CGIAR
SCIENCE FOR A FOOD-SECURE FUTURE

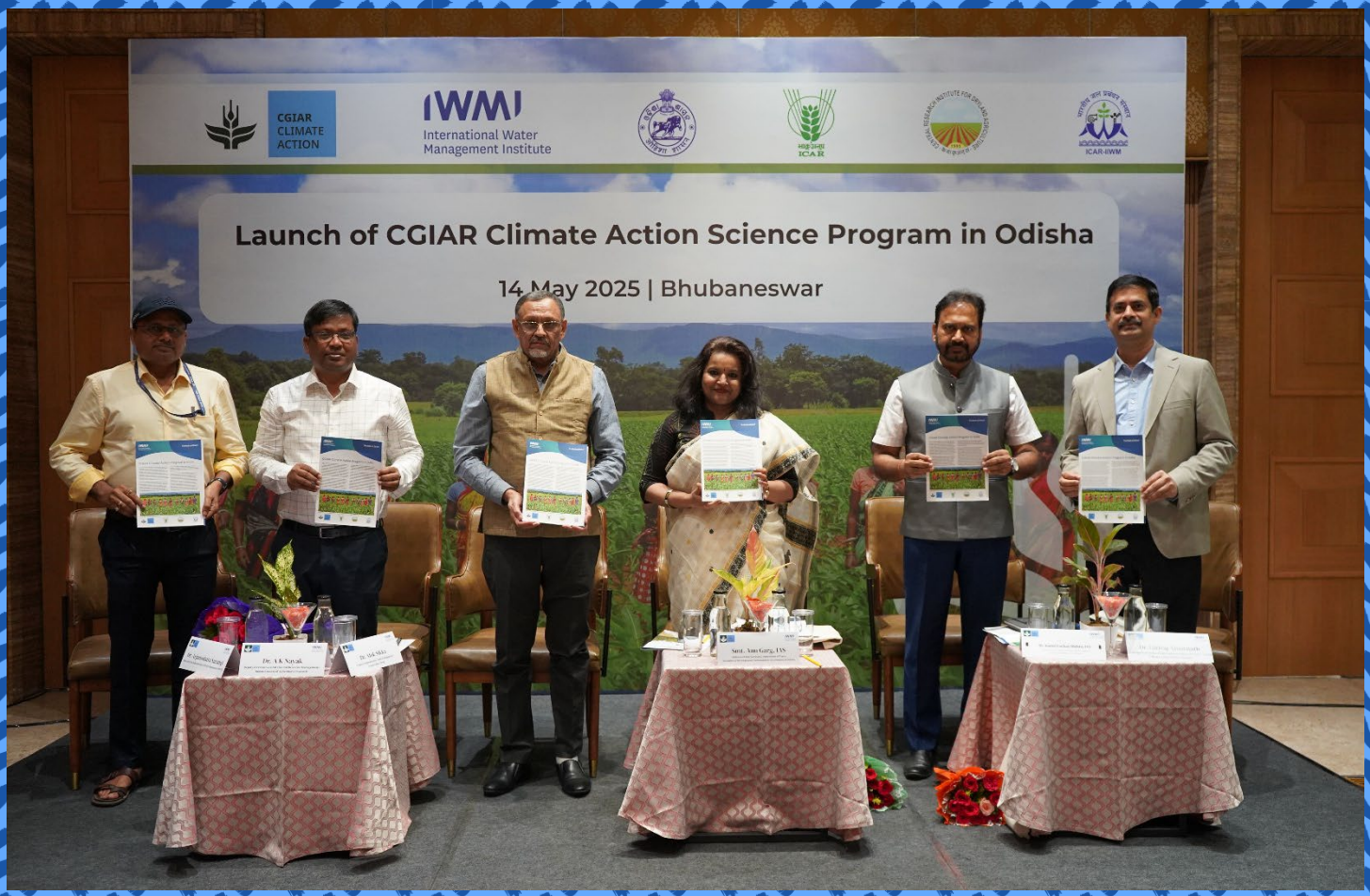
WORKSHOP REPORT

CGIAR Climate Action Program in Odisha, India

Bhubaneswar, Odisha, India | May 14, 2025

Tanmoy Bhaduri, Gulshan Borah, Giriraj Amarnath, Suman Padhee, Mohammad Faiz Alam, Dipaka Ranjan Sena, and Alok Sikka

December 2025



Contents

Authors

Tanmoy Bhaduri, Communications Specialist, International Water Management Institute (IWMI), New Delhi, India
Gulshan Borah, Project Coordinator, IWMI, New Delhi, India
Giriraj Amarnath, Research Group Leader - Water Data for Climate Resilience, and Principal Researcher – Disaster Risk Management and Climate Resilience, IWMI, Colombo, Sri Lanka
Suman Padhee, Researcher – Water Risk Modeler, IWMI, New Delhi, India
Mohammad Faiz Alam, Senior Regional Researcher, IWMI, New Delhi, India
Dipaka Ranjan Sena, Researcher – Hydrology and Water Resources Management, IWMI, New Delhi, India
Alok Sikka, Country Representative - India and Bangladesh, and Senior Fellow, IWMI, New Delhi, India

Acknowledgement

This work was carried out under the CGIAR Climate Action Program. We would like to thank all funders who support this research through their contributions to the CGIAR Trust Fund (www.cgiar.org/funders).

We would also like to acknowledge support provided by Indian Council of Agriculture Research (ICAR) institutes: Indian Institute of Water Management (ICAR-IIWM) and Central Research Institute for Dryland Agriculture (ICAR-CRIDA).

CGIAR Climate Action Program

The science 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, Sr Lanka, Sudan, Tanzania, Zambia, Zimbabwe.

Citation

Bhaduri, T.; Borah, G.; Amarnath, G.; Padhee, S.; Alam, M. F.; Sena, D. R.; Sikka, A. 2025. *CGIAR Climate Action Program in Odisha, India.* Report of the Workshop on the Launch of the CGIAR Climate Action Program in Odisha, Bhubaneswar, India, 14 May 2025. Colombo, Sri Lanka: International Water Management Institute (IWMI). CGIAR Climate Action Program. 24p.

Front and back cover photo: Tanmoy Bhaduri/IWMI

Disclaimer

This publication has been prepared as an output of the CGIAR Climate Action Program and has not been independently peer reviewed. Responsibility for editing, proofreading, layout, opinions expressed, and any possible errors lies with the authors and not the institutions involved. Boundaries used in the maps do not imply the expression of any opinion whatsoever on the part of CGIAR concerning the legal status of any country, territory, city, or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Borders are approximate and cover some areas for which there may not yet be full agreement.

