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Contributing to Viksit Bharat 2047

Indo-German Pathways Towards Sustainable Agriculture and Food Systems

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Abbreviations

ABS	Aquaculture Business School
AgriChains	Sustainability and Value Added in Agricultural Supply Chains
AgSys	Sustainable Agriculture Systems and Policies
AIF	Agriculture Infrastructure Fund
APEDA	Agricultural and Processed Food Products Export Development Authority
ASCI	Agriculture Skill Council of India
BBSSL	Bharatiya Beej Sahkari Samiti Limited
BCI	Better Cotton Initiative
BMZ	German Federal Ministry for Economic Cooperation and Development
BPKP	Bhartiya Prakritik Krishi Paddhati
CAPL	Change Alliance Private Limited
CDP	Cluster Development Programme
CETP(s)	Common Effluent Treatment Plants
CLF(s)	Cluster Level Federation(s)
CoFTI	Coalition for Food Systems Transforma(c)tion in India
DAY-NRLM	Deendayal Antyodaya Yojana – National Rural Livelihoods Mission
DBT	Direct Benefit Transfer
DoH	Department of Horticulture
e-KYC	e-Know Your Customer
e-PoS	e-Point of Sale
ERADA	Enhancing Rural Resilience through Appropriate Development Actions
FCO	Fertiliser Control Order
FiBL	Research Institute of Organic Agriculture
FIDF	Fisheries and Aquaculture Infrastructure Development Fund
FIRMS	Farmer Institution Real-time Monitoring System
FPC / FPCs	Farmer Producer Company / Companies
FPO / FPOs	Farmer Producer Organisation(s)
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GETP	Gujarat Eco Textile Park

GIC	Green Innovation Centres for the Agriculture and Food Sector
GIS	Geographic Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GOBARdhan	Galvanizing Organic Bio-Agro Resources Dhan
HARIT	Sanskrit term for "green"
i4Ag	Fund for the Promotion of Innovation in Agriculture
ICAR	Indian Council of Agricultural Research
ICRP(s)	Internal Community Resource Person(s)
IFC	International Finance Corporation
INRM	Integrated Natural Resource Management
ISA	International Solar Alliance
JJM	Jal Jeevan Mission
KCC	Kisan Credit Card
KUSUM / PM-KUSUM	Kisan Urja Suraksha evam Utthaan Mahabhiyan
KVK	Krishi Vigyan Kendra
MAVIM	Mahila Arthik Vikas Mahamandal
MGNREGS / NREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MIDH	Mission for Integrated Development of Horticulture
MoA&FW	Ministry of Agriculture & Farmers Welfare
MoEFCC	Ministry of Environment, Forest and Climate Change
MoFPI	Ministry of Food Processing Industries
MoHFW	Ministry of Health & Family Welfare
MoJS	Ministry of Jal Shakti
MoRD	Ministry of Rural Development
MoT	Ministry of Textiles
MoU	Memorandum of Understanding
NABARD	National Bank for Agriculture and Rural Development
NABCONS	NABARD Consultancy Services
NAM	National Ayush Mission
NCCD	National Centre for Cold Chain Development
NeGPA	National e-Governance Plan in Agriculture
NFDP	National Fisheries Digital Platform
NITI Aayog	National Institution for Transforming India Aayog
NMNF	National Mission on Natural Farming

NMSA	National Mission on Sustainable Agriculture
NRLM	National Rural Livelihood Mission
NWM	National Water Mission
PCM	Phase Change Material
PDS	Public Distribution System
PKVY	Paramparagat Krishi Vikas Yojana
PLI	Production Linked Incentive
PM-FME / PMFME	Pradhan Mantri Formalisation of Micro Food Processing Enterprises Scheme
PM-MKSSY	Pradhan Mantri Matsya Kisan Samridhi Sah-Yojana
PM-PRANAM	PM Programme for Restoration, Awareness, Nourishment and Amelioration of Mother Earth
PMKSY	Pradhan Mantri Kisan Sampada Yojana
PMMSY	Pradhan Mantri Matsya Sampada Yojana
PPB	Participatory Plant Breeding
PZTM	Potato Zero Tillage with Rice Straw Mulching
RDS	Regenerative Dry Sowing
SAFAL	Sustainable Aquaculture for Food and Livelihood
SAU(s)	State Agricultural Universities
SBM-U	Swachh Bharat Mission – Urban
SDGs	Sustainable Development Goals
SHG(s)	Self-Help Groups
SJY	Satat Jeevikaparjan Yojna
SRIJAN	Self-Reliant Initiatives through Joint Action
SRLM(s)	State Rural Livelihood Missions
ST	Scheduled Tribe
SuATI	Support to Agroecological Transformation Processes in India
SuWaVi	Support to India's Water Vision
TDU	University of Trans-Disciplinary Health Sciences and Technology
UAS-B	University of Agricultural Sciences, Bengaluru
URNCC	Urban-Rural Nutrient and Carbon Cycle
WRC(s)	Wastewater Reuse Certificates
WRG 2030	2030 Water Resources Group
YVCCA	Your Virtual Cold Chain Assistant
ZLD	Zero Liquid Discharge

Message

This compendium represents the transformative power of the Indo-German partnership in reshaping food systems for our shared future. At this pivotal moment, as global leaders chart the post-2030 agenda and confront climate realities, the partners present innovations and tested pathways, ranging from grassroots practices to policy implementation.

The solutions collectively contribute to India's vision under *Viksit Bharat 2047*, seamlessly integrating with flagship initiatives such as the Mahatma Gandhi National Rural Employment Guarantee Scheme, the National Rural Livelihood Mission, the Mission for Integrated Development of Horticulture, the Cluster Development Programme, Poshan Abhiyaan, the National Mission on Natural Farming, the Pradhan Mantri Matsya Sampada Yojana and other national schemes. This alignment demonstrates how international development cooperation can complement in national transformation.

The Indo-German Partners for Change (P4C) India Conference, happening under the ambit of the 'Indo-German Lighthouse on Agroecology and Sustainable Natural Resource Management', positions India as a pivotal country within the P4C network. India's diversity of agroecological regions and innovations holds lessons for both national scaling and South–South exchange. P4C India is co-hosted by the German Federal Ministry for Economic Cooperation and Development (BMZ), the Indian Ministry of Agriculture and Farmers Welfare and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH India.

This compendium draws on these experiences to illustrate how inclusive decision-making, community leadership, and institutional convergence can together shape sustainable outcomes.

We deeply acknowledge the role of our government partners, civil society leaders, non-governmental organisations, and private-sector innovators in shaping these innovations. Together, they signal the direction of sustainable agriculture and food systems in India and beyond. The foundation built through the Indo-German cooperation has created a platform for continuous progress in sustainability, resilience, and inclusion.

We recognise the commitment and collaboration that have made these pathways possible. Let this compendium be viewed as part of an ongoing journey, an evolving contribution to food system transformation supporting India's development agenda of *Viksit Bharat 2047* and the global transition towards sustainable agriculture.

Gerald Guskowski
Cluster Coordinator
Environment, Climate Change, Natural Resource Management & Biodiversity (ECNRM), GIZ India

Foreword

With more than six decades of the Indo-German Development Cooperation in India, GIZ has built trusted partnerships across central ministries, state governments and local communities to address both rural and urban challenges. GIZ India's footprint today includes 104 ongoing projects across 31 states and union territories, working with more than 20 ministries and supported by 470 national experts and 61 international experts. Under the Indo-German Development Cooperation, we have learnt in our six decades of work in India that the need of the hour is to look at agriculture also in terms of its natural connects, synergies and trade-offs in the form of Food Systems and Agroecology. We believe and are devoted to supporting an agroecological transformational process, to contribute to *Viksit Bharat 2047*.

Our approach is participative and inclusive. We work with farmer groups, women's collectives, tribal communities, urban authorities, civil society, and private-sector actors to co-create solutions that address real needs and foster collective problem-solving.

This compendium 'Contributing to *Viksit Bharat 2047*: Indo-German Pathways Towards Sustainable Agriculture and Food Systems' highlights concrete innovations in agroecology, sustainable agriculture, soil health, aquaculture, digital agriculture and nutrition security. These innovations have emerged through close cooperation and collaboration with Indian ministries, partners and institutions including the Ministry of Agriculture and Farmer Welfare, the Ministry of Rural Development, the National Bank for Agriculture and Rural Development, the Ministry of Commerce and Industry, the Ministry of Textiles, NITI Aayog, the Ministry of Women and Child Development and with state governments, and are designed to be scaled at scale.

Partners for Change (P4C) Network, part of Germany's special initiative "Transformation of Agricultural and Food Systems," provides a platform for dialogue and co-creation among government, civil society, and private sector stakeholders to advance sustainable agriculture and food systems. India is positioned as a pivotal country in the P4C network, with its diverse agroecological regions and innovations offering lessons for both national scaling and South–South exchange. The P4C module on Functional Agricultural and Food System Structures is being tested in India through thematic tracks on farmer incomes, nutrition security, digital and financing innovations, and emerging business models.

The P4C India titled as Contributing to *Viksit Bharat 2047*: Indo-German Pathways Towards Sustainable Agriculture and Food Systems, New Delhi event serves as both a platform for knowledge sharing and a space to position India's contributions within global dialogue. The knowledge product launched here documents tested pathways that can be adapted across geographies, enriching the shared learning of more than 30 P4C member countries. India's experiences will also feed into the forthcoming P4C 2030 Position Paper, ensuring that its lessons contribute to global agricultural transformation debates and the framing of the post-2030 agenda.

By aligning with the vision of *Viksit Bharat 2047*, this compendium contributes to building an India that is prosperous, sustainable, inclusive, and resilient. It reflects the shared commitment of India and Germany to transform agriculture and food systems in a way that ensures food and nutritional security, empowers communities, strengthens livelihoods, strong economy and safeguards natural resources for future generations.

This compendium is a call to our diverse partners to mainstream proven innovations, ensure programmatic convergence, and foster private investments in scaling for sustained impact.

We extend our sincere gratitude to all our partners ministries, civil society organisations, research organisations, private organisations, think tanks, institutions, farmer groups, and communities for their trust and collaboration. A special thanks also goes to everyone who contributes to and participants in the P4C event, making this shared journey towards sustainable agriculture and food systems possible.

Rajeev Ahal
Director, Natural Resource Management and Agroecology

About the Compendium

This compendium, *Contributing to Viksit Bharat 2047: Indo-German Pathways Towards Sustainable Agriculture and Food Systems*, captures the body of work facilitated by GIZ India in collaboration with ministries, state and local governments, private-sector partners, civil society organisations, NGOs, and community institutions. It draws on practical experiences, tested models, and emerging practices from diverse agroecological contexts across India.

The compendium highlights what has worked, the lessons learned, and the collective impact achieved so far. It also points to directions for scale, policy integration and future action. By capturing these innovations, the compendium aims to inspire dialogue, foster partnerships, and enable pathways toward a resilient, inclusive, and sustainable food system for India.

The innovations documented in this volume are organised around six thematic areas:

- **Enhancing Farmers' Incomes:** Initiatives that improve earnings through diversification, value addition, and stronger market linkages.
- **Integrated Landscape-Based Approaches to Sustainable Farming:** Models that connect farm-level practices with the restoration of soil, water, and forest resources, thereby securing resilience at scale.
- **Food Security to Nutrition Security:** Interventions that move beyond calorie sufficiency to address dietary diversity and improved nutritional outcomes.
- **Scaling Models for Sustainable Agriculture and Agroecology:** Programmes that institutionalise ecological practices through farmer networks, capacity development, and governance mechanisms.
- **Digital Solutions:** Applications that strengthen decision-making, enable monitoring, and extend access to timely knowledge and services.
- **Innovations in Financing and Markets:** Approaches that expand access to capital, reduce risk, and ensure fairer integration of farmers into value chains.

Each innovation is presented with its context, the enabling policy environment, the design of the intervention, and the impact observed on the ground.

The compendium is intended both as a repository of practices and as a platform for continued action. It encourages policymakers to integrate these lessons into programmes and regulations, practitioners to adapt and replicate effective models, researchers to generate evidence and refine approaches, and partners across sectors to collaborate towards shared goals.

Food security, nutrition, climate resilience, and rural livelihoods are interconnected challenges that no single institution can address alone. The experiences documented here, grounded in the Indo-German Partners for Change (P4C) network and the Lighthouse on Agroecology and Sustainable Natural Resource Management, illustrate the value of collective effort and the potential for sustained progress when knowledge, policy, and practice converge.

This compendium is offered as a living resource, designed to inform strategies, inspire innovation, and strengthen collaboration. It provides pathways for continued contributions to India's development agenda of *Viksit Bharat 2047* and to global dialogues on sustainable, inclusive, and resilient food systems.

The **Partners for Change** (P4C) Network, initiated by the German Federal Ministry for Economic Cooperation and Development (BMZ), brings together governments, civil society, private sector actors, and academia from over 30 countries to co-create and share solutions for sustainable agricultural and food systems. Through thematic and regional events, the network connects local transformation experiences with global policy agendas, fosters South–South exchange, and strengthens dialogue among partners. P4C also develops the 2030 Position Paper on Functional Structures for Agricultural and Food Systems, ensuring that practical innovations and lessons learned feed into key multilateral processes and global discussions on sustainable agriculture and food security.

A

THEMATIC AREA 1: ENHANCING FARMERS' INCOMES

INNOVATIONS

- Accelerating access to quality seed potatoes through decentralised, localised and cost-effective Apical Rooted Cuttings technology
- Aquaculture Business School – Transforming smallholder fish farming into profitable enterprises
- Project Sanjeevani – Integrating ecology and livelihoods through MGNREGS
- Resilient farming through mainstreaming traditional landraces (BioDivKa, Karnataka)
- Bridging rural communities with global audiences – Moringa cultivation in rural India
- Building resilient rural livelihoods through structured, goat-based livelihood models
- Potato Zero Tillage with Rice Straw Mulching method (PZTM) – Turning rice straw into a resource for profitable, sustainable potato cultivation
- Transforming underutilised ponds into nutrition-sensitive livelihoods through integrated aquaculture models

Accelerating access to quality seed potatoes through decentralised, localised and cost-effective Apical Rooted Cuttings technology

A joint innovation by the India component of the global development cooperation project 'Green Innovations Centre for the Agriculture and Food Sector (GIC)' and Indo-German development cooperation project 'Sustainable Agriculture Systems and Policies (AgSys)'

CONTEXT

Potato is India's fourth most important food crop, and the nation is the world's second-largest producer. However, the domestic seed potato sector faces significant structural challenges that hinder productivity and farmer prosperity. Currently, 60–70% of seed potatoes are produced in Punjab and transported across the country[1]. This centralised system creates a critical bottleneck: transportation alone adds up to 30% of the seed price, while seed itself accounts for nearly half of total production costs.[2] Consequently, a large proportion of smallholder farmers rely on old and degenerated seed, which increases susceptibility to disease and significantly reduces yields. These systemic inefficiencies underscore the need for decentralised, cost-effective technologies capable of delivering disease-free planting material at scale.

NATIONAL POLICY LANDSCAPE

The Government of India is driving a strategic push to modernise the agricultural input sector through institutional collaboration and the rapid adoption of agri-tech. Instead of relying solely on subsidies, the strategy focuses on building a robust R&D ecosystem. A key initiative is the strong partnership between the Indian Council of Agricultural Research (ICAR) and the International Potato Center (CIP), which has been instrumental in developing and releasing high-yielding, climate-resilient potato varieties. This collaboration was further solidified by the Union Cabinet's approval for the establishment of CIP's South Asia Regional Centre in Uttar Pradesh, a move aimed at accelerating innovation in the potato sector. These efforts signal a broader policy push to formalise and strengthen the seed production sector through science and technology.

[1] IndiaAI, *Punjab's Agri Export Corporation is using AI for improving the quality of seed potatoes, 19 July 2020,* https://indiaai.gov.in/article/punjab-s-agri-export-corporation-is-using-al-for-improving-the-quality-of-seed-potatoes

[2] GIZ, *Good Agricultural Practices in Potato Cultivation: A technical manual for Karnataka, January 2024,* https://snrd-asia.org/wp-content/uploads/2024/07/26-Good-agricultural-practices-in-Potato-Cultivation-%E2%80%93-A-technical-manual-for-Karnataka.pdf

ALIGNMENT WITH

VIKSIT BHARAT 2047

Achieving self-reliance (Atmanirbhar Bharat) in agriculture and enhancing farmer incomes are critical pillars to India's *Viksit Bharat 2047* vision. The promotion of decentralised seed potato production directly supports the national ambition to become the world's top potato producer, with a projected output of 100 million tonnes by 2050[3]. By empowering local communities and women entrepreneurs to become seed producers, the ARC technology can boost farmer incomes by as much as 50%, directly contributing to rural prosperity[4]. This innovation also aids food and nutrition security by stabilising the supply of a staple food crop and opening avenues for biofortified varieties to address hidden hunger. Furthermore, by facilitating the development of heat and drought-tolerant varieties, this approach builds climate resilience, making it a cornerstone of sustainable agriculture for a developed, food-secure India.

INNOVATION: APICAL ROOTED CUTTINGS TECHNOLOGY

Apical Rooted Cutting (ARC) is a tissue culture–based technique that accelerates potato seed multiplication by producing disease-free rooted cuttings in screenhouses. Each plantlet can generate hundreds of cuttings, with each cutting yielding multiple seed tubers, significantly boosting multiplication rates compared to traditional methods. ARC shortens the time to produce commercial seed, improves profitability, expands access to quality seed, and when combined with improved varieties, strengthens food security, supports local livelihoods, and can transform regions into seed production hubs.

KEY COMPONENTS OF THE INNOVATION

Accelerated seed multiplication cycles: Reduces the production timeline from six seasons to just two, making quality seed available faster and at scale.

Disease-free planting material with genetic purity: Tissue-culture plantlets are rigorously screened for diseases, ensuring healthy planting material for higher yields.

Decentralised seed production hubs: Promotes farmer-led seed systems using low-cost net houses, reducing reliance on centralised cold storage improving local seed access.

New livelihood opportunities in nurseries: Women and smallholder farmers are engaged in nursery operations and propagation services, generating income and employment.

[3] The Hindu Bureau, *India poised to emerge as world's leading potato producer, say international scientists,* 20 May 2025, https://www.thehindu.com/news/national/india-poised-to-emerge-as-worlds-leading-potato-producer-say-international-scientists/article69598117.ece

[4] GIZ, *GIC Innovation Booklet*, March 2023, https://snrd-asia.org/wp-content/uploads/2024/07/28-Green-Innovation-Centre-Innovation-Booklet-%E2%80%93-Best-practices-of-7-years-of-innovation-in-tomato-and-potato-value-chain.pdf

IMPACT OF THE INNOVATION

Seed production time reduced by two-thirds, accelerating availability to farmers.

Lower seed costs by **30-40** % compared to conventional tuber systems.

Higher yields from disease-free and climate-resilient planting material.

Women are employed in propagation and nursery activities, strengthening gender-inclusive livelihood opportunities.

Regional seed systems established, enhancing supply security and resilience.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Innovations in financing and markets

PUBLIC PARTNERS

Ministry of Agriculture & Farmers Welfare (MoA&FW), Mission for Integrated Development of Horticulture (MIDH), University of Horticultural Sciences, Bagalkot, Karnataka

Horticulture Research and Extension Stations (HRES)

Department of Horticulture in Karnataka and Maharashtra

IMPLEMENTATION PARTNERS

International Potato Center (CIP)

FPO, smallholder farmers

Aquaculture Business School – Transforming smallholder fish farming into profitable enterprises

An innovation by the India component of the global development cooperation project 'Sustainable Aquaculture for Food and Livelihood (SAFAL)'

CONTEXT

India's aquaculture sector is a significant engine of rural economic growth, contributing over 6.7% to the agricultural GVA and supporting the livelihoods of approximately 30 million people.[1,2] With seafood exports doubling in the last decade to over ₹60,000 crore[3], the commercial potential of the sector is immense. However, a critical gap persists at the grassroots level. The majority of smallholder fish farmers operate on a subsistence basis, facing challenges of escalating production costs, opaque markets, and poor returns on investment. This is largely due to a lack of essential business skills, including financial literacy, formal record-keeping, and enterprise management, which prevents them from transitioning their farms into profitable and resilient businesses.

NATIONAL POLICY LANDSCAPE

The Government of India's policy framework for the "Blue Revolution" is strongly focused on promoting entrepreneurship and doubling farmer incomes. Key initiatives are designed to transform the sector from a traditional activity into a modern enterprise. The flagship Pradhan Mantri Matsya Sampada Yojana (PMMSY) is complemented by the Pradhan Mantri Matsya Kisan Samridhi Sah-Yojana (PM-MKSSY), a sub-scheme aimed at formalising the sector and supporting micro and small enterprises. Financial inclusion is promoted through the Fisheries and Aquaculture Infrastructure Development Fund (FIDF) and the extension of the Kisan Credit Card (KCC) to 4.32 lakh fish farmers.[4] Furthermore, the government is supporting the creation of 2,195 Fish Farmer Producer Organizations (FFPOs) to enhance collectivization and market power.[5] These efforts signal a broader policy push to build a robust entrepreneurial ecosystem within the aquaculture sector.

[1] Press Information Bureau, *World Fisheries Day: Sustainable Fishing Practices for a Thriving and Eco-Friendly Fisheries Sector,* 20 November 2024, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2075160#

[2] Press Information Bureau, *Department of Fisheries allocated an amount of Rs. 2584.50 crore for financial year 2024-25,* 1 February 2024, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2001498

[3] News on Air, *India's Fish Exports Doubled in a Decade to ₹60,000 Crore: Minister Rajiv Ranjan Singh,* 11 August 2025, https://www.newsonair.gov.in/indias-fish-exports-doubled-in-a-decade-to-%E2%82%B960000-crore-minister-rajiv-ranjan-singh/

[4] Press Information Bureau, *Shri Rajiv Ranjan Singh briefs media today on the important decisions and achievements of Ministry for Fisheries, Animal Husbandry and Dairying in 100 days of the third term of Prime Minister Shri Narendra Modi,* 17 September 2024, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2055709

[5] Press Information Bureau, *Shri Rajiv Ranjan Singh briefs media today on the important decisions and achievements of Ministry for Fisheries, Animal Husbandry and Dairying in 100 days of the third term of Prime Minister Shri Narendra Modi,* 17 September 2024, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2055709

ALIGNMENT WITH
VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision aims to transform the blue economy into a primary driver of national prosperity, focusing on doubling farmers' incomes and enhancing global competitiveness.[6] The national ambition is to increase fish production to over 40 million tons by 2047, elevate seafood exports to ₹1,00,000 crore, and generate 55 lakh new employment opportunities within the sector.[7,8] Achieving this vision requires a fundamental shift from subsistence farming to a modern, enterprise-based approach. The strategy emphasizes the formalization of the sector, strengthening farmer collectives like FFPOs, and creating an ecosystem where smallholders can operate as profitable, sustainable businesses. The social and economic empowerment of the 30 million people dependent on aquaculture is a core pillar of this long-term plan for a self-reliant (*Atmanirbhar*) India.

INNOVATION: AQUACULTURE BUSINESS SCHOOL

The **Aquaculture Business School (ABS),** under SAFAL project implemented by GIZ India, introduces a new way of building business capacity in aquaculture. It adapts the Farmer Business School model, used with over 1.7 million farmers worldwide, to the context of smallholder fish farming in Assam. Unlike conventional training that focuses only on production, ABS combines technical aquaculture practices with financial literacy, enterprise management, risk optimization and market skills.

ABS is delivered through a network of certified trainers and anchored with the Department of Fisheries, Assam and the Assam State Rural Livelihood Mission (ASRLM). It enables farmers, especially women and youth in Self-Help Groups, to increase incomes, improve household nutrition, and build resilience. By embedding business skills into aquaculture, ABS shifts the sector from subsistence activity to sustainable enterprise.

KEY COMPONENTS OF THE INNOVATION

12-module aquaculture business curriculum: Includes topics such as pond management, nutrition-sensitive farming, profit and loss, financial planning, credit access, diversification, and entrepreneurship.

Practical workbooks and templates for financial planning: Cropping calendars, profit–loss sheets, and loan tracking formats help farmers directly apply business concepts to their farms.

Certified ABS trainer network: Trainers undergo structured certification and deliver content through adult learning methods such as role-plays, group exercises, and posters.

Nutrition-sensitive and gender-inclusive modules: Training emphasises household dietary balance and actively engages women Self-Help Group (SHG) members and rural youth.

Group-based market and input strategies: Modules on collective purchasing and sales strengthen farmer bargaining power, lower transaction costs, and build stronger market linkages.

[6] Press Information Bureau, *Blue Revolution: 4 Years of Pradhan Mantri Matsya Sampada Yojana,* 13 September 2024, https://www.pib.gov.in/PressNoteDetails.aspx?NoteId=152138&ModuleId=3

[7] Press Information Bureau, *World Fisheries Day: Sustainable Fishing Practices for a Thriving and Eco-Friendly Fisheries Sector,* 20 November 2024, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2075160#

[8] Press Information Bureau, *Shri Rajiv Ranjan Singh briefs media today on the important decisions and achievements of Ministry for Fisheries, Animal Husbandry and Dairying in 100 days of the third term of Prime Minister Shri Narendra Modi,* 17 September 2025, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2055709

IMPACT OF THE INNOVATION

1,700+ farmers trained across four districts of Assam within 6 months on topics such as informed business decision-making, risk identification and mitigation, and investment planning for livelihood products. Training delivered through a cascade model (1 Master Trainer → 15 Trainers → 1,700+ farmers) under the MoU among ASRLM, DoF Assam, and GIZ India.

30% increase in fish production and incomes reported by participating farmers.

Improved household nutrition outcomes, with explicit training on diets and food security alongside profit goals.

Scaling commitment secured from ASRLM, with **2,000** additional farmers to be trained in FY 2025–26.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Enhancing farmers' incomes

PUBLIC PARTNERS

- Ministry of Fisheries, Animal Husbandry & Dairying (MoFAHD)
- Department of Fisheries, Assam (DoF)
- Assam State Rural Livelihood Mission (ASRLM)
- Potential for expansion under Ministry of Rural Development (DAY–NRLM) and PM Matsya Sampada Yojana (PMMSY)

IMPLEMENTATION PARTNERS

- Krishi Vigyan Kendra (KVK), Darrang – Technical and field support
- Jolkuwori LLP – Local training delivery
- Farmer Producer Companies, SHGs, and ABS-certified trainers – Grassroots implementation

Project Sanjeevani – Integrating ecology and livelihoods through MGNREGS

An innovation supported by the Indo-German development cooperation project 'Enhancing Rural Resilience through Appropriate Development Actions (ERADA)'

CONTEXT

India's rural communities face mounting ecological pressures. An estimated 32% of land is degraded and 25% is affected by desertification, reducing agricultural productivity and undermining food security.[1] Rural youth are particularly vulnerable. Nearly 80% are employed in agriculture and allied sectors[2], yet limited opportunities and low returns contribute to migration and the weakening of village economies.

MGNREGS remains a critical source of wage support. However, the assets it generates (such as ponds and plantations) are frequently fragmented, of variable quality, and lack mechanisms for community ownership. Consequently, they provide limited long-term ecological or livelihood benefits. These conditions demonstrate the need for integrated, community-anchored interventions that restore landscapes, strengthen ecosystem services, and embed sustainable livelihoods within rural development.

NATIONAL POLICY LANDSCAPE

MGNREGA provides a statutory framework for wage employment and natural resource assets, with increasing emphasis on ecological regeneration and convergence across sectors. State governments and rural institutions are implementing multi-agency coordination – combining Panchayati Raj Institutions (PRIs), rural development, horticulture, forestry, and agricultural departments – to jointly plan and execute landscape restoration and livelihood investments. Guidelines such as the 2017 MGNREGS Convergence Framework formalise linkages with livelihoods, forestry, and nutrition missions, encouraging integrated outcomes at local scale (e.g., plantations paired with soil and water works).

[1] Food and Agriculture Organization of the United Nations (FAO). (2024, June 5). *Strengthening India's Agrifood Systems: Tackling Land Degradation and Desertification.* FAO India. https://www.fao.org/india/news/detail-events/en/c/1697185/

[2] Global Development Incubator (GDI). (2024, August). *State of Youth Report 2024.* Global Development Incubator. https://globaldevincubator.org/wp-content/uploads/2024/08/State-of-Youth-Report.pdf

ALIGNMENT WITH
VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision situates ecological sustainability, climate resilience, and inclusive rural development at the centre of India's long-term growth strategy. It calls for the creation of "Clean and Green Villages" through widespread adoption of natural resource regeneration and climate-smart agriculture. Strengthening local governance, empowering women's institutions, and embedding community ownership in public investments are identified as critical enablers. Integrated models that combine ecological restoration with livelihood generation directly advance these priorities, contributing to national goals of rural prosperity, environmental security, and social inclusion.

INNOVATION: PROJECT SANJEEVANI

Project Sanjeevani was conceived under ERADA with the MGNREGS Cell, Department of Rural Development, Rajasthan. It reorients MGNREGS from standalone works to an integrated, outcome-based model. Instead of building standalone assets, Sanjeevani creates living, interconnected assets – such as Miyawaki forests, moringa plantations, composting pits, and water harvesting structures – that work together to strengthen ecosystems. These ecological investments are directly linked to livelihood diversification opportunities like beekeeping, livestock rearing, and mushroom cultivation. The model is innovative because it transforms MGNREGS from an output-driven scheme (person-days, number of assets) into an outcome-driven ecosystem that delivers long-term ecological security, food security, and income diversification.

KEY COMPONENTS OF THE INNOVATION

Integrated site planning under MGNREGS: Village clusters are designed as interconnected eco-asset systems, replacing scattered works with outcome-driven planning.

Ecological regeneration through plantations and water structures: Native tree planting, soil conservation, and water harvesting improve micro-climate, biodiversity, and natural resource security.

Enterprises linked to ecological assets: Restored landscapes support income diversification through horticulture, beekeeping, and other allied activities.

Multi-level governance and departmental convergence: Gram Panchayats lead planning and oversight, while line departments provide technical expertise and ensure resource pooling.

Women's SHGs as implementing agencies: Self-Help Groups manage assets and revenues directly, enhancing accountability, stewardship, and sustainability.

