

Scaling up climate adaptation and nature preservation strategies in agriculture: A dialogue during the COP30 in Belém, Brazil

Leibniz Lab ‘Systemic Sustainability’ WEBNEWS

Biodiversity, climate, agriculture, and food are deeply interconnected, representing a complex global challenge that manifests in varying forms at local, regional, and international levels. Despite their interconnectedness, the four domains are often addressed in isolation within and across academia, policy, and society. As a result, the disciplinary and institutional silos, along with a lack of dialogue among science, policy, and society, are ineffective in addressing the challenge and generating consistent, real-world solutions for comprehensive, sustainable development. The scientific community, therefore, is requested to employ interdisciplinary, transdisciplinary, and transformative approaches that incorporate knowledge from multiple scientific fields, as well as from societal stakeholders, with their experience and indigenous and traditional knowledge. The overall aim should be to advance the understanding of interconnectedness and to co-create solutions with societal relevance and impact.

In this spirit, the Leibniz Lab ‘Systemic Sustainability’ organized a four-day event featuring a science-policy-society dialogue at the University of Para, Belém, in parallel to UNFCCC COP30. The event held at the Belém and Braganca campuses of the University of Para featured scientific presentations, discussions, field excursions, and various other activities themed around “Sustainability transformations and social-ecological dynamics of Amazonia and of other regions with special emphasis on systemic innovations and blue carbon ecosystems.”

This brief highlights the main points from the dialogue “From local and regional realities to global systemic sustainability: Scaling up climate adaptation and nature preservation strategies in agriculture”. First, it outlines the key challenges identified by the speakers, second, the potential approaches to address them, and finally, the proposed way forward. The dialogue brought together scientists and grassroots activists to discuss topics ranging from de-siloing agroecosystem research to local climate solutions.



Moderator Sundus Saleemi with Panellists Amina Amharech, Miguel Clüsener-Godt, Marcos Lana, and Sandro Schindwein

The Challenge: the monster has many heads

Local Limits of Climate Change Simulations

Model results on climate change impacts and climate variability indicate significant declines in agricultural yield in many regions worldwide. Marcos Lana depicted limitations particularly for traditional cropping systems, which are not adequately captured due to a lack of data on **local agroecological management practices**, e.g., mixed cropping, tillage practices, and water management. He emphasized an emerging **“resilience cancellation”**: extreme climate events exceed the adaptive capacity of farming systems. Such events will become more frequent as global temperatures continue to rise.

Disciplinary Perspectives on a Complex World



Panellist Farida Akhter

Global sustainability challenges cut across traditional disciplinary boundaries. Sandro Luis Schindwein stated that the real world is “volatile, uncertain, complex, and ambiguous.” Formal academic training, however, continues to reinforce disciplinary boundaries. Students are seldom taught to see comprehensive systems or their interconnectedness. The perception of what constitutes a “system” is heavily influenced by disciplinary assumptions in academia.

Institutional structures in science reinforce disciplinary boundaries, creating a cultural and professional environment in which crossing fields is risky. Schindwein said that reward systems, career paths, and academic recognition are largely discipline-based, discouraging scholars from exploring non-disciplinary approaches.

Language as a Barrier to Sustainability Transformation

The difference in language used by scientists and people outside science creates barriers to science-society cooperation on sustainability transformation. Effective translation of scientific knowledge and the appropriate integration of practical knowledge and experience have proven crucial to developing a common understanding and joint design of scalable sustainability solutions.

Universities Pose Structural Barriers to Science-Society Dialogues

Historically, universities and academic institutions have been conservative spaces, closed to social movements and marginalized voices, including those of indigenous peoples. In these contexts, formally recognized scientific knowledge was privileged over indigenous, practical, and traditional forms of knowledge. The hierarchies of knowledge within academia are closely

intertwined with broader hierarchies of power and privilege, which intersect across ethnic, economic, and gender lines, shaping whose knowledge is valued, legitimized, and institutionalized. The barriers between academia and social movements hindered acceptance of different types of knowledge.

What Works on the Mountains Fails in the Desert

Multiple speakers, including Patricia Chaves and Amina Amharech, stressed that sustainability solutions are often implemented without consideration of local conditions, complexities, and constraints. Industrial monoculture-based methods rely on standardized technologies and external inputs regardless of climate, soil, vegetation, or social context. Even well-meaning interventions based on traditional practices can fail if they are disconnected from the communities and environments for whom they are intended. Overlooking local realities often reduces effectiveness and can exacerbate vulnerabilities rather than address them.

Connecting Science, Society, and Place: Pathways Toward Systemic Sustainability

Co-creating Knowledge, Epistemological Diversity

Socio-environmental innovations, such as agroforestry, are often referred to as “new systems,” but they are not entirely novel. Many of these systems already exist outside academic knowledge, particularly within long-standing community and indigenous knowledge traditions. For example, Michelle Chevelev-Bonatti described one of these systems in Colombia, where indigenous communities created peasant agroecology schools that teach sustainable agricultural practices. Rather than creating new frameworks, it is valuable to recognize, strengthen, and integrate existing practices—such as agroforestry systems and indigenous environmental management—that have demonstrated resilience and effectiveness across diverse contexts.



