of 10-20%. The rest of the exposure is on the lenders to be managed by technology, service delivery by partners and risk transfers via insurance and other mechanisms (including market price hedging). Low margin enables price elasticity for lenders given the high RoA for farmers.

The supply chain approach enables aggregation or inclusion of farmers and distribution of costs. Current lending models work on exclusion, they assess borrowers individually have very high operating costs. Consider each lender has no more than 4-5 small value borrowers per village, while an average village consisting of a minimum 200 households cultivating at least 500- 800 acres of farmland. Economic benefit to farmers is the glue that keeps farmers loyal and credit worthy to the supply chains that they have been comfortable with for generations. It tends to create group dynamics similar to Micro finance without the legal binding. Sophisticated data systems can isolate village peer group performance for credit comparison and isolation to sort out problems if any. Contrary to popular belief dependence on Credit scores can be diluted based on farm performance and peer group comparison to increase the customer base and distribute the costs.

A change of thinking

It will require the financial system to challenge its thinking on the way we assess, distribute and collect. This includes inclusion and aggregation of more farmers per village by placing farmers of an aggregated unit in a bell curve based on geography, climate and produce information. Build biological understanding into product design. Finally, drive collaboration and ecosystem orchestration. The lender has to wear many hats.

Role of technology: There is plenty of low-cost technology available to develop a new financial process for small holder farmers. We do not require sophisticated tech and large tech budgets , but a focus on data accuracy and analysis. Execution is the key, this system will require boots on the ground, efficient manpower management is key. Technology can be a big enabler for training, development and on ground decision making, including the use of AI, available models may be evaluated.

In conclusion, the scale and size makes it worth it. This may all seem too overwhelming to do, however, 100 million small holder farmers in India, 450 million worldwide, with household credit requirements of around 2.5 lakhs per household translates to a market potential of 25 lakh Cr in India itself is worth the investment.

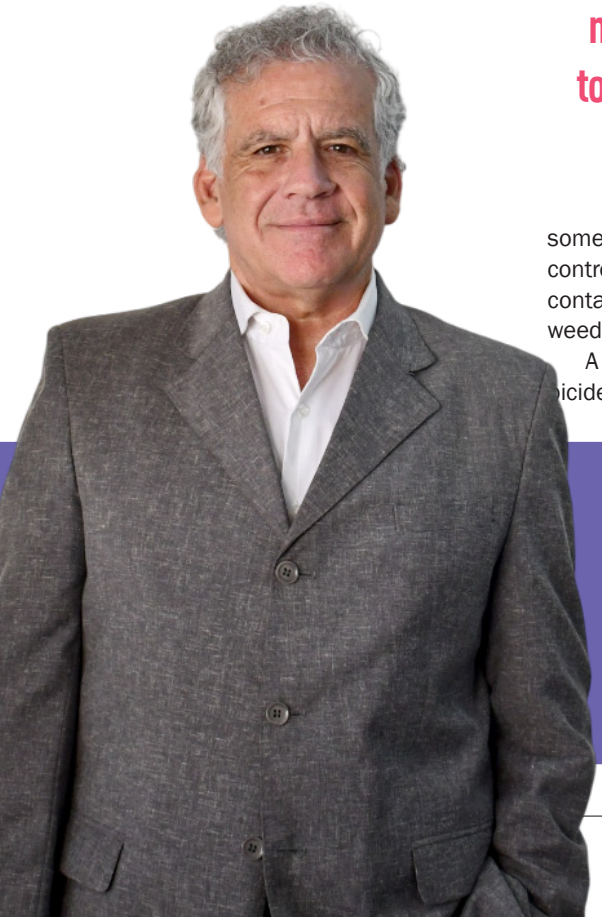
BIO-HERBICIDES FROM WEEDS

Agriculture is a strong industry and supports the economy of many regions and countries. One "input" of agriculture is the environment. Every year we use and modify the environment to produce food. If we consider how the Agri-environment was after and before agricultural work, we will see that it was modified. Of course, any human activity using the environment will modify the wild conditions. The question is how much the environment will resist. May we think that agriculture may be in a better balance with the environment than the actual? Is that possible?

Let´s develop the idea of "future agriculture". I am in Argentina where farmers use 10.000 hectares or more of the same crop. We cannot avoid the use of land in large areas. Argentina produces raw crops to feed 400MM people. Thus, crops must be cultivated on a large scale. But we can change how the agrochemicals are used. The control of pests is something we can modify using better controllers. Chemical controllers produce contamination of the environment and weed species resistance.

A biological active ingredient in the crop protection industry is a natural molecule used to kill pests like fungus, insects and weeds.

A simple question is this: Once a herbicide kills a weed plant, it remains in the soil for longer time. The chemicals can contaminate water sources and human populations, located far from farm. We can modify the negative impact by using biologicals.