[3] Pashudhan Praharee, Role of *Veterinarians & Livestock Sector for "Viksit Bharat@2047", 27 November 2024,* https://www.pashudhanpraharee.com/role-of-veterinarians-livestock-sector-for-viksit-bharat2047-18/

[4] Pashudhan Praharee, Role of Veterinarians & Livestock Sector for "Viksit Bharat@2047", 27 November 2024, https://www.pashudhanpraharee.com/role-of-veterinarians-livestock-sector-for-viksit-bharat2047-18/

IMPACT OF THE INNOVATION

8 Aspirational Districts covered under the ERADA project across Rajasthan, Bihar, Jharkhand, and Madhya Pradesh.

1 state-wide scale-up in Rajasthan, with adoption beyond the Baran pilot by the Department of Rural Development.

Multiple asset classes converged at each site, integrating plantations, forests, and water structures into connected eco-systems.

Improved ecological resilience through afforestation, biodiversity gains, and water conservation tied to enterprise development.

New livelihood opportunities created by integrating enterprises such as beekeeping, mushroom cultivation, and composting.

Systemic shift in MGNREGS monitoring from person-days and asset counts to outcomes in resilience, food security, and livelihood diversification.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Enhancing farmers' income

IMPLEMENTATION PARTNERS

- Panchayati Raj Institutions
- Department of Rural Development
- RAJEEVIKA (Rajasthan State Rural Livelihood Mission)
- Line departments (Horticulture, Forest, Agriculture, and Water Resources)

Resilient farming through mainstreaming traditional landraces (BioDivKa, Karnataka)

An innovation supported by the Indo-German development cooperation project 'Support to Agroecological Transformation Processes in India (SuATI)'

CONTEXT

India is a global repository of agricultural biodiversity, with its National Gene Bank conserving over 92,000 accessions of indigenous varieties and landraces.[1] These traditional crops are naturally climate-resilient, nutrient-rich, and adapted to local soil and water conditions.[2] However, despite this rich genetic heritage, agrobiodiversity on farms is rapidly declining due to the widespread adoption of commercial hybrids, rising temperatures, and recurrent droughts.[3] This erosion of diversity weakens the resilience of smallholder farming systems and is compounded by weak seed systems, a lack of agronomic knowledge, and limited market linkages for traditional crops, preventing them from being mainstreamed as a viable strategy for building sustainable food systems.

NATIONAL POLICY LANDSCAPE

The Government of India promotes conservation and use of indigenous agrobiodiversity through a strong legal and institutional framework. The Protection of Plant Varieties and Farmers' Rights Authority (PPV&FRA) formally recognises and incentivizes farmers and communities via the Plant Genome Saviour Awards.[4] Complementing this, 26 community seed banks have been established to conserve more than 4,000 native landraces at the local level. Government-supported projects are also mainstreaming these varieties, already reaching 25,000 farmers across 120,000 hectares. Together, these efforts reflect a clear policy push to conserve genetic resources while actively reviving and integrating them into agriculture through participatory, community-led approaches.[5]

[1] Press Information Bureau, 30 July 2021, *Promoting Traditional Agro-Products,* https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=1740832

[2] Campbell, Quinn, et al. Jan. 2025, *"Agricultural Landscape Genomics to Increase Crop Resilience."* Plant Communications, p. 101260, doi:10.1016/j.xplc.2025.101260.

[3] Kumar, T. Sunil, et al. Aug. 2025, *"The Importance Of Landraces In The Present Context Of Climate Change In India: A Review."* Researchgate, doi:10.51470/plantarchives.2025.v25.supplement-2.307.

[4] Krishi Vigyan Kendra Cachar, *Protection of Plant Varieties and Farmers' Rights (PPVFR),* https://kvkcachar.aau.ac.in/ppvfra.html#

[5] Press Information Bureau, 30 July 2021, Promoting Traditional Agro-Products, https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=1740832

ALIGNMENT WITH
VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision for agriculture aims to build a modern, climate-resilient, and sustainable sector that secures national food and nutritional needs. A core strategy is the conservation and mainstreaming of India's indigenous agrobiodiversity through a science-led approach that values nature and equips smallholders with climate-adapted systems.[6] This requires a shift from monolithic, input-intensive practices to diversified models that draw on local genetic resources. It also emphasises strengthening community seed systems, advancing farmer-centric research, and developing value chains for traditional crops, positioning India's agricultural heritage as a foundation for future prosperity.

INNOVATION: THE BIODIVKA INITIATIVE

The BioDivKa initiative, supported by GIZ and the Research Institute of Organic Agriculture (FiBL), works to mainstream traditional landraces of 20 crops in Karnataka as climate-resilient and nutrition-sensitive alternatives. It combines seed conservation, farmer-led innovation, and scientific trials with participatory approaches.

A mix of methods is used to establish scientific vigour behind these crops:

- Mother–baby trials: participatory research method to test many crop varieties on "mother plot" and then farmers select selected varieties on their own "baby" plots for comparing results and share feedback.
- Participatory plant breeding (PPB) involves farmers and scientists jointly selecting and improving varieties to meet both local needs and scientific standards.
- The TRICOT method (*Triadic Comparisons of Technology*) engages farmers in testing three varieties at a time and sharing results, generating reliable data across diverse locations.

KEY COMPONENTS OF THE INNOVATION

Traditional seed diversity is conserved and multiplied: Systematic collection, preservation, and multiplication of landraces of 20 crops ensures their continued use and resilience against climate stress.

Farmers and scientists jointly test and improve crops: Mother–baby trials, PPB, and the TRICOT citizen science method are used to evaluate, refine, and adapt landraces to local conditions.

Agroecological farming practices are promoted: Intercropping, crop rotation, and low-input techniques make landraces more viable while reducing dependence on chemical inputs.

Farmer knowledge and capacity on resilient crops is enhanced: Model farms, in-situ conservation sites, and participatory training sessions strengthen farmer skills in agronomic and nutritional benefits of landraces.

Policy and market linkages are created to support landraces: Collaboration with state agriculture institutions shapes supportive schemes, while local market promotion increases visibility and consumer trust in landrace-based products.

[6] Bisht, Ishwari Singh, et al. Dec. 2020. *"Mainstreaming Agricultural Biodiversity in Traditional Production Landscapes for Sustainable Development: The Indian Scenario."* Sustainability, vol. 12, no. 24, p. 10690, doi:10.3390/su122410690.

IMPACT OF THE INNOVATION

- Climate-smart farming systems adapted to local conditions
- Improved food and nutritional security through landrace-based diets
- Stronger economic and climate resilience of smallholder farmers
- Promotion of functional biodiversity and ecosystem restoration
- A replicable model for state and national scaling of agroecological transitions

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Enhancing farmers' incomes

PUBLIC PARTNERS

Ministry of Agriculture & Farmers Welfare (MoAFW)

Department of Agriculture, Government of Karnataka

State Agricultural Universities (SAUs) and Krishi Vigyan Kendras (KVKs)

IMPLEMENTATION PARTNERS

Research Institute of Organic Agriculture (FiBL) – Technical lead, participatory research

Local NGOs, farmer associations, and seed networks – Seed collection, field implementation, and training

Farmer groups – In-situ conservation, on-farm trials, and local dissemination

Bridging rural communities with global audiences – Moringa cultivation in rural India

An innovation supported by the Indo-German development cooperation project 'Enhancing Rural Resilience through Appropriate Development Actions (ERADA)'

CONTEXT

The horticulture sector is a critical component of India's agricultural economy, providing livelihoods for approximately 55% of the population and contributing around 18% to the GDP. Within this sector, Moringa[1], hailed as the 'Miracle Tree', offers a transformative solution for smallholder farmers in arid and semi-arid regions facing agro-ecological and nutritional challenges. As a native Indian superfood, moringa is exceptionally suited to these conditions due to its drought resilience, low input requirements, and rapid growth cycle.

India is the world's largest producer of moringa[2], supplying over 80% of global demand for a market projected to reach USD 18.2 billion by 2030.[3][4] The crop is rich in vitamins and minerals, containing more calcium than milk and more Vitamin C than oranges, directly addressing household nutritional gaps[5] However, challenges such as inadequate post-harvest infrastructure, poor market linkages, and the fact that India processes less than 10% of its agricultural output, leave much of its value-addition potential untapped.

NATIONAL POLICY LANDSCAPE

Recognising the potential moringa holds, the Government of India has fostered a supportive policy environment that converges flagship schemes to strengthen horticulture. Initiatives like the *Deendayal Antyodaya Yojana* – National Rural Livelihoods Mission (DAY-NRLM), Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), Mission for Integrated Development of Horticulture (MIDH), and the National Ayush Mission (NAM) have been synergised to promote plantation, processing, and market access. These efforts reflect a broader policy thrust to integrate horticulture into India's growth and nutrition agenda.

[1] Scientific name: *Moringa oleifera*

[2] Mongabay, *The rise of India's moringa economy,* 7 July 2025, https://india.mongabay.com/2025/07/the-rise-of-indias-moringa-economy/

[3] Export Import Data, *Moringa Powder Export from India and Key Growth Trends,* 3 July 2025, https://www.exportimportdata.in/blogs/moringa-powder-export-from-india.aspx

[4] Mongabay, *Bangladeshi farmers eye moringa as a climate and economic solution,* 22 Jan 2024 https://news.mongabay.com/2024/01/bangladeshi-farmers-eye-moringa-as-a-climate-and-economic-solution/

[5] Gopalakrishnan, Lakshmipriya, et al. *"Moringa Oleifera: A Review on Nutritive Importance and Its Medicinal Application." Food Science and Human Wellness,* vol. 5, no. 2, Apr. 2016, pp. 49–56, doi:https://doi.org/10.1016/j.fshw.2016.04.001.

ALIGNMENT WITH

VIKSIT BHARAT 2047

As India advances towards becoming a *Viksit Bharat* by 2047, agricultural transformation is central to increasing farmer incomes and strengthening climate resilience. Scaling moringa cultivation contributes to this vision by shifting from staple crops to high-value horticulture, raising food processing from under 10% to 30%[6], and boosting exports, with agriculture and food processing targeted to reach the national ambition of achieving USD 700 billion.[7] By transforming degraded lands into productive moringa plots, the crop strengthens nutrition security, creates rural jobs, and builds climate-resilient livelihoods, embodying the *Viksit Bharat* blueprint.

INNOVATION: MORINGA CULTIVATION THROUGH PUBLIC SCHEMES IN RURAL INDIA

The ERADA project promotes moringa cultivation as a multi-benefit livelihood option within a framework of agricultural transformation. It converges resources from MGNREGS and State Rural Livelihood Missions (SRLMs) to mobilise land, labour, and capacity-building support. Cultivation is undertaken on both individual and common lands, using assets such as nurseries, compost pits, and water harvesting structures. The innovation lies in combining nutrition-sensitive agriculture with public works planning and market-oriented production, an approach rarely institutionalised in rural programmes.

Moringa functions both as a household nutrition source and as a marketable commodity, advanced through campaigns such as *Har Ghar Moringa*. Women's participation in cultivation and community ownership anchor implementation at the grassroots level. The initiative demonstrates a scalable, multi-benefit model aligned with national priorities on employment, natural farming, and rural resilience.

KEY COMPONENTS OF THE INNOVATION

Asset-based infrastructure for sustainable cultivation: Establishment and use of nurseries, compost pits, and water harvesting structures to support long-term farming practices.

Market promotion of moringa with buy-back linkages: Structured efforts to position moringa as a commodity, backed by assured procurement and value chain opportunities.

Moringa Toolkit for standardised cultivation practices: Application of GIZ-supported tools, including planting guidelines, harvesting schedules, and field templates, to ensure consistency and quality.

Enabling women's leadership through organised group participation: Mobilisation of women-led groups using awareness campaigns and collective action to strengthen their role in cultivation and marketing.

[6] Food and Agriculture Centre of Excellence- Confederation of India Industry (2022), *Food Processing Vision 2047 white paper,* https://face-cii.in/wp-content/uploads/2022/12/White-Paper-on-Food-Processing-Vision-2047.pdf

[7] PHDCCI, *Agriculture drives India's growth trajectory towards Viksit Bharat: PHDCCI, 21 February 2025,* https://www.phdcci.in/2025/02/27/agriculture-drives-indias-growth-trajectory-towards-viksit-bharat-phdcci/

IMPACT OF THE INNOVATION

₹3.94 lakh per acre demonstrated income from pod cultivation.

₹1.13 lakh per acre – demonstrated income from dry leaf production.

3,000+ households mobilised through campaigns like *Har Ghar Moringa*.

Increased women's participation in cultivation and community ownership.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Enhancing farmers' incomes

PUBLIC PARTNERS

- Ministry of Rural Development (MoRD)
- State Rural Livelihood Missions (SRLMs), National Rural Livelihood Mission (NRLM)
- Ministry of Agriculture and Farmers Welfare (MoA&FW)

IMPLEMENTATION PARTNERS

- Mahatma Gandhi NREGS implementing agencies
- Women's Self-Help Groups and Community Resource Persons
- Private Sector
- Entrepreneurship Development Institute of India (EDII)

Building resilient rural livelihoods through structured, goat-based livelihood models

An innovation supported by the Indo-German development cooperation project 'Enhancing Rural Resilience through Appropriate Development Actions (ERADA)'

CONTEXT

Goat rearing plays a vital role in India's rural economy, especially for landless, marginal, and smallholder farmers in drought-prone, flood prone, and tribal regions. According to the 19th Livestock Census (2019), goats number 148.88 million, making them the second largest livestock species after poultry. The sector employs nearly 33 million people, with about 24% of rural households relying on it for income, nutrition, and financial security.[1][2] Goat farming also supports dietary diversity through milk and meat, particularly in low-income and Scheduled Tribe (ST) communities.

Yet, the sector remains largely informal and under-supported. Persistent challenges include high kid mortality (up to 40%), inadequate shelter and fodder limited veterinary services and good management practices, and poor market access. These problems are most severe among women-headed and vulnerable households, for whom goats serve as both livelihood and liquid assets. The COVID-19 pandemic, with widespread reverse migration, further exposed these systemic gaps and highlighted the urgent need for sustainable, asset-based rural livelihoods.

NATIONAL POLICY LANDSCAPE

In response to such needs, the Government of India, through the Department of Animal Husbandry and Dairying, has introduced several schemes aimed at improving income from the agriculture and allied sectors. Key initiatives include the Livestock Health and Disease Control Programme, the Animal Husbandry Infrastructure Development Fund, National Livestock Mission, and the Rashtriya Gokul Mission. These schemes provide the enabling framework for reducing goat mortality, improving infrastructure, and supporting women-led goat enterprises. In recent developments government is encouraging cluster approach to strengthen the goat farming and associated value chain among rural small holder farmers.

[1] Thirunavukkarasu, D., et al. *"Factors Driving Adoption of Climatic Risk Mitigating Technologies With Special Reference to Goat Farming in India: Evidence From Meta-analysis."* *Small Ruminant Research*, vol. 216, Aug. 2022, p. 106804, doi:10.1016/j.smallrumres.2022.106804.

[2] Singh, M. K., et al. *"Doubling Rural Farmers' Income Through Goat Farming in India: Prospects and Potential."* *Indian Farming*, vol. 68, no. 01, Jan. 2018, pp. 75–79, icar.org.in/sites/default/files/inline-files/Dobling-rural-farmers-income.pdf.

ALIGNMENT WITH

VIKSIT BHARAT 2047

As India advances toward its vision of becoming a Viksit Bharat by 2047, the livestock sector is emerging as an important driver of economic transformation. National ambition includes a 50% increase in livestock productivity, self-sufficiency in the production of milk, meat, and eggs, a significant reduction in disease prevalence, and the generation of 50 million new employment opportunities.[3] Aligned with the NITI Aayog's strategic roadmap, the sector is poised to contribute 8–10% to India's GDP while also supporting progress toward the UN Sustainable Development Goals (SDGs).[4]

INNOVATION: THE GOAT-BASED LIVELIHOODS PROJECT

The ERADA project pioneered a convergence-driven model to formalise goat-rearing as a resilient livelihood for landless and smallholder farmers, with a particular focus on women-led households. By aligning livestock development with public programmes such as MGNREGS and SRLMs, the project elevated goat-based livelihoods from an informal coping strategy to a structured, scalable pathway for income security. The uniqueness of this initiative lies in embedding goat-rearing assets directly into GPDPs and MGNREGS planning, thereby institutionalising goat enterprises. Goat shelter, integrating fodder species in public and private land plantations, construction of aggregation centres, SHG compliant work sheds, and rural *haat* (marketplace), are the few activities under the infrastructural support that strengthen the ecosystem for goat farming.

A cornerstone of this approach was the Goat-Based Livelihood Toolkit, designed to translate technical expertise and grassroots knowledge into actionable plans for institutions and communities.

KEY COMPONENTS OF THE INNOVATION

Livelihood-convergent infrastructure: Integration of goat sheds, fodder plots, and Azolla pits into MGNREGS planning, creating durable assets while generating employment.

Capacity building at scale: Roll-out of the Goat-Based Livelihood Toolkit in multiple local languages, disseminated through SHGs, FPOs, and NRLM clusters to ensure wide adoption.

Women's leadership and ownership: Active mobilisation of women-led households and SHGs, positioning women as key managers of goat-rearing enterprises.

Last-mile extension services: Establishment of a community-based service ecosystem with trained *Pashu Sakhis* and *Prani Mitras* delivering vaccinations, deworming, fodder planning, and breed management.

Community-based planning and health systems: Use of GIS tools to integrate goat assets into GPDPs, alongside community-led breed improvement programmes and preventive veterinary care.

[3] Pashudhan Praharee, Role of *Veterinarians & Livestock Sector for "Viksit Bharat@2047", 27 November 2024*, https://www.pashudhanpraharee.com/role-of-veterinarians-livestock-sector-for-viksit-bharat2047-18/

[4] Pashudhan Praharee, Role of Veterinarians & Livestock Sector for "Viksit Bharat@2047", 27 November 2024, https://www.pashudhanpraharee.com/role-of-veterinarians-livestock-sector-for-viksit-bharat2047-18/

IMPACT OF THE INNOVATION

18,000+ goat sheds constructed under MGNREGS in Bihar for the ultra-poor households of Satat Jeevikaparjan Yojna (SJY), enhancing income and asset security for vulnerable households.

Improved livelihood resilience for women by reducing drudgery, securing year-round nutrition and income, and giving women greater control over household assets.

Mortality reduced and productivity improved, with households reporting higher goat survival rates due to locally available *Pashu Sakhi* services on basic goat management practices

Institutionalisation of goat-based livelihoods through the Goat-Based Livelihood Toolkit, enabling women-led SHGs and community groups to scale the model sustainably.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Enhancing farmers' income

PUBLIC PARTNERS

- Ministry of Rural Development (MoRD), Government of India
- State MGNREGS Missions, SRLMs, and National Rural Livelihood Mission (NRLM)
- Department of Animal Husbandry, Government of India

IMPLEMENTATION PARTNERS

- Centre for Microfinance and Professional Assistance for Development Action (PRADAN) - Rajasthan
- Heifer International/Passing Gifts Private Limited (PGPL)
- Self Reliant Initiatives through Joint Acition (SRIJAN)
- Sarv Seva Samiti Sanstha (4S), Samagra Shikshan evam Vikas Sansthan (SSEVS), and Change Alliance Private Limited (CAPL) – Bihar
- SUPPORT – Jharkhand
- Indo-German Social Service Society (IGSSS) and Mahatma Gandhi Seva Ashram (MGSA) – Madhya Pradesh

Potato Zero Tillage with Rice Straw Mulching method (PZTM) – Turning rice straw into a resource for profitable, sustainable potato cultivation

An innovation supported by the India component of the global development cooperation project 'Fund for the Promotion of Innovation in Agriculture (i4Ag)'

CONTEXT

India is the world's second-largest potato producer, with current annual output at 60 million tonnes and a strong trajectory for future growth.[1] However, traditional potato cultivation within rice-based farming systems is often input-intensive, costly, and unsustainable.[2] A major environmental and public health challenge in these systems is the widespread practice of burning residual rice straw after harvest, which leads to severe air pollution and the loss of valuable organic matter.[3] This context creates a critical need for climate-smart, conservation agriculture practices that can sustainably intensify production on existing land, improve soil health by reusing farm residues, and enhance the profitability and resilience of smallholder farmers.

NATIONAL POLICY LANDSCAPE

The Government of India has established a strong policy framework to support the horticulture and food processing sectors, with a specific focus on creating robust value chains for key vegetable crops. A key initiative is the Pradhan Mantri Kisan SAMPADA Yojana (PMKSY). A crucial component under this umbrella is "Operation Greens," which was launched specifically for the integrated development of the Tomato, Onion, and Potato (TOP) value chains.[4] The overarching scheme is projected to benefit nearly 28.5 lakh farmers and generate over 5.4 lakh direct and indirect employment opportunities.[5] These efforts signal a broader policy push to formalise and strengthen the entire potato value chain, creating a conducive environment for adopting innovative and sustainable farming practices.

[1] Data, Export Import. *"Potato Export from India: Driving Growth in 2025 Global Markets."* Exportimportdata, 31 July 2025, www.exportimportdata.in/blogs/potato-export-from-india.aspx.

[2] Srivastava, A. K., et al. "*Sustainable Intensification of Rice-Based Cropping Systems: Experiences From Eastern India.*" CRC Press eBooks, 2022, pp. 185–94, doi:10.1201/9781003164968-20.

[3] Dey S, Sarkar S, Dhar A, Brahmachari K, Ghosh A, Goswami R, Mainuddin M. *Potato Cultivation Under Zero Tillage and Straw Mulching: Option for Land and Cropping System Intensification for Indian Sundarbans.* Land. 2025; 14(3):563. https://doi.org/10.3390/land14030563

[4] Press Information Bureau, *PMKSY Gets a Big Push with Additional ₹1,920 Crores*, 7 August 2025, https://www.pib.gov.in/PressNoteDetails.aspx?NoteId=154987&ModuleId=3

[5] About PMKSY Scheme | Ministry of Food Processing Industries | GOI. www.mofpi.gov.in/en/Schemes/about-pmksy-scheme.

ALIGNMENT WITH

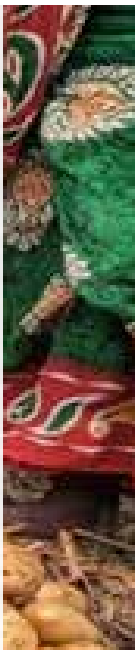
VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision for agriculture is centred on achieving food and nutritional security through sustainable, climate-resilient, and profitable farming systems. A core national ambition for the horticulture sector is to transform India into the world's leading potato producer by increasing annual output from 60 million tonnes to 100 million tonnes by 2050.[6] Achieving this scale requires a paradigm shift towards conservation agriculture practices that improve soil health, conserve water, and reduce the carbon footprint of farming. The vision emphasizes the economic empowerment of smallholders and women farmers by promoting low-cost, high-yield technologies that enhance their profitability and resilience in the face of climate change.

INNOVATION: POTATO ZERO TILLAGE WITH RICE STRAW MULCHING

The Potato Zero Tillage with Rice Straw Mulching (PZTM) method has been developed under the Fund for the Promotion of Innovation in Agriculture (i4Ag) with the International Potato Center (CIP) and partners in India. It is designed as a climate-smart alternative for rice-potato systems. Farmers plant seed potatoes on unworked soil and cover them with rice straw. This reduces tillage, lowers costs, prevents residue burning, and improves soil health.

PZTM is not only an agronomic method. It represents a systemic innovation that links conservation agriculture with community-led extension. Institutional partners support scientific validation, while farmer groups and women's collectives ensure dissemination. Together, these elements position PZTM as a scalable model for sustainable and inclusive farming.



KEY COMPONENTS OF THE INNOVATION

Direct potato planting on unworked rice fields: Seed potatoes are planted directly on unploughed fields, reducing labour and machinery use.

Straw mulching for soil and crop protection: Residual rice straw is spread as mulch to retain moisture, suppress weeds, and reduce pest pressure.

Optimisation of residual soil moisture: Farmers utilise existing post-rice soil moisture, enabling earlier planting and cultivation of long-duration potato varieties.

Improvement of soil health through natural processes: The method increases organic carbon, boosts fertility, and reduces soil salinity.

Women-centred extension and training models: Participatory training, self-help groups, and farmer-produced videos ensure women farmers lead adoption and dissemination.

[6] The Hindu Bureau, *India poised to emerge as world's leading potato producer, say international scientists,* 20 May 2025, https://www.thehindu.com/news/national/india-poised-to-emerge-as-worlds-leading-potato-producer-say-international-scientists/article69598117.ece

IMPACT OF THE INNOVATION

11339 farmers trained, out of which **8709** are women

311 Self Help Groups trained

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Enhancing farmers' incomes

IMPLEMENTATION PARTNERS

Dr. Rajendra Prasad Central Agricultural University, Bihar

Central Potato Research Station (ICAR-CPRS), Patna, Bihar

International Potato Center (CIP)

Digital Green

Transforming underutilised ponds into nutrition-sensitive livelihoods through integrated aquaculture models

An innovation supported by the Indo-German development cooperation project 'Enhancing Rural Resilience through Appropriate Development Actions (ERADA)'

CONTEXT

The fisheries and aquaculture sector, or the Blue Economy, is a vital pillar of India's socio-economic growth, providing nutrition and livelihood opportunities to approximately 3 crore fishers and fish farmers. As the world's second-largest fish producer, India contributes around 8% to global fish production.[1] The sector's contribution to India's agricultural GVA stands at 6.86%, with a sustained annual growth rate of 8.61% in recent years.[2]

Yet, significant opportunities remain untapped, particularly in states such as Bihar, Jharkhand, and Madhya Pradesh. 68,000 Amrit Sarovar and millions of farm ponds created under the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) nationally remain underutilised due to lack of technical knowledge, quality inputs, and clear tenure. This innovation addresses the gap between these existing water assets and their potential to be transformed into sustainable, nutrition-sensitive livelihoods.

NATIONAL POLICY LANDSCAPE

Recognising the potential of the Blue Economy, the Government of India has introduced a set of initiatives to strengthen fisheries and aquaculture. The Pradhan Mantri Matsya Sampada Yojana (PMMSY) marks the largest public investment in the sector and aims to increase productivity and income opportunities. The Fisheries and Aquaculture Infrastructure Development Fund (FIDF) supports the creation of modern facilities, while the extension of the Kisan Credit Card (KCC) provides fishers with easier access to working capital. Collectively, these measures form a robust policy framework for enhancing the use of community assets such as MGNREGS-constructed ponds and advancing the formalisation of India's Blue Economy.

[1] Press Information Bureau, *Casting Nets, Catching Success,* 15 February 2025, https://www.pib.gov.in/FactsheetDetails.aspx?Id=149135

[2] Press Information Bureau, *Shri Rajiv Ranjan Singh briefs media today on the important decisions and achievements of Ministry for Fisheries, Animal Husbandry and Dairying in 100 days of the third term of Prime Minister Shri Narendra Modi,* 17 September 2024, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2055709

ALIGNMENT WITH
VIKSIT BHARAT 2047

As India moves towards becoming a *Viksit Bharat* by 2047, the Blue Economy is identified as a central driver of sustainable growth. The *Vision of New India by 2030* already lists it as one of ten core growth areas, with a $100 billion target through the Deep Ocean Mission and ocean resource development[3].

Harnessing underutilised rural ponds for integrated aquaculture directly supports this ambition. It creates climate-resilient livelihoods, strengthens rural economies, and expands access to fish as an affordable source of protein and micronutrients. By aligning income generation with nutrition security, such innovations exemplify the inclusive and sustainable principles at the heart of the *Viksit Bharat* agenda.

INNOVATION: INTEGRATED AQUACULTURE MODELS

This livelihood model integrates MGNREGS-funded pond development with technical and institutional support from fisheries departments and rural livelihood missions. By converging with schemes such as PMMSY, ponds are used for dual purposes – fish farming and foxnut cultivation, either concurrently or in rotation. Communities also removed invasive water hyacinth to improve pond conditions, repurposing it into compost, livestock feed, and handicrafts, creating additional livelihood avenues.

KEY COMPONENTS OF THE INNOVATION

Pond-user groups with training and demonstration models: Groups formed with clear leasing terms and receive structured training on pond management, seed stocking, and water quality. Demonstration ponds highlight good practices for replication and are linked to PMMSY-supported state aquaculture plans.

Adoption of scientific aquaculture methods: Practices such as liming, fertilisation, and species diversification introduced with guidance from extension workers and Aqua Fellows.

Productive use of invasive water hyacinth: Removal of the weed is combined with its conversion into useful by-products, turning a problem resource into an asset.

Market and finance connections for sustainability: Farmers gain access to input suppliers, buyers, and rural credit schemes to strengthen production and sales.

[3] Ministry of Earth Sciences, *Transforming India's blue economy: Investment, innovation and sustainable growth, May 2025,* https://www.moes.gov.in/sites/default/files/2025-05/White-Paper_Blue_Economy.pdf

IMPACT OF THE INNOVATION

1,100+ water bodies revived across eight blocks in four states, improving water retention, irrigation access, and groundwater levels.

New income streams created through fish and foxnut farming. For instance, in Bihar, one marginal farmer earned a net income of **₹2.45** lakh within two years, illustrating the model's potential.

Entrepreneurship opportunities emerged around feed supply, nurseries, and aquatic produce processing, creating local value chains and jobs.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Enhancing farmers' incomes

PUBLIC PARTNERS

- Ministry of Rural Development (MoRD)
- State Rural Livelihood Missions (SRLMs), National Rural Livelihoods Mission (NRLM)
- Department of Fisheries, Government of India and State Departments
- Makhana Board
- Panchayati Raj Institutions

IMPLEMENTATION PARTNERS

- Kalong-Kapili
- Samagra Shikshan Evam Vikas Sansthan (SSEVS) and Change Alliance Private Limited (CAPL) – Bihar

B

THEMATIC AREA 2:

INTEGRATED LANDSCAPE-BASED APPROACHES TO SUSTAINABLE FARMING

INNOVATIONS

- Landscape-based natural farming model for forest fringe areas (Mandla model)
- Varuni – A digital tool for block-level water budgeting
- Nadi Darshan – A digital platform for community-led river rejuvenation
- A circular economy model – Composting urban organics for soil restoration and carbon sequestration
- Building capacity for climate-smart rice through training on Alternate Wetting and Drying (AWD) techniques
- Community Seed Nurseries for resilient and self-reliant farming systems
- Decentralised bio-fertiliser production – Converting biogas slurry into soil-friendly phosphate alternatives
- Elevating communities through Community Information Centres and Satellite Centres
- Mitigating human-wildlife conflict with solar-powered animal deterrents
- Pollination as an ecosystem service for sustainable horticulture

Landscape-based natural farming model for forest fringe areas (Mandla model)

An innovation by the India component of the global development cooperation project 'Soil Protection and Rehabilitation for Food Security (ProSoil)'

CONTEXT

In India, around 300 million people (largely tribal and smallholder communities) depend on forests for their subsistence and livelihoods.[1] Spread across more than 170,000 forest fringe villages, these communities face intertwined challenges of degradation of forest, recurring human-wildlife conflict[2] and declining agricultural productivity, soil degradation[3] While traditional, low-input farming practices persist, their sustainability is undermined by broader landscape-level pressures such as degraded common lands, shrinking forest resources, and weak institutional support. Conventional farm-centric interventions often fail to achieve scale or permanence, as they do not address the ecological and governance dimensions shaping these fragile landscapes. This makes a landscape-based approach essential for securing and sustaining food, nutrition, and income in forest-dependent regions.