Summary

The workshop brought together diverse expert groups to address key themes critical to advancing climate resilience and sustainable development in Odisha. The discussions centered on four major areas: Climate Risk Intelligence and Digital Advisory Services, Locally Led Adaptation and Resilient Livelihoods, Water Security and Climate-Smart Agriculture, Policy, Institutions, and Climate Finance. The workshop highlighted a multidimensional approach integrating technological innovation, institutional capacity building, participatory governance, and policy convergence to address Odisha's climate challenges. Priorities moving forward include improving data-driven decision support systems, scaling inclusive and locally adapted livelihood models, strengthening water management, and fostering coordinated institutional frameworks to accelerate climate resilience at scale.

Odisha's Climate Imperative

Odisha, located along India's eastern coastline, is among the most climate-vulnerable states in the country. It faces recurring and intensifying climate risks—ranging from devastating cyclones and floods to droughts and heatwaves. These hazards pose major threats to food and water security, coastal and inland livelihoods, natural ecosystems, and critical infrastructure. Agricultural systems, which form the backbone of rural livelihoods, are increasingly impacted by erratic monsoon patterns, saline water intrusion, groundwater depletion, and soil degradation.

The Government of Odisha has demonstrated strong leadership in climate action through initiatives such as the Odisha State Action Plan on Climate Change (SAPCC), promotion of climate-resilient agriculture, integrated watershed management, and disaster risk reduction programs. However, the scale and complexity of emerging climate risks require intensified and innovative approaches that combine science, technology, governance, and community-driven adaptation.

The CGIAR Climate Action Program: A Strategic Opportunity

The CGIAR Climate Action Science Program emerges as a timely and strategic initiative, complementing ongoing efforts by the State and Central governments. The program is designed to support states like Odisha in advancing toward a just, climate-resilient, and low-emissions future by leveraging actionable science, technological innovations, and inclusive partnerships. Building on CGIAR's decades of research leadership in climate change, agriculture, water systems, and food security, the program brings together global expertise and local knowledge to co-develop solutions tailored to Odisha's development goals.

The CGIAR Climate Action Program integrates climate foresight, digital climate services, early warning systems, locally led adaptation (LLA), resilient water and food systems, and low-emission transitions. It provides a platform for multi-stakeholder collaboration to build systemic resilience, enhance adaptive capacities, and accelerate climate-resilient development pathways across Odisha's diverse landscapes—from coastal zones to drought-prone hinterlands.

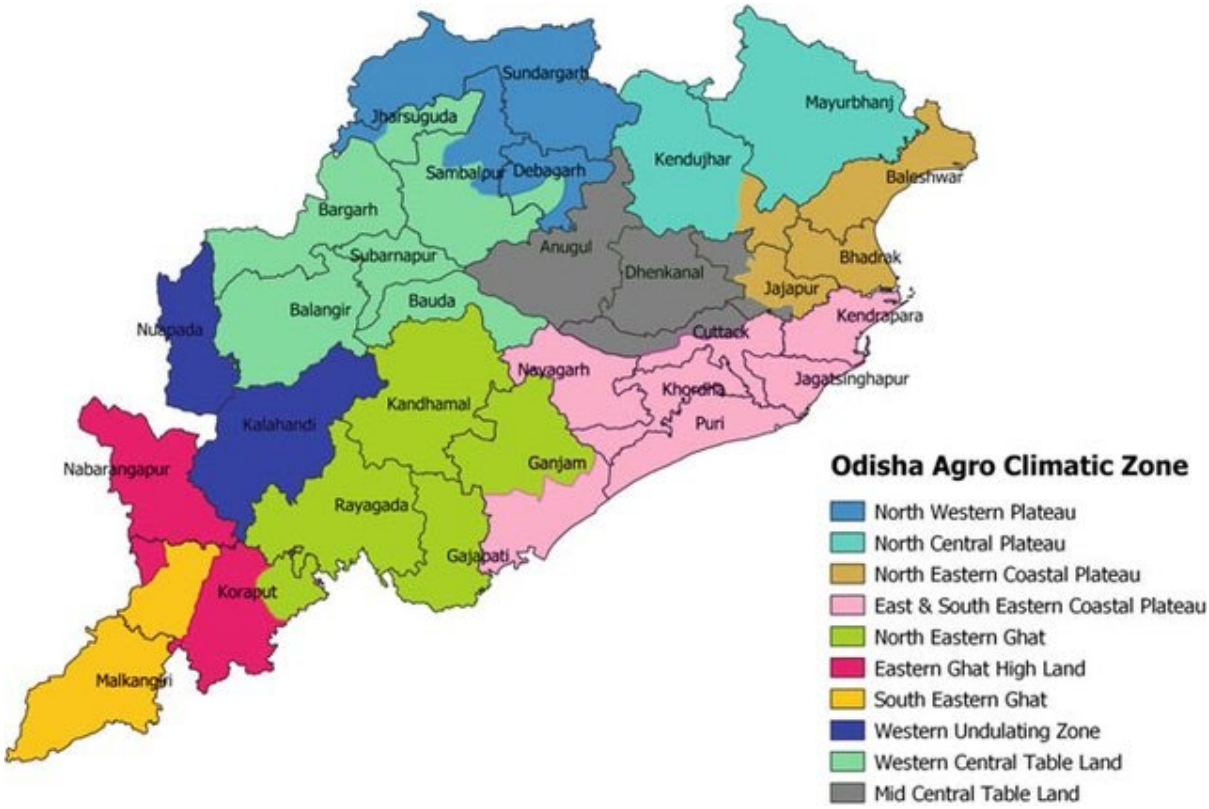


Figure 1. Agro-climatic zones of Odisha (adapted from Hoda eta l., 2021)

Workshop Objectives

The official launch workshop aims to:

Program Objective	**Climate-Aligned Justification (Specific to Agriculture & Water) (Hoda et al., 2021)**
1. Introduce the CGIAR Climate Action Program and its relevance to Odisha's climate resilience and development priorities	Odisha faces frequent climate shocks (floods, droughts, cyclones) impacting agricultural growth and water infrastructure. The program brings science-based approaches to enhance irrigation, crop resilience, and water-use efficiency. Climate Action Program relevance lies in building institutional and farm-level resilience across vulnerable regions with active alliance with OSDMA.
2. Engage state-level policymakers, researchers, development agencies, private sector actors, and community organizations to co-	Co-design ensures alignment with Odisha's 10 agro-climatic zones and localized risks, e.g., upland drought-prone areas, coastal saline zones, and low groundwater use blocks. Facilitates integration of Krushak Assistance for