About the **AUTHOR**

Dr. Gustavo Sosa is the Founder & Scientific Director INBIOAR GLOBAL LTD

Biologicals – Introduction

A biological active ingredient in the crop protection industry is a natural molecule used to kill pests like fungus, insects and weeds. We may say that nature builds an active ingredient, and nature can unbuild the same, i.e., a natural molecule can be degraded by similar biological mechanisms it was made. Enzymes can degrade a natural molecule, while a synthetic chemical does not have the same possibility, and remains in the soil for longer and unwanted periods of time.

When we apply a bio-herbicide, the weed is killed and the chemical would be degraded in the environment very soon, probably before the plant is dead. Let´s think that we use "orange juice" to kill a weed. If we use just 500 grams in one hectare to control weeds, how much time will the "orange juice" remain in the soil under natural conditions? A few hours, a couple of days, but not more than this.

The natural active ingredients avoid

the chances to contaminate other sources that we must keep safe, clean and without risks, because degradation occurs sooner than in the synthetic chemicals.

A dream that still is not true.

Today we do not have good bioherbicide. They are only a few in the market, they work at 50kg/ha like the pelargonic acid, they kill the weeds but a few days later as many others burning herbicides, the weed plant regrow, and a second application must be done. The solutions seem far from what we need.

Where does the answer come from?

We in INBIOAR focus on the plant-plant interaction. Some plant species produce chemicals that control the growth of other species of plants around them. Many times, some species release chemicals to kill other plants. Thus, we can see the natural monoculture of trees for instance and that is in part because plants are releasing a chemical in their surroundings allowing only those of the same species to grow.

What if we take that chemical and we can use it as a bioherbicide? The idea is good, but the chemicals released seem not too good.

We screen the flora-finding plants (trees and herbaceous plants) producing natural chemicals to be used in the crop protection industry. Most of the time we are faced with weak chemicals to be used. But not always.

We developed a discovery platform that allowed us to select plants in the field and later the extracts in the lab. The chemicals found would be good for the crop protection industry. A filed patent we have in a partnership with the USDA supports our concept.

But not all is about efficacy. The second bottleneck is production. How is a natural active ingredient going to be produced? There are many alternatives:

-Cultivating the plant producing the chemical as it is a crop.

-By tissue culture.

-Producing the natural molecules by synthesis methods.

-Gene transfers to a microorganism and produces the active ingredient by fermentation.

All the above is true until we consider the next bottleneck, that is the cost. The cost to produce a natural chemical will define the production method. We think that the cost to produce a chemical in Argentina would be 3USD/ha. But this cost varies if the economic equation varies. And this is considering producing the bio-active ingredient as a crop.

Global organic food production.

Where would we like to go? We would like to produce organically food worldwide. We today develop our project in Argentina collecting wild plants, many times are weeds, from where we obtain our natural active ingredients as bio-herbicides. We have the concept that weeds kill weeds. That is completely true because we often collect weeds as we did with *ammy visnaga*.

Ammi is a cosmopolitan plant growing in many world regions. The plant produces khelin and visnagin and both are bio-herbicides' active ingredients. In our lab they work at 2kg/ha, and we think we can improve our efficacy even better. We filed a patent about khelin and visnagina as active ingredients (USDA-INBIOAR patent).

Ammi grows freely in Argentina and the production cost would be low. Thus, our focus is to improve efficiency with better formulation.

Clean Technology

We may produce a plant extract using water and we later dry it by spray. The trash during the plant extract production is just wet plant tissue. We can use water soluble bags as a commercial container of our plant extract powder. Thus, we can ship bio-herbicide to the farm in bags. Once in the farm a 5-10 kg bag can be dropped to the water tank before using them as bio-herbicide. As a result, we do not produce trash in the plant extract factory and not in the farm. We like to think of organic production without trash.

In our future we plan to screen the flora in many regions so that we offer to the global crop protection industry with a biodiversity of natural molecules to control pests.

We plan to screen Texas in the US as a first step. Australia and The Thar desert are in our way. The Sub-Saharan region and many small deserts in Latin America are also of interest to us.

The production of the natural products would be in India. Because the different weathers in India and the culture of biologicals in this country makes it interesting for us to think in India.

Clean technology, organic food production, environmentally friendly products and efficacy are goals in INBIOAR. We trust we will give the crop protection industry new tools to control pests and produce safer for farmers and the environment in a new generation of active ingredients for the crop protection industry.