NATIONAL POLICY LANDSCAPE

India's legal and policy architecture recognises the rights and vulnerabilities of forest-dependent communities while promoting conservation. The Forest Rights Act (FRA), 2006 provides a foundation for securing community tenure, complemented by participatory institutions such as Joint Forest Management Committees. Livelihood diversification is supported by schemes like the National Agroforestry Policy, Bharatiya Prakritik Krishi Paddhati (BPKP), the Pradhan Mantri Van Dhan Yojana (PMVDY), and the Green India Mission. Crucially, programmes such as MGNREGA offer convergence opportunities by financing initial natural resource management (NRM) assets. This policy mix signals a deliberate national shift toward integrated, community-centric forest landscape management – one that combines ecological restoration with local institution-building and farmer capacity development.

[1] Press Information Bureau, *Involvement of Tribal Communities in protection, conservation, and management of Forest Development,* 18 December 2023, https://www.pib.gov.in/PressReleseDetailm.aspx?PRID=1987759

[2] Press Information Bureau, *Involvement of Tribal Communities in protection, conservation, and management of Forest Development,* 18 December 2023, https://www.pib.gov.in/PressReleseDetailm.aspx?PRID=1987759

[3] Press Information Bureau, *Involvement of Tribal Communities in protection, conservation, and management of Forest Development,* 18 December 2023, https://www.pib.gov.in/PressReleseDetailm.aspx?PRID=1987759

ALIGNMENT WITH

VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision places ecological restoration and livelihood security at the heart of rural transformation. For forest-dependent communities, this means ensuring that conservation efforts directly enhance incomes, food security, and resilience. National commitments reinforce this ambition: the Green India Mission targets an increase of 10 million hectares of forest and tree cover and improved livelihoods for 3 million households.[4] By integrating restoration with food and nutrition security, the vision sets out a pathway for self-reliant, sustainable, and climate-resilient rural communities – particularly in India's forest fringe landscapes.

INNOVATION: THE MANDLA MODEL

The Mandla Model is a community-led approach that demonstrated the interconnectedness of natural farming with the sustainable management of shared resources such as forests, water bodies, and village commons. It is designed for forest-fringe areas where livelihoods and local ecology are deeply connected. The model builds local institutions, especially women-led groups, to plan and manage these activities. Farmers receive technical and motivational support at their doorstep from trained women resource persons, called Gram Mitras. By linking farm-level practices with landscape restoration, the Mandla Model creates the conditions for sustained agroecological farming, improved food security, and long-term resilience.

KEY COMPONENTS OF THE INNOVATION

Institutional governance through Mahila Sabhas and NRM Committees: Village-level groups function as Special Purpose Vehicles (SPVs) for participatory planning, resource governance, and implementation.

Digital resource mapping with e-Prakriti: GIS-based planning of a landscape for natural farming, by mapping out natural resources and commons like soil, water, and forest resources, enabling scientific and site-specific interventions.

Women-led extension through Gram Mitras: Trained women Community Resource Persons provide continuous, doorstep technical advice and motivation to farming households.

Landscape restoration linked to household farming: Regeneration of commons, water bodies, and degraded forests is integrated with supply of raw materials for natural farming at the household level.

Agroecological practices embedded in farming systems: Techniques such as biochar application, homestead-based natural farming, and diversified cropping connect household practices to wider landscape restoration.

[4] Press Information Bureau, *International Day of Forests 2025,* 20 March 2025, https://www.pib.gov.in/PressNoteDetails.aspx?NoteId=153994&ModuleId=3

IMPACT OF THE INNOVATION

150+ master trainers developed, enabling outreach to **18,000** farmers across **9** blocks in Mandla.

7,000 hectares freed from invasive Lantana, contributing to the restoration of **25,000** hectares under the landscape approach.

1,500 farmers benefitted from the use of biochar produced with uprooted Lantana.

Improved irrigation potential across **1,600** hectares, benefitting **6,000** farmers and enabling integrated farming systems such as paddy-fish cultivation.

The model has been recognised by Madhya Pradesh State Rural Livelihood Mission and DAY-NRLM.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Integrated landscape-based approaches to sustainable farming

PUBLIC PARTNERS

Madhya Pradesh State Rural Livelihood Mission (MPSRLM)

Deendayal Antyodaya Yojana – National Rural Livelihoods Mission (DAY-NRLM), Ministry of Agriculture and Farmers Welfare (MoAFW), and local panchayats

Local Panchayati Raj Institutions

IMPLEMENTATION PARTNERS

Foundation for Ecological Security (FES) as field implementation partner

Jawaharlal Nehru Krishi Vishwa Vidyalaya (JNKVV), Watershed Support Services and Activities Network (WASSAN), and other technical partners

Varuni – A digital tool for block-level water budgeting

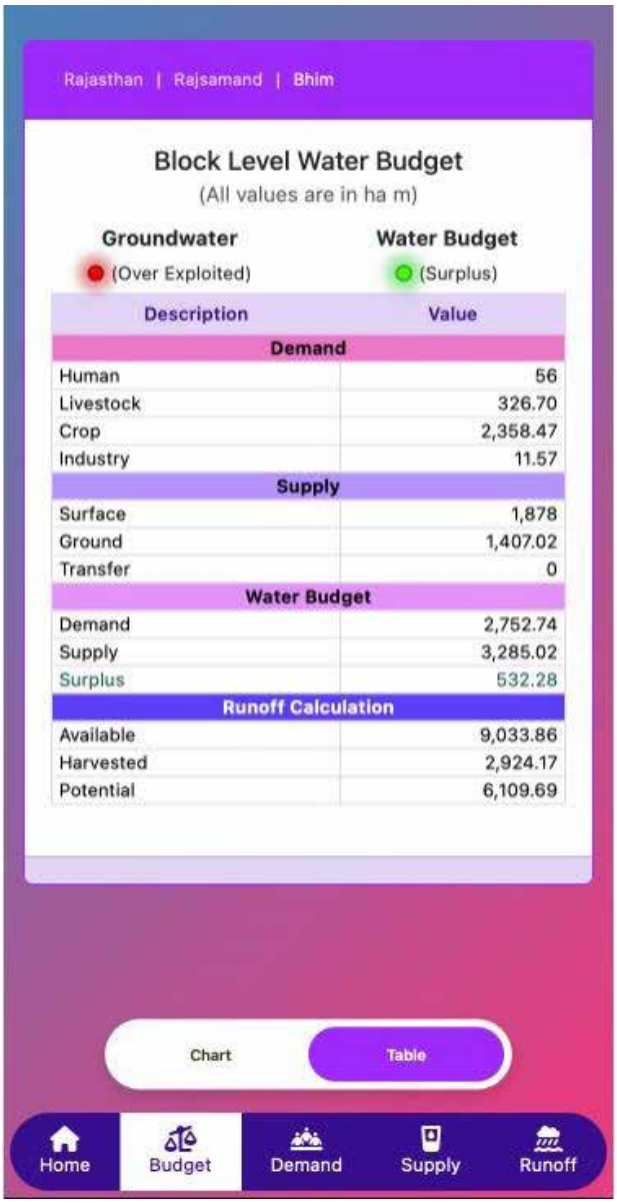
An innovation supported by the Indo-German development cooperation project 'Water Security and Climate Adaptation (WASCA II)'

CONTEXT

India faces a severe water crisis, holding 18% of the world's population but only 4% of its freshwater resources[1]. This stress is acutely felt in rural areas, where over 1,114 blocks are classified as overexploited or critical in terms of groundwater, and 54% of the nation's groundwater wells are in decline[2]. While national programmes generate extensive data on water supply and demand, a critical disconnect exists at the local level. Block and panchayat-level decision-makers often lack the tools to consolidate this disparate information into coherent, area-specific water budgets. This gap limits the design and implementation of government initiatives, preventing data-driven planning in ecologically vulnerable districts.

NATIONAL POLICY LANDSCAPE

India's policy landscape has increasingly focused on promoting data-driven, decentralised water governance. Key initiatives include the Jal Shakti Abhiyan and the Atal Bhujal Yojana. The national 'Water Vision@2047' further reinforces this direction, with key recommendations calling for the universal adoption of water budgeting at the Gram Panchayat level and the promotion of technologies like geo-mapping and remote sensing for improved resource assessment and planning[3]. These efforts signal a broader policy push to formalise and strengthen the water resource management sector through localised, evidence-based decision-making.



[1] TERI, *Study of Assessment of Water Foot Prints of India's Long Term Energy Scenarios*, 2017, https://www.niti.gov.in/sites/default/files/2019-01/Report%20Assessment%20of%20Water%20Foot%20Prints%20of%20India%27s%20Long%20Term%20Energy%20Scenarios_TERI%202017.pdf

[2] Sehgal Foundation, *Build Rural Water Security Through Community-Led Sustainability Efforts, 2 June 2025,* https://www.smsfoundation.org/building-water-security/

[3] Press Information Bureau, *Water Vision@2047- Suggestion For Addressing Water Security Challenges,* 2 February 2023, https://www.pib.gov.in/PressReleseDetailm.aspx?PRID=1895755

ALIGNMENT WITH
VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision views water security as a cornerstone of sustainable growth and inclusive development. It emphasises the transition from fragmented resource management to integrated, technology-enabled systems that can safeguard both rural and urban needs. National goals under this vision include scaling artificial rainwater harvesting structures to one million, expanding recycling capacity to 10,000 million litres per day[4], and embedding digital monitoring across water infrastructure. These ambitions highlight the central role of data-driven planning and localised governance in building a resilient and water-secure India by 2047.

INNOVATION: JALAGAM – A DIGITAL TOOL

Jalagam is a cloud-based application developed with NITI Aayog to make water budgeting simple, accessible, and actionable at the block level. It translates complex datasets into visual reports and AI-generated insights, equipping local planners for evidence-based, climate-responsive water governance. The innovation's value lies in bridging the long-standing gap between abundant public data and its practical use in decentralised planning.

KEY COMPONENTS OF THE INNOVATION

Automated integration of government datasets: Rainfall, groundwater, census, and agricultural data are directly pulled from public portals to generate block-level inputs.

Algorithms for block-level water budgeting: Demand and supply are calculated across human, livestock, agricultural, and industrial sectors, producing accurate surplus/deficit assessments.

Decision-support dashboards for administrators: User-friendly visualisations and printable reports translate technical datasets into formats usable by block officials and line departments.

AI-generated recommendations for prioritisation: Experimental modules provide block-wise inferences and actionable insights, helping planners select effective water management strategies.

[4] The Hindu, *Centre's vision for 'Viksit Bharat' focuses on providing drinking water from tap,* 26 April 2025, https://www.thehindu.com/news/national/urban-affairs-ministry-vision-forviksit-bharat-focuses-on-providing-drink-from-tap-facilities/article69490983.ece

JALAGAM
WATER BUDGET

IMPACT OF THE INNOVATION

Piloted across **23** aspirational blocks in **13** states, producing comprehensive, block-specific water budgets.

Automated surplus/deficit reports circulated to line ministries, supporting NITI Aayog's policy planning and inter-ministerial coordination.

Block-level officials accessed automated water budgets, using AI insights to prioritise local water interventions.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Digital solutions

PUBLIC PARTNERS

- NITI Aayog
- Ministry of Rural Development (MoRD)
- Ministry of Jal Shakti (MoJS)
- State and block-level planning teams

Nadi Darshan – A digital platform for community-led river rejuvenation

An innovation supported by the Indo-German development cooperation project 'Water Security and Climate Adaptation (WASCA II)'

CONTEXT

India's rivers, lifelines for millions, are under severe ecological stress. In 2022, 311 stretches across 279 rivers were classified as polluted, and nearly half of the country's 603 rivers remain contaminated.[1] While flagship programmes have focused on major rivers, the health of smaller rivers and tributaries – critical to entire basins – has often been overlooked. A major barrier is the fragmentation of knowledge: sub-basin level data, consistent mapping, and spaces for collective action remain inaccessible. Although local communities are the primary custodians of rivers, the absence of a unified platform to coordinate restoration practices has constrained community-led conservation.

NATIONAL POLICY LANDSCAPE

The Government of India has positioned community participation (*Jan Bhagidari*) as central to river rejuvenation. Programmes such as *Namami Gange*, the National River Conservation Plan (NRCP), and the Jal Shakti Abhiyan embed public involvement and awareness as core strategies. Institutional frameworks like the River Cities Alliance (RCA) and digital initiatives under *Digital India* reflect a growing reliance on technology to scale citizen participation. Information dashboards on biodiversity and pollution have already been piloted, setting a precedent for data-driven and participatory water governance. Together, these measures signal a shift towards embedding people and technology at the heart of river conservation.

[1] Danish Development Research Network, *From Clean to Contaminated: Indian Rivers Call for Urgent Action,* 21 November 2023, https://ddrn.dk/14561/

ALIGNMENT WITH

VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision places sustainability and citizen engagement as core elements of India's development trajectory. River rejuvenation is envisioned not merely as a top-down cleanup exercise but as a decentralised model of stewardship, where local communities shape long-term ecological outcomes. India's ambition extends to global leadership in this domain: the launch of the Global River Cities Alliance at COP28 and the UN's recognition of *Namami Gange* as a World Restoration Flagship underscore this direction. Achieving these goals requires equipping local actors with collaborative tools and real-time data, reflecting the larger push under *Digital India*.

INNOVATION: NADI DARSHAN – A DIGITAL PLATFORM

Nadi Darshan is an open-access platform that positions river rejuvenation as both a scientific and community-driven effort. It brings together hydrological data, local knowledge, and institutional collaboration, treating rivers as socio-ecological systems. By creating one shared space for experts, communities, and governance bodies, the platform ensures restoration plans are technically rigorous while rooted in cultural and social realities.

KEY COMPONENTS OF THE INNOVATION

Comprehensive digital repository of rivers: GIS-enabled maps, sub-basin profiles, and case studies provide a consolidated evidence base for eco-restoration.

Technical advisory hub for planning support: A moderated platform where national experts guide design and implementation of river rejuvenation efforts.

Community tools for participatory action: Resources to establish River Councils, document traditional practices, and coordinate collective initiatives.

Collaboration space for institutions and civil society: A convergence platform linking governance bodies, researchers, and non-profits to strengthen joint action.

IMPACT OF THE INNOVATION

River mapping and mobilisation launched at the sub-basin level in Kanpur Dehat, Uttar Pradesh.

Complex datasets translated for community use, enabling local planning in river systems such as the Ganga and Ramganga.

Formation of Local River Councils, which now apply both scientific data and traditional wisdom in restoration planning.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Digital solutions

PUBLIC PARTNERS

Ministry of Jal Shakti (MoJS)

Local administration – Kanpur Dehat, Uttar Pradesh

IMPLEMENTATION PARTNERS

Bhartiya Nadi Parishad

Consortium of NGOs/CSOs working on river rejuvenation

A circular economy model – Composting urban organics for soil restoration and carbon sequestration

An innovation by the India component of the global development cooperation project 'Soil Protection and Rehabilitation for Food Security (ProSoil)'

CONTEXT

India faces an interconnected challenge: urban organic waste mismanagement and rural soil degradation. The country generates over 62 million metric tonnes of municipal solid waste annually, nearly half of which is organic matter.[1] [2] Most of this biomass remains underutilised, creating pollution in cities while representing a lost opportunity for resource recovery. Simultaneously, India's agricultural soils are deteriorating: over 147 million hectares are degraded, with 3.7 million hectares suffering critically low organic carbon levels.[3] Declining soil fertility undermines productivity, food security, and climate resilience. Addressing these dual issues requires integrated solutions that link urban waste streams to rural soil rejuvenation through a circular economy approach.

NATIONAL POLICY LANDSCAPE

The Government of India has advanced a strong policy framework that positions waste-to-value as central to sustainability. The Swachh Bharat Mission-Urban (SBM-U) has prioritised waste segregation and composting in cities. The GOBAR-Dhan scheme promotes the conversion of organic waste into biogas and manure, while PM-PRANAM incentivises reduced chemical fertiliser use and adoption of alternatives. These programmes together establish the enabling environment for innovations that connect urban waste processing with agricultural sustainability, laying the groundwork for scalable circular economy models.

[1] Press Information Bureau, *Sustainable Processing of Municipal Solid Waste: 'Waste to Wealth'*, 23 October, 2020, https://www.pib.gov.in/PressReleasePage.aspx?PRID=1667099

[2] TERI, *"Waste to Wonder: Zinc Mining Waste Can Be Source for Magic Plant-nutrients."*, 20 December 2023, www.teriin.org/article/waste-wonder-zinc-mining-waste-can-be-source-magic-plant-nutrients

[3] GIZ, URBAN-RURAL NUTRIENT & CARBON CYCLE (URNCC),April 2021, https://www.giz.de/en/downloads/giz2023-en-URNCC-broshure.pdf

ALIGNMENT WITH
VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision builds directly on these policies, embedding the circular economy into India's long-term development agenda. A central ambition is to create "Clean and Green Villages" through sustainable waste management, soil health restoration, and organic farming[4]. Targets include setting up 200 compressed biogas plants and 300 community-based units, supported by district-level financial incentives under GOBAR-Dhan.[5]

By aligning environmental sustainability with economic opportunity, the roadmap envisions green job creation, energy security through waste-to-energy systems, and innovation in recycling and resource recovery. These priorities signal how today's policies converge into tomorrow's vision of a resilient, resource-efficient India – one where circular solutions underpin prosperity in both cities and villages.

INNOVATION: THE URBAN-RURAL NUTRIENT AND CARBON CYCLE

The Urban-Rural Nutrient and Carbon Cycle (URNCC) introduces a large-scale circular model that channels urban organic waste into nutrient-rich compost for rural farmlands. It establishes a structured system that recycles city waste into agricultural inputs while restoring soil health by directly linking Urban Local Bodies (ULBs) with Farmer Producer Organisations (FPOs). Developed with the Urban Development Department, Government of Maharashtra, and aligned with the Swachh Bharat Mission (SBM), the model combines compost processing, quality assurance, and branding under the HARIT. The result is a reliable flow of nutrients and carbon between cities and villages, improved soil productivity, and measurable contributions to climate resilience through carbon sequestration and reduced emissions.

KEY COMPONENTS OF THE INNOVATION

Operational and branding support for ULB compost production: Technical guidance for compost processing, quality checks, and branding under the HARIT label to improve efficiency and credibility.

Business models connecting ULBs with FPOs: Structured linkages that channel city-produced compost to farmer organisations, supporting widespread rural adoption.

Farmer engagement through demonstrations and exposure visits: Practical sessions and institutional linkages to build trust and promote adoption of city compost.

Compost quality testing and capacity building: maintaining compost quality as per FCO standards using only segregated organic waste, trainings and capacity building of ULB officials on scientific composting processes and regular sampling and testing of compost samples.

[4] NITI Aayog, Leveraging Agroecological Approaches for Clean and Green Villages, 16 November 2023, https://www.niti.gov.in/leveraging-agroecological-approaches-for-clean-green-villages

[5] Swachh Bharat Mission – Urban. (n.d.). Inside Asia's largest Gobar-Dhan Bio-CNG Plant. Government of India. Retrieved from https://sbmurban.org/indore-bio-cng-plant

IMPACT OF THE INNOVATION

12-15% yield improvements observed through field demonstrations.

Around **130000** metric tons of quality compost is being made available to farmers through various channels

Growing adoption by FPOs: one FPO procured **200** MT of compost, enough to cover **400-500** acres, indicating rising demand and confidence in compost quality.

Potential to recycle **350,000** metric tonnes of compost annually in Maharashtra; nationally, urban organic waste could yield about **2** million MT, covering **400,000** hectares of farmland.

Contribution to India's Land Degradation Neutrality (LDN) target of restoring **26** million hectares by 2030, aligning with national and global commitments.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Integrated landscape based approaches to sustainable farming

PUBLIC PARTNERS

- Urban Development Department, Government of Maharashtra
- NABARD
- Ministry of Housing and Urban Affairs (MoHUA)
- Ministry of Agriculture & Farmers Welfare (MoA&FW)

IMPLEMENTATION PARTNERS

Farmer Producer Organisations (FPOs), Municipal Corporations, and State Agriculture Universities

Building capacity for climate-smart rice through training on Alternate Wetting and Drying (AWD) techniques

An innovation supported by the Indo-German development cooperation project 'Carbon Offsetting Rice Emissions (CORE)'

CONTEXT

Rice is the backbone of India's food security, grown on 51 million hectares and sustaining hundreds of millions.[1] [2] [3] This places the sector at the centre of India's challenge to meet its Paris Agreement commitments and Long-Term Low Emissions Development Strategy.

Parallelly, excessive irrigation (seen often with rice) depletes groundwater, degrades soils, and contributes to micronutrient deficiencies such as iron and zinc in both soils and grains.[4] Climate-smart practices like Alternate Wetting and Drying (AWD) have been validated to address these issues, but adoption remains limited. The barrier is not farmer reluctance but the absence of structured, practical training for extension workers – the intermediaries responsible for translating research into farmer-ready guidance. Without systematic tools and confidence-building methods, AWD often remains promoted only in principle.

NATIONAL POLICY LANDSCAPE

The Government of India has prioritised reducing agricultural emissions while safeguarding food security. Under the NAPCC, the National Mission on Sustainable Agriculture promotes water efficiency and climate-resilient practices, with rice identified in India's NDCs as a priority for methane mitigation. Complementary schemes such as PMKSY and NICRA support low-emission methods, while ICAR-NRRI and IRRI have piloted AWD with states. The main gap is translating scientific protocols into structured, field-ready training for scale.

Recent climate governance frameworks strengthen this rationale. The Green Credit Programme (2023) incentivises water conservation and emission reduction, while the Carbon Credit Trading Scheme (2023) creates a domestic carbon market with agriculture included. The 2023 National Framework for Voluntary Carbon Markets in Agriculture provides clear crediting guidelines, embedding AWD within India's low-emissions pathway and climate finance agenda.

[1] United States Department of Agriculture (USDA), Foreign Agricultural Service (FAS). (2024). "*India Rice Area, Yield, and Production.*" https://ipad.fas.usda.gov/countrysummary/Default.aspx?crop=Rice&id=IN

[2] Surendran, U., Raja, P., Jayakumar, M., & Subramoniam, S. R. (2023). *Use of efficient water saving techniques for production of rice in India under climate change scenario: A critical review. Journal of Cleaner Production, 401,* 136711. https://doi.org/10.1016/j.jclepro.2023.136711

[3] Mishra, A., et al. "Reporting of Gridded (0.1° × 0.1°) Methane Emission Data for India." Earth System Science Data Discussions, 2025. https://doi.org/10.5194/essd-2025-65 (https://essd.copernicus.org/preprints/essd-2025-65/essd-2025-65.pdf

[4] Ahuja, A. (2025, March 25). "Depleting Soil Health: The Price of Growing Water-Guzzling Crops." NDTV. https://www.ndtv.com/india-news/depleting-soil-health-the-price-of-growing-water-guzzling-crops-8004539

ALIGNMENT WITH

VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision calls for agriculture that is climate-resilient, water-secure, and globally competitive. Rice, central to India's food economy yet among its most emissions-intensive crops, must be transformed to achieve this ambition.

Embedding structured AWD training into extension systems directly supports India's net-zero target for 2070 and interim methane reduction milestones, while improving water security in over-exploited regions such as Punjab, and Haryana. Its gender-responsive design also reflects Viksit Bharat's emphasis on inclusive growth, recognising women's crucial role in rice cultivation. Together, these dimensions position AWD training not only as a technical intervention but as a systemic lever for sustainable and inclusive agricultural transformation by 2047.

INNOVATION: STRUCTURED ALTERNATE WETTING AND DRYING TRAINING FOR FIELD-LEVEL EXTENSION SYSTEMS

The project introduces a structured training module on Alternate Wetting and Drying (AWD) for agricultural extension workers. AWD is a validated irrigation/water management method that reduces methane emissions significantly, conserves water and sustains yields. The innovation translates scientific research into a field-ready manual with step-by-step protocols, practical tools, and gender-responsive content, enabling extension staff to guide farmers in adopting climate-smart irrigation with confidence.

KEY COMPONENTS OF THE INNOVATION

Step-by-step AWD protocol for field staff: Training covers observation well setup, irrigation scheduling, and monitoring to ensure clarity and ease of use.

Locally adapted low-emission rice cultivation practices: Guidance included reduced nitrogen fertilizer use, biochar application, and other context-specific methods. Protocols were customized to soil type, climate, and water availability to ensure local suitability.

Gender-responsive modules for inclusive adoption: Developed with UN Women, these highlight women's roles in rice value chains and offer strategies to reduce gender-specific constraints by up-skilling women workforce in rice.

Low-cost field tools for real-time water management: Simple instruments such as PVC or bamboo water tubes enable farmers to monitor water levels, facilitates decision to irrigate or drain water thereby build confidence in AWD practices.

IMPACT OF THE INNOVATION

13 districts scaled in 2 years across Haryana, Madhya Pradesh, and Andhra Pradesh, up from a single pilot.

531 community resource persons (CRPs) trained to deliver climate-smart irrigation and low-emission practices.

20,000+ smallholder farmers reached with training on AWD, natural farming, methanotroph integration, direct seeded rice (DSR), and other sustainable protocols adapted to local conditions.

Gender roles in rice mapped, recognising women's labour in cultivation and laying the foundation for their policy and market inclusion.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Integrated landscape based approaches to sustainable farming

PUBLIC PARTNERS

International Rice Research Institute (IRRI)

Ministry of Agriculture and Farmers Welfare (MoA&FW)

IMPLEMENTATION PARTNERS

RySS, PRADAN, CSA and PCI as field implementation partners for Andhra Pradesh, Madhya Pradesh, and Haryana

UN Women (Gender module)

Olam Agri

Community Seed Nurseries for resilient and self-reliant farming systems

An innovation supported by the Indo-German development cooperation project 'Support to Agroecological Transformation Processes in India (SuATI)'

CONTEXT

The adoption of modern, uniform crop varieties has resulted in significant biodiversity loss, with global estimates indicating that up to 75% of genetic diversity had been lost by the mid-1990s.[1] In India, the decline of traditional, climate-resilient seed varieties, together with the weakening of community seed-saving systems, has increased farmer dependence on costly and less-adapted commercial hybrids. This context highlights the need for decentralised, farmer-led initiatives to conserve local genetic resources, revive traditional practices, and restore seed sovereignty at the grassroots as a foundation for a resilient and self-reliant food system.

NATIONAL POLICY LANDSCAPE

The Government of India is placing a renewed strategic emphasis on the conservation, promotion, and mainstreaming of traditional seeds. A key initiative is the establishment of the Bharatiya Beej Sahkari Samiti Limited (BBSSL), a national-level cooperative society tasked with making high-quality traditional seeds available to farmers. The government has mandated the BBSSL to ensure the organic production and market availability of selected traditional seeds starting from Kharif 2025.[2] This is complemented by the legal framework of the Protection of Plant Varieties and Farmers' Rights Authority (PPV&FRA), which incentivizes conservation through Plant Genome Saviour Awards for farmers and communities. These efforts signal a broader policy push to create a formal ecosystem that values and promotes traditional seeds for their role in climate-resilient agriculture.

[1] Shiva, Vandana. 6 Feb. 2012, *"The Seed Emergency: The Threat to Food and Democracy."* Al Jazeera, www.aljazeera.com/opinions/2012/2/6/the-seed-emergency-the-threat-to-food-and-democracy.

[2] Press Information Bureau, 25 February 2025, *Union Home Minister and Minister of Cooperation Shri Amit Shah Chairs Review Meeting Regarding Traditional Seeds of the Bharatiya Beej Sahkari Samiti Limited (BBSSL) in New Delhi.,* www.pib.gov.in/PressReleasePage.aspx?PRID=2106262.

ALIGNMENT WITH
VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision for agriculture is founded on building a modern, sustainable, and climate-resilient sector that ensures food and nutritional security for all. A core tenet of this vision is the revival and promotion of India's rich agrobiodiversity to build self-reliant rural communities and reduce dependence on external inputs.[3] [4] Achieving this long-term goal requires empowering farmers as 'custodians of biodiversity' and revitalizing traditional knowledge with scientific validation. The national strategy focuses on creating decentralized, community-owned systems for seed conservation and exchange, ensuring that India's agricultural heritage becomes a foundational pillar of its future resilience and prosperity.

INNOVATION: COMMUNITY SEED NURSERIES

The Community Seed Nursery model, introduced under the SuATI project, establishes farmer-led, decentralised seed hubs that conserve, multiply, and distribute traditional vegetable varieties. Farmers – particularly rural and tribal women – are trained in nursery management, organic inputs, and seed stewardship, reviving knowledge of indigenous varieties. Women farmers are recognised as custodians of seed knowledge, enhancing their social capital and leadership within communities. The model restores seed sovereignty at the community level by reducing dependence on hybrids and combining farmer field schools with digital platforms for continuous knowledge exchange.

KEY COMPONENTS OF THE INNOVATION

Decentralised community nurseries: Hubs established for conserving, multiplying, and exchanging indigenous vegetable seeds.

Capacity building of women and tribal farmers: Training provided on nursery management, organic inputs, and seed stewardship.

Continuous farmer learning platforms: Farmer field schools, peer demonstrations, and WhatsApp groups used for ongoing engagement.

Institutional support for seed systems: Local NGOs and SHGs engaged to operate nurseries and manage seed exchange networks.

[3] Press Information Bureau, 7 August 2025, *English Rendering of PM's Address at the M.S. Swaminathan Centenary International Conference in New Delhi.,* www.pib.gov.in/PressReleasePage.aspx?PRID=2153424.

