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Technical Brief

# CGIAR Climate Action Program in India

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**CGIAR Climate Action Program**

The Climate Action Program aims to drive science, innovation, and collaboration to transform food, land, and water systems for a climate-resilient, net-zero, and equitable future in Bangladesh, Cambodia, Côte d'Ivoire, Ethiopia, Honduras, India, Kenya, Nepal, Nigeria, Pakistan, Philippines, Senegal, Sri Lanka, Sudan, Tanzania, Zambia, and Zimbabwe.

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# Contents

# Key messages

1. **India faces intensifying climate extremes—including droughts, floods, and heatwaves—that increasingly threaten food, land, and water systems.** The *CGIAR Science Program on Climate Action (CASP)* delivers science-led, locally relevant, and inclusive solutions to strengthen climate resilience, adaptation, and mitigation across vulnerable regions.
2. **The program integrates five interconnected Areas of Work**, bringing together climate foresight, digital advisories and climate risk management, locally led adaptation, low-emission innovation, and climate transitions for coherent policy and finance. This ensures that climate action remains **data-driven, aligned with national priorities, and socially equitable**.
3. **CASP operates in India across Odisha, Tamil Nadu, and Uttar Pradesh**, working closely with government line departments, the *Indian Council of Agricultural Research (ICAR)*, agricultural universities, and state-level partners. These collaborations help align **science, policy, and practice** for climate-resilient development.
4. **The International Water Management Institute (IWMI)** leads major climate innovations under CASP, including:
    a. **AWARE – Anticipatory Warning, Action, and Response for Emergencies**,
    b. **WAT-NRM – Watershed Natural Resources Management tools**,
    c. **Water Productivity Decision Support Systems (WP-DSS)**, and
    d. the **Climate Smart Governance (CSG) Dashboard**, all of which strengthen national adaptation planning, and climate-finance tracking.
5. **CASP scales proven adaptation and mitigation solutions** such as Climate-Smart Villages, solar-powered irrigation, and low-emission farming systems. Through these efforts, the program delivers **digital climate advisories to thousands of farmers**, improves adaptive capacities, and supports **policy reforms that accelerate climate-resilient development**.

# CGIAR Climate Action Program in India

India is increasingly exposed to the compounded impacts of climate extremes—ranging from erratic monsoon patterns and prolonged droughts to devastating floods, rising heatwaves, and cyclonic disturbances. These climate stressors pose serious threats to the sustainability of the country's food, land, and water (FLW) systems. Smallholder farmers, women, and marginalized communities are disproportionately affected, facing heightened vulnerability due to limited access to climate information, resilient technologies, and institutional support. Climate-induced disruptions to agriculture, water security, and rural livelihoods are escalating across both rainfed and irrigated landscapes, calling for urgent and transformative responses.

The CGIAR Climate Action Science Program (CASP) responds to this need by delivering science-driven, systems-based, and inclusive solutions that address climate resilience, mitigation, and adaptation at scale. CASP offers a strategic framework anchored in five integrated Areas of Work (AoWs)—climate foresight, digital advisories and climate risk management, locally-led adaptation (LLA), low-emission innovations, and climate transitions. These domains support national and sub-national stakeholders in anticipating risks, co-developing through innovation, governance reform, and equitable financing. The program builds on CGIAR's decades of leadership in agricultural research, environmental sustainability, and food system transformation.

In India, CASP directly supports national priorities including the National Action Plan on Climate Change (NAPCC), Nationally Determined Contributions (NDCs), State Action Plans on Climate Change (SAPCCs), and flagship programs such as the National Mission on Sustainable Agriculture (NMSA), Mission Mausam, National Water Mission (NWM). Through deep collaboration with government departments, research institutions, civil society, and the private sector, the program fosters convergence of science, policy, and action. CASP facilitates integration of climate-smart innovations into agricultural development and strengthens institutional capacities to deliver climate-informed services across diverse agro-ecological and socio-economic contexts. With its presence across multiple Indian states, including Odisha and Tamil Nadu, the program positions itself as a catalytic platform for scalable, inclusive, and impact-oriented climate action.