ROLE OF SUSTAINABLE AGRICULTURE IN ENSURING GLOBAL FOOD SECURITY

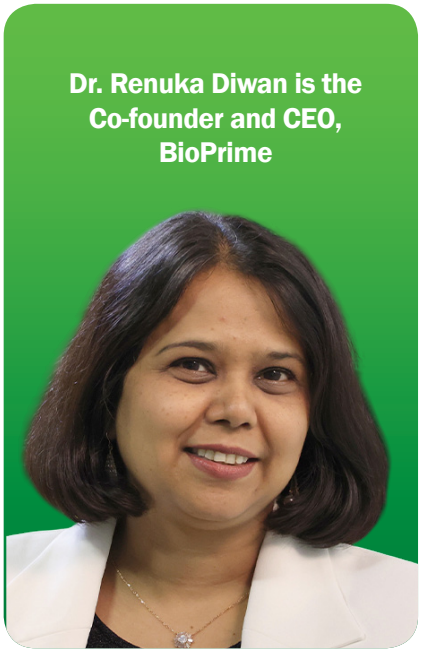
With the global population projected to reach 10 billion by 2050, ensuring food security amidst finite resources, climate change, and environmental degradation will be a monumental challenge for humanity. The coming years will redefine how we grow food, ensure climate resilience, improve productivity, and maintain equity. By leveraging advanced biological solutions and scientifically informed farming practices, sustainable agriculture will be the centre of the paradigm shift that emerges as the most viable solution to this predicament.

Practices such as crop diversification, integration of bio stimulants & bio pesticides with chemical products, agroforestry, and organic farming can reduce input costs by minimizing the need for synthetic fertilizers and pesticides.

A Multi-Dimensional Approach

In simple terms, sustainable agriculture is the practice of focusing on meeting current food demands without jeopardizing future food security. But when applied on a large scale, it provides a comprehensive framework and a multi-dimensional approach to tackling the many ailments impeding or endangering productivity.

One of its core principles is to increase yield productivity on the existing land parcel implementing better farm practices to ensure uncompromised yield & nutritional security. There are existing scalable techniques in the entire value chain covering seeds, fertilizers, bio stimulants, irrigation & farm management to maximise the crop yield, while rationalising the use of water, energy, fertilizers & pesticides. There are also optimistic developments in more technical means like bio control usage, precision farming—using IoT sensors, drones, geospatial data, and AI—which will allow farmers to monitor crop health, optimize inputs, and prepare for erratic climates.



Dr. Renuka Diwan is the Co-founder and CEO, BioPrime

And when facing these erratic climates that challenge our conventional farming practices, developing resilient input solutions becomes our vanguard. We fortify our farms through agroecological practices such as crop diversification, agroforestry, biological based farming, and integrated pest management. We also are witnessing the trend of bio stimulants being used to mitigate the risk of abiotic stress like drought, scorching heat & erratic rainfall to mitigate the production risk. The last couple of years have witnessed drastic yield loss on a wide variety of crops due to climate change & its induced impact. The innovation around affordable solution to protect crop damage against these stress conditions are going to be essential to support farming community. These practices will be the cornerstone of farming in the coming years.

With agriculture consuming 70% of the world's freshwater, innovative water management is vital. Sustainable practices like drip irrigation, rainwater harvesting, and deficit irrigation reduce water wastage. Genetic engineering has produced drought-tolerant crops that require 30-50% less water, ensuring productivity in arid regions. Aquaponics and water-absorbing polymers offer additional solutions by maximizing water reuse and efficiency. Such advancements are essential in regions facing increasing water scarcity.

But most importantly, it is the health of the soil that forms the foundation of sustainable agriculture. About 20% of

arable land across the world has degraded due to unsustainable agricultural practices. It threatens food security and ecosystem stability. Sustainable agriculture practices like crop rotation, cover cropping, and regenerative farming can restore soil organic matter, improving fertility and carbon sequestration. Sustainable grazing practices also integrate livestock into regenerative systems, enhancing nutrient cycles and biodiversity. And to offset the damage done by over-exploitation of soil, microbial bioengineering and composting agricultural residues will see greater adoption to improve nutrient availability. These practices will create a self-sustaining foundation for farming.

Scaling for Sustainability

Adopting and scaling sustainable agriculture practices is essential for improving food security while preserving the environment and ensuring long-term agricultural productivity. For farmers to embrace these practices, their economic viability must be central to the approach, as profitability and financial sustainability are critical motivators for widespread adoption.

A key factor in promoting sustainable agriculture is demonstrating its potential for cost savings and increased profitability. Practices such as crop diversification, integration of bio stimulants & bio pesticides with chemical products, agroforestry, and organic farming can reduce input costs by minimizing the need for synthetic fertilizers and pesticides. Precision agriculture techniques, which optimize the use of water, seeds, and nutrients, further enhance efficiency, leading to better yields with lower expenses. Farmers are more likely to adopt sustainable methods when these practices translate into tangible financial benefits.