[4] Pashudhan Praharee,19 February 2025, *Agriculture in India: Roadmap for Viksit Bharat in Amrit Kaal,* https://www.pashudhanpraharee.com/agriculture-in-india-roadmap-for-viksit-bharat-in-amrit-kaal/

IMPACT OF THE INNOVATION

25 indigenous vegetable varieties revived and multiplied.

82,000 saplings distributed to **430** households, strengthening household nutrition security.

5 community nurseries and **45** farmer-led nurseries established, building a resilient local seed supply chain.

81% of farmers indicated readiness to adopt climate-smart practices.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Integrated landscape based approaches to sustainable farming

PUBLIC PARTNERS

National Bank for Agriculture and Rural Development (NABARD)

Department of Agriculture, Government of Assam

Ministry of Agriculture & Farmers Welfare (MoAFW)

State Rural Livelihood Missions (SRLMs)

IMPLEMENTATION PARTNERS

Gramya Vikash Mancha, Ajagar Social Circle, Grameen Sahara – Grassroots NGOs

Self-Help Groups (SHGs), Farmer Producer Organisations (FPOs), and tribal farmer groups – Seed custodians and multipliers

Decentralised bio-fertiliser production – Converting biogas slurry into soil-friendly phosphate alternatives

An innovation by the India component of the global development cooperation project 'Soil Protection and Rehabilitation for Food Security (ProSoil)'

CONTEXT

India's over-reliance on chemical fertilisers has led to widespread soil degradation, nutrient imbalance, and declining agricultural productivity.[1] Long-term research by the Indian Council of Agricultural Research (ICAR) shows that while integrated nutrient management sustains soil fertility, imbalanced application of chemical inputs steadily depletes it. Nutrient efficiency is low, with 50–70% of nitrogen from fertilisers lost to the environment[2], partly through nitrate leaching into groundwater.

Parallelly, nutrient-rich slurry from thousands of biogas plants remains underutilised, often treated as waste. This represents a major missed opportunity to create value within the rural bioeconomy. Transforming slurry into enriched organic fertilisers could both close the nutrient cycle and offer farmers affordable, soil-friendly alternatives to synthetic inputs. Such solutions are vital to restore soil health, improve productivity, and build long-term climate resilience.

NATIONAL POLICY LANDSCAPE

The Government of India has strengthened its policy framework to promote bio-fertilisers and organic manures as alternatives to chemical inputs. Key initiatives include the Paramparagat Krishi Vikas Yojana (PKVY) and the Mission Organic Value Chain Development for the North Eastern Region (MOVCDNER), which support natural and organic farming; PM-PRANAM, which incentivises reduced fertiliser use; and GOBARdhan, which converts organic waste into biogas and bio-fertilisers. Together, these schemes signal a decisive policy shift towards sustainable agriculture and improved soil health management.

[1] Bhattacharyya, R.; Ghosh, B.N.; Mishra, P.K.; Mandal, B.; Rao, C.S.; Sarkar, D.; Das, K.; Anil, K.S.; Lalitha, M.; Hati, K.M.; et al. *Soil Degradation in India: Challenges and Potential Solutions*. Sustainability 2015, 7, 3528-3570. https://doi.org/10.3390/su7043528

[2] Hegde et al., *Enhancing nutrient-use efficiency in crop production - A review,* December 2007, https://doi.org/10.59797/ija.v52i4.4937

ALIGNMENT WITH

VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision places the circular economy and sustainable agriculture at the centre of rural transformation. A core ambition is to create "Clean and Green Villages" by reducing chemical dependence, restoring soil fertility, and promoting waste-to-wealth models. This vision is reinforced by concrete targets, including Market Development Assistance of ₹1,500 per metric tonne for organic fertilisers under GOBARdhan, an allocation of ₹1,451.84 crore for 2023–26, and the establishment of 200 compressed biogas plants and 300 community units.[3] [4] These measures aim to build self-reliant rural economies, foster women-led agri-enterprises, and strengthen climate-resilient farming systems.

INNOVATION: DECENTRALISED BIO-FERTILISER PRODUCTION

This innovation pioneers a decentralised, circular bioeconomy model that converts biogas slurry into a consistent, marketable organic fertiliser. Unlike informal slurry use, it formalises the value chain through quality assurance, packaging, and branding at the Farmer Producer Company (FPC) level, ensuring farmer confidence in the product. Implemented across six districts in Maharashtra and Mandla in Madhya Pradesh, the model integrates clean energy, organic farming, and women-led enterprises, making it both environmentally sustainable and socially inclusive. Post its implementation, improved soil organic carbon and microbial activity has been recorded, thereby aiding long-term soil fertility. Its recognition as a cost-effective alternative to conventional phosphate fertilisers positions it as a scalable solution for soil fertility restoration and reduced chemical dependency.

KEY COMPONENTS OF THE INNOVATION

Value addition through Phosphate Rich Organic Manure (PROM): Enrichment of slurry with rock phosphate and microbial cultures creates a more nutrient-dense organic fertiliser.

Standardisation for quality assurance and branding: Structured protocols for testing, packaging, and labelling under the HARIT or FPC brand build trust among farmers and buyers.

Institutional partnerships driving scale: Collaboration with FPOs, women's Self-Help Groups, MAVIM, NABARD, and state livelihood missions expands outreach and embeds the model in rural systems.

Gender-inclusive entrepreneurship for local income: Community-managed enterprises provide women with livelihood opportunities while generating revenue for FPOs.

Infrastructure linkage with biogas plants: India's network of over 50 lakh household biogas units supplies steady and low-cost raw material for PROM production.

[3] Press Information Bureau (PIB). (2024, July 26). *Government is implementing dedicated schemes for promotion of organic farming in the country viz. Paramparagat Krishi Vikas Yojana (PKVY) and Mission Organic Value Chain Development in North East Region (MOVCDNER) since 2015-16.* Press Information Bureau, Government of India. https://www.pib.gov.in/PressReleasePage.aspx?PRID=2037424

[4] Swachh Bharat Mission – Urban. (n.d.). *Inside Asia's largest Gobar-Dhan Bio-CNG Plant.* Government of India. Retrieved from https://sbmurban.org/indore-bio-cng-plant

IMPACT OF THE INNOVATION

₹3,000–4,000 earned annually by individual farmers through dry cake sales.

FPOs are projecting profit margins above **20%** by Year 3 and a Benefit-Cost Ratio of **1.24.**

15–26% increase in paddy yields observed in field demonstrations when PROM replaces chemical fertilisers.

Reduced dependence on imported rock phosphate, of which India currently imports nearly **90%** of its requirement.

Business model for FPOs, SHGs using locally available resources to promote organic agriculture and natural farming.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Integrated landscape-based approaches to sustainable farming

PUBLIC PARTNERS

National Bank for Agriculture and Rural Development (NABARD)

Madhya Pradesh State Rural Livelihoods Mission (MPSRLM)

IMPLEMENTATION PARTNERS

Mahila Arthik Vikas Mahamandal (MAVIM)

Farmer Producer Companies in Sindhudurg, Dhule, Aurangabad, Nagpur, Ahmednagar, and Mandla

BAIF Development Research Foundation

Local Community Managed Resource Centres (CMRCs)

Elevating communities through Community Information Centres and Satellite Centres

An innovation by the India component of the global development cooperation project 'Sustainable Aquaculture for Food and Livelihood (SAFAL)'

CONTEXT

India's fisheries and aquaculture sector contributes approximately 1.1% to the country's national GDP and 6.2-7.3% to agricultural GVA, with a Gross Value Added of around ₹2 trillion in 2023 fisheries.[1,2] Despite its scale and growth, smallholder fish farmers – particularly in regions like Assam and Odisha – often operate in informal settings with limited access to advisory support or formal extension systems. The absence of localized, trusted information mechanisms significantly constrains farmers' ability to access subsidies, adopt improved practices, or leverage market opportunities, impairing both sustainability and livelihoods.

NATIONAL POLICY LANDSCAPE

The Government of India has placed aquaculture at the centre of its fisheries development agenda. The Pradhan Mantri Matsya Sampada Yojana (PMMSY), with an outlay of ₹20,050 crore[3], aims to enhance productivity, modernise value chains, and support entrepreneurship through subsidies, insurance, and marketing assistance. The Fisheries and Aquaculture Infrastructure Development Fund (FIDF) extends concessional finance for cold chain and logistics infrastructure, while the forthcoming National Fisheries Digital Platform will integrate farmer data with scheme delivery. Together, these measures establish an enabling framework for sustainable and inclusive aquaculture growth.

[1] Press Information Bureau. (December 14, 2023). *Year End Review 2023: Department of Fisheries.* Government of India. https://www.pib.gov.in/PressReleasePage.aspx?PRID=1986155

[2] International Journal of Fisheries and Aquatic Studies. (April 2025). *Impact of Blue Revolution in India: An analytical study.* https://www.fisheriesjournal.com/archives/2025/vol13issue3/PartB/13-3-4-905.pdf

[3] Ministry of Fisheries, Animal Husbandry & Dairying. (2025, August 12). *Development of Fisheries and Fishermen.* Press Information Bureau, Government of India. https://www.pib.gov.in/PressReleasePage.aspx?PRID=2155580

ALIGNMENT WITH

VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision places aquaculture at the centre of India's strategy for nutrition security, rural livelihoods, and export growth. By 2047, national production is targeted to exceed 400 lakh tonnes , reflecting both inland and coastal expansion. At the same time, India aims to increase its share of global fisheries exports to over 8%, consolidating its position as a leading supplier in international markets. Women and youth are positioned as key participants in this transformation, ensuring that aquaculture growth contributes directly to inclusive rural development and national prosperity.

INNOVATION: COMMUNITY INFORMATION CENTRES AND SATELLITE CENTRES

The SAFAL project established a decentralised, multi-tiered support system for aquaculture communities in Assam and Odisha. At the block level, Community Information Centres (CICs) act as formal hubs within farmer institution offices, while village-level Satellite Centres (SCs) are managed directly by trained Community Resource Persons (CRPs). This structure embeds information, training, and market linkages within rural communities, ensuring that support is continuous, locally governed, and farmer-owned. Market visibility is strengthened by linking farmers with value chain actors and sharing real-time demand information. By integrating farmer institutions as anchors, the model enhances both accountability and long-term sustainability.

KEY COMPONENTS OF THE INNOVATION

Block-level Community Information Centres (CICs): Equipped with training spaces, ICT tools, storage facilities, and office infrastructure to support farmer institutions.

Village-level Satellite Centres (SCs): Managed by trained CRPs from their homes, providing direct community access to aquaculture services.

Local information and advisory services: Farmers receive guidance on government schemes, input supply, market trends, and insurance options.

Accessible knowledge resources: Posters, manuals, and other IEC materials available at both CICs and SCs for reference and awareness.

Digital infrastructure for operations: CICs provide facilities for printing, photocopying, and use of MIS tools to streamline communication and record-keeping.

Institutional embedding for governance: Housing CICs within FPOs or cooperatives ensures farmer ownership, sustainability, and integration with wider value chains.

IMPACT OF THE INNOVATION

10 CICs and **20** SCs established across nine districts (four in Assam, five in Odisha), creating a block–village network.

Dozens of CRPs trained and equipped to manage SCs, ensuring last-mile service delivery to farmers.

Thousands of farmers gained easier access to PMMSY and state-level fisheries schemes through localised application support.

Regular training and extension sessions delivered at CICs and SCs, strengthening aquaculture knowledge and practice.

Greater participation of women and youth achieved through their involvement in SC management and enterprise activities.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Integrated landscape based approaches to sustainable farming

PUBLIC PARTNERS

Ministry of Fisheries, Animal Husbandry & Dairying (MoFAHD)

State Departments of Fisheries, Assam and Odisha

Local Panchayati Raj Institutions (PRIs)

IMPLEMENTATION PARTNERS

Farmer Producer Organisations (FPOs), cooperatives, and farmer institutions – Hosts of CICs

Community Resource Persons (CRPs) – Managers of SCs

Local NGOs – Field mobilisation and capacity building

Mitigating human-wildlife conflict with solar-powered animal deterrents

An innovation by the India component of the global development cooperation project 'Green Innovation Centres (GICs) for the Agriculture and Food Sector'

CONTEXT

Across India's agro-forest interfaces, human-wildlife conflict continues to undermine rural livelihoods through recurring crop and livestock losses. In Himachal Pradesh, a study[1] found that wildlife incursions reduced cropped areas by 12.7%, increased cultivation costs, and caused average annual losses of ₹25,358 per farm – a severe burden for smallholders. Leopards, bears, monkeys, and wild boars are among the most common wildlife intruders, leading not only to financial strain but also to heightened risks of injury and psychological stress among farming communities.

Traditional deterrents (like electric fencing and manual vigilance) are costly, labour-intensive, and often ineffective in hilly terrain. In contrast, solar-powered deterrent systems provide a scalable, non-lethal, and low-maintenance solution that can safeguard farmer incomes while supporting human-wildlife coexistence.

NATIONAL POLICY LANDSCAPE

The Government of India has recognised the challenge of human-wildlife conflict and introduced programmes through the Ministry of Environment, Forest and Climate Change, state wildlife boards, and the National Mission on Sustainable Agriculture (NMSA). Simultaneously, renewable energy schemes such as KUSUM support deployment of decentralised solar technologies. Together, these create an enabling policy environment for solar-powered deterrent systems.

[1] Sharma, S., Sharma, R., & Kumar, R. (2022). *Economic assessment of crop damages by animal menace in mid-hill regions of Himachal Pradesh.* Indian Journal of Animal Sciences, 92(11), 1324–1330. ICAR – Indian Council of Agricultural Research. Retrieved from https://epubs.icar.org.in/index.php/IJAnS/article/download/124173/46928

ALIGNMENT WITH

VIKSIT BHARAT 2047

As India advances toward *Viksit Bharat* by *2047*, doubling farmer incomes and restoring ecological balance are central goals. Solar deterrents directly support these by reducing crop and livestock losses, safeguarding farmer livelihoods, and promoting non-lethal coexistence with wildlife while advancing renewable energy adoption in rural areas.

INNOVATION: SOLAR-POWERED ANIMAL DETERRENT

A solar-powered LED deterrent system has been designed to protect farms, orchards, and apiaries from nighttime wildlife incursions. The technology provides a safe, non-lethal, and autonomous alternative to conventional methods (like electric fencing or lethal measures), combining low maintenance with scalability across high-risk agro-forest zones.

KEY COMPONENTS OF THE INNOVATION

Predator-simulation through flashing LED patterns: Randomised light sequences mimic predator activity and vary frequently to prevent animal habituation.

Autonomous operation with solar power: Units charge during the day and activate automatically from dusk to dawn without grid electricity or manual input.

Durability in harsh agro-forest conditions: Weather-resistant design withstands extreme terrain and climates common in high-risk zones.

Farmer-friendly installation and scale-up: The system is easy to set up, requires little maintenance, and can be deployed across orchards, cowsheds, and apiaries.

IMPACT OF THE INNOVATION

96.36%
reduction in economic losses, with reported damages dropping from **₹13** lakh to **₹45,000** post-installation.

50 units
deployed across Himachal Pradesh, Maharashtra, and Andhra Pradesh.

Improved farmer and livestock safety, with notable reductions in crop damage, hive destruction, and animal attacks.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Integrated landscape based approaches to sustainable farming

PUBLIC PARTNERS

State Departments of Horticulture

IMPLEMENTATION PARTNERS

Farmer Producer Companies (FPCs)

Pollination as an ecosystem service for sustainable horticulture

An innovation by the India component of the global development cooperation project 'Green Innovation Centres (GICs) for the Agriculture and Food Sector'

CONTEXT

Across India's horticulture sector, the decline of native pollinators is emerging as a serious barrier to productivity. Apple growers in Himachal Pradesh are experiencing this challenge acutely. According to recent reports,[1] apple production in the state has declined by 30-35% in recent years, with poor pollination linked to bee mortality during flowering and adverse climatic conditions.

This ecological disruption, driven by habitat loss, excessive pesticide use, and monoculture practices, has lowered fruit yields, reduced produce quality, and eroded farmer incomes. Given the centrality of apples to rural economies, restoring native pollinator populations through habitat conservation and sustainable farming practices is essential to stabilise livelihoods and ensure the long-term growth of high-value horticulture.

NATIONAL POLICY LANDSCAPE

Responding to these challenges, the Government of India has prioritised the holistic development of horticulture and sustainable agriculture. The Mission for Integrated Development of Horticulture (MIDH) and the National Horticulture Mission under it encourage technology adoption and innovative practices to raise productivity. Complementary efforts under the Paramparagat Krishi Vikas Yojana (PKVY) and Bhartiya Prakritik Krishi Paddhati (BPKP) promote natural farming, biodiversity restoration, and reduced chemical use. These programmes provide the enabling framework for integrating pollinator conservation into horticultural systems.

[1] Choudhary, D. (2023, May 22). *Climate change may be causing an apple crisis in Himachal and Kashmir: Here's how. Down To Earth.* Retrieved from https://www.downtoearth.org.in/climate-change/climate-change-may-be-causing-an-apple-crisis-in-himachal-and-kashmir-this-year-here-s-how-89491

ALIGNMENT WITH

VIKSIT BHARAT 2047

Viksit Bharat 2047 vision places agriculture at the core of inclusive growth, farmer self-reliance, and sustainable rural transformation. A shift toward high-value horticulture, combined with ecological practices, is seen as central to raising farm productivity and incomes. Strengthening pollination services directly supports this trajectory by enhancing yield, improving fruit quality, and reducing chemical reliance. In doing so, pollinator-focused interventions not only secure farmer prosperity but also build resilience within India's agricultural systems, positioning horticulture as a driver of long-term national growth.

INNOVATION: ON-FARM BEE HABITATS, INCLUDING BEE FLORA, NESTING SITES AND BEE HOTELS

The innovation promotes pollination as an ecosystem service by integrating bee habitats, pollinator-friendly practices, and beekeeping into orchard management. The innovation combines orchard-based income generation with ecological restoration through on-farm bee habitats – an approach that remains relatively uncommon in Himachal Pradesh's apple-growing regions. Supported by GIZ India in partnership with Dr. Y.S. Parmar University of Horticulture and Forestry and the Keystone Foundation, it engages apple-growing communities in Shimla and Kullu to conserve native pollinators while improving agricultural productivity. By combining habitat restoration, awareness campaigns, and livelihood diversification through beekeeping, the model advances both ecological stewardship and farmer prosperity.

KEY COMPONENTS OF THE INNOVATION

Bee-friendly farming practices: Farmers encouraged to reduce pesticide use during flowering, maintain floral diversity, and adopt pollinator-supportive farming methods.

Habitat creation: Establishment of on-farm nesting structures such as mud hives and bee hotels tailored to native species like *Apis cerana* and solitary bees.

Beekeeping and honey processing for added income: Orchard systems integrate apiculture to provide new livelihood opportunities and strengthen incentives for pollinator conservation.

Training and community capacity for pollination services: Farmer Producer Companies (FPCs) and local groups receive guidance on hive management and species conservation.

IMPACT OF THE INNOVATION

2,000+
individuals engaged through village meetings, SHG sessions, and school outreach on pollination and biodiversity.

6 FPCs
trained on pollinator-friendly practices, hive maintenance, and pollination-linked enterprises.

New income streams created – e.g., one farmer in Manali expanded to **25** hives, producing **50** kg of honey and renting hives for pollination services.

Agronomic benefits observed: improved fruit set, better apple quality, and reduced premature fruit drop.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Integrated landscape based approaches to sustainable farming

PUBLIC PARTNERS

Department of Horticulture, Himachal Pradesh

IMPLEMENTATION PARTNERS

Dr. Y.S. Parmar University of Horticulture and Forestry

Keystone Foundation

Self-Help Groups (SHGs) and Local Farmer Producer Companies (FPCs)

C

THEMATIC AREA 3: FOOD SECURITY TO NUTRITION SECURITY

INNOVATIONS

- Eat Well; Live Well – 21 Habits Programme to help navigate the 21st century
- From waste to wellness – Nourishing the nation and empowering women through sustainable plant proteins from oilseed by-products
- Building convergent welfare systems through eKYC-based PDS reform
- Digital monitoring of Take-Home Rations under ICDS
- Strengthening food security and women's leadership through Community Nutrition Gardens (CNGs)
- Structured aquaculture curriculum – Farmer-centric learning for climate- resilient fish farming
- Taking Nutrition-Sensitive Carp – SIS Polyculture Technology to scale

Eat Well, Live Well – 21 Habits Programme to help navigate the 21st century

An innovation supported by the Indo-German development cooperation project 'Global Programme Transformation of Food Systems'

CONTEXT

India continues to face a serious nutrition challenge among its child and adolescent population. National survey data indicate that the prevalence of anaemia exceeds 60% among those under 19 years of age, with particularly high rates among females.[1] Findings from the Comprehensive National Nutrition Survey further show that between 19% and 42% of school-age children and adolescents are anaemic, underscoring a substantial micronutrient deficit during critical years for learning and growth.[2] Simultaneously, rapid dietary transitions toward ultra-processed foods are driving childhood overweight and obesity, adding to the double burden of undernutrition. Conventional school-based nutrition education is largely theoretical, with limited behavioural impact. This highlights the need for structured, habit-forming "food literacy" programmes that build lifelong skills in nutrition, lifestyle, and sustainability, enabling children to make healthy choices from an early age.

NATIONAL POLICY LANDSCAPE

The Government of India has established a multi-sectoral framework to improve nutrition and promote healthy eating, especially among children. Key initiatives include FSSAI's flagship "Eat Right India" campaign and its "Eat Right School" programme, which integrates food safety and nutrition into school curricula. These are reinforced by the PM POSHAN (Poshan Shakti Nirman) Scheme, delivering hot cooked meals to millions of children, and the POSHAN Abhiyaan, which addresses holistic nutrition. Together, these efforts reflect a strong policy push to go beyond food provision and build a culture of food literacy and wellness from an early age.

[1] Sinha, A., Kurpad, A., & Sachdev, H. P. S. (2024). Need to go beyond iron supplementation for controlling anemia in India. *Journal of Postgraduate Medicine, Education and Research,* 58(1), 1–4. https://journals.lww.com/pmrr/fulltext/2024/01060/need_to_go_beyond_iron_supplementation_for.1.aspx

[2] Sinha, A., Kurpad, A., & Sachdev, H. P. S. (2024). Need to go beyond iron supplementation for controlling anemia in India. *Journal of Postgraduate Medicine, Education and Research,* 58(1), 1–4. https://journals.lww.com/pmrr/fulltext/2024/01060/need_to_go_beyond_iron_supplementation_for.1.aspx

ALIGNMENT WITH

VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision links national development to the health and well-being of its citizens, recognising that a productive population is central to growth. A core strategy is the shift towards preventive healthcare, tackling malnutrition and lifestyle diseases at their roots. The vision prioritises investment in child health and education as the foundation of future human capital. Building a national culture of food literacy and wellness is seen as essential to equipping the next generation with the knowledge and habits needed for healthy, sustainable choices, ensuring a resilient and thriving India.

INNOVATION: EAT WELL; LIVE WELL – 21 HABITS PROGRAMME

"Eat Well; Live Well," developed by the Food Future Foundation under the Global Programme Transformation of Food Systems, is a structured school programme that builds lifelong habits in food, nutrition, lifestyle, and sustainability. Inspired by Japan's Shokuiku model and contextualised for India, it equips children with practical skills for healthier daily choices. The programme centres on 21 habits for the 21st century, organised under three pillars: Smart Routines, Choosing Healthy Foods, and Mindful Eating. It moves beyond theory by using classroom modules, interactive activities, teacher-led nudges, and digital tools to embed good practices in daily life. Recognised as scalable, its curriculum and resources are available through the Food Future Foundation and partner institutions.

KEY COMPONENTS OF THE INNOVATION

Habit-centric pedagogy for behavioural change: A structured framework that uses behavioural science to embed lasting habits, moving beyond short-term awareness campaigns.

Integrated classroom and experiential learning: Curriculum delivery is reinforced through games, activities, visual tools, and planners that turn abstract nutrition concepts into life skills.

Digital systems for continuity and tracking: The TruthIn app and a teacher–parent portal provide continuity at home and school, supported by baseline, midline, and endline surveys for monitoring and evaluation.

Teacher-led reinforcement through daily nudges: Minimal training enables teachers to use small, everyday prompts during meals and breaks, strengthening the link between classroom learning and daily practice.

IMPACT OF THE INNOVATION

Hundreds of students reached across private and public schools, including Lotus Valley International School, through pilot cohorts.

Curriculum co-developed with ICMR-NIN and FSSAI, ensuring alignment with national dietary guidelines and scientific accuracy.

Increased student engagement as children acted as ambassadors, demonstrating healthy practices and influencing peers and families.

Improved awareness and measurable shifts in food identity, sustainability, and nutrition, confirmed through pre- and post-programme surveys.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Food security to nutrition security

PUBLIC PARTNERS

- Ministry of Education (MoE)
- Ministry of Health & Family Welfare (MoHFW)
- Ministry of Agriculture & Farmers Welfare (MoAFW)
- ICMR–National Institute of Nutrition (NIN)
- Food Safety and Standards Authority of India (FSSAI)
- State Education Departments

IMPLEMENTATION PARTNERS

- Food Future Foundation
- Arney's FitKids
- Nourishing Schools Foundation, Annapoorna Trust
- UNESCO Chair for Global Health & Education, Tarang Health Alliance, WASSAN, PARC, CERC
- TruthIn app (digital partner)
- Schools (public and private networks) – Pilots and scaling nodes

From waste to wellness – Nourishing the nation and empowering women through sustainable plant proteins from oilseed by-products

An innovation supported by the Indo-German development cooperation project 'Global Programme Transformation of Food Systems'

CONTEXT

India faces a serious public health challenge in addressing its national protein gap. An analysis shows that while pulse production has, at times, been sufficient to meet recommended intake levels, the average consumption has met only about 50% of dietary requirements.[1,2] At the same time, India's growing self-reliance in oilseeds, which now meet over 42% of domestic edible oil demand, generates large volumes of protein-rich by-products such as oilseed cake.[3] These are often underutilised and diverted to low-value cattle feed, representing a critical missed opportunity. The central constraint is the lack of affordable, decentralised processing technologies to upcycle these residues into safe, nutritious, and appealing food products for human consumption, transforming a wasted resource into a nutrition solution.

NATIONAL POLICY LANDSCAPE

The Government of India is building a strong ecosystem for value addition in agriculture through policies that support both production and processing. The National Food Security Mission – Oilseeds & Oil Palm (NFSM-OS&OP) aims to boost raw material production, complemented by a national strategy announced in the 2024 budget to achieve self-reliance in oilseeds with emphasis on value addition, market linkages, and procurement.[4] Broader schemes on food processing infrastructure and farmer collectivisation further reinforce this shift. Together, these measures signal a clear policy push to move beyond commodity production and establish integrated value chains that convert agricultural by-products into high-value foods.

[1] John, A. T.; Makkar, S.; Swaminathan, S.; Minocha, S.; Webb, P.; Kurpad, A. V.; Thomas, T. (2021). *Factors influencing household pulse consumption in India: A multilevel model analysis.* Global Food Security, 29, 100534. Elsevier. Link: https://doi.org/10.1016/j.gfs.2021.100534

[2] Indian Council of Medical Research – National Institute of Nutrition (ICMR-NIN) Expert Group (2020). *A Brief Note on Nutrient Requirements for Indians: The 2020 Recommendations.* ICMR-NIN, Hyderabad. Link: https://www.nin.res.in/rdabook/brief_note.pdf

[3] Press Information Bureau, Steps to increase production of oilseeds and edible oil. 9 February 2024, www.pib.gov.in/PressReleasePage.aspx?PRID=2004514.

[4] Press Information Bureau, *Steps to increase production of oilseeds and edible oil.* 9 February 2024, www.pib.gov.in/PressReleasePage.aspx?PRID=2004514.

ALIGNMENT WITH
VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision for agriculture focuses on nutritional self-sufficiency and positioning India as a global leader in food processing. India's alternative protein market alone is projected to rise from ₹350 crore to $4.2 billion by 2030.[5] Achieving this ambition requires a transition to a circular bio-economy that minimises waste and maximises value from agricultural outputs. The strategy prioritises decentralised food processing capacity for Farmer Producer Organisations (FPOs) and Self-Help Groups (SHGs), enabling by-products to be transformed from "waste" into "wellness" and creating a new generation of sustainable rural enterprises.[6,7,8]

INNOVATION: SUSTAINABLE PLANT PROTEINS FROM OILSEED BY-PRODUCTS

The innovation upcycles oilseed cakes, pulses, and millets into affordable, nutritious, and climate-friendly foods. Led by the University of Trans-Disciplinary Health Sciences and Technology (TDU), patented processes convert these by-products into protein- and micronutrient-rich items, ranging from soy-based analogues and iron-enriched powders to fortified oils and high-moisture meat substitutes. The model combines Ayurveda dietetics, modern nutrition science, and circular economy principles to expand protein availability, reduce agricultural waste, and generate rural enterprise opportunities. Led by the Coalition for Food Systems Transformations in India (CoFTI), women entrepreneurs and SHGs are engaged in production trials, gaining new skills and income. A lab-to-market approach provides affordable machinery and rural processing hubs, enabling SHGs and FPOs to establish local protein enterprises that link nutrition security with farmer prosperity.

KEY COMPONENTS OF THE INNOVATION

Upcycling by-products into high-protein foods: Patented methods valorise oilseed cakes, pulses, and millets into nutrient-rich food products.

Diversified product range for multiple uses: Includes soy-based lentils (dal) (35–45% protein), quick-cooking pulse analogues (30% protein), millet flours, fortified oils, and meat analogues.

Science-based formulation for balanced nutrition: Cereal–pulse blends are optimised to deliver complete amino acid profiles.

Enterprise and technology model for rural communities: Affordable machinery such as extruders and classifier mills enables SHGs and FPOs to operate rural protein hubs.

Circular economy framework in food systems: Reduces agricultural waste while promoting sustainable, climate-resilient nutrition.

[5] Pandey, Ashish. 4 June 2025, *"India's Plant-based Protein Market Is Heating up–But Can It Overcome These Challenges?"* The Economic Times, economictimes.indiatimes.com/small-biz/sustainability/indias-plant-based-protein-market-is-heating-upbut-can-it-overcome-these-challenges/articleshow/121612444.cms?from=mdr.