# Program Overview: CGIAR Climate Action Science Program

The CGIAR Climate Action Science Program (CASP) is a flagship initiative aimed at accelerating climate-resilient, low-emission, and inclusive transformations across food, land, and water systems. Anchored in a systems-based, science-led, and equity-driven approach, CASP delivers actionable research and innovation to support countries in achieving their climate goals, with a strong focus on local relevance and global learning. CASP is structured around five integrated Areas of Work (AoWs):

**AoW1 - Strategic Foresight and Climate Intelligence:** Enhancing decision-making through scenario planning, climate analytics, and forward-looking risk assessments.

**AoW 2 - Digital Advisories and Climate Risk Management:** Leveraging digital platforms and early warning systems to deliver tailored, timely, and localized advisories to farmers and institutions.

**AoW 3 - Locally-Led Adaptation (LLA):** Empowering communities through inclusive, participatory processes that integrate indigenous knowledge and gender-responsive climate actions.

**AoW 4 - Low-Emission Innovation:** Promoting climate-smart agriculture, water-efficient practices, and sustainable livestock and aquaculture systems that reduce greenhouse gas emissions.

**AoW 5 - Climate Transitions:** Supporting climate policy coherence, institutional reform, and mobilization of climate finance to enable just and scalable adaptation and mitigation. The program operates across 17 focus countries, including India, and aligns with national climate priorities such as NDCs, SAPCCs, and the Sustainable Development Goals (SDGs). Through partnerships with governments, scientific institutions, civil society, and the private sector, CASP bridges global research with local action, ensuring scientific innovation translates into resilience-building solutions that benefit vulnerable populations and ecosystems.

# IWMI's Contributions to Climate-Resilient Agriculture and Water Systems in Odisha

- **Climate-Smart Villages and Policy Integration:** Partnered with the Odisha Agriculture Department and CGIAR Climate Change, Agriculture and Food Security (CCAFS) to develop a roadmap for establishing 1,000 Climate-Smart Villages, aligning climate-smart agriculture (CSA) practices with 27 government schemes to boost resilience and farm incomes.

- **Climate-Smart Irrigation and Convergence Models:** Piloted micro-irrigation and efficient agricultural water management technologies under the RESILIENCE project (with ICAR-National Rice Research Institute, M. S. Swaminathan Research Foundation and Odisha University of Agriculture & Technology), including convergence of irrigation schemes in Cuttack and Ganjam.

- **Enhancing Policy Coherence for Climate Resilience:** Collaborated with Council on Energy, Environment and Water (CEEW) to assess coherence across key agri-water programs (e.g., KALIA, OMM, OIIPCRA), informing governance improvements.

- **Climate Risk Management in Drought- & Flood-Prone Areas:** Targeted high-risk districts with anticipatory action, digital climate services, and adaptation strategies which align with National Disaster Management Authority (NDMA), Rejuvenating

Watersheds for Agricultural Resilience through Innovative Development (REWARD), and Odisha Integrated Irrigation Project for Climate Resilient Agriculture (OIIPCRA).

- **Scaling Innovation in Agri-Food Systems:** Supported low-emission transitions in rice, fisheries, and livestock through alternate wet and dry (AWD), aquaculture, and climate-smart farming practices.

