

Summary of the CS4RRA Stocktaking Conference (Parallel Session 1)

Development of Transdisciplinary Science

Introduction

The session on “Development of Transdisciplinary Science” opened with an emphasis on the urgency of addressing climate change, its intensification of natural disasters, and its disproportionate impact on vulnerable communities. Transdisciplinary science means the co-design of research and the co-production of knowledge together with communities and societal actors in a way that integrates diverse scientific and societal perspectives on given issues. Four core components of effective early warning systems—Risk Knowledge, Monitoring and Warning Services, Dissemination and Communication, and Response Capabilities—were outlined as a framework for discussion.

This session fostered a structured dialogue on enhancing resilience through comprehensive early warning systems, addressing urban and rural challenges, and exploring the integration of transdisciplinary approaches to climate resilience and adaptation.

Discussion on the Early Warning Chain

Participants explored the interconnected stages of the early warning chain, which include observations, forecasting, communication, and decision-making. Discussions highlighted the need for real-time, accurate data collection, effective forecasting, and communication strategies tailored to community needs.

Key points included:

1. **Observations:** Accurate, real-time data collection and monitoring are critical to identifying emerging risks and activating the early warning chain.
2. **Forecasting:** The ability to predict the occurrence and impact of hazards is essential. Impact forecasting, which goes beyond merely predicting the hazard itself, helps communities and decision-makers envision the cascading consequences, enabling more targeted responses.
3. **Communication:** Clear and timely communication of warnings to the public and relevant authorities is a vital step in ensuring that individuals and organizations can prepare and respond effectively. Communication channels must be trusted, accessible, and tailored to community needs at local level.
4. **Decision-Making:** The final step involves making decisions based on the information received and implementing appropriate responses, including emergency measures and longer-term adaptation strategies. Evaluating the socio-economic benefits and the efficacy of past responses is essential for building trust and improving systems over time.

Challenges and Considerations:

- Collaboration across disciplines and sectors is essential but remains costly and complex.
- The inherent uncertainties in forecasting require transparent communication of limitations.

- Integration of smaller, focused projects under broader strategies was proposed as a means to enhance impact and resource efficiency.

Urban and Rural Specificities in Early Warning Systems

Discussions acknowledged the distinct challenges and opportunities in urban and rural settings in the implementation of early warning systems and adaptation measures:

Urban Areas

- Urban flooding, inadequate drainage, and rising sea levels are exacerbated by extreme rainfall and poor planning.

Rural Areas

- Rural Areas: In contrast, rural communities may have different needs and opportunities. Participants highlighted the potential to leverage excess rainfall for agricultural irrigation, creating opportunities for water harvesting and storage. Examples from Edo State, Nigeria, illustrated policies encouraging rainwater harvesting, which could be expanded to enhance resilience.

Key Recommendations:

- Integration of Traditional Knowledge: Traditional practices, such as household water storage, to be integrated with modern solutions to enhance adaptation measures.
- Infrastructure Adaptation: Both rural and urban areas require tailored strategies to address their unique vulnerabilities, focusing on adaptive infrastructure that aligns with local needs and conditions.

Integration and Multidisciplinary Collaboration

Achieving a comprehensive approach to early warning systems requires collaboration across disciplines and sectors. Participants agreed that successful projects must also involve multiple stakeholders, including public and private sector partners, and encompass disciplines ranging from meteorology and hydrology to social planning and community engagement. Examples of effective initiatives demonstrated the value of combining engineering, social science, and community perspectives to address complex challenges such as flood management.

Recommendations:

1. Transdisciplinary Projects: Effective projects must span from hazard monitoring and risk assessment to decision-making and community response. While managing such projects is complex and costly, creating umbrella initiatives that integrate smaller projects can enhance cohesion and maximize impact.
2. Community Engagement and Trust Building: Building community trust through accurate forecasting, effective communication, and participatory decision-making is essential to ensure public buy-in and cooperation.

Strategic Priorities for the Next Five Years

The session concluded with a focus on identifying key priorities for research, innovation, and capacity development in early warning systems over the next five years:

- **Urban and Rural Resilience Strategies:** Tailored approaches that address climate hazards and cascading impacts in both urban and rural areas are essential, focusing on infrastructure adaptation, water management, and community engagement.
- **Data Integration and Accessibility:** Establishing centralized systems and open-access platforms to ensure data sharing and utilization for informed decision-making.
- **Capacity Building and Education:** Training programs and curriculum development must evolve to prepare planners, engineers, and community leaders to address emerging climate risks.
- **Community Resilience and Adaptation:** Promoting sustainable agriculture, integrated water management, and real-time climate monitoring tailored to both rural and urban needs.
- **Regional and National Collaboration:** Encouraging collaborative frameworks between countries and sectors to address transboundary climate challenges.
- **Supporting Vulnerable Populations:** Developing strategies to assist climate-displaced communities and integrating migration considerations into national policies.
- **Bridging Development and Climate Strategies:** Integrating development strategies with climate adaptation scenarios ensures cohesive planning and sustainability, reducing risks while creating opportunities for innovation and growth.

Short-Term and Long-Term Climate Adaptation Strategies

Participants highlighted the need to balance short-term and long-term climate adaptation measures, emphasizing that immediate solutions must pave the way for sustainable, scalable strategies.

Short-Term Solutions:

Efforts such as deploying early warning systems, enhancing data collection, and providing immediate support for climate-affected communities were seen as critical. For example, short-term initiatives like real-time data integration can help with current challenges, such as salinity intrusion in agriculture, offering farmers tailored support and climate projections.

Long-Term Solutions:

Long-term strategies must consider landscape transformation, including tree planting, improved agricultural practices, and genetic enhancements of crops. These measures aim to improve resilience to climate conditions like droughts, salinity, and extreme weather. The discussion stressed a shift to sustainable agricultural practices, such as re-adopting local seed varieties that better adapt to environmental conditions, and reducing reliance on hybrids and heavy fertilizer use, which often lead to soil degradation.

Participants stressed that adaptation measures must include both immediate and gradual responses, from addressing acute vulnerabilities to building infrastructure for climate-resilient agriculture and water storage (e.g., household-level water collection and connecting larger dams for effective water management).

Conclusion

The breakout session underscored the urgency of addressing climate change through effective early warning systems, tailored adaptation measures, and integrated approaches. Participants emphasized

the importance of transdisciplinary collaboration, community engagement, and sustained investments in building climate resilience. Strategic priorities for the next five years include enhancing urban and rural resilience, fostering capacity building, and bridging development with climate strategies.

By aligning immediate actions with long-term goals, leveraging data and traditional knowledge, and fostering cross-sector partnerships, stakeholders can develop adaptable, sustainable solutions to mitigate risks and enhance resilience for vulnerable populations worldwide.