[6] Press Information Bureau, *Steps to increase production of oilseeds and edible oil.* 9 February 2024, www.pib.gov.in/PressReleasePage.aspx?PRID=2004514.

[7] Pashudhan Praharee, *Agriculture in India: Roadmap for Viksit Bharat in Amrit Kaal,* 19 February 2025, https://www.pashudhanpraharee.com/agriculture-in-india-roadmap-for-viksit-bharat-in-amrit-kaal/

[8] Press Information Bureau, *English Rendering of PM's Address at the M.S. Swaminathan Centenary International Conference in New Delhi,* 7 August 2025, www.pib.gov.in/PressReleasePage.aspx?PRID=2153424

IMPACT OF THE INNOVATION

30% protein pulse analogue developed and tested in Akshaya Patra kitchens, with production cost of about **₹70/kg.**

20 g protein per **100 g** achieved in texturised blends combining soy and millet flours.

35-45% protein soy-based lentils (dal) formulated for use in meals, snacks, and fortification.

Institutional adoption piloted with Akshaya Patra Foundation to integrate plant proteins into midday meal programmes.

Scalable model of rural protein hubs created, combining nutrition solutions with farmer-linked value chains.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Food security to nutrition security

PUBLIC PARTNERS

Ministry of Food Processing Industries (MoFPI)

Ministry of Women & Child Development (MoWCD)

State Agriculture and Industries Departments

IMPLEMENTATION PARTNERS

University of Trans-Disciplinary Health Sciences and Technology (TDU), Karnataka – R&D, product development, lab-to-market support

Akshaya Patra Foundation – Testing and institutional adoption in kitchens

Coalition for Food Systems Transformation in India (CoFTI) – Enterprise incubation, SHG mobilisation, food business support

Farmer Producer Organisations (FPOs), Cluster Level Federations (CLFs), and SHGs – Rural processing and distribution

Building convergent welfare systems through eKYC-based PDS reform

An innovation supported by the Indo-German development cooperation project 'Securing Nutrition, Enhancing Resilience (SENU)'

CONTEXT

India's Public Distribution System (PDS) is the world's largest food subsidy programme, covering more than 800 million beneficiaries (about two-thirds of the population), under the National Food Security Act (NFSA), 2013.[1] Each year, more than 60 million tonnes of foodgrains are procured by the Food Corporation of India (FCI) and distributed at a fiscal cost of over ₹2.05 lakh crore (FY 2024-25).[2,3] This scale makes PDS central to food and nutrition security, but also exposes it to inefficiencies. Leakages, duplicate ration cards, and inclusion errors have historically undermined programme integrity. Independent studies estimate that roughly 10% of subsidised grains still fail to reach recipients, while inflated rolls raise fiscal costs.[4] For poor households, even small diversions mean skipped meals and weakened dietary diversity. These inefficiencies also ripple across complementary schemes such as ICDS and the Mid-Day Meal Programme. Addressing these governance risks requires systemic reforms that build accountability, transparency, and beneficiary inclusion.

NATIONAL POLICY LANDSCAPE

The Government of India has steadily moved towards technology-enabled reform in the PDS. The NFSA (2013) provides the legal foundation, while the End-to-End Computerisation of PDS Operations (2015) introduced ePoS devices for biometric authentication. The One Nation One Ration Card (ONORC) initiative expanded portability, allowing households to access entitlements nationwide. Integration of Aadhaar with PDS databases has further reduced ghost and duplicate beneficiaries. These reforms reflect a decisive shift towards data-driven delivery under the Digital India programme. At the state level, Madhya Pradesh has aligned with this trajectory by adopting eKYC at PoS machines and deploying a real-time beneficiary verification and monitoring into the state's PDS framework.

[1] Press Information Bureau, Delhi (PIB Delhi) *"Year-End- Review of Department of Food and Public Distribution- 2024", 20 December 2024,* https://www.pib.gov.in/PressReleasePage.aspx?PRID=2086345&utm

[2] Reuters. (2024, July 17). *"India's food subsidies to cost about ₹2.05 lakh crore"–interim budget estimate,*

[3] Press Information Bureau (PIB). (2024, July 3). *"FCI procures 266 lakh metric tonnes of wheat during Rabi Marketing Season 2024-25."* Government of India. https://www.pib.gov.in/PressReleasePage.aspx?PRID=2030483

[4] IndiaTogether. (2025, August 11). *"Declining PDS leakages: A look at the numbers."* https://www.reuters.com/world/india/indias-food-subsidies-cost-11-more-than-initial-plan-sources-say-2024-07-17/?utm https://www.ideasforindia.in/topics/poverty-inequality/declining-pds-leakages-a-look-at-the-numbers.html

ALIGNMENT WITH

VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision identifies inclusive growth, food and nutrition security, and digital empowerment as central pillars of national development. Strengthening the efficiency and transparency of large-scale social protection systems like PDS is fundamental to this ambition. By 2047, the goal is to ensure universal access to entitlements through technology-enabled delivery, minimise leakages across welfare programmes, and integrate digital governance tools to create citizen-centric systems. These priorities not only safeguard food security but also contribute to equitable development, poverty reduction, and the creation of a resilient, digitally empowered society.

INNOVATION: EKYC IN PDS

The PDS in Madhya Pradesh has been strengthened through a state-wide digital reform implemented by the Government of Madhya Pradesh with technical support from GIZ. The reform combines biometric authentication and real-time monitoring to replace paper-based processes prone to duplication and diversion. This digital framework ensures foodgrains reach genuine beneficiaries and creates the foundation for linking PDS data with welfare programmes such as Direct Benefit Transfers (DBT), farmer registration, and subsidy delivery.

KEY COMPONENTS OF THE INNOVATION

Biometric verification to eliminate ghost beneficiaries: eKYC on electronic Point of Sale (ePoS) machines authenticates beneficiaries in real time using Aadhaar-based biometrics, ensuring accuracy and preventing fraud.

Digital records to enable cross-scheme linkages: Uniform database creates the base for integrating PDS with DBT, farmer registration, input subsidies, and social pension systems, enabling smoother convergence across welfare schemes.

IMPACT OF THE INNOVATION

eKYC implemented across all PoS machines in the state, eliminating duplicate and fake beneficiaries.

Diversion of foodgrains has markedly reduced, improving last-mile transparency and strengthening beneficiary trust.

Enhanced governance capacity through real-time, data-based decision-making at state and district levels.

A scalable digital framework now in place to support convergence of food security with broader welfare systems.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Food security to nutrition security

PUBLIC PARTNERS

Department of Food, Civil Supplies and Consumer Protection, Government of Madhya Pradesh

All State Food Departments (potential scale)

IMPLEMENTATION PARTNERS

Visiontek Linkwell Telesystems Pvt. Ltd., Hyderabad – Technology provider for PoS machines and eKYC.

Digital monitoring of Take-Home Rations under ICDS

An innovation supported by the Indo-German development cooperation project 'Securing Nutrition, Enhancing Resilience (SENU)'

CONTEXT

India continues to face a serious nutrition challenge despite decades of investment in child health and food security. According to NFHS-5 (2019-21), 35.5% of children under five are stunted, 32.1% are underweight, and 57% of women aged 15-49 are anaemic.[1] The Integrated Child Development Services (ICDS) is the flagship programme to address these gaps, reaching more than 100 million beneficiaries nationwide through Anganwadi Centres.[2] One of its critical interventions is the distribution of Take-Home Rations (THR) to pregnant and lactating women and children aged 6-36 months. THR is often the primary source of fortified food for these beneficiaries, filling critical nutrient gaps during the first 1,000 days of life when growth and cognitive development are most sensitive.

The scale of ICDS creates systemic risks. Paper-based procurement and supply systems allow leakage, diversion, and delays, weakening quality and credibility. The lack of real-time data and visibility further limits assurance that fortified foods reach intended beneficiaries. Strengthening supply chain accountability is therefore essential to improving ICDS outcomes.

NATIONAL POLICY LANDSCAPE

The Government of India has progressively strengthened nutrition policy to address child and maternal malnutrition. The National Food Security Act (2013) established a legal framework for supplementary nutrition through ICDS. The Saksham Anganwadi and Poshan 2.0 scheme (2021) consolidated earlier programmes to deliver integrated services, including THR distribution. POSHAN Abhiyaan (2018) introduced technology for growth monitoring, real-time data capture, and nutrition counselling through the ICDS-CAS application. At the state level, governments have issued guidelines to digitise supply chains and improve accountability in food distribution. Collectively, these measures mark a shift from calorie provision to nutrition security, laying the foundation for transparent, technology-enabled systems.

[1] Demographic and Health Survey (DHS) Program. (2021). *NFHS-5 India National Fact Sheet.* https://dhsprogram.com/pubs/pdf/OF43/India_National_Fact_Sheet.pdf

[2] Press Information Bureau (PIB). (2023, February 8). *"ICDS services reach over 102.2 million beneficiaries through Anganwadi Centres."* https://www.pib.gov.in/PressReleseDetailm.aspx?PRID=1897355

ALIGNMENT WITH

VIKSIT BHARAT 2047

The *Viksit Bharat 2047* roadmap positions nutrition and human capital as central to India's aspiration of becoming a developed nation. It envisages a future where no child is malnourished, women's health is safeguarded, and all families have access to safe and adequate food. The vision underscores technology-enabled governance, with digital systems ensuring that welfare delivery is transparent, accountable, and inclusive. Nutrition is recognised as the foundation of learning, productivity, and equity, linking food security with institutional resilience. By 2047, the objective is zero hunger, universal access to welfare, and efficient service delivery, making strengthened ICDS supply chains and monitoring systems integral to the national development agenda.

INNOVATION: THE FOOD SUPPLY MONITORING SYSTEM

The Food Supply Monitoring System is a digital platform developed by the Department of Women and Child Development (DWCD), Maharashtra, with support from GIZ's SENU project. It digitises the supply chain of THR under ICDS, one of the world's largest nutrition programmes. The system replaces paper-based records with real-time tracking and closes long-standing gaps of leakage, diversion, and delay.

The innovation transforms ICDS delivery from routine logistics into accountable service provision. It creates visibility across the supply chain, enables timely oversight by officials, and strengthens trust that entitlements reach intended recipients. Anganwadi Workers experience reduced paperwork and administrative burden, which allows more time for service delivery. The model institutionalises accountability in nutrition governance and demonstrates how digital systems can be scaled across India.

KEY COMPONENTS OF THE INNOVATION

Mobile app and web portal for supply chain management: Enables department officials to generate demand and supply orders, suppliers to generate QR-coded delivery challans, and Anganwadi Workers to receive and report delivery of THR packets (based on QR-code) at Anganwadi Centres.

Quality assurance through photo verification and rejection process: Anganwadi Workers can upload photographs of THR packets received. In cases of poor quality or damaged packets, they may reject the delivery, record the reason for rejection, and upload supporting photographs for accountability.

Dashboards for governance: District and state officials access real time data on supplies and track delays.

User-friendly design for inclusivity: Multilingual interfaces in Marathi, Hindi, and English, combined with offline functionality, ensure accessibility for frontline workers in remote and low-connectivity areas.

IMPACT OF THE INNOVATION

Reached **6.4** million beneficiaries across Maharashtra through **110,000+** Anganwadi Centres.

Piloted in two districts, with state-wide scale-up now underway and potential for national replication.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Food security to nutrition security

PUBLIC PARTNERS

Department of Women and Child Development (DWCD), Government of Maharashtra

Integrated Child Development Services (ICDS), Government of Maharashtra

IMPLEMENTATION PARTNERS

Deloitte Consulting – IT solution statewide rollout partner

Awzpact Technologies & Services Pvt Ltd, Bhopal – IT solution development partner

Strengthening food security and women's leadership through Community Nutrition Gardens (CNGs)

An innovation supported by the Indo-German development cooperation project 'Securing Nutrition, Enhancing Resilience (SENU)'

CONTEXT

India continues to face the paradox of being a leading food producer while carrying some of the world's highest burdens of malnutrition. According to NFHS-5 (2019–21), 35.5% of children under five are stunted, 32.1% are underweight, and 57% of women of reproductive age are anaemic. These challenges are most acute in rural areas, where cereal-based diets dominate and access to fruits, vegetables, and protein-rich foods remains limited. Landlessness and gender inequality deepen the crisis: women, though primarily responsible for food preparation and family nutrition, often lack recognition as farmers or access to productive resources. Farming households also remain vulnerable to climate variability, soil degradation, and declining dietary diversity. Addressing these interlinked issues requires integrating nutrition-sensitive agriculture into rural development systems, while creating pathways for women to be recognised as producers and leaders in local food systems.

NATIONAL POLICY LANDSCAPE

India's policy framework increasingly emphasises the convergence of nutrition security, rural livelihoods, and women's empowerment. MGNREGS now extends beyond wage employment to include agriculture-supportive assets such as compost pits, plantations, and water harvesting structures on community land. Its 2017 Convergence Guidelines link the scheme with NRLM, ICDS/ Poshan Abhiyaan, and agriculture departments to promote nutrition gardens, vermicomposting, and natural farming. Complementary measures such as Poshan Abhiyaan, the National Food Security Act (2013), and ICDS provide entitlements for vulnerable households, while NRLM strengthens Self-Help Groups as platforms for collective livelihood action. Together, these frameworks signal a systemic shift, embedding nutrition-sensitive agriculture within the wider rural development and social protection agenda.

ALIGNMENT WITH VIKSIT BHARAT 2047

The vision of *Viksit Bharat 2047* places human development, gender equality, and sustainability at the centre of India's transformation. Community-based, nutrition-sensitive agriculture directly contributes to this ambition by strengthening the nutritional foundation of future generations, ensuring healthier and more productive citizens. Recognising women as farmers and land managers advances the agenda of gender equity and inclusive participation in rural economies. At the same time, embedding agroecological and climate-resilient practices into social protection supports long-term sustainability and self-reliance. Together, these priorities align with Viksit Bharat's commitment to building a prosperous, food-secure, and equitable India by 2047.

INNOVATION: COMMUNITY NUTRITION GARDENS

The Community Nutrition Garden (CNG) model integrates nutrition-sensitive agriculture into the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS). Managed collectively by women's Self-Help Groups (SHGs) on community land, CNGs ensure year-round access to diverse, nutrient-rich foods while creating wage and income opportunities. The model positions landless women as recognised farmers and leaders, linking agroecological farming with institutional support and convergence mechanisms to address food security, gender equity, and rural resilience.

KEY COMPONENTS OF THE INNOVATION

Women's SHGs as garden managers: Collective ownership and decision-making structures led by women ensure accountability and equitable benefit-sharing.

Agroecological production systems: Use of natural inputs, vermicomposting, community seed banks, and water harvesting practices to strengthen sustainability.

Institutional tools for scaling and monitoring: State-issued directives, IT-based monitoring apps, and training manuals standardise processes and enable accountability.

Cross-departmental convergence: Linkages across rural development, agriculture, and health departments secure resources and expand outreach.

Nutrition services integrated into agriculture: Nutrition counselling paired with production supports household food security while generating income from surplus sales.

IMPACT OF THE INNOVATION

Over **1,400** CNGs were established, directly supporting **16,800** women and their families with improved year-round nutrition and diversified incomes.

More than **€6.5** million channelled through MGNREGS for wages, fencing, wells, and agricultural inputs.

2,000+ government officials, **8,963** frontline workers, and SHG members trained in agroecology, nutrition, and gender-transformative practices.

CNG guidelines institutionalised in Madhya Pradesh, backed by IT-based monitoring, training manuals, and district-level coordination mechanisms.

Women SHG members recognised as land managers and farmers, gaining entitlements, confidence, and visibility within families and Gram Sabhas.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Food security to nutrition security

PUBLIC PARTNERS

- Department of Panchayat and Rural Development, Government of Madhya Pradesh (MGNREGS and SRLM wings)
- Department of Women and Child Development (DWCD), MP
- Department of Agriculture, Horticulture, Water Resources, AYUSH, Tribal Welfare, Forest, Revenue, Public Health Engineering
- Gram Panchayats & Zila Panchayats

IMPLEMENTATION PARTNERS

- Self-Help Groups (SHGs): Community-level implementation
- Civil society partners: SRIJAN, PRADAN, Harsha Trust

Structured aquaculture curriculum – Farmer-centric learning for climate-resilient fish farming

An innovation by the India component of the global development cooperation project 'Sustainable Aquaculture for Food and Livelihood (SAFAL)'

CONTEXT

India's aquaculture sector is a global powerhouse, ranking as the world's second-largest fish producer and supporting the livelihoods of approximately 30 million fishers and fish farmers.[1] With fish production reaching a record 17.5 million tons and seafood exports doubling to over ₹60,000 crore in the last decade, the sector's economic importance is rapidly growing.[2] However, this growth has created a critical need for a skilled workforce and empowered farmers who can adopt modern, sustainable practices. A significant gap exists in the current knowledge ecosystem; existing training materials are often overly technical, text-heavy, and lack a modern pedagogical approach suited for adult learners. This hinders the effective transfer of knowledge, limiting the adoption of sustainable technologies and the sector's full potential.

NATIONAL POLICY LANDSCAPE

The Government of India has placed a strong emphasis on capacity building and skill development as central pillars for driving the Blue Revolution. Key initiatives include the flagship Pradhan Mantri Matsya Sampada Yojana (PMMSY) which includes a major component for training and extension and is complemented by the broader national framework of the Skill India Mission and the National Education Policy (NEP) 2020 that prioritizes vocational education. Under PMMSY alone, the government has supported over 12.63 lakh training and capacity-building programmes and is establishing a network of 102 Matsya Seva Kendras (fisheries service centres) to provide last-mile support.[3] These efforts signal a broader policy push to formalise and strengthen the human resource capacity of the aquaculture sector.

[1] Press Information Bureau, *World Fisheries Day: Sustainable Fishing Practices for a Thriving and Eco-Friendly Fisheries Sector,* 20 November 2024, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2075160#

[2] Press Information Bureau, *Union Minister Shri Rajiv Ranjan Singh alias Lalan Singh to chair Stakeholder Consultation on Fisheries Export Promotion with focus on strengthening shrimp farming & value chain on 6th September 2024 at Vishakhapatnam, Andhra Pradesh, 5 September 2024,* https://www.pib.gov.in/PressReleasePage.aspx?PRID=2052075

[3] Press Information Bureau, *Year End Review 2024: Department of Fisheries (Ministry of Fisheries, Animal Husbandry and Dairying),* 12 December 2024, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2083813

ALIGNMENT WITH

VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision for the blue economy is centred on building a globally competitive, sustainable, and inclusive sector. The national ambition is to increase fish production to over 40 million tons by 2047 and expand India's share of global fisheries exports to more than 8%.[4] Achieving these long-term targets requires a fundamental shift towards a knowledge-based approach that empowers the sector's 30 million stakeholders.[5] Central to this vision is the social and economic empowerment of small-scale farmers, women, and youth by equipping them with the skills and knowledge needed to adopt productive, climate-resilient, and sustainable aquaculture practices.

INNOVATION: SUSTAINABLE AQUACULTURE CURRICULUM

The Sustainable Aquaculture for Food and Livelihood (SAFAL) project introduced India's first structured curriculum for smallholder aquaculture. Co-developed by GIZ with the Departments of Fisheries in Assam and Odisha, the framework replaces dense technical manuals with farmer-centric, practice-oriented learning. It applies adult-learning methods, embeds climate-resilient practices, and is anchored in fisheries universities and extension systems. Further, integration with digital platforms such as PANORAMA, digigyanshala.in and atingi.org ensures wide access and long-term sustainability.

https://panorama.solutions/en/solution/sustainable-aquaculture-food-and-livelihood

KEY COMPONENTS OF THE INNOVATION

Farmer Handbooks and Farm Record Books for practical decision-making: Tools that guide scientific farming practices, farm economics, and risk assessment in an accessible format.

Trainer Manual for structured teaching: Standardised resources that support fisheries trainers and academic institutions in delivering consistent aquaculture education.

Visual IEC materials for community-level learning: Posters, flip overs, and pamphlets that simplify technical content and enable participatory training sessions.

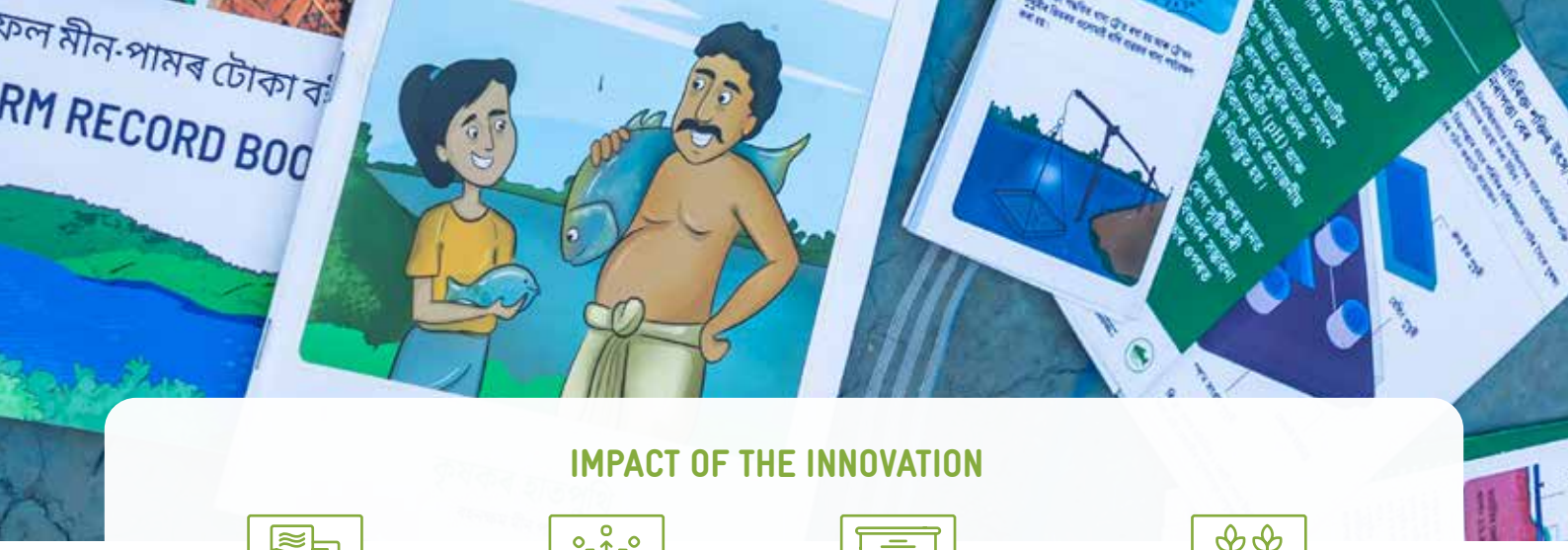
Local language adaptations for wider accessibility: Assamese and Odia translations with illustrations and contextual examples designed for farmers and SHGs with limited literacy.

Institutional adoption by state and academic systems: Integrated into Department of Fisheries extension services, SRLMs, ICAR institutions, KVKs and fisheries universities to ensure continuity.

Digital platforms for large-scale dissemination: Resources hosted on digigyanshala.in, Panorama Solutions, ASCI's portal, and atingi.org for national and global reach.

[4] Press Information Bureau, *Shri Rajiv Ranjan Singh briefs media today on the important decisions and achievements of Ministry for Fisheries, Animal Husbandry and Dairying in 100 days of the third term of Prime Minister Shri Narendra Modi,* 17 September 2024, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2055709

[5] Press Information Bureau, *World Fisheries Day: Sustainable Fishing Practices for a Thriving and Eco-Friendly Fisheries Sector,* 20 November 2024, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2075160#



IMPACT OF THE INNOVATION

37 aquaculture manuals simplified into farmer-friendly knowledge products and IEC materials.

12 districts in Assam and **5** districts in Odisha covered, reaching thousands of smallholders.

500+ Community Resource Persons (CRPs) trained, cascading knowledge at the community level.

Pond productivity increased by **147%** (from recorded baseline), raising yields to **2.43** tonnes/ha per annum and generating ~**3,300** tonnes of fish annually worth ₹33 crore.

13 government schemes accessed by trained farmers, improving convergence and entitlements.

500 women piloted PGS certification in Assam, achieving **30–40%** higher farm-gate prices.

Farmer incomes rose six-fold, with individual cases such as Ms. Sonmani Devi of Assam moving from **₹20,000** to **₹1,20,000** annually after adopting SAFAL practices.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Food security to nutrition security

PUBLIC PARTNERS

- Ministry of Fisheries, Animal Husbandry & Dairying (MoFAHD)
- Department of Fisheries, Assam and Odisha
- Assam Agricultural University (AAU) & Odisha University of Agriculture and Technology (OUAT)
- Ministry of Rural Development (MoRD) – Through digigyanshala.in
- ICAR institutions and Agriculture Skill Council of India (ASCI)

IMPLEMENTATION PARTNERS

- Kalong Kapili, SeSTA, ICCo, DSS, Gram Utthan, and other CSOs – Local rollout
- Self-Help Groups (SHGs), Producer Groups (PGs), FPOs/FPCs – Farmer-level adoption
- Champion farmers and CRPs – Grassroots trainers

Taking Nutrition-Sensitive Carp – SIS Polyculture Technology to scale

An innovation by the India component of the global development cooperation project 'Sustainable Aquaculture for Food and Livelihood (SAFAL)'

CONTEXT

India faces persistent nutritional deficits, with 57% of women and 67% of children under five being anaemic (as per NFHS-5).[1] Anaemia weakens immunity, reduces cognitive development in children, and lowers productivity in adults, creating long-term health and economic costs. Rural diets remain cereal-dominated and lack affordable sources of bioavailable micronutrients such as iron, zinc, and vitamin A. Small Indigenous Fish Species (SIS) offer a powerful yet overlooked solution. Exceptionally nutrient-dense and typically consumed whole, even 50–100 grams of SIS can provide a significant share of daily micronutrient needs for women and children.[2]

Yet, SIS populations are declining due to habitat loss, pollution, and overfishing. Rising prices have made these "natural superfoods" less accessible to low-income households. The lack of reliable hatchery systems for large-scale seed production remains the key barrier to integrating SIS into mainstream aquaculture for nutrition and livelihoods.

NATIONAL POLICY LANDSCAPE

The Government of India has created a robust policy landscape to modernize and expand the fisheries sector through its "Blue Revolution." The central pillar of this effort is the Pradhan Mantri Matsya Sampada Yojana (PMMSY), further supported by the Pradhan Mantri Matsya Kisan Samridhi Sah-Yojana (PM-MKSSY). Key components of these missions directly create a conducive environment for this innovation, including a focus on species diversification, the promotion and conservation of indigenous fish species, and the establishment of Nucleus Breeding Centres for freshwater aquaculture. These efforts signal a broader policy push to formalise and strengthen the aquaculture sector by enhancing productivity, sustainability, and nutritional outcomes.

[1] International Institute for Population Sciences (IIPS) & ICF (2021). National Family Health Survey (NFHS-5), 2019–21: India Fact Sheet. IIPS and ICF. https://dhsprogram.com/pubs/pdf/OF43/India_National_Fact_Sheet.pdf

[2] Kawarazuka, N., & Béné, C. (2011). The potential role of small fish species in improving micronutrient deficiencies in developing countries: building evidence. *Public Health Nutrition,* 14(11), 1927–1938. DOI: 10.1017/S1368980011000814

ALIGNMENT WITH
VIKSIT BHARAT 2047

The vision of *Viksit Bharat 2047* identifies nutrition-sensitive aquaculture as a driver of food security, farmer income growth, and global competitiveness. National targets include increasing fish production to 200 lakh tonnes by 2030 and more than 400 lakh tonnes by 2047, doubling seafood exports to ₹1,00,000 crore, and raising India's global fisheries export share above 8%.[3] The sector is also expected to create 55 lakh employment opportunities under the Pradhan Mantri Matsya Sampada Yojana (PMMSY), strengthening rural prosperity.[4]

Within this framework, breakthroughs in mass seed production of nutrient-rich species such as Mola (*amblypharyngodon mola*), Pool Barb (*puntius sophore*), and other SIS (with over 50 million seeds already produced[5]) provide a scalable pathway to realise these ambitions. Expanding access to such SIS addresses malnutrition, diversifies farmer income sources, and builds a sustainable, high-value aquaculture sector aligned with Viksit Bharat's long-term goals.

INNOVATION: NUTRITION-SENSITIVE CARP – SIS POLYCULTURE TECHNOLOGY

The Nutrition-Sensitive Carp – Small Indigenous Species (SIS) Polyculture Technology is the first scalable, hatchery-based model for producing and distributing nutrient-rich SIS seed while integrating them into carp farming systems. Developed by WorldFish with support from GIZ's SAFAL project and the Departments of Fisheries in Assam and Odisha, the innovation addresses two long-standing gaps: the absence of a reliable seed supply for various SIS (such as mola), and the underutilisation of aquaculture to improve household nutrition. Mola is exceptionally rich in vitamin A, iron, calcium, zinc, vitamin B12, and essential fatty acids, nutrients critical for women and children. The model combines induced breeding protocols for mass seed production with training for farmers on pond preparation, stocking, feeding, harvesting, and nutrition awareness. Its breakthrough lies in ensuring SIS can be cultured at scale without reducing carp yields, creating a pathway for both higher farm incomes and improved nutritional outcomes.

KEY COMPONENTS OF THE INNOVATION

Hatchery protocols for mola seed production: Induced breeding coupled with environmental manipulation, hormone treatment, hapa systems, and aeration tanks used to establish the first scalable seed supply chain for SIS.

Carp-SIS polyculture systems: Integration of mola into carp ponds through improved pond management practices such as liming, fertilisation, and supplementary feeding.

Partial harvesting for regular household consumption: Farmers harvest SIS every 15–30 days for family use, while carp are retained to reach market size.

Nutrition-sensitive farming design: Women and children benefit directly as mola and other SIS can be consumed whole, providing highly bioavailable micronutrients.

Institutional anchoring for scale: Piloted under government support in Assam and Odisha, and embedded in state projects such as World Bank's Assam Agribusiness and Rural Transformation Project (APART) and Odisha Integrated Irrigation Project for Climate Resilient Agriculture (OIIPCRA) projects and Women SHG-managed Gram Panchayat tanks.