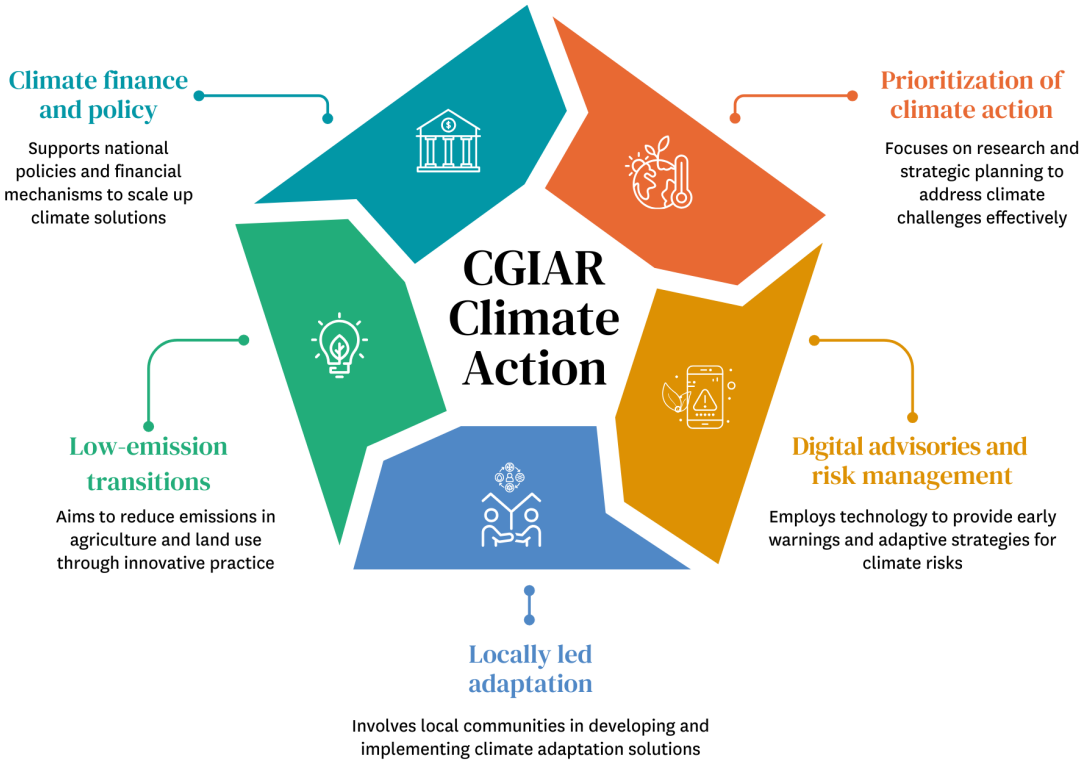


*Figure 1 CGIAR Climate Action Framework (Source: Authors)*

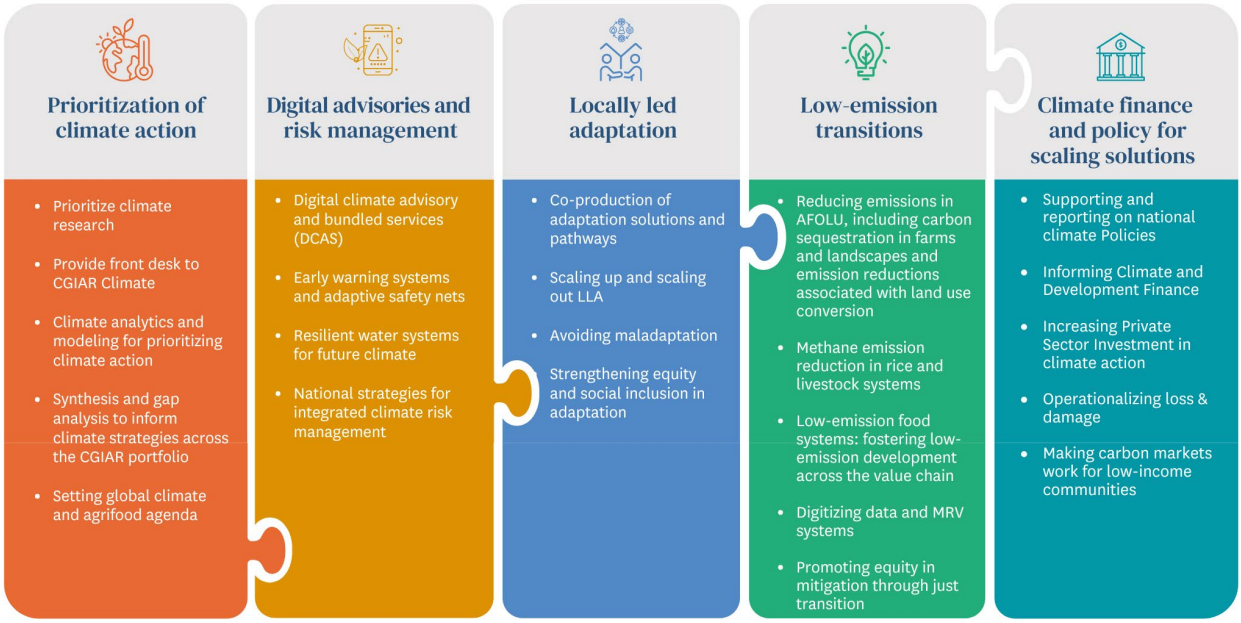


*Figure 2 CGIAR Climate Portfolio (2025-30) Areas of Work. (Source: Authors)*

# IWMI's Contributions to Climate-Resilient Agriculture and Water Systems in Tamil Nadu

- **Irrigation Modernization Collaboration:** IWMI partnered with Tamil Nadu's government on TN-IAMWARM (Tamil Nadu Irrigated Agriculture Modernisation and Water- Bodies Restoration and Management) and TNIAMP (Tamil Nadu Irrigated Agriculture Modernisation) projects to modernize irrigation and enhance climate resilience.

- **Climate-Smart Rice Cultivation:** Collaborated with Tamil Nadu Agricultural University (TNAU) on ClimaRice and ClimaAdapt projects, promoting AWD irrigation and improved rice strains for climate adaptation.

- **Establishment of Climate Field Schools:** IWMI and TNAU established Climate Field Schools to train farmers on adaptive practices enhancing resilience to climate variability.

- **Climate Change Modeling for Planning:** Partnered with state agencies to model river basin scenarios, informing Tamil Nadu's State Action Plan on Climate Change.

- **Engagement in Policy-Oriented Research:** Through the IWMI-Tata Water Policy Program, conducted research influencing water governance and policy dialogues in Tamil Nadu.

# Climate Action Science Program in India

**Area of Work 1:** Strategic Foresight and Climate Intelligence supports the prioritization of climate action through forward-looking analysis, data-driven planning, and knowledge synthesis. Both in Odisha and Tamil Nadu leverages climate analytics and scenario modeling to inform adaptation strategies at the district and state levels. The initiative connects CGIAR expertise to state needs, guiding investment decisions and supporting global climate policy dialogue.