design a localized implementation pathway	Livelihood & Income Augmentation (KALIA) , Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), and Jal Jeevan Mission with climate actions. The coastal and tribal districts of Odisha show high vulnerability due to socio-economic marginalization, low adaptive capacity, and climate exposure. Engagement with local communities, NGOs (like Gram Vikas), and state agencies is vital to embed equity and inclusion in climate solutions.
3. Identify priority entry points for strengthening climate adaptation and mitigation across agriculture and water resources	Key entry points include: (1) Closing irrigation utilization gap (only 64% used) (2) Expanding solar micro-irrigation (3) Scaling climate-resilient rice varieties (e.g., Sahabhagi Dhan), (4) Enhancing water harvesting & recharge in rainfed areas, (5) Promoting rabi diversification (pulses, oilseeds with improved soil moisture regime during the period)
4. Facilitate dialogue on opportunities for integrating science, digital innovation, and community-based adaptation into Odisha's ongoing climate initiatives	Introduce hydro-climatic forecasts, soil-water-crop advisory systems, and digital DSS tools in support of Odisha SAPCC (OIIPCRA), Watershed+ program (REWARD), Odisha Millet & Paddy Missions, Enhance adaptive capacity of water and agriculture departments through data-driven planning.
5. Lay the foundation for collaborative partnerships to scale climate-smart innovations and mobilize resources for impact	Leverage groundwater, solar infrastructure, wetlands, and tanks for scalable models in climate-resilient farming and irrigation. Build coalitions with NABARD, OREDA, NGOs, and CGIAR to attract climate finance (e.g., GCF) and scale-up innovations like solar pumps, micro-irrigation, and climate-informed extension. Successful post-cyclone recovery models, Odisha's State Climate Action Plan, and ongoing multilateral climate funding (e.g., Green Climate Fund) provide a base to scale up investments in climate-resilient agriculture and water systems, especially with institutions like CGIAR-IWMI bringing in science-policy integration and innovation platforms.

Areas of Work Relevant to Odisha

The Climate Action Program is structured around five integrated Areas of Work (AoWs) that directly address Odisha's urgent climate needs. These AoWs include: (1) Strategic Foresight and Climate Intelligence for Agri-Food Action, (2) Digital Advisories and Climate Risk Management to enhance early warning systems and farmer services, (3) Locally-Led Adaptation to empower communities and strengthen institutional capacities, (4) Low-Emission Innovation to reduce greenhouse gas emissions in agriculture and water systems, and (5) Climate Transitions to scale impacts through policy reform and climate finance. These interconnected areas provide a comprehensive framework for research, implementation, and scaling of climate-smart solutions across Odisha's food, land, coastal, and water systems.

Focus Regions and Programmatic Priorities

Given Odisha's exposure to cyclones, monsoon variability, droughts, floods, and rising temperatures, the CGIAR Climate Action Program will initially focus on both drought-prone and flood-prone districts. Drought-affected regions such as Nuapada, Bolangir, Kalahandi, Phulbani and Bargarh face frequent water scarcity, prolonged dry spells, and agricultural distress, especially among rainfed farming communities. The initiative will align closely with ongoing programs such as the Odisha Drought Mitigation Programme supported by the National Disaster Management Authority (NDMA) and ongoing World Bank watershed projects namely Rejuvenating Watersheds for Agricultural Resilience through Innovative Development (REWARD), Odisha Integrated Irrigation Project for Climate Resilient Agriculture (OIIPCRA) and implemented through the Department of Soil Conservation and Watershed Development, Department of Water Resources (DoWR),Odisha University of Agriculture and Technology (OUAT), Department of Agriculture and Farmers' Empowerment, Department of Water Resources among others.

At the same time, flood-prone districts including Kendrapara, Jagatsinghpur, Puri, Khordha, and Bhadrak are increasingly vulnerable to riverine flooding, coastal inundation, and cyclone-induced water surges, particularly during the southwest and northeast monsoon seasons. These regions are highly sensitive to extreme weather events and water-related hazards, which critically impact food production, water security, coastal livelihoods, infrastructure resilience, and disaster recovery efforts. Through integrated climate risk management, digital advisory services, anticipatory action, and community-centered adaptation pathways, the program will strengthen local capacities to manage these risks, enhance resilient agri-food systems, and support climate-resilient development transitions in Odisha.

The program will also prioritize innovations in key agricultural systems such as rice cultivation, pulses, fisheries, and livestock management, making Odisha an ideal landscape for piloting and scaling low-emission food system transitions—including alternate wetting and drying

(AWD) in paddy fields, climate-resilient aquaculture practices, sustainable livestock management, and water-smart farming innovations. The Climate Action Program will leverage Odisha's strong institutional networks, digital platforms, and ongoing partnerships to co-develop locally led adaptation solutions, strengthen climate information services, and catalyze policy and investment reforms under the Climate Transitions Area of Work.

Expected Outcomes and Next Steps

- Strengthened alignment of CGIAR research and innovation with Odisha's State Action Plan on Climate Change (SAPCC), sectoral missions, and Sustainable Development Goals (SDGs).
- Selection of target districts, sectors, and themes (e.g., climate-resilient agriculture, flood and drought risk management, digital climate services) for initial implementation.
- Launch of joint initiatives for capacity development involving government departments, academic institutions, NGOs, and farmer organizations.
- Establishment of a working group or advisory committee to guide the implementation, scaling, and learning under the Climate Action Program.
- Facilitation of collaborations with national and international development partners, climate finance entities, and private sector stakeholders to support long-term program sustainability.
- Development of an initial roadmap for the co-design, piloting, and scaling of climate-smart technologies, policies, and practices in Odisha.

Contribution to Global CGIAR Outcomes

Activities under the Climate Action Program in Odisha will contribute to the following global outcomes:

- 38 million producers and food-land-water system actors use climate adaptation or low-emissions solutions by 2030.
- US$15 billion in public and private climate finance mobilized for just transitions by 2030.
- 100 policies informed by climate data and evidence across sectors by 2030.
- 1 gigaton of CO_2 avoided, reduced, or sequestered through program activities by 2030.

Opening Session

Welcome Remarks

Dr Alok Sikka, Country Representative India & Bangladesh/Senior Fellow, IWMI welcomed the gathering and set the context for the day by providing valuable insights to gather diverse insights and promote collaborative engagement for climate change mitigation and adaptation, tailored to Odisha's unique challenges and opportunities. He emphasized that climate action is a cross-cutting and urgent agenda, intersecting with multiple development sectors. Reference was made to existing frameworks such as Odisha's State Action Plan on Climate Change and India's National Adaptation Plan, with CGIAR and IWMI aiming to align closely with these to ensure synergy and added value.

An overview of IWMI's presence and contributions in India was shared, highlighting its longstanding work in water management, policy engagement, and climate resilience.

Participants were introduced to the broader CGIAR 2030 Research and Innovation Strategy, which prioritizes science-based, partnership-driven approaches. The Climate Action Science Program was highlighted as one of CGIAR's flagship programs under its new portfolio.

A call to action was made for stakeholders to actively participate in co-designing locally led, inclusive, and evidence-informed strategies. The goal is to create scalable climate solutions through partnerships, innovation, and shared ownership.