[3] Press Information Bureau, *Shri Rajiv Ranjan Singh briefs media today on the important decisions and achievements of Ministry for Fisheries, Animal Husbandry and Dairying in 100 days of the third term of Prime Minister Shri Narendra Modi,* 17 September 2025, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2055709

[4] PRS Legislative Research, *Standing Committee Report Summary: Employment Generation and Revenue Earning Potential of Fisheries,* 29 February 2024, https://prsindia.org/files/policy/policy_committee_reports/Employment_Generation_Potential_of_Fisheries_Industry.pdf.

[5] WorldFish 2024. Tiny Treasures, Big Impact. The Vital Role of Small Indigenous Fish in Nutrition and Livelihoods. A Photographic Sojourn of the Project "Taking Nutrition-Sensitive Carp-SIS Polyculture Technology to Scale". New Delhi, India: WorldFish. Photo Book: 2024-88.

IMPACT OF THE INNOVATION

6 SIS species with first-ever hatchery protocols developed in Odisha (2022) and Assam (2023), removing the decades-old barrier of seed scarcity.

Seed price set as **₹1,000** per **100,000** hatchlings, comparable to carp seed and viable for smallholder adoption.

2 state programmes mainstreamed – Assam Agribusiness and Rural Transformation Project (APART) in Assam and Women SHG tank management in Odisha.

~200 kg/ha of mola harvested alongside **2.5–3** t/ha of carp, with no reduction in carp yield.

~14 kg of mola consumed per household annually (**~3** kg per capita), a fourfold rise that boosts vitamin A, calcium, and iron intake.

₹19,681/ha additional income from mola sales, raising carp system profitability by **20–25%** and delivering **~₹7,354** more per household annually.

~2,650 community members directly benefitted, with wider indirect nutrition and livelihood gains.

Technology transferred to Bangladesh and Cambodia, where carp-mola polyculture is now being scaled through South–South collaboration.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Food security to nutrition security

PUBLIC PARTNERS

Ministry of Fisheries, Animal Husbandry & Dairying (MoFAHD)

Department of Fisheries, Assam and Odisha

Farmer Producer Organisations, SHGs, and cooperatives (as institutional anchors)

IMPLEMENTATION PARTNERS

Civil Society Organisations (CSOs) – Targeted farmer support and monitoring

Farmer Institutions (FPOs, SHGs, cooperatives) – Ground-level implementation

D

THEMATIC AREA 4: SCALING MODELS FOR SUSTAINABLE AGRICULTURE AND AGROECOLOGY

INNOVATIONS

- Gaushala-based Bio-Input Resource Centres (BRC): Transforming cow by-products into farmer-friendly soil enhancers
- Cow dung planters as an eco-friendly alternative to plastic nursery bags
- On-farm biological input production through solar-powered biofermenters
- Scaling sustainable aquaculture by strengthening last-mile access through Community Resource Persons
- Women-led agro-processing through solar-powered dryers

Gaushala-based Bio-Input Resource Centres (BRC): Transforming cow by-products into farmer-friendly soil enhancers

An innovation supported by the Indo-German development cooperation project 'Agroecological Transformation Processes (SuATI)'

CONTEXT

India's agricultural sector is moving from heavy dependence on chemical inputs – averaging 141.2 kg of fertiliser per hectare in 2022-23 – towards more sustainable, nature-positive practices.[1,2] This transition is driven by rising concerns over soil degradation, environmental stress, and farmer vulnerability. A critical barrier to scaling natural farming, however, is the limited availability of quality bio-inputs and the labour-intensive process of preparing them on individual farms. Bio-Input Resource Centres (BRCs) address this challenge by operating as cluster-level enterprises that produce ready-to-use natural farming inputs. Additionally, they serve as knowledge hubs to train and support farmers in adopting regenerative agriculture.

NATIONAL POLICY LANDSCAPE

The establishment of BRCs is a central pillar of the Government of India's flagship National Mission on Natural Farming (NMNF). Building on earlier programmes such as the Paramparagat Krishi Vikas Yojana (PKVY), the NMNF provides a dedicated framework for scaling natural farming. Guidelines issued in April 2025 formalised the role of BRCs, with financial assistance of ₹1 lakh provided for setting up each centre.[3] The mission also emphasises convergence with complementary national schemes, including the Formation and Promotion of 10,000 Farmer Producer Organisations and GOBAR-Dhan, to strengthen rural enterprise ecosystems.[4,5] Collectively, these measures represent a decisive policy shift towards institutionalising sustainable agriculture and creating the infrastructure needed for its scale-up.

[1] Council on Energy, Environment and Water (CEEW), *Bio-inputs,* https://www.ceew.in/bio-inputs

[2] INDIA NARRATIVE, *Natural Farming in India: Concepts, Implementation, and Impact,* 25 August 2025, https://www.indianarrative.com/explainer/natural-farming-in-india-concepts-implementation-and-impact/

[3] Down to Earth, *Centre releases guidelines for setting up bio-resource centres to aid natural farming transition,* 28 April 2025, https://www.downtoearth.org.in/agriculture/centre-releases-guidelines-for-setting-up-bio-resource-centres-to-aid-natural-farming-transition

[4] Council on Energy, Environment and Water (CEEW), *Bio-inputs,* https://www.ceew.in/bio-inputs

[5] Down to Earth, *Centre releases guidelines for setting up bio-resource centres to aid natural farming transition,* 28 April 2025, https://www.downtoearth.org.in/agriculture/centre-releases-guidelines-for-setting-up-bio-resource-centres-to-aid-natural-farming-transition

ALIGNMENT WITH

VIKSIT BHARAT 2047

The creation of a decentralised network of BRCs is integral to the *Viksit Bharat 2047* vision of a self-reliant, climate-resilient, and prosperous agricultural sector. The national target is to transition 1 crore farmers across 7.5 lakh hectares to natural farming, supported by the establishment of 10,000 BRCs in 15,000 clusters.[6] As of July 2025, 2,045 BRCs have already been set up,[7] marking strong early progress. Projections show that scaling natural farming in a single state such as Odisha would require ~2,000 BRCs, creating a market opportunity worth USD 8 million and generating significant local employment.[8] By embedding sustainability in input supply chains, fostering rural entrepreneurship, and advancing green job creation, BRCs embody the inclusive and resilient agricultural future envisioned under *Viksit Bharat 2047*.

INNOVATION: GAUSHALA-BASED BRCS

The Gaushala-based Bio-Input Resource Centre (BRC) cum Bio-PROM Unit links sustainable farming with the financial revival of *gaushalas*. By converting cow by-products into affordable organic fertilisers and soil enhancers, it reduces farmers' dependency on chemical inputs while generating steady revenues for gaushalas. The model also strengthens rural institutions by positioning women's Self-Help Groups (SHGs) as enterprise managers, creating dignified livelihoods and embedding natural farming within village economies.

KEY COMPONENTS OF THE INNOVATION

On-site bio-input production in gaushalas: Cow dung, urine, and crop residues are transformed into PROM, liquid bio-fertilisers, and vermi-wash through structured workflows.

Women-managed enterprises under DAY-NRLM: SHG members are trained to operate and oversee units, linking women's empowerment with enterprise sustainability.

Convergence with national schemes for scale: Alignment with MGNREGS, PKVY, NMNF and the Agri-Infrastructure Fund provides financial support and opportunities for expansion.

Market linkages for steady demand: Packaged bio-inputs are supplied to farmers, FPOs, nurseries, and community gardens, ensuring consistent uptake.

Revenue streams that sustain gaushalas: Income from bio-input sales is reinvested to reduce feed deficits and strengthen *gaushala* upkeep.

[6] Press Information Bureau, National Mission on Natural Farming: Back to Roots, Forward with Sustainability, 13 August 2025, https://www.pib.gov.in/PressNoteDetails.aspx?id=155019&NoteId=155019&ModuleId=3

[7] Press Information Bureau, Implementation of National Mission on Natural Farming, 22 July 2025, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2146937

[8] Council on Energy, Environment and Water (CEEW), Bio-inputs, https://www.ceew.in/bio-inputs

IMPACT OF THE INNOVATION

15 MT of PROM and **50,000** litres of liquid bio-fertiliser produced monthly by a 100-cow unit, generating a turnover of ₹5–7 lakh and net profits of ~₹1 lakh per month.

600–800 acres of farmland transitioned annually to natural farming through substitution of chemical fertilisers with bio-inputs.

25–35% increase in SHG household incomes, alongside youth employment in logistics and marketing.

80–90% reduction in gaushala feed deficits, with reinvested profits improving upkeep and long-term sustainability.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Innovations in financing and markets

PUBLIC PARTNERS

DAY-NRLM, Ministry of Rural Development, Govt of India

All States: State Rural Livelihood Mission

Madhya Pradesh State Rural Livelihood Mission (MP-SRLM)

IMPLEMENTATION PARTNERS

Pragati, Cluster Level Federation, Narmadapuram

District Panchayat, Narmadapuram, Madhya Pradesh

Forecast Agrotech Pvt. Ltd., Equipment supplier and Technology provider

Cow dung planters as an eco-friendly alternative to plastic nursery bags

An innovation supported by the Indo-German development cooperation project 'Agroecological Transformation Processes (SuATI)'

CONTEXT

India's livestock sector, with a bovine population of over 303 million, forms the backbone of the rural economy and is central to its traditional circular bio-economy.[1] Livestock convert crop residues into valuable outputs, including dung, a resource with immense but often underutilized potential. Simultaneously, modern agricultural practices have introduced environmentally harmful materials like plastic nursery bags, which contribute to soil and water pollution and pose a lethal threat to grazing animals when discarded improperly. This creates a critical need for simple, "waste-to-wealth" innovations that can replace non-biodegradable inputs with locally available, organic resources, thereby closing the loop on the farm and reducing the negative environmental externalities of agriculture.

NATIONAL POLICY LANDSCAPE

The Government of India is promoting a rural circular economy through a "waste-to-wealth" approach, with emphasis on livestock by-products.[2] The GOBARDHAN scheme serves as an umbrella programme to convert cattle dung and agricultural waste into organic manure and clean energy. Financial support through the Animal Husbandry Infrastructure Development Fund (AHIDF) incentivises value-added dung-based products, while schemes like PM-PRANAM encourage organic inputs over chemical alternatives.[3,4] Together, these measures signal a strong policy push to convert agricultural waste into economic assets and foster rural entrepreneurship.

[1] Press Information Bureau, 27 June 2023, *Brief Note on 9 Years' Achievement of Department of Animal Husbandry and Dairying,* www.pib.gov.in/PressReleasePage.aspx?PRID=1935628.

[2] GOBARdhan (Galvanizing Organic Bio-Agro Resources Dhan)| National Portal of India. www.india.gov.in/spotlight/gobardhan-galvanizing-organic-bio-agro-resources-dhan.

[3] Press Information Bureau, 15 March 2022, *Procurement of Cow Dung.* www.pib.gov.in/PressReleaseIframePage.aspx?PRID=1806255.

[4] Press Information Bureau, 6 August 2024, *Financial Assistance to Organic Farmers,* www.pib.gov.in/PressReleasePage.aspx?PRID=2042237

ALIGNMENT WITH
VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision for agriculture is anchored in sustainability, circularity, and self-reliance. A core strategy is to strengthen integrated crop–livestock systems, which sustain over 100 million rural households.[5] The ambition is to position livestock as a major economic driver, contributing 8–10% to GDP and generating 50 million jobs by 2047.[6] Achieving this requires grassroots, low-cost innovations that replace synthetic inputs with locally sourced, organic alternatives. The vision is to build a rural bio-economy where resource efficiency and waste-to-wealth models drive sustainability and inclusive growth.

INNOVATION: COW DUNG PLANTERS

The cow dung planter, developed by farmers with support from the SuATI project, is a sustainable and biodegradable alternative to plastic nursery bags. Made entirely from cow dung, the planters raise seedlings for transplantation and, on decomposing, release organic nutrients into the root zone, enhancing soil fertility while eliminating plastic waste.

This farmer-led innovation transforms a readily available livestock by-product into a low-cost tool that addresses multiple smallholder challenges. It improves seedling survival, reduces input costs, and strengthens resilience against climatic risks such as frost. The planters also suppress early weed growth, reduce pest and disease pressures by enabling healthier seedlings, and enrich the soil through gradual nutrient release. By applying simple methods to traditional resources, the cow dung planter offers a scalable and adaptable solution across diverse cropping systems.

KEY COMPONENTS OF THE INNOVATION

Biodegradable planter production: Fresh cow, ox, or buffalo dung is pressed into 4-inch PVC moulds, hollowed with smaller pipes, and sun-dried for 3–4 days to form hardened planters.

Agroecological contribution of planters: The planters support minimum tillage, reduce irrigation requirements, and enrich soils with organic nutrients during decomposition.

Applicability across crop categories: The planters are used for nurseries of vegetables (tomato, brinjal, chili), fruit crops (papaya, drumstick), and flowers.

Farmer-led experimentation pathway: The solution evolved through successive farmer trials, moving from crop protection methods to short-duration varieties, plastic bags, and finally to cow dung planters.

[5] Pashudhan Praharee, 27 November 2024, *Role of Veterinarians & Livestock Sector for "Viksit Bharat@2047"*, https://www.pashudhanpraharee.com/role-of-veterinarians-livestock-sector-for-viksit-bharat2047-18/

[6] Pashudhan Praharee, 27 November 2024, *Role of Veterinarians & Livestock Sector for "Viksit Bharat@2047"*, https://www.pashudhanpraharee.com/role-of-veterinarians-livestock-sector-for-viksit-bharat2047-18/

IMPACT OF THE INNOVATION

100% replacement of plastic nursery bags, reducing environmental damage and soil contamination.

Higher seedling survival rates and improved yields compared to conventional plastic nursery methods.

Frost protection achieved for long-duration crops such as pigeon pea, improving establishment.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Scaling models for sustainable agriculture and agroecology

PUBLIC PARTNERS

National Bank for Agriculture and Rural Development (NABARD)

Ministry of Agriculture & Farmers Welfare (MoAFW)

State Rural Livelihood Missions (SRLMs), Madhya Pradesh

IMPLEMENTATION PARTNERS

Local farmer groups and Self-Help Groups (SHGs) in Panna district – Innovation developers and adopters

On-farm biological input production through solar-powered biofermenters

An innovation by the India component of the global development cooperation project 'Green Innovation Centres (GICs) for the Agriculture and Food Sector'

CONTEXT

India's agricultural landscape is facing a crisis, marked by declining soil health, rising input costs, and reduced biodiversity. Years of monocropping and excessive use of agrochemicals have degraded soil ecosystems, depleted organic matter, and polluted water sources. This has led to diminishing economic returns for farmers, as input costs for chemical fertilizers, pesticides, and herbicides have risen sharply, in some cases by as much as 60-600% over the last decade.[1]

In response, a transition to sustainable and natural farming systems has emerged as a crucial solution to restore soil health, reduce environmental pollution, and enhance farmers' incomes. However, while natural farming relies on the use of on-farm-produced biological inputs, their manual preparation is labour-intensive and time-consuming, limiting widespread adoption. Solar-powered biofermenters present a viable solution by automating this process, making sustainable practices more accessible to smallholder farmers, increasing self-reliance, and improving working conditions.

NATIONAL POLICY LANDSCAPE

The Government of India has launched several initiatives to reduce dependence on chemical inputs and promote natural farming. Key programmes include the Paramparagat Krishi Vikas Yojana (PKVY), National Mission on Natural Farming (NMNF), GOBARdhan, and PM-PRANAM. Together, these signal a clear policy direction to formalise natural farming, empower local communities, and embed eco-friendly practices in mainstream agriculture. Within this framework, biofermenters provide farmers with reliable, affordable alternatives to chemical fertilisers while supporting sustainable production.

[1] National Centre for Organic & Natural Farming. *Organic Farming Newsletter*. March 2022, https://nconf.dac.gov.in/uploads/OrganicNewsLetter/OFNL_March_2022.pdf

ALIGNMENT WITH

VIKSIT BHARAT 2047

Sustainable agriculture is identified as a cornerstone of India's ambition to become a *Viksit Bharat* by 2047. A key goal is the creation of "Clean and Green Villages" through circular economy models that convert waste to wealth, alongside scaling natural farming to one crore farmers and establishing 10,000 new FPOs for institutional support.

Solar-powered biofermenters directly advance this vision by automating bio-input production, reducing chemical use, and improving soil health while strengthening farmer self-reliance. Their solar base also contributes to India's energy transition targets (50% non-fossil fuel power by 2030 and net-zero emissions by 2070). By linking agricultural sustainability with clean energy, biofermenters help build the resilient rural communities envisioned in *Viksit Bharat 2047*.

INNOVATION: SOLAR-POWERED BIOFERMENTER

The solar-powered biofermenter is an automated solution that helps smallholder farmers and Farmer Producer Organisations (FPOs) produce reliable natural alternatives to chemical fertilisers. By using solar-driven stirring and controlled fermentation, it reduces labour needs and ensures consistency in bio-inputs. The model works at both individual and community levels, with potential for local enterprises through fee-based services. Soil health improvements have been reported in degraded apple orchards, including better structure, enhanced water retention, and higher microbial activity. Farmers also benefit from lower input and labour costs, as reliance on commercial fertilisers and manual stirring declines. Affordability is supported by a revolving finance system piloted with FPOs, while structured training builds farmer confidence in operation and maintenance. Together, these features create a pathway for scale, reduced chemical dependency, and the transition to natural farming with lower drudgery.

KEY COMPONENTS OF THE INNOVATION

Engineering design for decentralised production: Twin tanks for fermentation and filtration, supported by a battery-powered motor and solar controller for reliable off-grid use.

Versatile range of bio-inputs: Production of *Jeevamrut*, *Neemastra*, and *Ghanjeevamrut* suitable for foliar sprays, soil enrichment, and drip irrigation.

Ownership and service models: Options for individual farmer ownership or community-managed systems, where operators distribute inputs to others on a fee basis.

Financing for adoption and scale: Revolving credit piloted through FPOs, structured with one-year repayment cycles and a ten-year adoption horizon.

Capacity building for effective use: Training modules that cover operation, maintenance, and quality assurance to ensure safe and consistent application.

IMPACT OF THE INNOVATION

50 units installed across Himachal Pradesh and Andhra Pradesh, with **100+** farmers reached through shared community models and spillover use.

Soil health improvements reported in degraded apple orchards, including better structure, water retention, and microbial activity.

Lower input and labour costs as reliance on commercial fertilisers and manual stirring declines, supporting the transition to natural farming and reducing drudgery.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Scaling models for sustainable agriculture and agroecology

PUBLIC PARTNERS

Ministry of Agriculture and Farmers Welfare (MoA&FW)

National Rural Livelihoods Mission (NRLM)

State Departments of Horticulture

IMPLEMENTATION PARTNERS

Farmer Producer Organisations (e.g., KPM, CVA)

Scaling sustainable aquaculture by strengthening last-mile access through Community Resource Persons

An innovation by the India component of the global development cooperation project 'Sustainable Aquaculture for Food and Livelihood (SAFAL)'

CONTEXT

Aquaculture contributes 1.07% of GDP and supports over 28 million livelihoods,[1] with India producing 8%[2] of global fish output. Yet smallholder fish farmers face limited access to reliable, farm-level advisory. Public extension is often under-skilled, leaving farmers dependent on informal networks. This creates sharp productivity gaps: progressive farmers achieve 10–15 tonnes/ha/year, while most smallholders manage only 3–6 tonnes/ha/year.[3] These disparities reduce incomes, slow adoption of sustainable practices, and weaken disease management and record-keeping. Addressing this last-mile extension gap is essential to unlocking the potential of India's 2.36 million hectares of ponds and tanks:[4] a gap the CRP model is designed to fill.

NATIONAL POLICY LANDSCAPE

The Pradhan Mantri Matsya Sampada Yojana (PMMSY), launched in 2020 with ₹20,050 crore, is India's most ambitious aquaculture programme, focusing on production, infrastructure, and capacity building. It has already sanctioned projects worth ₹21,000 crore, supporting technologies such as Recirculatory Aquaculture Systems (RAS) and bio-floc units. Convergence with schemes like DAY-NRLM and the Skill India Mission strengthens farmer collectivisation and enterprise promotion. Together, these initiatives create the policy space for community-led models such as CRPs to extend technical knowledge and connect farmers with schemes and markets.

[1] FAO country profile on India, *India – Fishery and Aquaculture Country Profiles.* https://www.fao.org/fishery/en/facp/ind?lang=en&utm=

[2] Press Information Bureau, *Casting Nets, Catching Success,* 15 February 2025, https://www.pib.gov.in/FactsheetDetails.aspx?Id=149135

[3] ICAR – Central Institute of Freshwater Aquaculture. (2020). *Actionable Strategies for Increasing the Freshwater Aquaculture Production in India*

[4] FAO country profile on India, *India – Fishery and Aquaculture Country Profiles.* https://www.fao.org/fishery/en/facp/ind?lang=en&utm=

ALIGNMENT WITH
VIKSIT BHARAT 2047

Viksit Bharat 2047 positions aquaculture as a driver of rural prosperity and global competitiveness, with targets to raise fish production beyond 400 lakh tonnes and expand India's export share.[5] The CRP model contributes directly by decentralising knowledge, embedding climate-smart practices, and narrowing yield gaps between smallholders and progressive farmers. By enabling CRPs to operate as fee-based service providers, the model fosters inclusive livelihoods, especially for women and youth, while strengthening FPOs, SHGs, and cooperatives. In doing so, it advances the vision of Atmanirbhar Bharat by combining sustainability, self-reliance, and productivity growth.

INNOVATION: STRENGTHENING LAST-MILE ACCESS THROUGH CAPACITY BUILDING OF COMMUNITY RESOURCE PERSONS

The Community Resource Person (CRP) model addresses the persistent gap in last-mile aquaculture extension. It creates a decentralised, community-based cadre of service providers drawn from practicing fish farmers. By rooting the model in farmer institutions such as FPOs, SHGs, and cooperatives, it ensures community ownership, accountability, and sustained support for aquaculture households. The approach strengthens technical knowledge at the grassroots, reduces dependence on external extension systems, and builds a pathway for economic self-reliance while enhancing the outreach of government schemes like the Pradhan Mantri Matsya Sampada Yojana (PMMSY).

KEY COMPONENTS OF THE INNOVATION

Community selection through participatory processes: CRPs are chosen by FPOs, SHGs, and cooperatives using PRA methods, with each CRP supporting 15–25 farmers.

Tiered capacity-building framework: Training modules include a 3-day basic course, 10-day advanced training with exposure visits, 3-day refresher sessions, and a 7-day trainer programme.

Comprehensive service delivery at the farm level: CRPs provide technical advice, maintain pond records, support disease management, and manage seed banks and resource hubs.

Economic sustainability through service fees: CRPs earn income from advisory services and input facilitation, reducing reliance on subsidies and creating a self-sustaining service model.

Alignment with government schemes for scale: The CRP model strengthens delivery under national initiatives such as PMMSY, improving scheme outreach and adoption at the community level.

[5] Ministry of Fisheries, Animal Husbandry & Dairying, Government of India. (2024, September 17). *Fish production targets: more than 200 lakh tonnes by 2030 and more than 400 lakh tonnes by 2047; global fisheries export share envisaged at over 8% by 2047.* Press Information Bureau. https://www.pib.gov.in/PressReleasePage.aspx?PRID=2055709

IMPACT OF THE INNOVATION

566 CRPs trained across 12 districts in Assam and 5 in Odisha, supported by 143 certified CRP trainers.

Over **7,000** farmers reached, covering more than 1,500 hectares of water area.

3.3 million kilograms of annual fish production enabled through improved pond management and technical support.

Self-financed service ecosystem demonstrated, reducing reliance on subsidies and ensuring long-term sustainability.

Knowledge dissemination expanded through Department of Fisheries, ASRLM, FPCs, FPOs, KVKs, and NGOs actively using CRP training resources.

Scaling pathway established beyond Assam and Odisha, following a national workshop in Odisha (April 2025) with MoFAHD.

Replication interest expressed by fisheries departments of Telangana, Hyderabad, and Nagaland.

Partnership plans underway to train CRPs, strengthen farmer institutions, and integrate the model into state fisheries extension systems.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Scaling models for sustainable agriculture and agroecology

PUBLIC PARTNERS

- Ministry of Fisheries, Animal Husbandry and Dairying (MoFAHD)
- Departments of Fisheries, Assam and Odisha

IMPLEMENTATION PARTNERS

- State Rural Livelihood Missions (SRLMs)
- Self-Help Groups (SHGs), Producer Groups (PGs), Cooperatives, FPOs/FPCs
- Kalong Kapili
- Seven Sisters Development Assistance (SeSTA)
- Innovative Change Collaborative Services Private Limited (ICCSPL)
- Innovative Change. Collaborate. (ICCo)
- Darbar Sahitya Sansad (DSS), Odisha
- Gram-utthan (GU), Odisha

Women-led agro-processing through solar-powered dryers

An innovation by the India component of the global development cooperation project 'Green Innovation Centres (GICs) for the Agriculture and Food Sector'

CONTEXT

Post-harvest management is critical for India's agriculture, especially for smallholders whose produce is highly perishable. Despite being the world's second-largest producer of fruits and vegetables, India suffers massive post-harvest losses that weaken farmer incomes and food security. A 2022 NABARD Consultancy Services (NABCONS) study estimated these losses at ₹1.53 lakh crore annually (about 22% of foodgrain output).

Losses are most severe in fruits and vegetables, where supply chains lose 10 – 40% of value due to inadequate storage, poor handling, and inefficient logistics. Limited access to technology and finance further disadvantages smallholders. Low-cost innovations such as solar dryers show potential to preserve crops, enable value addition, and improve farmer resilience.

NATIONAL POLICY LANDSCAPE

To address these challenges, the Government of India has launched initiatives such as the Mission for Integrated Development of Horticulture (MIDH), the Agriculture Infrastructure Fund (AIF), the Pradhan Mantri Kisan Sampada Yojana (PMKSY), and the PM Formalisation of Micro Food Processing Enterprises Scheme. These programmes create the enabling framework for affordable, decentralised post-harvest innovations like solar dryers.

ALIGNMENT WITH VIKSIT BHARAT 2047

The ambition of *Viksit Bharat* by 2047 places agricultural transformation at its core, shifting focus from staples to high-value crops, livestock, and fisheries. India aims to raise food processing from 10% to 30%,[1] increase processed products in exports to more than 50%, and expand agriculture and food processing exports to USD 700 billion.[2] The food processing sector is projected to reach USD 2 trillion[3] and create 4 million jobs.[4] Achieving these targets will depend on modern infrastructure, digital innovations like the Digital Agriculture Mission, and sustainable practices that support both farmer incomes and national growth.

[1] Food and Agriculture Centre of Excellence- Confederation of India Industry (2022), *Food Processing Vision 2047 white paper,* https://face-cii.in/wp-content/uploads/2022/12/White-Paper-on-Food-Processing-Vision-2047.pdf

[2] PHDCCI, *Agriculture drives India's growth trajectory towards Viksit Bharat: PHDCCI, 21 February 2025,* https://www.phdcci.in/2025/02/27/agriculture-drives-indias-growth-trajectory-towards-viksit-bharat-phdcci/

[3] PHDCCI, *Agriculture drives India's growth trajectory towards Viksit Bharat: PHDCCI, 21 February 2025,* https://www.phdcci.in/2025/02/27/agriculture-drives-indias-growth-trajectory-towards-viksit-bharat-phdcci/

[4] Food and Agriculture Centre of Excellence- Confederation of India Industry (2022), *Food Processing Vision 2047 white paper,* https://face-cii.in/wp-content/uploads/2022/12/White-Paper-on-Food-Processing-Vision-2047.pdf

INNOVATION: SOLAR-POWERED DRYERS

This innovation introduces a suite of solar drying technologies, including solar conduction dryers, standard solar dryers, and Phase Change Material (PCM)-based dryers that enable continuous 24/7 operation. These models provide a faster, climate-friendly drying process that reduces food loss and creates value from surplus produce. By shifting value addition to the farm gate, decentralized solar dehydration units help farmers and local entrepreneurs preserve crops, generate income, and access new markets.

KEY COMPONENTS OF THE INNOVATION

Multiple solar drying technologies for continuous processing: Use of conduction, standard, and PCM-based dryers ensures efficiency and round-the-clock operation.

Household-scale pilots for direct farmer use: Twenty-five small units tested to assess feasibility at the household level.

Women-led enterprises for inclusive growth: Deployment of 3,000 units to strengthen women's participation and create local economic opportunities.

Commercial-scale pilots for larger enterprises: 20 standalone units established to demonstrate business viability at scale.

Market and finance integration for sustainability: Farmers and entrepreneurs linked to buy-back arrangements, market channels, and formal credit, including PMFME convergence.

Capacity building for effective adoption and scale: Training and ongoing support provided for operation, maintenance, and wider replication.

IMPACT OF THE INNOVATION

2,500 women-led solar dryer enterprises established, with plans to expand by 1,000 more

103% increase in annual income per entrepreneur, from an average of ₹55,908 to ₹1,13,812

Preventing **60,000** tonnes of food waste annually also avoided ~80,000 tonnes of CO_2 emissions.

More than **200** value chain jobs created, including roles in logistics, maintenance, and processing

€4 million credit cumulatively mobilised from financial institutions.

40% capital subsidy for units provided via PM-FME scheme convergence.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Integrated landscape based approaches to sustainable farming

PUBLIC PARTNERS

Ministry of Agriculture and Farmers Welfare (MoA&FW)

IMPLEMENTATION PARTNERS

Science for Society (S4S) Technologies

State Departments of Horticulture and Farmer Producer Companies

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THEMATIC AREA 5: DIGITAL SOLUTIONS

INNOVATIONS

- AgriPath – Sustainable agriculture through digital pathways
- Enabling data-driven agri-decisions with open-source Artificial Intelligence (AI) crop monitoring tools in Telangana
- e-Saksham – Digital learning platform for MGNREGA functionaries
- Building institutional capacity for ecological transitions through a Massive Open Online Course (MOOC) on natural farming
- Artificial Intelligence (AI)-based pest surveillance and source trace for cotton supply chains
- Multilingual speech & text-to-speech system for inclusive, accessible communication in agriculture
- Digitalising fish farming through Farmer Institution Real-time Monitoring System (FIRMS)

AgriPath – Sustainable agriculture through digital pathways

An innovation by the India component of the global development cooperation project 'Fund for the Promotion of Innovation in Agriculture (i4Ag)'

CONTEXT

India is home to over 126 million small and marginal farmers – more than 85% of the country's agricultural population – who cultivate less than two hectares of land and together manage nearly 45% of the nation's net sown area.[1,2] These farmers face persistent structural challenges: low productivity, volatile incomes, and heightened vulnerability to climate change.