**Area of Work 2:** Digital Advisories and Climate Risk Management enhances climate and disaster preparedness through digital tools and climate services. The AWARE Platform (Early Warning, Early Action and Early Finance) enables anticipatory action for floods and droughts, while Managed Aquifer Recharge (MAR) mapping and infrastructure resilience assessments support water risk management. Bundled solutions—advisories, stress-tolerant seeds, and insurance— are digitally delivered to strengthen farmer resilience.

**Area of Work 3:** Locally-Led Adaptation (LLA) enables co-designed adaptation strategies rooted in local knowledge and community priorities across diverse climate contexts. In Odisha and Tamil Nadu, tools such as the WAtershed planning Tool for Natural Resource Management (WAT-NRM) platform support participatory watershed planning, drought contingency measures, and flood resilience, with linkages to systems like the South Asia Drought Management System (SADMS). In Uttar Pradesh, LLA focuses on post-flood management, including resilient water infrastructure, livelihood recovery, and community-led adaptation planning. The Climate-Smart Village (CSV) model is scaled across vulnerable blocks to foster climate-resilient farming. This area emphasizes social inclusion, scenario-based planning, and institutional convergence to ensure adaptation is equitable, scalable, and context-responsive.

**Area of Work 4:** Low-Emission Innovation promotes scalable, evidence-based strategies for reducing greenhouse gas emissions across India's agri-food systems. In the Ganges basin and other focus regions, the program explores clean energy adoption patterns, such as the proliferation of solar irrigation pumps under schemes like PM-KUSUM. Through data mining, field surveys, and cross-state case studies, CGIAR partners assess business models, adoption barriers, and enabling conditions for low-emission transitions. Activities include the development of a solar irrigation framework, stakeholder feedback, and to inform national clean energy programs.