Overview of CGIAR Climate Action Program

Dr. Giriraj Amarnath, Principal Researcher, IWMI / Interim Deputy Director – CGIAR Climate Action Science Program, highlighted the urgent climate challenges facing Odisha, particularly in relation to agriculture, water resources, and rural livelihoods. The speaker emphasized the need for integrated, science-based climate action, recognizing that Odisha's vulnerabilities require both immediate and long-term responses. He briefly introduced the CGIAR Climate Action Program and its aims to enable a climate-resilient, low-emission, and just transition, targeting 30 million producers globally to reduce CO_2-equivalent emissions.

Drawing on international experience from countries like Zambia and Sri Lanka, the program promotes locally led adaptation, multi-hazard advisories, resilient water systems, and low-emission agroforestry. Odisha's high vulnerability and proactive climate governance were presented as ideal conditions for piloting and scaling the Climate Action Science Program. The state offers a strong platform for co-developing locally tailored, high-impact climate solutions. His remarks concluded with the tone for collaborative, science-informed, and action-oriented partnerships in Odisha under the CGIAR Climate Action umbrella.

Special Remarks

Dr. A K Nayak, Deputy Director General (Natural Resource Management), Indian Council of Agricultural Research (ICAR) emphasized ICAR's long-standing commitment to climate research, spanning over two decades. He highlighted the need to strengthen scientific convergence across disciplines and institutions, advocating for integrated efforts rather than siloed approaches. He stressed the importance of data-driven agriculture, calling for robust

data systems and the use of AI technologies, including large language models, to enhance resilience in farming systems. Dr. Nayak underscored the gap between existing location-specific advisories and their practical implementation, urging greater convergence of financial, infrastructural, and institutional resources. He proposed developing a vulnerability index at district or block levels and stressed the importance of mapping adaptive capacity, particularly in light of the emerging issue of climate-induced displacement in Odisha. Concluding his remarks, he called for scientific tools to assess resilience and better inform planning, while encouraging the use of AI models and the development of in-house technical capacity to support long-term climate action.

Technical Consultation Meeting: Pre-Launch Discussion with key stakeholders

Group 1 focused on Climate Risk Intelligence and Digital Advisory Services, highlighting the need for localized, multi-hazard advisories and scalable digital platforms to support informed decision-making for farmers and communities. Key points highlighted by group participants:

- Occurrence of extreme weather events is increasing in Odisha, but the trends vary across districts. For example, 116 districts show an increase in rainfall, while 60 districts show a decrease. At the same time, 143 districts report an increasing number of rainy days, whereas 54 show a decrease. Furthermore, heavy rainfall days are often followed by dry spells, resulting in compounded extreme events. Similarly, the timing of monsoon onset and withdrawal has also changed. These nuances need to be considered when planning climate adaptation strategies.
- Participants emphasized the importance of developing Homogeneous Land Parcel Units (HLPUs), similar to Hydrological Response Units (HRUs), which have unique agro-climatic and other conditions. This approach would enable the replication and contextualization of successful climate adaptation options and advisories for each HLPU.
- The government is working on the GO-WAT portal for flood forecasting and predictions, which will support timely action.
- For climate advisory, a bi-weekly advisory is currently sent to all farmers registered on the KRISHI Portal. These advisories are prepared by the Climate Resilience Cell (Krishi Sam Kendra) based on IMD data, with recommendations tailored to all districts across Odisha's 10 agro-climatic zones. The advisory service operates under the Odisha Gramin Krishi Mausam Sewa (GKMS) program, hosted by OUAT.
- Currently, the advisories are issued at the district level. Participants suggested increasing their resolution to the block or village level.
- For flood and drought monitoring and forecasting, meteorological data and composite indices could be utilized.
- For cyclones, impact-based forecasts are conducted.
- Some pilot initiatives and proposals focus on image-based advisory services and crop health monitoring, including pest and disease detection. Currently, pest and disease forecasting are limited to weather-based models due to insufficient data. Participants stressed the need for structured data collection on pest and disease occurrences to support model-based forecasting.
- Participants also highlighted the necessity of validating forecasts, given that they can sometimes be inaccurate. Engaging local champion farmers in a participatory monitoring system, similar to citizen science models, was suggested as a way to generate data and improve forecast accuracy.

Group 2 explored Locally Led Adaptation and Resilient Livelihoods, emphasizing inclusive approaches, particularly for women and tribal communities, and the need to align traditional knowledge with science-based interventions. Key points highlighted by group participants:

- Inclusive, locally led adaptation (LLA) is critical for tribal communities and women facing climate variability. There is a strong need for context-specific, sustainable agricultural interventions for Particularly Vulnerable Tribal Groups (PVTGs) and marginal farmers dependent on traditional and shifting cultivation systems. Integrated Farming Systems (IFS)—combining crops, livestock, and fisheries—were highlighted as effective for building diversified, resilient livelihoods. Proven models like rice with banana and millet-based systems are promoted for their adaptability to erratic rainfall, and the use of millets and legumes in drylands, along with improved irrigation and intensified cropping, can boost productivity by 10–20%.
- Seed systems and institutional convergence were recognized as key enablers of change. Locally adapted, high-yielding, and drought-tolerant varieties are being promoted through village-level seed systems, supported by Krishi Vigyan Kendras (KVKs) and Panchayati Raj Institutions. These institutional collaborations help deliver climate-smart innovations at scale and enhance the resilience of smallholders.
- Water and soil conservation were seen as equally critical. Watershed development programs led by Self-Help Groups (SHGs) not only restore ecological balance but also improve local ownership of resources. The revival of over 500 traditional water tanks across 15 districts showcases community-led water management, complemented by Participatory Irrigation Management (PIM) through Pani Panchayats and Water User Associations. Custom hiring centres are improving access to mechanization for remote farming communities.
- Technology transfer and institutional innovation are advancing through initiatives like the Tribal Sub-Plan (TSP), Scheduled Caste Sub-Plan (SCSP), Farmers First, and Ama Odisha. These bridge the gap between research and field-level implementation. Tools like reservoir-based contingency planning, weather-based agro-advisories, and the formal integration of Indigenous Technical Knowledge (ITK) into planning processes are gaining momentum. KVKs and Farmer Producer Organizations (FPOs) are vital in building producer-entrepreneur capacities among farmers.
- Local governance and financial inclusion are essential components of resilient livelihoods. Decentralized institutions like Watershed Committees and SHG networks are acting as key implementers. Government-linked SHGs enhance access to micro-credit, while market linkages, agro-enterprise incubation, and value chain integration ensure tribal farmers are not left out of economic opportunities.
- Barriers and gaps persist. Many tribal farmers lack awareness of modern climate-resilient practices and need consistent handholding. Challenges such as unclear land rights, language barriers, financial exclusion, and weak benefit targeting hinder the scaling of good practices. Fragmentation of pilot initiatives limits broader transformation, reinforcing the need for scalable, community-owned models.
- Strategic focus areas must include scaling successful local pilots, building culturally rooted, community-led models, and delivering ongoing training on climate-resilient technologies. The formal inclusion of ITK enhances community trust and sustainability. Converging schemes like National Apprenticeship Promotion Scheme (NAPS), Rashtriya Krishi Vikas Yojana (RKVY), and ATMA are vital to mainstream LLA within state and national frameworks.
- The path forward involves building grassroots capacity through integrated farming, participatory water governance, institutional innovation, and inclusive value chains. Scaling up proven models and aligning them with financial and policy support creates a replicable blueprint for climate resilience. Developing a state-level catalogue of LLA

case studies can guide adaptive policies and enable systemic transformation in India's climate-vulnerable regions.