NATIONAL POLICY LANDSCAPE

India's agricultural policy has pivoted decisively towards digitalisation and farmer-centric service delivery. The Digital Agriculture Mission (2021-25) provides the roadmap for leveraging AI, big data, and cloud-based platforms to modernise advisory systems. The creation of AgriStack, a federated digital public infrastructure, aims to unify land records, crop data, and farmer registries for personalised service delivery.

The National e-Governance Plan in Agriculture (NeGPA) has enabled states to pilot mobile-based advisories, while the National Policy for Farmers (2007) continues to emphasise knowledge empowerment, participatory extension, and gender-sensitive approaches. Together, these frameworks establish the enabling environment for initiatives such as AgriPath, which align with national objectives by embedding inclusivity, farmer participation, and sustainability in digital agriculture.

[1] Development Intelligence Unit (DIU). (2023). *"Annual Survey of Marginal Farmers in India."* https://www.diu.one/wp-content/uploads/2023/08/3.-Annual-Survey-for-Marginal-Farmers.pdf

[2] Down To Earth. (2025, May 19). *"India's small and marginal farmers cultivate nearly 45% of net sown area."* https://www.downtoearth.org.in/agriculture/indias-small-farmers-seek-fairness-voice-and-opportunity-not-handouts

ALIGNMENT WITH
VIKSIT BHARAT 2047

The vision of *Viksit Bharat 2047* identifies digital empowerment, inclusivity, and sustainability as pillars of agricultural transformation. National ambitions under this roadmap include creating digital identities for over 11 crore farmers, mapping 142 million hectares of agricultural land through soil profiling and completing a nationwide digital crop survey within the next two years.[3]

INNOVATION: AGRIPATH

AgriPath introduces a digital advisory model designed for smallholder farmers, with a focus on inclusivity and adoption. The farmbetter application links farmer profiles to sustainable land management practices from the World Overview of Conservation Approaches and Technologies (WOCAT) database, providing context-specific solutions. AgriPath stands out by embedding gender roles, youth perspectives, and household decision-making into its design, ensuring that advisories reflect the realities of all family members involved in farming. The application is free to use and remains available on the Google Play Store beyond the project period. This approach ensures that digital advisories are locally relevant, easy to use, and capable of driving sustained behavioural change in farming practices.

KEY COMPONENTS OF THE INNOVATION

Effective adoption: Randomised trials and field validation are used to identify effective digital pathway (out of self-service, agent-based, and hybrid models) for higher uptake.

Gender and youth-responsive advisory design: Interfaces are co-created with farmers, reflecting intra-household decision-making and making advice relevant for all users.

Engagement Hub: Capacity building and stakeholder engagement activities are conducted through the Digital Agricultural Services Engagement Hub.

[3] Press Information Bureau (PIB). (2024, September 4). *"Digital Agriculture Mission: Tech for Transforming Farmers' Lives."* Government of India. https://www.pib.gov.in/PressReleasePage.aspx?PRID=2051719

IMPACT OF THE INNOVATION

1760 farmers onboarded, with women comprising **30%** of users. Scaling to **10000** farmers in process.

80 extension workers trained in digital advisory approaches.

Engagement hub established to support capacity building, scaling and policy dialogue.

Policy recommendation(s) to be produced to guide national and regional adoption.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Digital solutions

IMPLEMENTATION PARTNERS

Grameen Foundation India

Farmbetter Ltd

Enabling data driven agri-decisions with open-source Artificial Intelligence (AI) crop monitoring tools in Telangana

An innovation supported by the Indo-German development cooperation project 'FAIR Forward – AI for All'

CONTEXT

Reliable agricultural data is essential for crop planning, procurement, and disaster preparedness. In states like Telangana, where smallholder farmers cultivate diverse crops under variable rainfall, existing monitoring systems fall short.[1] Large-scale field surveys are costly, slow, and lack the spatial precision needed for timely action.[2] This limits effective governance in areas such as procurement, subsidy allocation, and crop insurance, while also constraining farmers' decisions on inputs, markets, and risk.

Climate change has further raised the stakes, with unpredictable rainfall, pest outbreaks, and heat stress demanding rapid, localized responses. Yet, in the absence of near real-time, district-level crop data, institutions continue to depend on outdated information and farmers remain without tailored advisories. Closing this gap with scalable, affordable, and open data systems is critical to strengthening both governance and farmer resilience.

NATIONAL POLICY LANDSCAPE

India has placed digital agriculture at the centre of its transformation agenda. The Digital Agriculture Mission (2021-25) and AgriStack are building digital public infrastructure by integrating land records, farmer registries, and satellite data to deliver targeted policies. The National e-Governance Plan in Agriculture (NeGPA) supports adoption of remote sensing and AI for forecasting, while the PM Fasal Bima Yojana (PMFBY) mandates use of technology in crop loss assessment.

At the state level, Telangana is a frontrunner. Its Agricultural Data Exchange (ADeX) consolidates datasets into a secure, standardised backbone for evidence-based policymaking.[3] By encouraging partnerships with startups and research institutions, ADeX complements national efforts to build open data ecosystems. These initiatives collectively provide the enabling environment for AI-driven, open-source crop monitoring to strengthen official data systems.

[1] Kuchimanchi, B. R.; van Paassen, A.; & Oosting, S. J. (2021). *"Understanding the vulnerability, farming strategies and development pathways of smallholder farming systems in Telangana, India." Climate Risk Management,* 31, Article 100275. https://doi.org/10.1016/j.crm.2021.100275

[2] National Institution for Transforming India (NITI Aayog). (2021, September). *"Harnessing Technology in Agriculture for Sustainable Development."* Government of India. https://www.niti.gov.in/sites/default/files/2021-09/AgricultureTechnology.pdf

[3] News On AIR. (2023, August 12). *"Telangana launches India's first Agricultural Data Exchange and Agriculture Data Management Framework in Hyderabad."* https://newsonair.gov.in/telangana-launches-indias-first-agricultural-data-exchange-and-agriculture-data-management-framework-in-hyderabad/

ALIGNMENT WITH

VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision positions technology-enabled agriculture as a foundation for inclusive growth and global competitiveness. National goals include doubling farmer incomes, embedding AI and satellite tools into governance, and expanding digital public infrastructure.

Open-source AI crop monitoring advances these priorities by democratising access to high-quality, real-time data. It reduces reliance on proprietary systems, offers low-cost solutions for states and institutions, and improves transparency in procurement, insurance, and climate adaptation. By making datasets and models publicly accessible, it fosters innovation by startups, empowers farmers with timely advisories, and strengthens India's role as a leader in open, AI-driven digital public goods.

INNOVATION: OPEN-SOURCE AI CROP MONITORING TOOLS

The project introduced an AI-based crop mapping and monitoring system in Telangana to strengthen agricultural planning and farmer support. Implemented through a partnership between GIZ's FAIR Forward initiative and the State's Departments of Agriculture and ITE&C, the solution builds a digital public good by making datasets and models openly available. By combining government backing with an open-source approach, it ensures that high-quality crop data can be accessed and reused by multiple stakeholders, from policymakers to startups.

KEY COMPONENTS OF THE INNOVATION

AI-based crop type mapping for accurate datasets: Satellite imagery is combined with field-verified data to generate reliable, district-level crop information.

Hosting on Telangana's Agricultural Data Exchange (ADeX): Datasets are stored on a secure, government-backed platform designed for open and standardised data use.

Open-source datasets and models for wider adoption: Public availability enables replication and use by startups, researchers, and other state governments, extending impact beyond Telangana.

Global innovation challenge for model refinement: The Zindi platform engages data scientists worldwide to improve crop health monitoring and yield estimation models.

IMPACT OF THE INNOVATION

Open-source AI model for crop type mapping developed and deployed across Telangana.

Ground-truth and satellite data integrated for district-level crop surveillance, contributing high-quality datasets and models to ADeX.

Foundations created for applications in yield forecasting, disease detection, and climate-resilient agricultural planning.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Digital solutions

PUBLIC PARTNERS

ITE&C Department, Government of Telangana

IMPLEMENTATION PARTNERS

WRMS (Weather Risk Management Systems)

Earth Analytics

Zindi (Africa-based data science platform)

e-Saksham – Digital learning platform for MGNREGA functionaries

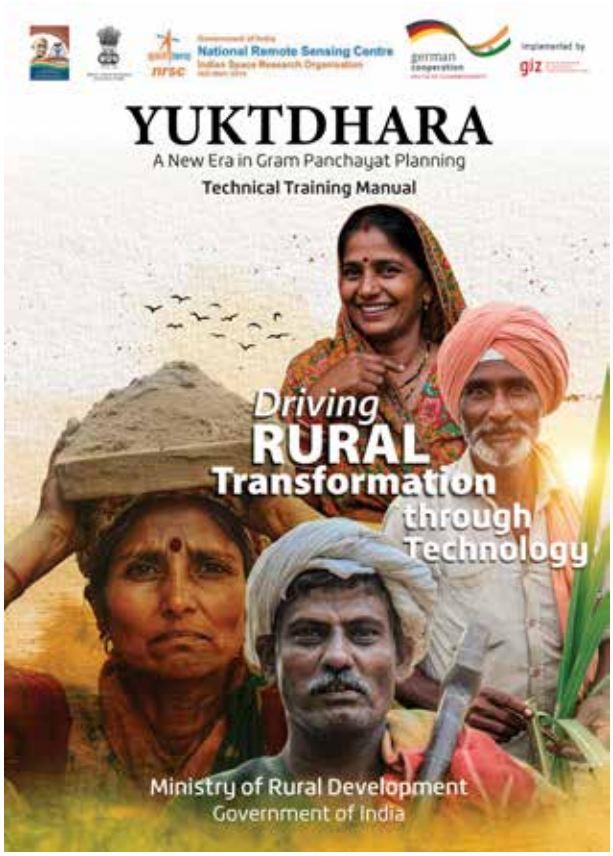
An innovation supported by the Indo-German development cooperation project 'Support to India Water Vision (SuWaVi)'

CONTEXT

MGNREGS, one of the world's largest public works programmes, is central to India's rural development strategy. In FY 2024-25, it engaged over 14 crore workers, spanned 6.4 lakh Gram Panchayats, and generated 290 crore person-days of paid employment.[1] With an allocation of ₹86,000 crore in the Union Budget 2024-25, its highest to date,[2] the scheme remains a cornerstone for livelihood security and climate-resilient infrastructure. However, implementation is constrained by limited technical capacity of local functionaries. Although training has reached millions of representatives and staff, sessions are short-term with little follow-up or digital support. Consequently, Gram Panchayat Development Plans vary in quality, restricting the programme's impact on climate resilience and sustainable resource management. This highlights the need for digital skilling platforms that offer continuous, practical, and scalable learning for frontline staff.

NATIONAL POLICY LANDSCAPE

India's rural development policies increasingly link wage employment with durable, climate-resilient assets. The Mahatma Gandhi National Rural Employment Guarantee Act (2005) requires Panchayats to plan and implement works in natural resource management and water conservation. The Gram Panchayat Development Plan (GPDP) Guidelines (2015, revised 2020) strengthen this mandate by requiring evidence-based, participatory planning across India's approximately 2.69 lakh Gram Panchayats.[3] To support data-driven decision-making, the Ministry of Rural Development and the National Remote Sensing Centre introduced Yuktdhara (2021), a geospatial platform for developing scientifically backed, integrated, and holistic GP Plans. These policies establish a foundation for continuous capacity building and digital skilling of local institutions.



[1] Ministry of Rural Development, Government of India. (n.d.). MGNREGA *"At a Glance" Dashboard*. Retrieved 02 September 2025, from https://nreganarep.nic.in/netnrega/nrega_ataglance/At_a_glance.aspx

[2] Press Information Bureau (PIB), 1 February 2024, *"Budget Estimates 2024-25: Highest Ever Allocation of ₹86,000 Crore for MGNREGA"*, Press Information Bureau, Government of India, https://pib.gov.in/PressReleasePage.aspx?PRID=2148475

[3] Ministry of Rural Development, Government of India. (n.d.). *MGNREGA "At a Glance" Dashboard*. Retrieved 02 September 2025, from https://nreganarep.nic.in/netnrega/nrega_ataglance/At_a_glance.aspx

ALIGNMENT WITH

VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision calls for 2.69 lakh Gram Panchayats[4] to evolve into digitally empowered, climate-resilient institutions of self-governance. This transformation is anchored in large-scale investments in digital infrastructure, with the BharatNet programme planned to extend broadband to every Panchayat and enable real-time connectivity across more than six lakh villages.[5,6] Building on this backbone, the eGramSwaraj platform has already been adopted by over 2.5 lakh Panchayats,[7] providing integrated systems for planning, financial management, and citizen services that bring transparency and accountability into local governance. The vision also highlights the use of geospatial tools such as Yuktdhara to institutionalise evidence-based planning for water, natural resources, and climate adaptation, ensuring that local development directly supports national goals such as the Jal Jeevan Mission, the National Water Mission, and India's net-zero commitment by 2070.

INNOVATION: E-SAKSHAM PLATFORM

e-Saksham is a digital platform developed under the Support to India's Water Vision (SuWaVi) project. Hosted by the Ministry of Rural Development (MoRD), it builds the skills of MGNREGA functionaries and local government staff. The platform offers modular MOOCs on natural resource management, GIS-based planning, and the use of the Yuktdhara portal. Yuktdhara, created by MoRD and the National Remote Sensing Centre (NRSC), is a geospatial tool that enables Panchayats to design evidence-based development works. Short, mobile-friendly lessons turn complex technical guidance into practical learning, helping officials prepare climate-resilient Gram Panchayat Development Plans. The platform reduces dependence on occasional workshops, provides certifications and institutionalises digital skilling for grassroots governance. The application is live at https://e-saksham.nic.in and is being used by MoRD officials and state functionaries.

KEY COMPONENTS OF THE INNOVATION

Flexible, self-paced learning for continuous skilling: Officials and functionaries access content anytime, supporting ongoing capacity building.

Hands-on activities for practical application: Exercises and self-assessment tools reinforce learning and improve field planning.

Integrated feedback loop with Yuktdhara: User experience directly informs improvements to the geospatial planning portal, reducing delays in official workflows.

Centralised repository of planning guidelines: Technical references on INRM, watershed works, and Gram Panchayat planning are consolidated in one accessible hub.

Secure and user-friendly platform design: A simple registration process ensures safe access and user data protection.

[4] Ministry of Rural Development, Government of India. (n.d.). *MGNREGA "At a Glance" Dashboard.* Retrieved 02 September 2025, from https://nreganarep.nic.in/netnrega/nrega_ataglance/At_a_glance.aspx

[5] Indian Council for Research on International Economic Relations (ICRIER), 2022, Policy Brief: BharatNet – Transforming Digital Connectivity in Rural India, ICRIER, https://icrier.org/pdf/pb-BharatNet.pdf

[6] Government of India (Ministry of Communications), 19 July 2024, *BharatNet Project: 2.18 Lakh Gram Panchayats Service Ready,* Press Information Bureau, Government of India, https://pib.gov.in/PressReleaseIframePage.aspx?PRID=2123137

[7] Press Information Bureau (PIB), Ministry of Panchayati Raj, 7 Aug 2024, "e-Panchayat Mission Mode Project," Press Information Bureau, https://pib.gov.in/PressReleseDetailm.aspx?PRID=2042683

IMPACT OF THE INNOVATION

~100,000 MGNREGA officials and local functionaries actively use the platform across India.

Wider access to digital skilling that equips grassroots officials to prepare evidence-based, climate-resilient local plans.

A scalable, collaborative model of technical assistance that strengthens grassroots governance while supporting national rural development and water security priorities.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Digital solutions

PUBLIC PARTNERS

Ministry of Rural Development (MoRD) – Lead agency

Ministry of Jal Shakti (MoJS)

Rural Development Department at State, District and Block Level

IMPLEMENTATION PARTNERS

Ministry of Rural Development (MoRD) – Hosting and institutionalisation

Building institutional capacity for ecological transitions through a Massive Open Online Course (MOOC) on natural farming

An innovation by the India component of the global development cooperation project 'Soil Protection and Rehabilitation for Food Security (ProSoil)'

CONTEXT

Scaling up natural farming in India is not just a matter of promoting techniques but of transforming knowledge systems. As a knowledge-intensive practice, natural farming requires farmers and extension personnel to continuously learn and adapt. Yet, structured and scientifically validated training tools remain scarce, leaving a gap between research and field-level practice – a significant challenge given the national ambition under the NMNF to train 18.75 lakh farmers who will in turn reach out to one crore farmers. Without accessible and standardised learning platforms, adoption is fragmented, and extension staff often lack the capacity to provide consistent guidance.[1] Closing this gap is essential to enable wider uptake of natural farming, strengthen resilience, and align agricultural systems with climate and sustainability goals.

NATIONAL POLICY LANDSCAPE

The Government of India launched the National Mission on Natural Farming (NMNF) in 2024, creating an enabling framework for natural farming. The mission emphasises capacity-building and decentralised knowledge dissemination, supported by interventions such as the formation of natural farming clusters, the establishment of Bio-Input Resource Centres, and the deployment of Krishi Sakhis as community resource persons. Training is further anchored by Krishi Vigyan Kendras (KVKs), agricultural universities, and local institutions, creating a multi-tiered ecosystem for farmer education. Within this policy context, digital learning platforms like MOOCs strengthen institutional capacity by offering structured, scalable, and inclusive training, ensuring that extension staff, local functionaries, and farmers share a common scientific understanding of natural farming.

[1] Hariraj N et al., *Constraints faced by farmers in adopting natural farming practices,* 13 April 2025, https://www.doi.org/10.33545/2618060X.2025.v8.i6Sb.3084

ALIGNMENT WITH

VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision positions natural farming as a cornerstone of a resilient, sustainable, and self-reliant agricultural economy. The ambition is to move India beyond input-intensive farming toward knowledge-driven, ecosystem-based practices that enhance soil health, biodiversity, and farmer livelihoods.[2]

The targets under NMNF – bringing 7.5 lakh hectares under natural farming, mobilising 1 crore farmers, and institutionalising a cadre of trained practitioners – directly contribute to this vision.[3] MOOCs on natural farming reinforce these efforts by providing inclusive, accessible, and scientifically rigorous training to farmers, students, extension workers, and policy practitioners. By creating a common language of natural farming, such innovations accelerate the transition to a knowledge-intensive, climate-smart agricultural system, advancing India's long-term goals of safe and secured food and nutrition, rural prosperity, and ecological balance under *Viksit Bharat 2047*.

INNOVATION: A MASSIVE OPEN ONLINE COURSE ON NATURAL FARMING

The Massive Open Online Course (MOOC) "Natural Farming – Principles and Practices" addresses a critical gap in scaling natural farming. Supported by GIZ India and hosted on the e-learning platform of MANAGE, the course offers structured and evidence-based training on natural farming. Contributions from scientists, practitioners, and development professionals ensure both technical rigour and field relevance. The course has been designed as inclusive, reaching extension staff, Gram Panchayat functionaries, students, and professionals beyond the farming community and at local level policy makers. The course strengthens grassroots knowledge systems to reduce dependence on costly external inputs, to promotes community-based farming models, and contributes to the regeneration of soil health.

KEY COMPONENTS OF THE INNOVATION

Comprehensive 12-week agroecology curriculum: Covers landscape planning, biodiversity, bio-input systems, integrated farming, plant protection, weed management, and soil fertility.

Inclusive learning design for diverse participants: Accessible not only to farmers but designed specifically to cater to the training need of extension workers, local governance staff, students, and professionals on Natural Farming practices.

Multilingual learning support through subtitles: Video content is available with subtitles in multiple Indian languages to reach learners across regions.

Knowledge base created through expert contributions: Developed with inputs from leading scientists, researchers, academia, and practitioners from public, private institutions and corporates to ensure rigour and practical relevance.

Certification: Free of cost, with evaluation-based certificates issued to participants upon completion.

[2] Pashudhan Praharee, *Agriculture in India: Roadmap for Viksit Bharat in Amrit Kaal,* 19 February 2025, https://www.pashudhanpraharee.com/agriculture-in-india-roadmap-for-viksit-bharat-in-amrit-kaal/

[3] Press Information Bureau, *National Mission on Natural Farming: Back to Roots, Forward with Sustainability,* 13 August 2025, https://www.pib.gov.in/PressNoteDetails.aspx?id=155019&NoteId=155019&ModuleId=3

IMPACT OF THE INNOVATION

India's first comprehensive online training on natural farming tailored for institutional actors and grassroots governance staff.

Over **7,000** participants have already undergone the course in last two batches, the third batch registration is on.

Recognised and supported by the Ministry of Agriculture, aligning directly with the National Mission on Natural Farming (NMNF).

Strengthened grassroots knowledge systems on natural farming.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Scaling models for sustainable agriculture and agroecology

PUBLIC PARTNERS

Ministry of Agriculture and Farmers Welfare (MoA&FW) – Integrated Nutrient Management Division

IMPLEMENTATION PARTNERS

National Institute of Agricultural Extension Management (MANAGE), Hyderabad

Centre for Climate Change and Adaptation (CCA)

Artificial Intelligence (AI)-based pest surveillance and source trace for cotton supply chains

An innovation by the India component of the global development cooperation project 'Global Programme Sustainability and Value Added in Agricultural Supply Chains - Cotton, Tea and Spices, India (AgriChains)'

CONTEXT

Cotton is India's foremost cash crop, grown on nearly 12.5 million hectares and involving 5.8 million farmers, most of them smallholders.[1] Contributing about 25% of global cotton output,[2] it is vital to rural livelihoods and the national textile economy. Yet, recurrent pest outbreaks, especially the Pink Bollworm, have caused yield declines of 20-30% in states which produce the highest quantities of cotton, directly impacting farmer incomes.[3]

NATIONAL POLICY LANDSCAPE

Cotton's policy framework reflects its agricultural and industrial role. The National Cotton Mission under the Ministry of Agriculture targets productivity, quality, and income stability, while the Ministry of Textiles supports value chains through MSP procurement by the Cotton Corporation of India.

Recent policies emphasise digitalisation and sustainability. The Digital Agriculture Mission (2021-25) promotes AI, remote sensing, and blockchain; the National Mission on Sustainable Agriculture (NMSA) supports integrated pest management; and global platforms such as the Better Cotton Initiative (BCI) push transparency and sustainability. These efforts together create an enabling environment for real-time pest surveillance and digital traceability in cotton.

[1] Better Cotton. (2023). *"Better Cotton in India."* https://bettercotton.org/where-is-better-cotton-grown/better-cotton-in-india/

[2] Press Information Bureau (PIB). (2025, April 1). *"Threads of Progress - How Make in India is Shaping the Future of Textiles and Apparel Industry."* Government of India. https://www.pib.gov.in/PressReleasePage.aspx?PRID=2117470

[3] Fand, B. B., Nagrare, V. S., Gawande, S. P., & Waghmare, V. N. (2019, July). *Widespread infestation of pink bollworm (Pectinophora gossypiella) on Bt cotton in Central India: a new threat and concerns for cotton production.* **Phytoparasitica.** Retrieved from https://link.springer.com/article/10.1007/s12600-019-00738-x

ALIGNMENT WITH

VIKSIT BHARAT 2047

India's *Viksit Bharat 2047* vision highlights agriculture as a foundation for farmer prosperity, sustainability, and global competitiveness. The Ministry of Textiles has launched the Mission on Enhancing Cotton Productivity, which further underscores the importance of cotton and textiles in the Indian economy. Within this, cotton remains a strategic crop for income growth and textile leadership. Digital pest surveillance and traceability systems strengthen this role by reducing losses, improving efficiency, and enabling verifiable practices that connect smallholders to premium markets.

INNOVATION: AI-BASED PEST SURVEILLANCE

This innovation, developed with Welspun India Ltd and the Welspun Foundation, brings together digital pest surveillance and supply chain traceability in cotton production. By linking farm-level intelligence with transparent procurement systems, it creates a farmer-centric model that improves productivity while meeting global demands for credible, sustainable cotton.

Its distinctiveness lies in combining real-time agronomic decision support with end-to-end traceability. Farmers benefit from actionable guidance that reduces crop losses, while buyers gain assurance of integrity in sourcing. The model shows how digital tools can both enhance farmer incomes and reinforce India's competitiveness in global cotton markets.

KEY COMPONENTS OF THE INNOVATION

AI-based pest surveillance: Image recognition and cloud analytics detect Pink Bollworm infestations with over 90% accuracy, generate advisories based on Economic Threshold Levels (ETL), and function offline with multilingual support for inclusivity.

Traceability platform: Source Trace enables real-time data capture, farm geo-tagging, and transparent procurement, while providing farmer-facing insights such as profit–loss statements and payment alerts.

Supply chain integration: Direct linkage with the Better Cotton Initiative (BCI) procurement system ensures integrity, accountability, and farmer inclusion in sustainable cotton markets.

IMPACT OF THE INNOVATION

9,500 cotton farmers in Wardha (Maharashtra) and Kutch (Gujarat) equipped with AI pest surveillance and traceability tools.

Significant reduction in crop losses through timely and accurate pest control interventions.

100% integrity in procurement achieved through BCI-linked Source Trace system.

Faster procurement payments and improved income monitoring strengthened farmer confidence and transparency.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Digital solutions

PUBLIC PARTNERS

Ministry of Textiles (MoT), Government of India

Ministry of Agriculture and Farmers Welfare (MoAFW)

IMPLEMENTATION PARTNERS

Welspun India Ltd & Welspun Foundation

Source Trace Systems

Multilingual speech & text-to-speech system for inclusive, accessible communication in agriculture

An innovation supported by the Indo-German development cooperation project 'FAIR Forward – AI for All'

CONTEXT

India's digital ecosystem is expanding rapidly, with rural users now forming the majority of the country's internet base.[1] Yet, access does not equal inclusion. Around 20% of the population remains non-literate, and millions more are semi-literate or unable to read dominant languages such as Hindi or English.[2] For these users, digital platforms delivering agricultural advisories, health information, or government schemes remain out of reach.

The challenge is acute in agriculture, where timely information on weather, pests, and schemes can make the difference between profit and loss. Farmers who cannot read SMS advisories or navigate portals in non-native languages are systematically excluded, widening gaps between digitally enabled farmers and those at the margins. With 22 scheduled languages and hundreds of dialects,[3] linguistic diversity itself becomes a structural barrier, limiting equitable access to digital transformation.

NATIONAL POLICY LANDSCAPE

The Government of India has begun addressing these gaps through new initiatives. The National Language Translation Mission (BHASHINI), launched in 2022, is building scalable AI-driven voice and translation solutions across 35+ Indian languages, enabling citizens to access services "in their own language."

Complementing this, the Guidelines for Indian Government Websites (GIGW 3.0), aligned with global accessibility standards, require portals and applications to provide multilingual and audio-enabled features. Sectoral initiatives such as the Digital Agriculture Mission (2021-25) and AgriStack are embedding digital public infrastructure into agriculture, envisioning farmer-centric advisories and data-driven decision support at the last mile. Collectively, these efforts create the policy environment for integrating inclusive, speech-based technologies into rural services.

[1] Internet & Mobile Association of India (IAMAI). (2024). *"Internet in India 2024 (ICUBE 2024)."* https://www.iamai.in/sites/default/files/research/Kantar_%20IAMAI%20report_2024_.pdf

[2] Ministry of Statistics & Programme Implementation (MoSPI). (2024). "Periodic Labour Force Survey (PLFS) – Annual Report 2023–24." https://mospi.gov.in/document/publi/7769

[3] Legislative Department, Ministry of Law & Justice. (2024). *"The Constitution of India (Sixth Pocket Edition) – Eighth Schedule."* https://lddashboard.legislative.gov.in/sites/default/files/coi/COI_2024.pdf

ALIGNMENT WITH

VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision places inclusivity and technology at the core of national development. It explicitly calls for harnessing AI and digital public infrastructure to ensure all citizens' access to opportunities, irrespective of literacy or language. Multilingual voice technologies advance this vision by dismantling barriers of literacy and language, enabling equitable participation in agriculture and welfare systems.

By 2047, India aspires to be a $30 trillion economy that is also inclusive and participatory. Speech-based systems ensure that women, smallholders, and marginalised groups are not excluded from the digital platforms that govern entitlements, advisories, and markets. In doing so, they reflect the principles of *Viksit Bharat 2047* – technology-enabled growth that empowers every household and strengthens rural transformation.

INNOVATION: MULTILINGUAL SPEECH & TEXT-TO-SPEECH SYSTEM

A multilingual text-to-speech (TTS) AI model has been developed in nine Indian languages – Telugu, Kannada, Marathi, Bengali, Chhattisgarhi, Hindi, Magadhi, Maithili and Bhojpuri – to make digital services accessible for Indians in their language. The system is built on the SYSPIN (Text-to-speech synthesizer in nine Indian languages) open-source speech datasets and provides TTS models required for building AI-based voice applications in agriculture, health and other essential sectors. By making applications and information available in local languages, it would enable millions of people to access information that would otherwise remain in accessible due to language barriers.

KEY COMPONENTS OF THE INNOVATION

Inclusive language datasets for cultural relevance: Text and audio are curated from real-world contexts and validated by native speakers to ensure authenticity and clarity.

Balanced voice models for natural outputs: Training uses both male and female recordings, producing speech that is accessible and representative.

Open-source datasets and models for adoption: Resources are publicly available, enabling use by startups, researchers, and government agencies.

Collaborative development to improve inclusivity: Hackathons with IISc and Bhashini addressed accent and style transfer challenges, strengthening usability across languages.

IMPACT OF THE INNOVATION

Voice-based access to digital services in nine Indian languages to reach **600** million speakers.

Rural populations empowered with voice-based solutions in local languages that bridge the digital divide and make vital agricultural, health, and welfare information accessible to those with limited literacy.