Sustainable practices like drip irrigation, rainwater harvesting, and deficit irrigation reduce water wastage. Genetic engineering has produced drought-tolerant crops that require 30-50% less water, ensuring productivity in arid regions

Market access and value chain integration are also equally important. Connecting farmers to markets that reward sustainably grown produce, such as premium organic markets or ethical trade networks, can boost incomes and incentivize the transition. Additionally, forming cooperatives or collective enterprises allows small-scale farmers to pool resources, reduce costs, and negotiate better deals with buyers.

Education and capacity-building also play a pivotal role. Farmers need practical training and knowledge about how sustainable practices can improve both yields and profitability over time. Peer-to-peer learning, workshops, and demonstration plots can illustrate the long-term economic advantages of these methods. Collaboration with agricultural technology providers and private organizations can help make these solutions accessible and affordable.

Ultimately, scaling sustainable agriculture requires a focus on strategies that balance environmental stewardship with economic viability. By prioritizing profitability, empowering farmers with knowledge and tools, and connecting them to rewarding markets, sustainable agriculture can become a cornerstone of resilient food systems and global food security.

Endnote

The road to achieving global food security in the face of a burgeoning population and erratic climatic pattern is fraught with challenges but illuminated by innovation and collaboration. Sustainable agriculture, with its multi-dimensional approach and emphasis on ecological balance, offers a pathway toward a resilient and equitable food system. The integration of cutting-edge technologies, climate-resilient practices, and regenerative techniques will redefine how we produce food, protect our natural resources, and empower farming communities.

As we move forward, the success of sustainable agriculture depends on uniting policymakers, scientists, farmers, and consumers under a shared vision of environmental stewardship and economic viability. By ensuring that these practices are not only effective but also accessible and profitable, we can collectively usher in an era where global food security becomes a reality, not just an aspiration. This transition is not just a necessity—it is a testament to humanity's ability to adapt, innovate, and thrive in harmony with the planet.

AGRICULTURE AS THE 1ST ENGINE

Union Budget 2025 - Key Highlights

On Feb 1, 2025, Union Finance Minister, Nirmala Sitaraman, made history as she presented a record eighth consecutive budget, which In this Budget, the proposed development measures spanning ten broad areas focusing on Garib, Youth, Annadata and Nari. **Spurring Agricultural Growth and Productivity seemed first on the agenda of the new budget. A slew of schemes and announcements in the agri sector, the important ones included are**

Prime Minister Dhan-Dhaanya Krishi Yojana - Developing Agri Districts Programme

Motivated by the success of the Aspirational Districts Programme, 'Prime Minister Dhan-Dhaanya Krishi Yojana' will be undertaken in partnership with states. Through the convergence of existing schemes and specialized measures, the programme will cover 100 districts with low productivity, moderate crop intensity and below-average credit parameters. This programme is likely to help 1.7 crore farmers.

It aims to

- Enhance agricultural productivity,
- Adopt crop diversification and sustainable agriculture practices,
- Augment post-harvest storage at the panchayat and block level,
- improve irrigation facilities,
- Facilitate availability of long-term and short-term credit.

Building Rural Prosperity and Resilience

A comprehensive multi-sectoral 'Rural Prosperity and Resilience' programme will be launched in partnership with states. This will address under-employment in agriculture through skilling, investment, technology, and invigorating the rural economy. The goal is to generate ample opportunities in rural areas so that migration is an option, but not a necessity.

The programme will focus on rural women, young farmers, rural youth, marginal and small farmers, and landless families. Global and domestic best practices will be incorporated and appropriate technical and financial assis-

tance will be sought from multilateral development banks. In Phase-1, 100 developing agri-districts will be covered.

Aatmanirbharta in Pulses

The 6-year "Mission for Aatmanirbharta in Pulses" will have a special focus on Tur, Urad and Masoor. Central agencies (NAFED and NCCF) will be ready to procure these 3 pulses, as much as offered during the next 4 years from farmers who register with these agencies and enter into agreements.

Comprehensive Programme for Vegetables & Fruits

A comprehensive programme to promote production, efficient supplies, processing, and remunerative prices for farmers will be launched in partnership with states. Appropriate institutional mechanisms for implementation and participation of farmer producer organizations and cooperatives will be set up.

Makhana Board in Bihar

A Makhana Board will be established in Bihar to improve production, processing, value addition, and marketing of makhana. The people engaged in these activities will be organized into FPOs. The Board will provide handholding and training support to makhana farmers and will also work to ensure they receive the benefits of all relevant Government schemes.