Group 3 addressed Water Security and Climate-Smart Agriculture, calling for integrated watershed management, resource-efficient irrigation technologies, and crop diversification strategies. Key points highlighted by group participants:

- Participants focused on water-resilient agriculture as a foundation for a climate-ready future. The group emphasized the need for integrated watershed management, resource-efficient irrigation technologies, and diversified cropping strategies. A combination of institutional frameworks, research priorities, policy innovation, and technological adoption was highlighted as essential for achieving water security in agriculture.
- Institutional frameworks such as Water User Groups (WUGs), operating under Participatory Irrigation Management (PIM), have enabled community-led irrigation governance. Integrated Irrigation Agriculture Plans (IIAPs) and on-farm water management promote a bottom-up, participatory approach that aligns irrigation planning with crop-specific needs.
- Watershed development programs are being strengthened by formal and informal institutional coordination, allowing for multi-sector collaboration. However, the group identified critical R&D gaps—such as the absence of reliable tools for crop-wise water productivity assessment, limited access to modern water monitoring technologies, and poor uptake of demand-based irrigation scheduling.
- Implementation challenges persist, including the underutilization of the "More Crop per Drop" principle, limited models for decentralized water harvesting, and insufficient approaches for soil health and springshed management. There is also a need to address behavioral inertia among water users and support the development of climate-resilient cropping systems.
- Community-level capacity remains weak in maintaining irrigation infrastructure, and promising solutions such as cyclical water use (e.g., greywater reuse and conjunctive use of surface and groundwater) are not being adequately explored. The integration of fallow land and over-exploited aquifers into broader water planning also needs greater attention.
- Technological innovations are gaining momentum, including IoT-based sensors for real-time monitoring and platforms like Go-Water ERP for automating canal operations and improving irrigation efficiency. These tools support precision agriculture and better resource regulation.
- Policy support is multifaceted, with national programs like Atal Bhujal Yojana, OIPCRA, Green Climate Fund, REWARD, and the Command Area Development initiative providing macro-level direction for water sustainability. These are reinforced by state-led schemes like the Mukhyamantri Canal Drip Irrigation Project, Chhata (for rainwater harvesting), and Jaldhara (for rural water security and long-term conservation).
- Together, these strategies represent a comprehensive approach to ensuring water security and climate-smart agriculture. By integrating technology, policy, institutions, and local knowledge, Group 3 envisions a more resilient, efficient, and sustainable future for agricultural water management in the face of growing climate uncertainty.

Group 4 delved into Policy, Institutions, and Climate Finance, recommending stronger interdepartmental coordination, convergence of schemes, and accessible finance models to drive implementation at scale. Key points by group participants:

- Participants highlighted the need to develop a convergence and knowledge-sharing platform across various government and non-government programs working on climate issues in Odisha, such as Indian Council of Agricultural Research (ICAR) - National Innovations in Climate Resilient Agriculture (NICRA) villages and line departments.
- This platform could facilitate the sharing of success stories, field experiences, impact evaluations, and more.
- Currently, some mechanisms exist for inter-ministry and inter-departmental coordination. For instance, Agricultural Production Commissioners (APCs) chair drought monitoring meetings to assess drought conditions and contingency measures, with participation from various departments.
- Similarly, the State Climate Action Plan, developed by the State Climate Resilience Cell, incorporates inputs from all relevant departments. Each department assigns a nodal person responsible for sector-specific actions.
- However, participants identified the need for a more systematic approach to coordination. Some suggestions included:
    - Adopting bottom-up planning and convergence, instead of a top-down approach.
    - Increasing the frequency of meetings among nodal personnel from all departments working on climate action.
    - Enhancing knowledge sharing across scales, from local to state levels.

Official Launch

Welcome and Opening Remarks

(Left: Dignitaries marked the opening of the CGIAR Climate Action Program launch event in Bhubaneswar, Odisha, on May 14, 2025, by ceremonially watering a plant—symbolizing growth, sustainability, and commitment to climate resilience. **Right:** The CGIAR Climate Action Program was officially launched in Bhubaneswar, Odisha, on May 14, 2025, bringing together key stakeholders to advance climate-resilient development and water management. In the photo (left to right): Giriraj Amarnath (Principal Researcher, IWMI / Interim Deputy Director – CGIAR Climate Action Science Program), Kamal Lochan Mishra, IAS (Executive Director, OSDMA, Government of Odisha), Anu Garg, IAS (Additional Chief Secretary, Department of Water Resources & Development Commissioner, Government of Odisha), Alok Sikka (Country Representative – India & Bangladesh, IWMI), A. K. Nayak (Deputy Director General – Natural Resource Management, ICAR), and Arjamadutta Sarangi (Director, ICAR-Indian Institute of Water Management). (*photo:* Tanmoy Bhaduri/IWMI)

Dr. Alok Sikka, during his welcome remarks provided a concise introduction to the CGIAR Climate Action Science Program, highlighting it as a global, science-led initiative focused on advancing climate resilience, adaptation, and mitigation. He emphasized that the program is designed to operate through strong partnerships, context-specific interventions, and policy alignment, with the ultimate goal of supporting countries like India in navigating the complex challenges of climate change through evidence-based and inclusive approaches.
Dr. Alok Sikka presented a comprehensive overview of climate-resilient strategies tailored to Odisha's agro-ecological and water resource context.

Key focus areas included enhancing economic water productivity by shifting from volume-based irrigation to value-oriented water use and promoting sustainable groundwater recharge through nature-based and managed aquifer solutions aligned with local hydrology. He emphasized the importance of affordable, clean energy access—such as solar power—for smallholder irrigation to address the energy-water equity gap.

He advocated for scaling climate-smart village (CSV) models, integrating resilient agriculture, water management, and risk reduction through community-led planning. He also introduced data-driven watershed planning tools and underscored the need for climate-resilient water systems and adaptive governance. Finally, he highlighted the role of Decision Support Systems (DSS) in enabling real-time, informed planning and climate advisory services for both farmers and policymakers.

Dr. Arjamadutta Sarangi, Director, ICAR-Indian Institute of Water Management (IIWM), described the CGIAR Climate Action Science Program as a holistic and inclusive initiative aimed at advancing climate action through collaborative efforts. He emphasized that partnerships—with IWMI, state departments, and technology providers—are central to the program's design and success, especially in integrating technological modules into state systems for long-term sustainability.