Audience of the Science-Policy-Society Dialogue

Bridging the Divide Between Academic and Traditional Knowledge

The knowledge held by indigenous peoples and practitioners on the ground is valid, practiced, and can even be more advanced than that articulated in academic frameworks. For example, Amina Amharech described khattara, an indigenous water management system that can bring water from the mountains into the desert over a distance of 400 kilometers without requiring any energy, while protecting it from evaporation. This knowledge is passed down through the generations and does not require academic study of mathematics or physics to practice.

The aim of emphasizing the voices of indigenous knowledge holders is to establish genuine connections between academic institutions and embodied, community-based knowledge—moving beyond hierarchy and acknowledging the transformative power of grassroots expertise. Academic institutions are, in the meantime, increasingly welcoming people from diverse ethnic and economic backgrounds, and women and indigenous people are participating more in university settings. These institutions are evolving through the lived experiences of their members, demonstrating that on-the-ground knowledge is credible and essential. Universities, though they still suffer from academic siloing between disciplines, are increasingly open to these voices, recognizing that local and traditional knowledge is often sophisticated, context-specific, and highly relevant.



Moderator Sundus Saleemi (left) and panellist Patricia Chaves (right)

Innovation as Recognition, Not Reinvention

Community-led initiatives create lasting solutions, respond effectively to climate and socio-economic pressures, and preserve biodiversity through traditional knowledge. Innovation should not be understood solely as the development of new technologies or frameworks, but the recognition and legitimation of long-standing practices that have demonstrated resilience in complex socio-ecological environments. Climatic and societal changes

accelerate the need to revisit and value community-based knowledge, emphasizing that sustainability transitions depend as much on recognition and redistribution of epistemic authority as on technological innovation.

Principles for Effective Knowledge Integration

Amina Amharech noted that bridges between scientific and indigenous knowledge are strengthened when the local context is respected. Knowledge cannot simply be transplanted from one region to another—it must account for climate, soil, and endemic vegetation. Holistic approaches ensure food security, sovereignty, and sustainable management of natural resources.

Building Systems Literacy to Reconnect Humans and Nature

Reconnecting humans with the biophysical world involves recognizing the patterns that connect social and ecological systems, according to Sandro Luis Schlindwein. By developing systemic awareness and strong systems literacy, researchers and decision-makers can see these links clearly, allowing for a more integrated understanding and action. In this way, bridging disciplinary silos is both necessary for and a consequence of adopting a systems-based approach.

Scaling Up Local Solutions

Scaling local, context-sensitive solutions requires strong public policy support, like government investment in past agricultural transformations. Key actions include educating practitioners, communities, and researchers; moving beyond narrow economic metrics to evaluate broader social, ecological, and systemic outcomes; and strengthening advisory and extension services to go beyond individual projects. Pilot programs, living labs, and research initiatives can provide vital support for testing and adapting solutions at scale. Effective interdisciplinary collaboration is also crucial and requires systems literacy, awareness of different ways of knowing, and clear communication across fields. Still, these efforts will succeed only if institutional structures actively promote and reward boundary-crossing and integration across disciplines.

The Path Ahead



Members of the Feminist Land Platform and Panellists for the Event

Future potential lies in connecting science, society, and place, valuing the knowledge of communities, indigenous peoples, and researchers alike. By breaking down disciplinary barriers, encouraging dialogue across fields, and grounding solutions in local realities, complexity can be turned into opportunity. What has long seemed impossible — the interconnected crises of climate, biodiversity, agriculture, and food—can be addressed with systemic

approaches that are inclusive, adaptable, and resilient. Together, through collaboration, acknowledgment, and context-aware actions, a future can be created in which people and ecosystems flourish.

Sundus Saleemi, M Anderson Lanham

Panelists



Dr. Michelle Chevelev-Bonatti, Associate Professor, Center for Agricultural Landscape Research (ZALF) and Humboldt University



Dr. Marcos Lana, Associate Professor, Swedish University of Agricultural Sciences (SLU)



Farida Akhter, advisor to the Ministry of Livestock and Fisheries in Bangladesh, Executive Director of Policy Research for Development Alternatives (UBINIG)



Patricia Chaves, co-founder of Feminist Land Platform, co-founder and Executive Director of Espaço Feminista



Amina Amharech, co-founder of the Amazigh community network AZUL



Dr. Sandro Luis Schlindwein, Professor, Federal University of Santa Catarina (UFSC)



Dr. Miguel Clüsner-Godt, Professor, University of Coimbra, UNESCO Chair

Moderators



Dr. Sundus Saleemi, Senior Researcher, Leibniz Lab 'Systemic Sustainability', Leibniz Center for Agriculture and Landscape Research (ZALF)



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