Women's empowerment tested in practice; for e.g. **400+** audio learning materials created in Telugu and Chhattisgarhi for Self-Help Groups, focusing on health and financial literacy.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Digital solutions

PUBLIC PARTNERS

Digital India Bhashini Division

IMPLEMENTATION PARTNERS

Indian Institute of Science (IISc), Bangalore

Audiopedia Foundation

Digitalising fish farming through Farmer Institution Real-time Monitoring System (FIRMS)

An innovation by the India component of the global development cooperation project 'Sustainable Aquaculture for Food and Livelihood (SAFAL)'

CONTEXT

India's aquaculture sector has grown rapidly, with inland fish production rising by 142%[1] over the past decade, making the country the world's second-largest producer. This expansion is driven by millions of smallholder farmers, most operating in an unorganised manner with fragmented, unreliable paper records of costs, inputs, and productivity. In aquaculture, such gaps are critical since traceability underpins export compliance, biosecurity, and sustainability. To improve market access and economies of scale, the government is promoting Fish Farmer Producer Organisations (FFPOs). Yet these institutions struggle to monitor and support hundreds of dispersed farms without digital tools. The lack of real-time data weakens their ability to deliver timely advisories, enforce quality control, enhance efficiency, and meet the traceability standards essential for high-value markets.

NATIONAL POLICY LANDSCAPE

The Government of India is driving a paradigm shift in the fisheries sector, with a strong policy focus on digitalization, formalization, and collectivization to unlock its full potential. Key initiatives that create a conducive environment for this innovation include the flagship Pradhan Mantri Matsya Sampada Yojana (PMMSY) and its sub-scheme, the Pradhan Mantri Matsya Kisan Samridhi Sah-Yojana (PM-MKSSY). These programs are actively supporting the establishment of 2,195 Fish Farmer Producer Organizations (FFPOs) and are creating a National Fisheries Digital Platform (NFDP) to provide digital identities to all stakeholders in the value chain.[2,3] With over 26 lakh stakeholders already registered on the NFDP, these efforts signal a broader policy push to create a data-driven, organized, and globally competitive aquaculture ecosystem.[4]

[1] Ministry of Fisheries, Animal Husbandry & Dairying, Government of India. (2025, August 23). *Harnessing the Blue Economy: India's Fisheries at a Glance.* Press Information Bureau. https://www.pib.gov.in/PressNoteDetails.aspx?ModuleId=3&NoteId=155080

[2] Press Information Bureau, *Shri Rajiv Ranjan Singh briefs media today on the important decisions and achievements of Ministry for Fisheries, Animal Husbandry and Dairying in 100 days of the third term of Prime Minister Shri Narendra Modi,* 17 September 2024, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2055709

[3] Ministry of Fisheries, Animal Husbandry & Dairying, Government of India. (2025, August 23). *Harnessing the Blue Economy: India's Fisheries at a Glance.* Press Information Bureau. https://www.pib.gov.in/PressNoteDetails.aspx?ModuleId=3&NoteId=155080

[4] Ministry of Fisheries, Animal Husbandry & Dairying, Government of India. (2025, August 23). *Harnessing the Blue Economy: India's Fisheries at a Glance.* Press Information Bureau. https://www.pib.gov.in/PressNoteDetails.aspx?ModuleId=3&NoteId=155080

ALIGNMENT WITH

VIKSIT BHARAT 2047

The *Viksit Bharat 2047* vision for the blue economy is built on the pillars of technology, sustainability, and enhanced global competitiveness. The national ambition is to increase fish production to over 40 million tons by 2047, double seafood exports to ₹1,00,000 crore, and generate 55 lakh employment opportunities in the sector.[5,6] Achieving these goals requires the digital transformation and formalization of the largely unorganized aquaculture value chain. The vision emphasizes empowering farmer collectives like FFPOs to operate as efficient, modern enterprises with end-to-end traceability. This focus on creating a digitally enabled, organized, and data-driven ecosystem is central to making India's aquaculture sector a leading engine of the nation's economic growth by 2047.

INNOVATION: THE FARMER INSTITUTION REAL-TIME MONITORING SYSTEM (FIRMS)

The Farmer Institution Real-Time Monitoring System (FIRMS) is a digital platform created under GIZ's SAFAL project to modernise aquaculture record-keeping. It enables farmers and their institutions to move from scattered, paper-based ledgers to a collective, real-time monitoring system. By linking farm data with dashboards, FIRMS turns everyday records into insights that improve decision-making, build stronger Farmer Producer Organisations (FPOs), Self-Help Groups (SHGs), and cooperatives, and provide government agencies with reliable evidence for planning. This shift makes aquaculture more profitable, transparent, and resilient.

KEY COMPONENTS OF THE INNOVATION

Digital farmer identity through QR-linked Farm Record Book: Each farmer is assigned a unique QR code that connects personal details and farm data to the system.

Mobile app for continuous data entry: Open-source applications enable farmers or institution representatives to submit both one-time registration data and recurring farm-level records.

Structured formats for registration and operations: Form 1 captures static farmer and pond details, while Form 2 records dynamic operational data such as costs, inputs, and productivity.

Real-time dashboards for institutions: Dashboards visualise aggregated farmer data to track farm economics, disease cycles, and resource use. Customised access provides tailored insights for Farmer Institutions, government agencies, and civil society organisations.

[5] Press Information Bureau, *World Fisheries Day: Sustainable Fishing Practices for a Thriving and Eco-Friendly Fisheries Sector,* 20 November 2024, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2075160#

[6] Press Information Bureau, Shri Rajiv Ranjan Singh briefs media today on the important decisions and achievements of Ministry for Fisheries, Animal Husbandry and Dairying in 100 days of the third term of Prime Minister Shri Narendra Modi, 17 September 2025, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2055709

IMPACT OF THE INNOVATION

3,444 farmers in Odisha using FIRMS, covering **3,505** ponds across 1,503 ha, supported by 240 CRPs (including 561 women).

4,271 farmers in Assam registered, managing **4,949** ponds across 2,518 ha, supported by 277 CRPs (including 2,921 women).

Farmers report greater productivity, profitability, and awareness of risks through regular record-keeping and access to insights.

Farmer Institutions now use dashboards for business planning, better service delivery, and attracting finance.

Government departments gain real-time ground-truth data that strengthens aquaculture programme design and resource allocation.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Digital solutions

PUBLIC PARTNERS

Ministry of Fisheries, Animal Husbandry & Dairying (MoFAHD)

Department of Fisheries, Assam and Odisha

IMPLEMENTATION PARTNERS

Civil Society Organisations (CSOs)

Farmer Producer Organisations, SHGs, and cooperatives (as institutional anchors)

F

THEMATIC AREA 6: INNOVATIONS IN FINANCING AND MARKETS

INNOVATIONS

- Promoting circular water economy in the textile sector through Wastewater Reuse Certificates (WRCs)
- Participatory Guarantee System (PGS) in freshwater aquaculture
- BharatGAP – National certification framework for Good Agricultural Practices in horticulture
- Decentralised, affordable, solar-powered cold storage as a service for smallholder farmers
- Solar Irrigation as a Service (SIS) – Clean energy access and rural livelihoods through solarpreneurs

Promoting circular water economy in the textile sector through Wastewater Reuse Certificates (WRCs)

An innovation by the India component of the global development cooperation project 'Global Programme Sustainability and Value Added in Agricultural Supply Chains - Cotton, Tea and Spices, India (AgriChains)'

CONTEXT

India's textile industry is a vital pillar of the economy, contributing 2% to GDP and ranking as the second-largest employer after agriculture.[1] At the same time, its environmental footprint is significant. Globally, the sector consumes over 93 billion cubic meters of water annually and is responsible for approximately 20% of global industrial wastewater, primarily from dyeing and finishing processes.[2,3] Major textile clusters are located in water-stressed regions, intensifying the challenge.

NATIONAL POLICY LANDSCAPE

The Government of India has responded by promoting a circular economy model that balances industrial growth with environmental sustainability. A dedicated Circular Economy Cell has been established in NITI Aayog, alongside the development of the National Resource Efficiency Policy (NREP). Complementary initiatives include the PM MITRA Parks Scheme, the Production Linked Incentive (PLI) Scheme for textiles, the National Water Mission's targets for water-use efficiency, and the enforcement of Zero Liquid Discharge (ZLD) norms for polluting industries. Together, these measures create a strong policy framework for embedding resource efficiency into the textile sector.

[1] Press Information Bureau, 1 April 2025 *"Threads of Progress - How Make in India is Shaping the Future of Textiles and Apparel Industry"*, https://www.pib.gov.in/PressNoteDetails.aspx?NoteId=154084

[2] Bailey K, Basu A, Sharma S. *The Environmental Impacts of Fast Fashion on Water Quality: A Systematic Review. Water.* 2022; 14(7):1073. https://doi.org/10.3390/w14071073

[3] Olivar Aponte, N., Hernández Gómez, J., Torres Argüelles, V., & Smith, E. D. (2024). *Fast fashion consumption and its environmental impact: a literature review.* Sustainability: Science, Practice and Policy, 20(1). https://doi.org/10.1080/15487733.2024.2381871

ALIGNMENT WITH
VIKSIT BHARAT 2047

A circular water economy is central to the textile sector's role in achieving the *Viksit Bharat 2047* vision. The national ambition is to position India as a global leader in sustainable manufacturing, aligned with the Prime Minister's call for "Fashion for Environment and Empowerment."[4] Economic goals include tripling textile exports to ₹9 lakh crore by 2030 and expanding the technical textiles market to USD 350 billion by 2030.[5]

INNOVATION: WASTEWATER REUSE CERTIFICATES (WRCS)

Wastewater Reuse Certificates (WRCs) provide a market-based incentive for industries to treat and reuse wastewater. Introduced under the AgriChains programme in partnership with the World Bank's 2030 Water Resources Group (WRG 2030), the model aligns environmental compliance with economic value creation. It allows industries, particularly textile clusters, to track, verify, and claim credits for wastewater reuse, creating both financial savings and a pathway to sustainable resource use.

KEY COMPONENTS OF THE INNOVATION

Certification system to incentivise wastewater reuse: Verification and crediting mechanisms create financial incentives and support regulatory compliance for industries.

Integration with national and state policies: Alignment with the Green Credit Programme of MoEFCC and inclusion in draft state-level policies strengthen institutional uptake.

Industrial pilots demonstrating scalability: Implementation underway in Gujarat Eco Textile Park (GETP) and Tirupur, with readiness metrics designed for replication.

Knowledge resources and digital platforms for adoption: Development of a handbook for industrial clusters, digital tracking tools, and global dissemination through platforms such as Singapore Water Week 2024.

[4] Press Information Bureau, *Prime Minister Shri Narendra Modi addresses the Bharat Tex 2025,* 16 February 2025, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2103838

[5] Press Information Bureau, *"Threads of Progress – How Make in India is Shaping the Future of Textiles and Apparel Industry",* 1 April 2025, https://www.pib.gov.in/PressReleasePage.aspx?PRID=2117470

IMPACT OF THE INNOVATION

Baseline survey completed across **188** factories in Gujarat and Maharashtra on water use, discharge quality, and infrastructure.

Draft water reuse policy submitted to the Government of Maharashtra positioning WRCs as a central mechanism.

Implementation readiness metrics established for Gujarat Eco Textile Park (GETP) and Tirupur clusters.

Integration with India's Green Credit Programme has been initiated, with digital WRC platforms planned for rollout in 2025.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Integrated landscape-based approaches to sustainable farming

PUBLIC PARTNERS

- Ministry of Textiles
- Ministry of Environment, Forest and Climate Change (MoEFCC)
- World Bank Water Resources Group (WRG) 2030
- International Finance Corporation (IFC)

IMPLEMENTATION PARTNERS

- Innovative Change Collaborative Services Private Limited (ICCSPL)
- German textile industry partners

Participatory Guarantee System (PGS) in freshwater aquaculture

A joint innovation supported by the Indo-German development cooperation project 'National Centre for Organic and Natural Farming (NCONF)' and 'Innovative Change Collaborative Services Pvt. Ltd. (ICCSPL)'

CONTEXT

India's freshwater aquaculture sector is both substantial and expanding. Inland fisheries output surged from 61 lakh tonnes in 2013-14 to 147.37 lakh tonnes in 2024-25, marking a 142% increase in just over a decade. This growth signals rapid productivity gains but also underscores a pressing challenge: small-scale farmers struggle to communicate product quality, limiting their share in lucrative markets. Demand for reliable, chemical-free fish is rising, yet conventional third-party certification remains unaffordable and centrally managed. Compounding this are infrastructural bottlenecks – especially in cold-chain, storage, and live-fish logistics – that erode product quality and value. Addressing these intertwined issues calls for participatory, low-cost certification systems that can build consumer trust, reward responsible practices, and help smallholders thrive.

NATIONAL POLICY LANDSCAPE

India's fisheries policy framework increasingly emphasises quality assurance, market access, and sustainability. The Pradhan Mantri Matsya Sampada Yojana (PMMSY) enables standards, certification, and traceability across aquaculture. The Fisheries and Aquaculture Infrastructure Development Fund (FIDF) finances cold chain, processing, and logistics, while the extension of the Kisan Credit Card (KCC) eases working-capital access for fishers. Alongside, the PGS-India programme – originally for organic farming – shows the potential of low-cost, participatory certification that builds consumer trust and opens premium markets. Together, these measures create an ecosystem to scale farmer-led certification, strengthening both livelihoods and food security.

ALIGNMENT WITH

VIKSIT BHARAT 2047

The 2047 vision emphasises farmer prosperity, sustainability, and globally competitive agri-food systems. For fisheries, national targets look to raise production beyond 400 lakh tonnes by 2047 and expand India's global export share, underscoring the push for quality, traceability, and organised smallholder participation. Participatory, low-cost certification like PGS complements these priorities by improving market credibility, supporting inclusive growth (including women and SHG-led enterprises), and catalysing private and public investment into hygienic handling, cold chain, and retail.

INNOVATION: PGS IN FRESHWATER AQUACULTURE

Participatory Guarantee Systems (PGS) provide a low-cost certification pathway for small-scale fish farmers to demonstrate the safety and sustainability of their produce. Conventional third-party certification is costly and inaccessible, but PGS uses peer review, collective responsibility, and transparent processes to make certification practical for smallholders. Through the Indo-German project *Food Security through Integrated Aquaculture (EIAA),* locally known as *SAFAL*, GIZ has supported the adoption of PGS in freshwater aquaculture by developing guidelines, training farmer groups, and linking the model with consumer awareness campaigns and institutional partners. This approach strengthens farmer credibility, fosters consumer trust in chemical-free fish, and supports the wider transition to agroecological aquaculture.

KEY COMPONENTS OF THE INNOVATION

Farmer- and consumer-led certification process: Local groups of farmers, consumers, and stakeholders co-manage PGS, ensuring shared ownership and accountability.

Sustainability standards tailored to aquaculture: Agreed guidelines set clear expectations for chemical-free, environmentally responsible fish production.

Peer review system for on-farm verification: Farmers inspect each other's ponds and production practices, creating a transparent and trust-based certification process.

Producer pledges to maintain credibility: Written commitments and group undertakings bind members to follow PGS norms and uphold collective trust.

Horizontal governance and shared responsibility: Rotating leadership and participatory decision-making ensure fairness, inclusivity, and mutual respect within farmer groups.

IMPACT OF THE INNOVATION

Over **75%** of participating farmers reported higher incomes, with farm gate prices rising by **35–45%** due to greater consumer confidence in PGS-certified fish.

More than **500** women fish farmers adopted PGS practices, marking significant social and behavioural shifts towards agroecological aquaculture.

Improved market access and reputation for naturally farmed fish, with nearly half the participants reporting stronger buyer demand and new market opportunities.

Annual fish sales expanded, supported by consumer preference for chemical-free and responsibly farmed fish.

Knowledge dissemination strengthened through SAFAL's awareness campaigns, positioning PGS-certified fish as reliable and trustworthy options in local markets.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Food security to nutrition security

PUBLIC PARTNERS

- Ministry of Fisheries, Animal Husbandry and Dairying (MoFAHD)
- Departments of Fisheries, Assam and Odisha
- National Centre for Organic and Natural Farming

IMPLEMENTATION PARTNERS

- ICCSPL
- Champabati Fish Farmers Co-operative

BharatGAP – National certification framework for Good Agricultural Practices in horticulture

An innovation to boost safe, sustainable & globally competitive horticulture in India, supported by the Indo-German development cooperation project 'Sustainable Agriculture Systems and Policies (AgSys)'

CONTEXT

India is the world's second-largest producer of fruits and vegetables, making horticulture a cornerstone of its agricultural economy.[1] Despite this massive scale, the sector faces significant challenges in meeting the rising domestic and global demand for safe, traceable, and high-quality produce. The existing landscape of agricultural certification is fragmented, often expensive for smallholders, and lacks a unified national standard that inspires consumer trust. This gap limits millions of farmers from accessing premium markets and constrains growth in production and exports. A transparent, simplified, and globally recognised standard is critical to unlock opportunities and ensure the safety and sustainability of India's horticulture value chain.

NATIONAL POLICY LANDSCAPE

India's policy direction for horticulture has shifted from boosting output to ensuring quality, safety, and traceability. The Mission for Integrated Development of Horticulture (MIDH) and the Agriculture Export Policy (2018) highlight the need for standards that match international benchmarks to expand India's global share. More recently, the ₹1,765.67 crore National Clean Plant Programme (2023) and schemes such as the Agriculture Infrastructure Fund (AIF) and PM-FME reflect targeted investment in quality planting material, certification, and post-harvest systems.[2] Together, these initiatives signal a shift toward a trust- and quality-driven horticulture ecosystem. Bharat Local Good Agricultural Practices (BharatGAP) builds on this by offering a unified certification framework under the National Horticulture Board, enabling Indian producers to compete credibly in domestic and export markets.

[1] Press Information Bureau, *Clean Plant Programme: A Major Leap Forward in Horticulture Sector,* 11 August 2024, https://www.pib.gov.in/PressNoteDetails.aspx?NoteId=152014&ModuleId=3

[2] Press Information Bureau. (2024, August 9). *Cabinet approves the Clean Plant Programme under Mission for Integrated Development of Horticulture.* Ministry of Agriculture & Farmers Welfare, Government of India. Retrieved from PIB. https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=2043922#:~:text=Ambitious%20Clean%20Plant%20Programme%20to%20revolutionize%20horticulture%20sector%20in%20the%20country&text=The%20Union%20Cabinet%2C%20chaired%20by,of%20Agriculture%20and%20Farmers%20Welfare.

ALIGNMENT WITH

VIKSIT BHARAT 2047

Establishing a globally benchmarked national quality standard like BharatGAP is a critical enabler of the *Viksit Bharat 2047* vision for a competitive, sustainable, and food-secure nation. The national ambition is to elevate India from its position as the world's second-largest producer to a global leader in horticultural production and exports, an objective backed by the Cluster Development Programme (CDP) under the National Horticulture Board, with a scheme outlay of ₹3,300 crore.[3] BharatGAP is designed to provide trust and traceability, enabling farmers to access high-value domestic and international markets. By empowering millions of smallholders through a simplified, digital-first certification process, the initiative directly supports the core Viksit Bharat goals of driving economic growth, ensuring environmental sustainability, and promoting inclusive development for all farmers.

INNOVATION: BHARATGAP

BharatGAP is a national certification system for Good Agricultural Practices (GAP) in horticulture, designed as India's "passport to trust, safety, sustainability, and premium markets." Anchored in the National Horticulture Board (NHB), the Ministry of Agriculture & Farmers Welfare (MoA&FW), it replaces fragmented certification efforts with a unified framework. The programme adapts international standards to Indian conditions through technical inputs from ICAR and GIZ, while keeping protocols farmer-friendly and accessible. Targeting fruits, vegetables, and flowers, BharatGAP enables smallholders and Farmer Producer Companies (FPCs) to meet global benchmarks for safety and sustainability, while opening access to domestic premium and export markets. With NHB anchoring and state-level rollout, BharatGAP is positioned to cover millions of smallholders across India's horticultural clusters.

KEY COMPONENTS OF THE INNOVATION

Two-stage learning and certification preparation: Farmers and producer groups complete self-learning modules and assessments before formally applying.

Digital benchmarking of farm practices: A self-assessment portal helps producers compare their practices against GAP standards and identify gaps.

Scientifically validated crop packages to guide farmers: ICAR-curated protocols combine international standards with locally tested methods.

Online certification with traceability systems: Accreditation, record-keeping, and product traceability are managed through a digital platform.

Multi-tier governance for transparency and compliance: A National Steering Committee sets policy, NHB functions as secretariat, NAB-BharatGAP ensures compliance, and certification bodies handle field-level certification.

[3] National Horticulture Board. (2021). *Horticulture Cluster Development Programme: Brochure.* Ministry of Agriculture & Farmers' Welfare, Government of India. Retrieved from https://nhb.gov.in/pdf/CDPBrochure.pdf

IMPACT OF THE INNOVATION

India's national GAP certification framework has been formulated under the Ministry of Agriculture & Farmers' Welfare and the National Horticulture Board. The scheme is scheduled for launch in September 2025, following which it will be made available to farmers.

Digital platform fully operational, offering learning, self-assessment, certification, and traceability functions.

Scientifically validated crop packages integrated, developed by ICAR for diverse horticultural crops.

Capacity-building modules are designed for strengthening farmer readiness for certification.

Readiness for nationwide scaling, with State Horticulture Departments, FPOs, and export boards positioned to connect local farmers to premium markets.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Innovations in Financing and Markets

PUBLIC PARTNERS

- Ministry of Agriculture & Farmers Welfare (MoA&FW)
- National Horticulture Board (NHB)
- State Governments – Horticulture Departments, APEDA, State Horticulture Missions
- National Horticulture Board (NHB) the primary implementing partner
- ICAR is the technical partner, developing packages of practices for crops

IMPLEMENTATION PARTNERS

- Farmer Producer Companies (FPCs), Cooperatives, Producers for adoption at grassroots

Decentralised, affordable, solar-powered cold storage as a service for smallholder farmers

An innovation by the India component of the global development cooperation project 'Green Innovation Centres (GICs) for the Agriculture and Food Sector'

CONTEXT

Cold chain infrastructure is vital for preserving produce quality and enabling fair market access. Its absence in India remains a major barrier for smallholders, leading to inefficiencies, wastage, and exploitative pricing. Nearly half of all post-harvest losses occur before produce leaves the farm, causing both economic and nutritional damage. The challenge is acute in horticulture-intensive states such as Himachal Pradesh, Andhra Pradesh, Maharashtra, and Karnataka, where storage is centralized, controlled by large players, and located far from small farms. For smallholders, distance and high costs limit access, forcing distress sales during harvest gluts and weakening bargaining power. A 2022 NABARD Consultancy Services (NABCONS) study estimated horticulture losses at 49.9 million metric tonnes annually. Decentralized, solar-powered cold storage is emerging as an affordable alternative, reducing losses, improving incomes, and strengthening farmers' role in the value chain.

NATIONAL POLICY LANDSCAPE

To address post-harvest challenges, the Government of India has launched schemes such as the Mission for Integrated Development of Horticulture (MIDH), the Agriculture Infrastructure Fund (AIF), and the Pradhan Mantri Kisan Sampada Yojana (PMKSY). The creation of the National Centre for Cold Chain Development (NCCD) further signals a commitment to integrated cold chain systems for perishables. These measures provide a clear policy base for decentralised, farmer-accessible cold chain systems.

ALIGNMENT WITH

VIKSIT BHARAT 2047

Agricultural transformation and higher farmer incomes are core themes of the Viksit Bharat agenda, which seeks to position India as the "food basket of the world" by 2047. Cold chain innovations directly support these goals by cutting wastage, modernising preservation, and strengthening market linkages. They also advance renewable energy targets, with agriculture expected to contribute to achieving 50% of cumulative electric power from non-fossil sources by 2030.

INNOVATION: SOLAR-POWERED COLD STORAGE AS A SERVICE

The innovation introduces a "Cooling as a Service" model, positioning solar-powered cold storages at the farmgate. Unlike conventional storages near mandis, these units eliminate transport barriers and make preservation affordable. Farmers pay only for storage used, while private operators install, own, and maintain units for financial sustainability. The model is climate-friendly, providing low-emission, decentralised cold storage even in remote locations.

KEY COMPONENTS OF THE INNOVATION

Pay-per-use cold storage for small farmers: Provides affordable access without large upfront investment

Private investment ensuring long-term viability: Units are installed, owned, and maintained by companies that recover costs sustainably.

Rural jobs through operations and maintenance: Daily management creates employment and builds local technical skills.

Solar-powered systems for clean energy adoption: Reduces grid dependency and lowers emissions.

Digital tools for quality monitoring and market decisions: Sorting, grading, and the YVCCA app help farmers track storage conditions, predict shelf life, and plan sales.

Policy alignment for scale and subsidy access: Drafted guidelines with NCCD under MIDH to create an institutional pathway for wider adoption.

IMPACT OF THE INNOVATION

65 units installed across Maharashtra (22), Andhra Pradesh (16), Karnataka (20), and Himachal Pradesh (7).

20% reduction in post-harvest losses in targeted locations

15-25% increase in price realisation for farmers due to storage-led price flexibility

Through the pilots, an estimated **5.8** to **26.2** tonnes of CO_2 emissions avoided each year.

Small solar powered cold storage technical specification was done with support of National Centre for Cold Chain Development (NCCD)

Small solar powered cold storage was introduced in the subsidy scheme Mission for integrated development of Horticulture (MIDH).

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Innovations in financing and markets

PUBLIC PARTNERS

Mission for Integrated Development of Horticulture (MIDH), Ministry of Agriculture & Farmers Welfare (MoA&FW)

Department of Horticulture (DoH) in Karnataka, Himachal Pradesh, Maharashtra

National Center for Cold Chain Development (NCCD)

IMPLEMENTATION PARTNERS

Coolcrop Technologies Pvt ltd

Energy Efficiency Services Limited

Solar Irrigation as a Service (SIS) – Clean energy access and rural livelihoods through solarpreneurs

An innovation by the India component of the global development cooperation project 'DeveloPPP'

CONTEXT

As India accelerates its transition to clean energy to meet its climate goals, solarising the agricultural sector has become a national priority. While government programs have successfully promoted the installation of individual solar pumps, a key challenge has emerged: the chronic underutilization of these high-value assets. Studies show that due to cropping cycles, solar pumps often remain idle for significant parts of the year, used for as few as 50-139 days annually, which undermines their economic viability.[1,2] This inefficiency, coupled with the high upfront capital cost that remains a barrier for many small and marginal farmers, undermines the economic viability of the asset-ownership model and limits the potential impact of public investment in clean energy for agriculture.

NATIONAL POLICY LANDSCAPE

The Government of India has established a robust policy framework to drive the adoption of solar energy in the agricultural sector and enhance farmers' energy security. The promotion of solar irrigation is driven by key initiatives like the National Solar Mission, the Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM-KUSUM) and International Solar Alliance (ISA). These efforts signal a broader policy push to formalise and strengthen the clean energy transition in agriculture, aiming to replace fossil fuels and empower farmers with reliable and affordable power.

[1] Mongabay, *Off-grid, standalone solar pumps under government scheme remain underutilised,* 29 September 2023, https://india.mongabay.com/2023/09/under-utilisation-of-off-grid-standalone-solar-pumps-remains-a-challenge/

[2] Rahman, Anas and Abhishek Jain. 2021. *How is India using its solar pumps for irrigation? Insights from Solar Pump Remote Monitoring Data in Chhattisgarh.* New Delhi: Council on Energy, Environment and Water. Retrieved from: https://www.ceew.in/publications/solar-pumps-underutilization-and-usage-patterns-in-india

ALIGNMENT WITH

VIKSIT BHARAT 2047

The vision of *Viksit Bharat 2047* places energy self-reliance and climate-smart agriculture at the core of India's long-term development. National targets include 500 GW of non-fossil fuel capacity by 2030, with the PM-KUSUM scheme aiming to solarise 49 lakh agricultural pumps.[3,4] Over 8.5 lakh pumps[5] have already been installed, yet affordability, utilisation, and equitable access remain critical challenges. Meeting these requires models that move beyond individual ownership, ensure reliable service delivery, and harness the full potential of decentralised renewable energy. Such approaches advance India's clean energy transition, strengthen rural livelihoods, contribute to an Atmanirbhar energy sector, and support national climate commitments through substantial CO_2 reductions.

INNOVATION: SOLAR IRRIGATION SYSTEMS

The Solar Irrigation Service (SIS) is an entrepreneur-led, pay-per-use model that shifts irrigation from diesel-powered pumps to solar-based systems. By providing irrigation as a service, it removes the high upfront costs of ownership and ensures reliable access for smallholders.

The model also creates rural enterprises by training local youth as "solarpreneurs" who manage operations and payments, embedding accountability within communities. Developed under the develoPPP programme by GIZ with Symrise and Haleon, and implemented in India by Oorja, it offers a scalable pathway for climate-smart agriculture and rural livelihoods.

KEY COMPONENTS OF THE INNOVATION

Cost reduction through service-based irrigation: Farmers access water without buying or maintaining pumps, making irrigation affordable and reducing financial risks.

Collective access via shared solar systems: Each installation of 3-5 HP capacity supports 15-20 farmers and irrigates up to 20 acres, ensuring efficient use of assets.

Rural entrepreneurship through solarpreneurs: Local youth are trained to operate, maintain, and manage payment systems, creating jobs and building technical capacity.

Clean energy transition in agriculture: Solar units directly replace diesel pumps, cutting greenhouse gas emissions and reducing reliance on fossil fuels.

Scalable infrastructure adaptable to diverse contexts: Modular system design enables replication across states, cropping patterns, and irrigation requirements, with strong alignment to national programmes.

[3] Press Information Bureau. (2023, April 5). *Government declares plan to add 50 GW RE annually for next five years to achieve 500 GW by 2030.* Ministry of New and Renewable Energy, Government of India. Retrieved from https://pib.gov.in/PressReleasePage.aspx?PRID=1914139

[4] Press Information Bureau. (2024, January 3). *Year End Review 2023 of Ministry of New & Renewable Energy.* Ministry of New and Renewable Energy, Government of India. https://www.pib.gov.in/PressReleasePage.aspx?PRID=1992732

[5] *Government of India. (2025). Unstarred Question No. 2691, Ministry of New and Renewable Energy, Rajya Sabha. Retrieved from sansad.in*

IMPACT OF THE INNOVATION

31 solar pumps installed so far (₹3 lakh per unit plus maintenance), with a project target of 50 pumps.

Affordable irrigation access for smallholders without the burden of capital investment.

Lower carbon footprint through the large-scale replacement of diesel pumps (for e.g. - one enterprise enabled the closure of **5-8** diesel pumps, reducing capital costs).

Job creation and skill development for rural youth engaged as solarpreneurs.

Higher agricultural productivity driven by timely and reliable irrigation services.

SUPPORTING THE PRIORITIES OF
VIKSIT BHARAT 2047

Innovations in financing and markets

IMPLEMENTATION PARTNERS

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