He shared ongoing efforts in Odisha, particularly around climate-resilient interventions, including the development of irrigation command areas and pilot projects jointly implemented by ICAR-IIWM and IWMI, with critical support from Odisha Integrated Irrigation Project for Climate Resilient Agriculture (OIIPCRA). Dr. Sarangi highlighted the current collaboration with the State Water Resources Department and expressed optimism about replicating successful models in other districts or states.

Concluding his remarks, he called for active and inclusive stakeholder engagement, stressing that local, context-specific issues can best be addressed through collective participation and a unified vision among all partners.

Overview of CGIAR Climate Action Program

Dr. Giriraj Amarnath, in his presentation emphasized the vital role of strategic partnerships with both state and national government bodies in advancing climate resilience, citing an ongoing collaboration with NITI Aayog to embed climate considerations into national development planning. A key innovation highlighted was the Climate-Smart Governance (CSG) Dashboard, a digital platform designed to track, visualize, and support data-driven implementation of climate interventions. The dashboard is adaptable for Odisha and can enhance transparency, monitoring, and accountability in climate programs.

A strong focus was placed on mainstreaming gender and social inclusion, with a commitment to addressing the specific vulnerabilities of women, youth, and marginalized communities within all program components. He also highlighted the Odisha Climate Action Program that is being guided by eight strategic pillars, ranging from climate-resilient agriculture and

sustainable water management to community-led adaptation, low-emission development, and scaling innovations. These pillars aim to foster a comprehensive, inclusive, and science-based approach to climate action in the state.

Special Remarks

Sh. Kamal Lochan Mishra, IAS, Executive Director, Odisha State Disaster Management Authority (OSDMA), Govt. of Odisha, in his special remarks highlighted Odisha's position as one of India's most disaster-prone states, having faced an extensive range of natural calamities—including floods, cyclones, droughts, and increasingly, heatwaves—between 1999 and 2024. He emphasized the resilience of Odisha's communities in adapting to these recurring threats and noted that Odisha was the first Indian state to establish a dedicated Disaster Management Authority (OSDMA).

He spoke regarding heatwaves as an emerging climate threat, referencing alarming trends from 2023 and 2024, and stressed the economic vulnerability of the informal sector due to climate-induced disasters. Acknowledging the crucial role of research institutions and think tanks, he appreciated their support in data generation, risk analysis, and policy formulation.

Sh. Mishra reaffirmed OSDMA's commitment to working with partners like CGIAR and IWMI, pledging data sharing and policy alignment, and advocated for the development of climate-smart, disaster-resilient villages and panchayats. He also outlined plans for technological upgrades, including real-time weather monitoring and database systems, and emphasized minor irrigation and micro-level watershed management as critical for future resilience in Odisha.

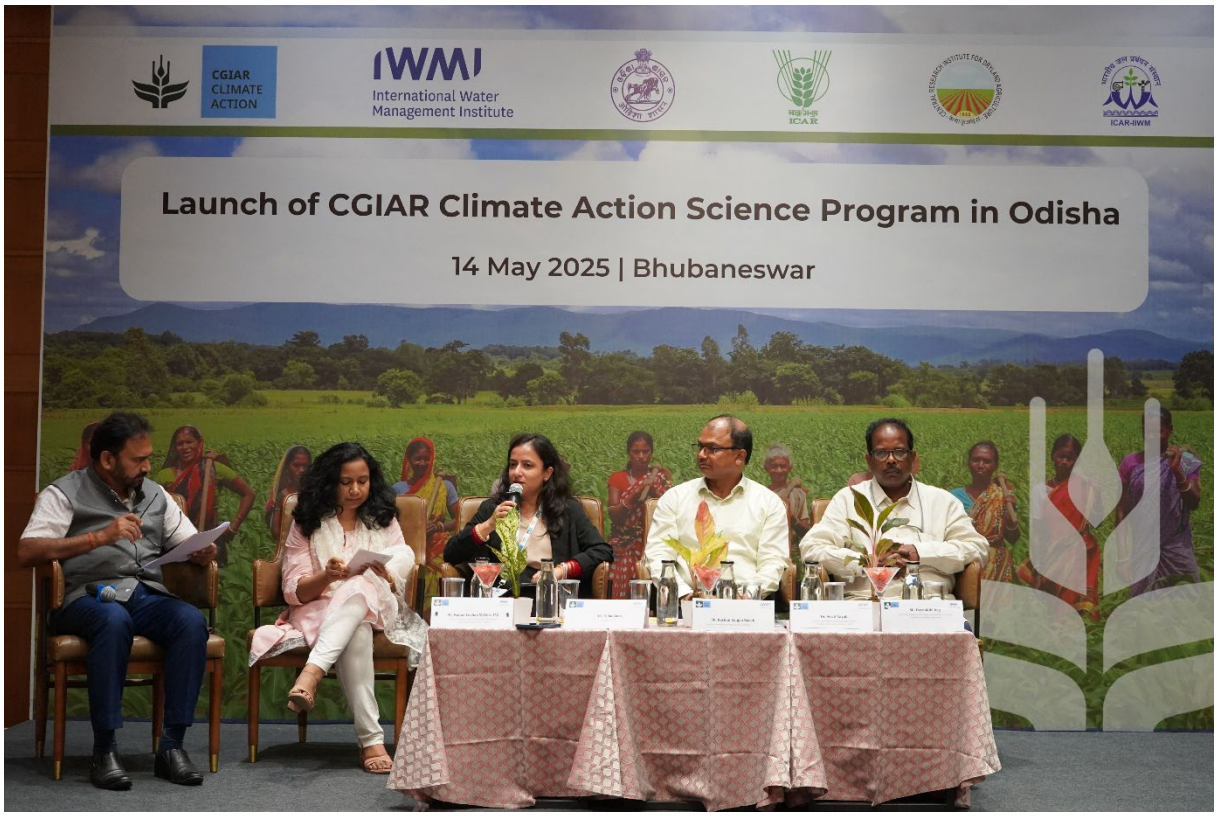
Special Remarks

Smt. Anu Garg, IAS, Additional Chief Secretary, Department of Water Resources & Development Commissioner, Govt. of Odisha, reflected on her decades of administrative experience in Odisha, underscoring the state's increasing exposure to climate extremes such as floods, droughts, and cyclones. She emphasized that climate change is no longer a distant threat but a present reality for Odisha, and reiterated the state's strong commitment to climate action, highlighting the upcoming Vision 2036 strategy, which integrates climate resilience across all sectors.

She showcased successful initiatives like OIIPCRA's 538 micro-irrigation projects and a Green Climate Fund-supported program, while noting the persistent challenge of fragmentation across departments and partners. Applauding CGIAR's integrated approach, she stressed the need for convergence to ensure transformative outcomes.