National Mission on High Yielding Seeds

- A National Mission on High Yielding Seeds will be launched, aimed at
- Strengthening the research ecosystem
- Targeted development and propagation of seeds with high yield, pest resistance and climate resilience
- Commercial availability of more than 100 seed varieties released since July 2024

Fisheries

India ranks second-largest globally in fish production and aquaculture. Seafood exports are valued at Rs. 60 thousand crore. To unlock the untapped potential of the marine sector, the Government will bring in an enabling framework for sustainable harnessing of fisheries from Indian Exclusive Economic Zone and High Seas, with a special focus on the Andaman & Nicobar and Lakshadweep Islands.

Mission for Cotton Productivity

For the benefit of lakhs of cotton growing farmers, 'Mission for Cotton Productivity' was announced. This 5-year mission will facilitate significant improvements in productivity and sustainability of cotton farming, and promote extra-long staple cotton varieties. The best of science & technology support will be provided to farmers. Aligned with the government's integrated 5F vision for the textile sector, this will help in increasing incomes of the farmers, and ensure a steady supply of quality cotton for rejuvenating India's traditional textile sector.

Enhanced Credit through KCC

Kisan Credit Cards (KCC) facilitate short term loans for 7.7 crore farmers, fishermen, and dairy farmers. The loan limit under the Modified Interest Subvention Scheme will be enhanced from Rs. 3 lakh to 5 lakh for loans taken through the KCC.

Urea Plant in Assam

For Atmanirbharta in urea production, the Government had reopened three dormant urea plants in the Eastern region. To further augment urea supply, a plant with annual capacity of 12.7 lakh metric tons will be set up at Namrup, Assam.

Support for Food Processing

A National Institute of Food Technology, Entrepreneurship and Management will be established in Bihar. The institute will provide a strong fillip to food processing activities in the entire Eastern region. This will result in enhanced income for the farmers through value addition to their produce, and skilling, entrepreneurship and employment opportunities for the youth.

Gene Bank for Crops Germplasm

The 2nd Gene Bank with 10 lakh germplasm lines will be set up for future food and nutritional security. This will provide conservation support to both public and private sectors for genetic resources.

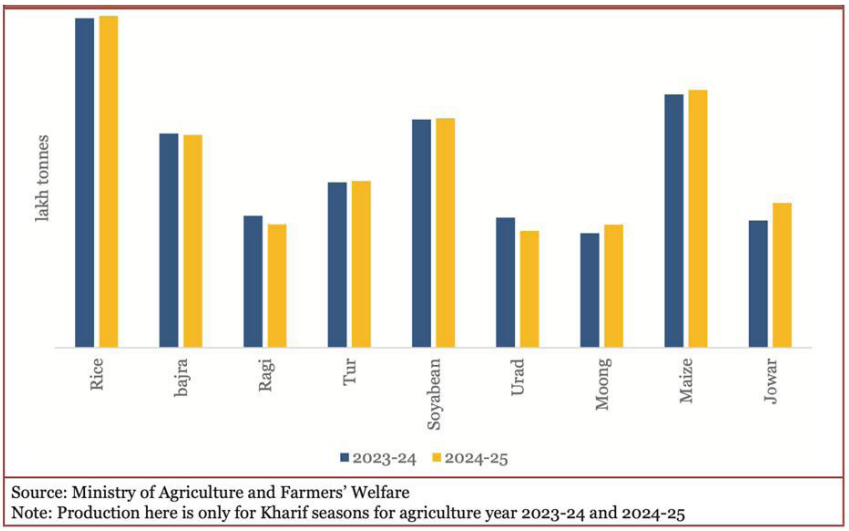
REMARKABLE RESILIENCE OF AGRICULTURE SECTOR ECONOMIC SURVEY 2024-25

The 'Agriculture and Allied Activities' sector has long been the backbone of the Indian economy, playing a vital role in national income and employment. This sector contributes approximately 16 per cent of the country's GDP for FY24 (PE) at current prices and supports about 46.1 per cent of the population. Not only does its performance directly impact food security, but it also influences other sectors, sustaining livelihoods and supporting economic growth.

Agriculture Growth

In the second quarter of the FY25 year, the agriculture sector recorded a growth rate of 3.5 per cent. This performance represents a recovery compared to the previous four quarters, during which growth rates varied from a modest 0.4 per cent to 2.0 per cent. The recent rise in growth rate can be attributed to improved conditions, potentially driven by favourable weather patterns, advancements in agricultural practices, and government initiatives to enhance productivity and sustainability within the sector. Riding on good monsoon, kharif foodgrain production in 2024 is projected at 1647.05 Lakh Metric Tonnes (LMT), suggesting an increase of 89.37 LMT compared to the previous year and 124.59 LMT above the average kharif foodgrain output. Agricultural income has increased at 5.23 per cent annually over the past decade, compared to 6.24 per cent for non-agricultural income and 5.80 per cent for the overall economy.