**Area of Work 5:** Climate Transitions (Policy, Governance, and Finance) strengthens climate governance in Odisha and Tamil Nadu by supporting SAPCC tracking, policy integration, and climate finance alignment. CASP enhances multi-sector coordination across agriculture, water, and disaster management, while mobilizing public and private investments to drive equitable, long-term transitions toward climate-resilient development in both states.

# Key Partners and Institutional Collaborations

The CASP is implemented through strategic partnerships in Odisha, Tamil Nadu and Uttar Pradesh led by IWMI in collaboration with key state and national institutions. • In **Odisha**, key government collaborators include the **Department of Agriculture and Farmers' Empowerment, Department of Water Resources, Odisha State Disaster Management Authority (OSDMA), ICAR-Indian Institute of Water Management (IIWM), and Odisha University of Agriculture** and **Technology (OUAT).**

- In **Tamil Nadu**, CASP is implemented in coordination with the **Department of Agriculture and Farmers' Welfare, Water Resources Department, Tamil Nadu State Disaster Management Authority (TNSDMA)**, and **Tamil Nadu Agricultural University (TNAU)**, alongside the **Institute for Water Studies** in Chennai.

- In **Uttar Pradesh,** CASP is implemented in coordination with the **Department of Agriculture, Uttar Pradesh State Disaster Management Authority (UPSDMA), and Krishi Vigyan Kendra (KVK), Gorakhpur**, with technical support from regional ICAR institutes and district-level agricultural and rural development agencies.

- In the **Ganga basin and other regions**, the initiative is co-developed with partners including the **Institute of Rural Management Anand (IRMA) and Chaudhary Charan Singh Haryana Agricultural University (CCS-HAU),** contributing to India's climate targets through applied innovation and evidence-based policy integration. In both states, IWMI engages with NGOs, FPOs, watershed associations, and development partners such as the World Bank and GIZ to pilot and scale integrated solutions. At the national level, CGIAR centers collaborate with ICAR, NDMA/SDMAs, and State Climate Change Cells, ensuring CASP's alignment with national priorities and enabling cross-state knowledge exchange and scalability.

# Program Outcomes and Impact Metrics

- Tens of thousands of farmers and water users accessing digital climate advisories and bundled CSA solutions.
- 100 Climate-Smart Villages scaled up through convergence with state and national government programs.
- Institutionalization of anticipatory action using the AWARE Platform in at least five high-risk districts.
- Climate-Smart Governance Dashboard fully operational for tracking SAPCC implementation and monitoring climate finance.
- Evidence-based contributions to 8-10 climate-related policy reforms or investment strategies by 2030.

# Call to Action and Next Steps

The CASP invites policymakers, research institutions, private investors, and community-based organizations to join forces in advancing climate resilience in Odisha, Tamil Nadu and across India.

Next steps include piloting tools like the WAT-NRM, AWARE platform, CSG dashboard, business models on solar irrigation pumps in target districts, forming multi-stakeholder alliances for scaling climate resilient agriculture and water management, and mobilizing investments for climate-resilient infrastructure including water systems. Stakeholders are encouraged to engage with the CGIAR India team to co-design initiatives and unlock transformative pathways for food, water, and climate security.

CGIAR is a global research partnership for a food-secure future. CGIAR science is dedicated to transforming food, land, and water systems in a climate crisis. Its research is carried out by 13 CGIAR Centres/Alliances in close collaboration with hundreds of partners, including national and regional research institutes, civil society organisations, academia, development organisations and the private sector. www.cgiar.org

To learn more about this program, please visit: https://www.cgiar.org/cgiar-research-portfolio-2025-2030/climate-action/

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CGIAR CLIMATE ACTION SUSTAINABLE FARMING DIGITAL TRANSFORMATION

IWMI International Water Management Institute