Smt. Garg proposed practical steps, including the launch of 1,000 Climate Smart Villages, micro-level watershed planning, and a shift to solar-based irrigation systems. She invited IWMI and CGIAR to share global best practices, reaffirming Odisha's readiness to collaborate, invest, and scale innovative, science-based climate solutions, and thanked all partners for convening a focused and action-oriented consultation. She urged continued efforts to make Odisha a model state for flood and drought resilience and best water management practices, aligning with the CGIAR Climate Action Program's strategic goals.

Panel Discussion: Building Odisha's Climate Resilience: From Vulnerability to Action



Kamal Lochan Mishra, IAS, Executive Director of the Odisha State Disaster Management Authority (OSDMA), moderates a high-level panel discussion titled "Building Odisha's Climate Resilience: From Vulnerability to Action" during the launch of the CGIAR Climate Action Program in Bhubaneswar on May 14, 2025. The session focused on translating vulnerability assessments into concrete adaptation strategies for the state (*photo:* Tanmoy Bhaduri/IWMI)

Moderated by: Sh. Kamal Lochan Mishra, IAS, Executive Director, OSDMA panelists:

- Sh. Rashmi Ranjan Nayak, Additional Secretary and Project Director, Odisha Integrated Irrigation Project for Climate Resilient Agriculture (OIIPCRA)
- Sh. Dayanidhi Bag, Rejuvenating Watersheds for Agricultural Resilience through Innovative Development (REWARD)
- Ms. Neha Batra, Weather Risk Management Services (WRMS) Pvt. Ltd.
- Dr. Swati Nayak, Scientist, International Rice Research Institute (IRRI)

Question for Sh. Rashmi Ranjan Nayak:

How is OIIPCRA integrating climate risk considerations into irrigation and watershed investments to enhance resilience among smallholder farmers in Odisha's vulnerable regions? In what ways can OIIPCRA's approach align with the CGIAR Climate Action Program to scale climate-resilient practices and strengthen convergence across agriculture, water, and risk management sectors in Odisha?

Answer: Sh. Rashmi Ranjan Nayak shared that the project is proactively integrating climate risk considerations into irrigation and watershed investments to enhance resilience among smallholder farmers in Odisha's most vulnerable regions. He emphasized that exposure visits and training programs conducted for officers, farmers, and local stakeholders have significantly improved their understanding of climate-resilient practices and adaptive strategies. Sh. Nayak highlighted the importance of partnerships with research-oriented organizations such as ICAR and CGIAR, noting that such collaborations bring valuable global and national best practices into state-level implementation. He stressed the need to move away from traditional, "business-as-usual" approaches in water governance and instead adopt a collaborative, climate-resilient strategy that fosters synergy across departments and engages all relevant stakeholders in the water sector. Aligning OIIPCRA's approach with the CGIAR Climate Action Program would not only help scale climate-smart practices but also enhance institutional convergence and strengthen advisory systems, ultimately enabling more effective, integrated responses to climate challenges across Odisha.

Question for Sh. Dayanidhi Bag:

How is the REWARD program advancing watershed management to build long-term agricultural resilience and reduce climate vulnerabilities in rainfed regions? What are key partnership and collaboration do you foresee with IWMI/Climate Action Program?

Answer: Sh. Dayanidhi Bag emphasized that the initiative is advancing watershed management in Odisha's rainfed regions through science-based, plot-to-plot planning aimed at building long-term agricultural resilience and reducing climate vulnerabilities. He underscored the use of GIS tools, hydrological modelling, and digital platforms for efficient and data-driven project planning, enabling better land and cropping system design. The program is also working closely with institutions like IIT Bhubaneswar, IWMI, and NBSS to enhance technical accuracy and dissemination.

He stressed the role of technology partners in natural resource management and highlighted the REWARD program's emphasis on capacity building across implementation hubs and stakeholders. Shri Bag expressed strong interest in collaborating with IWMI and the CGIAR

Climate Action Program, particularly in the areas of climate-resilient technologies and land system analysis. Additionally, he cited initiatives like Jaldhara and the Coffee Development Mission as potential platforms for sustainable livelihoods and proposed engaging local youth vulnerable to migration through innovative livelihood options like coffee cultivation.

Question for Dr. Swati Nayak:

How can climate-resilient rice varieties and inclusive seed systems contribute to enhancing food security in Odisha under increasing climate variability? Potential areas of collaboration between rice and water system for co-managing adaptation and mitigation.

Answer: Dr. Swati Nayak emphasized that climate-resilient rice varieties and inclusive seed systems are central to strengthening food security and adaptation efforts in Odisha amidst rising climate variability. She noted that significant progress has been made in developing rice varieties that are tolerant to drought, floods, heat, and multiple stresses, and stressed the importance of integrating indigenous knowledge and biodiversity to enhance local adaptation strategies.

Dr. Nayak advocated for a shift from commodity-specific interventions to a more holistic agri-food systems approach, where land, water, and food systems are interconnected. She highlighted opportunities to develop bundled solutions that combine rice with allied activities like fish farming and livestock, all of which depend on efficient water management. She concluded by encouraging collaborative efforts between rice science and water systems to co-manage adaptation and mitigation strategies suited to Odisha's ecological realities.

Question for Ms. Neha Batra:

How is WRMS using digital innovations and climate-smart advisories to support farmers in Odisha in making timely decisions and managing weather-related risks? How do you see the linkages of AWARE Platform with early financial instrument for pro-active disaster mitigation efforts?

Answer: Ms. Neha Batra detailed how the organization is leveraging digital innovations and climate-smart advisories to support farmers in Odisha in making informed, timely decisions to better manage climate-related risks. Initially involved in crop insurance under schemes like PMFBY and MNAIS, WRMS soon recognized that insurance alone is not enough to build resilience amid increasingly frequent extreme weather events. As a result, WRMS has developed integrated risk management systems that combine real-time weather data, satellite imagery, and IoT tools such as soil moisture sensors and automated irrigation to deliver targeted, geo-tagged advisories via mobile applications.

She highlighted the AWARE platform as a tool for proactive disaster mitigation, capable of generating site-specific early warnings and forecasting the intensity of hazards like floods and droughts. This allows for a tiered, forecast-based response, linking financial instruments to predicted events, enabling rapid disbursement of compensation and relief. Ms. Batra emphasized the potential of bundled solutions—combining insurance with drought-resistant seeds or climate-resilient technologies—and underscored WRMS's collaboration with partners like IWMI to build holistic resilience strategies for smallholder farmers.

Key Takeaways from Climate Action Science Program Launch in Odisha:

1. Way forward to launch **1,000 Climate Smart Villages (with smart water risks management)** through district-level collaboration with relevant departments/agencies.
2. Roadmap to undertake actions for **districts/blocks based on typology** requiring **water conservation, groundwater development/management, watershed management planning**.
3. Ground-based study to **assess barriers and adaptive solutions** for promoting **solar-powered irrigation/deep borewells** as sustainable alternative.
4. IWMI's support in **sharing global experiences and best practices**, particularly in **water management, disaster resilience**, and **emerging technologies**
5. **DSS for on-farm water management**, conjunctive use of surface and groundwater, and **IoT-enabled water productivity tracking in MIP command areas**.
6. Rejuvenation of **springs and springshed management** practices
7. Promotion of **Climate Risk Intelligence and Digital Advisory Services** using AI, chatbots, and **digital dashboards**.