The slower growth rate of oilseeds at 1.9 per cent raises concerns, especially considering India's heavy reliance on imports to satisfy domestic edible oil demands. High-value sectors such as horticulture, livestock, and fisheries have emerged as the primary contributors to the overall growth of agriculture. Among these, the fishery sector has demonstrated the highest compound annual growth rate (CAGR) at 13.67 per cent, followed by livestock with a CAGR of 12.99 per cent during FY15 to FY23(at current prices).



Source: Ministry of Agriculture and Farmers' Welfare
Note: Production here is only for Kharif seasons for agriculture year 2023-24 and 2024-25

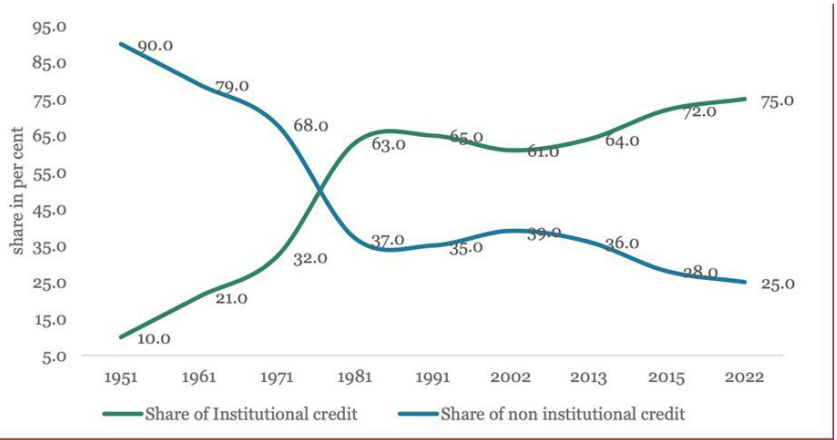
Production of major kharif crops

In the fiscal year FY24, the value of agri-food exports, which includes processed food exports, reached USD 46.44 billion, constituting roughly 11.7 per cent of India's total exports

Andhra Pradesh was the leading performer with a CAGR of 8.8 per cent in agriculture and allied sectors, excluding forestry and logging. Madhya Pradesh followed with 6.3 per cent, and Tamil Nadu came in third with 4.8 per cent among major states.

Seed Production

In the 2023-24 season, ICAR produced 1.06 lakh quintals of breeder seeds encompassing 1,798 varieties across 81 crops for further multiplication. Given the impact of weather on agricultural output, research into climate-resistant seeds has become a priority, with 2,177 of the 2,593 new varieties released since 2014 specifically addressing this challenge. To ensure that these varieties are readily available, seed banks have been established. In regions such as north-western India, heat-tolerant wheat varieties have seen widespread adoption to alleviate the effects of heat stress. In FY24, demonstrations of



Source: Ministry of Agriculture

Declining share of non-institutional credit

climate-resilient technology packages were conducted in 121 vulnerable districts under the National Innovations in Climate Resilient Agriculture initiative.

Fertilizer Coverage

To achieve optimal crop yields while ensuring environmental sustainability, it is imperative to use fertilisers judiciously. Recently introduced, 'Urea Gold' combines urea with sulphur, minimizing wastage and enhancing plant nutrient uptake. Additionally, the use of drones and fertigation techniques are being implemented to optimize fertiliser applications. The Programme for Restoration, Awareness Generation, Nourishment, and Amelioration of Mother Earth (PM-PRANAM) initiative incentivises states to adopt alternative fertilisers such as Nano Urea, Nano Diammonium phosphate (DAP), and organic fertilisers.

Irrigation

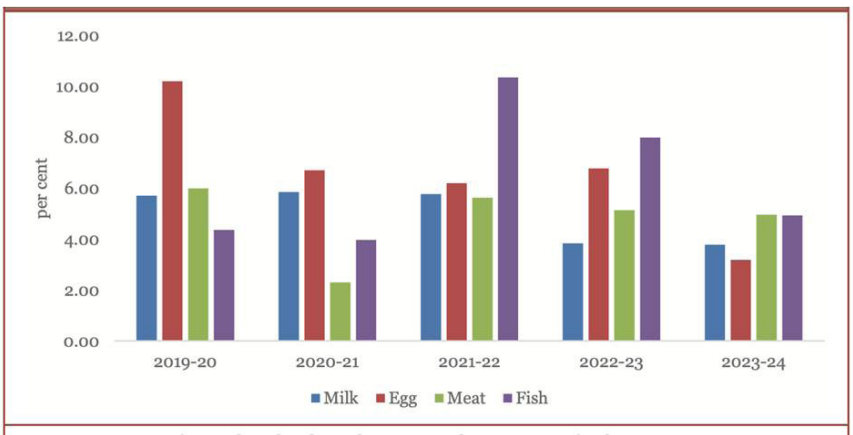
The coverage of irrigation area has increased between FY16 and FY21 from 49.3 per cent to 55 per cent of the gross cropped area (GCA), while irrigation intensity has risen from 144.2 per cent to 154.5 per cent. Micro-irrigation holds significant potential for India's 140 million hectares of arable land . Even though there is an increase in area under micro-irrigation in India (8 per cent of irrigated area), the pace is still slow.