8. **Climate-smart governance tools** and alignment with ongoing national and state-level schemes (PMKSY, PM-KUSUM, PMFBY, REWARD, OIIPCRA, CHHATA, etc.)
9. Importance of **Index-Based Flood Insurance (IBFI)** and **underground aquifer storage** for flood and drought resilience.

Way Forward

The session concluded with a formal vote of thanks from Dr. A. K. Sikka, who expressed gratitude to all dignitaries, partners, and participants for contributing to a productive and successful event. The workshop reinforced the CGIAR Climate Action Program's commitment to enabling locally led adaptation, integrated climate services, and multi-stakeholder collaboration to drive climate-resilient development across Odisha.

Annex A.

Table A.1. Workshop Agenda

Time	Topic	Speaker
10:00–10:30	Participants arrival and registration	IWMI Team
10:30–10:40	Welcome remarks	Dr. Alok Sikka Country Representative, India & Bangladesh/ Senior Fellow, IWMI
10:40–13:00	Technical Consultation Meeting: Pre-Launch Discussion with key stakeholders • Brief introduction to CGIAR Climate Action Program • Discussion with key stakeholders on climate action focus areas, key challenges, ongoing and future priorities • Deep Dive session: Pathways for Scaling Climate Action in Odisha Participants collaborate to identify priorities for integrating science, innovation, and community action across agriculture, water, and climate risk management sectors. ▪ Group 1: Climate Risk Intelligence and Digital Advisory Services ▪ Group 2: Locally Led Adaptation and Resilient Livelihoods ▪ Group 3: Water Security and Climate-Smart Agriculture ▪ Group 4: Policy, Institutions, and Climate Finance • Key Insights and Recommendations	IWMI Team
13:00 –14:00	Lunch and Networking	
Launch of Climate Action Program		

14:00 – 14:15	Welcome & opening remarks	Dr. Alok Sikka Country Representative India & Bangladesh/ Senior Fellow, IWMI Dr. Arjamadutta Sarangi Director, ICAR-Indian Institute of Water Management (IIWM)
14:15 – 14:30	Overview of CGIAR Climate Action Program	Dr. Giriraj Amarnath Principal Researcher, IWMI / Interim Deputy Director – CGIAR Climate Action Science Program
14:30 – 14:40	Special remarks	Dr. A K Nayak Deputy Director General (Natural Resource Management), Indian Council of Agricultural Research
14:50 – 15:00	Special remarks	Sh. Kamal Lochan Mishra, IAS Executive Director, Odisha State Disaster Management Authority (OSDMA), Govt. of Odisha
15:00 – 15:15	Remarks from chief guest	Smt. Anu Garg, IAS Additional Chief Secretary, Department of Water Resources & Development Commissioner, Government of Odisha
15:15 – 15:30	Group Photo and Tea/Coffee Break	
15:30 – 16:15	Panel Discussion: Building Odisha's Climate Resilience: From Vulnerability to Action	Dr. Alok Sikka
Panelists: ▪ Sh. Rashmi Ranjan Nayak, Additional Secretary and Project Director, OIIPCRA ▪ Sh. Dayanidhi Bag, Rejuvenating Watersheds for Agricultural Resilience through Innovative Development (REWARD) ▪ Ms. Neha Batra, WRMS Pvt. Ltd. ▪ Dr. Swati Nayak, Scientist, International Rice Research Institute (IRRI)		
16:15 – 16:30	Closing remarks and Way forward	IWMI and Key State Partners

Annex B.

Table B.1. List of Participants

Sl No	Name	Designation	Organisation
1	Anu Garg	Additional Chief Secretary and Development Commissioner	Department of Water Resources, Govt. of Odisha
2	Rashmi Ranjan Nayak	Project Director, OIIPCRA	Department of Water Resources, Govt. of Odisha
3	Kamal Lochan Mishra	ED	Odisha State Disaster Management Authority, Govt. of Odisha
4	A K Nayak	DDG, NRM-ICAR	ICAR
5	D.K. Kar	Joint Director (Geology)	GWD Central Circle, Bhubaneswar, GoO
6	Niaranjana Panigrahi	Chief Scientist	Chiplima, OUAT
7	Sandeep Nayak	Advisor	GIZ India
8	Arjamadutta Sarangi	Director	IIWM
9	Neha Batra	Head - Risk & Underwriting	WRMS Pvt. Ltd.
10	Dayanidhi Bag	Jt Director (REWARD)	Government of Odisha
11	S K Jena	Principal Scientist	IIWM
12	Rabindra Panda	Principal Scientist	IIWM, Bhubaneswar
13	K K Bandopadhyay	Principal Scientist	IIWM, Bhubaneswar
14	Swati Nayak	Scientist	IRRI
15	Dwarika Mohan das	Scientist	KVK
16	Amit Burman	Project Coordinator	IFPRI
17	Alok Sikka	Country Representative	IWMI
18	Giriraj Amarnath	Principal Researcher	IWMI
19	Faiz Alam	Researcher	IWMI
20	Suman Padhee	Researcher	IWMI
21	D R Sena	Researcher	IWMI
22	Gulshan Borah	Project Coordinator	IWMI
23	Tanmoy Bhaduri	Comms Consultant	IWMI
24	S Mohanty	Scientist	IIWM, Bhubaneswar
25	P Pattanaik	Scientist	F, E and CC Dept
26	Argha Ghosh	Asst Prof	OUAT
27	Chinmaya Kr Sahoo	Agrometereologist	OHAT, BBSR
28	PK Mohapatra	SE, Agri	DAEFP
29	Avinandan Taron	Researcher	IWMI
30	Soumya Ranjan Nayak	Young Professional	ICAR-IIWM

31	T R Mohanty	Agrometerologist	OUAT
32	Anil G	Associate Scientist	ICRISAT
33	S K Rout	Professor	OUAT
34	Abinash Dalai	Researcher	IIWM, Bhubaneswar
35	Prasad Kamdi	Agronomist	ICRISAT
36	Santosh K	Associate Scientist	ICRISAT
37	Sucharita Panda	Sr Officer	ICRISAT

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 Centers/Alliances in close collaboration with hundreds of partners, including national and regional research institutes, civil society organizations, academia, development organizations and the private sector. www.cgiar.org

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

Contact
Giriraj Amarnath, Research Group Leader - Water Data for Climate Resilience (WDCR) and Principal Researcher – Disaster Risk Management and Climate Resilience, IWMI (a.giriraj@cgiar.org)

CGIAR CLIMATE ACTION
IWMI International Water Management Institute
ICAR