Agri Credit

As of March 2024, the country has 7.75 crore operational KCC accounts with a loan outstanding of ₹9.81 lakh crore. As of 31 March 2024, 1.24 lakh KCC and 44.40 lakh KCC were issued to fisheries and animal husbandry activities, respectively. In addition to interventions such as the Modified Interest Subvention Scheme (MISS), which provides short-term agri-loans through KCC for working capital requirements at the concessional interest rate of 7 per cent, the Prompt Repayment Incentive (PRI) provides a 3 per cent incentive to farmers who repay on time. Starting from FY25, the claim processing has been digitised through the Kisan Rin Portal for faster and more efficient capturing and settlement of MISS claims. To further support small and marginal farmers, banks must allocate 40 per cent of their Adjusted Net Bank Credit (ANBC) or Credit Equivalent Amount of Off-Balance Sheet Exposure (CEOBE), whichever is higher, to priority sectors, including agriculture. All the above measures have significantly reduced the reliance on non-institutional credit sources from 90 per cent in 1950 to around 25.0 per cent in FY22[27].

Ground-level credit (GLC) to agriculture has also shown impressive growth with a CAGR of 12.98 per cent from 2014-15 to 2024-25. The GLC has risen from ₹8.45 lakh crore in 2014-15 to ₹25.48 lakh crore in 2023-24. Within this, the share of small and marginal farmers has significantly increased from ₹3.46 lakh crore (41 per cent) to ₹14.39 lakh crore (57 per cent) from 2014-15 to 2023-24.

By ensuring financial stability, the Pradhan Mantri Fasal Bima Yojana (PMFBY) encourages farmers to adopt modern agricultural practices and technologies. In response to recommendations from various committees, the scheme has recently launched several technological interventions, such as YES-TECH, WINDS, and CROPIC. The participation of State governments and insurers has increased to 24 and 15, respectively, in FY25, up from 20 and 11 in the 2020-21. Additionally, these interventions have contributed to a 32 per cent reduction in premium rates compared to previous years. As a result, in the FY24 period, the number of enrolled farmers reached 4 crore, a 26 per cent increase from 3.17 crore in the FY23 period. The insured area also expanded to



Source: Department of Animal Husbandry and Dairying and Department of Fisheries

Growth in the production of milk, meat, eggs and fish

600 lakh hectares in FY24, reflecting a 19 per cent rise from 500 lakh hectares in FY23. Both the acreage and farmer enrolment figures under the scheme are at an all-time high.

Agri Mechanization

The Sub-Mission on Agricultural Mechanisation (SMAM) supports state governments in establishing Custom Hiring Centres (CHCs). As of 31 December, 26,662 CHCs were established under this initiative, with 138 CHCs set up in the year FY25 alone. Furthermore, the government has promoted a recently approved scheme aimed at providing drones to Women SHGs. This initiative targets 15000 selected Women SHGs to offer rental services to farmers for agricultural purposes.

Agri Extension

The government is implementing the Sub-Mission on Agricultural Extension (SMAE), a key component of which is the support provided by the Agricultural Technology Management Agency (ATMA). During the FY24 period, over 3.66 million farmers benefitted from these extension activities, with an additional 4.49 million having availed themselves of these benefits by November 2024. Furthermore, the government has launched the short duration skill training of rural youth scheme and so far, 20940 candidates were trained as of November 2024 of which 5504 were trained in FY25 .

Infrastructure and Marketing

As of October 31, 2024, 48611 storage infrastructure projects have been sanctioned, with ₹4,795.47 crore disbursed in subsidies. In addition, 21004 projects related to other types of infrastructure have been sanctioned, amounting to a subsidy of ₹2,125.76 crore. As of October 31, 2024, over 1.78 crore farmers and 2.62 lakh traders have registered on the e-NAM portal. As of the same date, 9,204 FPOs have been registered, and 4,490 of these organisations have received equity grants amounting to ₹237 crore.

Under Paramparagat Krishi Vikas Yojana (PKVY), 52,289 clusters covering 14.99 lakh hectares and 25.30 lakh farmers have been mobilised. Similarly, under Mission Organic Value Chain Development for North Eastern Region (MOVCDNER), 434 Farmer Producer Companies have been created, covering a total area of 1.73 lakh hectares and benefiting 2.19 lakh farmers.

Livestock and Fisheries

Gross Value Added (GVA) of agriculture and related sectors surged from 24.38 per cent in the fiscal year FY15 to an impressive 30.23 per cent by FY23. In the latter year, the livestock sector alone represented 5.5 per cent of the total GVA, with a robust CAGR of 12.99 per cent. The economic significance of this sector is clearly illustrated by its escalating output value, which reached an astounding 17.25 lakh crore rupees (equivalent to US$205.81 billion) in FY23. Among the various branches of livestock production, the milk industry stands out, generating over ₹11.16 lakh crore (US$133.16 billion) in revenue.

Total fish production has surged to 184.02 lakh tonnes in FY 23. Furthermore, India's seafood exports have risen from ₹46,662.85 crore in FY-20 to ₹60523.89 crore in 2023-24, reflecting a growth of 29.70 per cent. Under the Pradhan Mantri Matsya Kisan Samridhi Sah-Yojana (PM-MKSSY), the National Fisheries Digital Platform (NFDP) was launched, successfully mobilising and registering 16.35 lakh fish producers, workers, vendors, and processors within a short timeframe of just four months.

Food Processing

The food processing industry in India is one of the largest employers within organised manufacturing, accounting for 12.41 per cent of total employment in the organised sector. In the fiscal year FY24, the value of agri-food exports, which includes processed food exports, reached USD 46.44 billion, constituting roughly 11.7 per cent of India's total exports. Notably, the share of processed food exports within agri-food exports has risen from 14.9 per cent in FY18 to 23.4 per cent in FY24.

By 31 October 2024, 171 applications had been approved under the Production Linked Incentive Scheme for Food Processing (PLISFPI), with beneficiaries investing ₹8,910 crore and receiving ₹1,084.01 crore in incentives. As of 31 October 2024, the Pradhan Mantri Formalisation of Micro Food Processing Enterprises (PMFME) scheme has received 407,819 applications.. Additionally, the programme has successfully trained 672 Master Trainers, 1,120 District Level Trainers, and 87,477 beneficiaries across 36 states and union territories.

ICFA

भारतीय कृषि एवं खाद्य परिषद्

INDIAN CHAMBER OF FOOD AND AGRICULTURE

FPOs - INDUSTRY PARTNERSHIP PROGRAM 2.0

10 Events I 10 States I 2000+ FPOs I Connecting 20 Crore+ Farmers

Farm Services I Inputs I Technologies I Produce Sourcing I Exports
Contract Farming I Agri-Processing I Partnerships

27th February 2025 - 17th October 2025

Workshops | Exhibitions | Business Meets

For More Details, Please Contact :

Mr. Tushar Sharma | *+91 – 8874184076* | *tushar.sharma@icfa.org.in*

Mr. Syed Areesh Hussain | *+91 – 8448698320* | *areesh.hussain@icfa.org.in*

www.fpo.icfa.org.in | ***www.icfa.org.in***

Scan the QR

Regular Posting Date 27-28
Date of Printing 23
Post Office: Lodhi Road

DL(ND)-11/6128/2024-25-26
RNI No. 68745/98

SBI
The banker to every Indian

KISAN KI UNNATI SE HAI DESH KI PRAGATI.

SBI Agri Loan Products for your every agricultural need

KISAN CREDIT CARD

- Interest rate at 7% p.a., up to ₹ 3 Lakhs*
- 3% incentive for prompt paying farmers, up to ₹ 3 Lakhs*
- Collateral-free loan for up to ₹ 1.6 Lakhs

LOAN FOR SELF-HELP GROUPS

- Loan for livelihood
- Flexible repayment

KISAN SAMRIDDHI RIN

- Higher loan limit for modern farming: ₹5 Lakhs - ₹50 Crores
- Open to all farmer types: Individual, Non-Individual, or Corporate

FARMER PRODUCER COMPANIES (FPCs)

- Loans available for all activities of FPCs
- Attractive interest rates
- Credit guarantee available
- Interest concession available

AGRI GOLD LOAN

- Digital sanction on YONO KRISHI
- Low interest rate

MUDRA LOAN

- No collateral up to ₹10 Lakhs
- Simple documentation

AGRI ENTERPRISE LOAN

- Loan range: ₹1 Lakh - ₹100 Crores
- Covers all facilities, including fund-based and non-fund-based
- Features for exporters: EPC, PCFC, Post Shipment Credit, Bill discounting, etc

ATMA NIRBHAR BHARAT SCHEMES:

- Loans available under Agri Infra Fund, PMFME scheme, AHIDF scheme
- To establish cold storage, warehouses, silos, food processing units, etc.
- Credit Guarantee available
- Interest subvention available

T&C Apply

For more details, visit bank.sbi or contact Branch Manager

Follow us on