United Nations
Framework Convention on
Climate Change

GEO
GROUP ON
EARTH OBSERVATIONS

Realising Early Warnings for All:

Innovation and Technology in Support of Risk-Informed Climate Resilience Policy and Action

KEY MESSAGES AND RECOMMENDATIONS FROM A JOINT POLICY BRIEF
BY THE UNFCCC TECHNOLOGY EXECUTIVE COMMITTEE
AND THE GROUP ON EARTH OBSERVATIONS

Executive Summary[1]

Key Messages

1. The Technology Executive Committee (TEC) highlights the following key messages drawn from the findings in a policy brief on this issue prepared jointly with the Group on Earth Observations (GEO):

(a) **Scaling up early warning innovations and technologies is essential** to enhancing risk-informed climate resilience policies and actions;

(b) **Climate information and disaster risk knowledge provide the foundation for the multi-hazard early warning system value chain**, which saves lives and protects property and the environment. Yet, significant differences exist among countries in access to and availability of data and knowledge on disaster risk; in particular, the least developed countries, small island developing states and African countries experience poor access and availability. Challenges in relation to risk knowledge, including in its monitoring, status reporting, production, use and accessibility, persist globally, but in particular for these countries;

(c) **A wide array of scalable technology measures, platforms and services have already demonstrated their effectiveness** in boosting climate information and disaster risk knowledge for countries in need. These technologies are most effective when integrated: for example, by combining hardware, software and 'orgware' measures; approaches based on Indigenous and traditional knowledge; and high- and low-technology open solutions that leverage low-cost sensors, mobile and digital technologies, AI and Earth observation satellites, for example;

(d) **Parties have underscored the importance of early warning systems to realising their climate agendas in their national action and planning documents:** about 50 per cent of nationally determined contributions (NDCs), about 40 per cent of national adaptation plans (NAPs) and more than 90 per cent of adaptation communications submitted under the Convention and the Paris Agreement mention early warning systems. However, there is limited recognition of the role of technology applications in improving climate information and multi-hazard early warning systems in these policies and plans or in country programme documents and funding proposals submitted to climate funds: only about 25 per cent of NDCs, 30 per cent of adaptation communications, 12 per cent of the adaptation-related components of technical needs assessments (TNAs) and 10 per cent of Green Climate Fund (GCF) funding proposals based on NAPs highlight technologies for this purpose;

(e) **Long-term financing**, both domestic and international, supported by a coordinated multisectoral approach is key to sustaining project outcomes and scaling-up integrated technological solutions that address multiple hazards across multiple sectors, including the building of resilient infrastructure and the assessment of loss and damage;

(f) **Technology can empower citizen scientists and other local stakeholders to produce and use local data on vulnerability and exposure to hazards,** allowing countries to identify their most vulnerable populations, communities and groups. Such local data and knowledge enable evidence-based decision-making and enhance people-centred multi-hazard early warning systems with effective 'last mile delivery', which remains a key challenge.

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[1] This executive summary is what was agreed at the 29th meeting of TEC as its key messages and recommendations for the Conference of the Parties at its 29th session (COP29) and the sixth Conference of the Parties serving as the meeting of the Parties to the Paris Agreement (CMA6). This is included on pages 25 and 26 in the joint annual report of the TEC and the Climate Technology Centre and Network (CTCN) for 2024 (>Link).

Recommendations

2. To scale up innovation and fit-for-purpose technology solutions, the TEC recommends that the COP and the CMA encourage Parties, international organisations and stakeholders, as relevant, to:

(a) Consider technologies for multi-hazard early warning systems when preparing and updating NDCs, NAPs, TNAs and other national strategies and plans, where appropriate, integrating a combination of complementary technologies into both existing and proposed systems, plans and processes;

(b) Invest in multisectoral technology solutions by leveraging funding from relevant financial mechanisms and other sources, including the Adaptation Fund, the Climate Risk and Early Warning Systems initiative, the Fund for responding to Loss and Damage, the GCF, the Global Environment Facility and the Systematic Observations Financing Facility, while building on the outcomes of funded projects to avoid fragmentation of efforts, promote longer-term sustainability and maximise impact;

(c) Leverage international initiatives and public-private partnerships in order to strengthen the capacity of Governments to understand and mitigate context-specific disaster risks and to reduce the financial and other barriers associated with accessing international capital;

(d) Support the integration of technologies into projects to promote local stakeholder engagement such that both low- and high-technology solutions enable the creation and consumption of risk knowledge by Indigenous Peoples; youth; female-led and community-based groups and entities, including local universities, research institutions and start-ups;

(e) Build the technical capacity of stakeholders in developing countries for enhancing reporting on, production, use of and access to risk knowledge, including by implementing targeted actions that strengthen the inclusion and build the capacity of women in technology in order to address persisting gender disparity;

(f) Leverage the global community of scientific experts and innovators, including GEO, who promote open data, knowledge and solutions as public goods; and who can provide the technical support and knowledge transfer needed for engaging stakeholders and building their capacity; while helping to design fit-for-purpose combined technology measures, including frontier and emerging technologies.
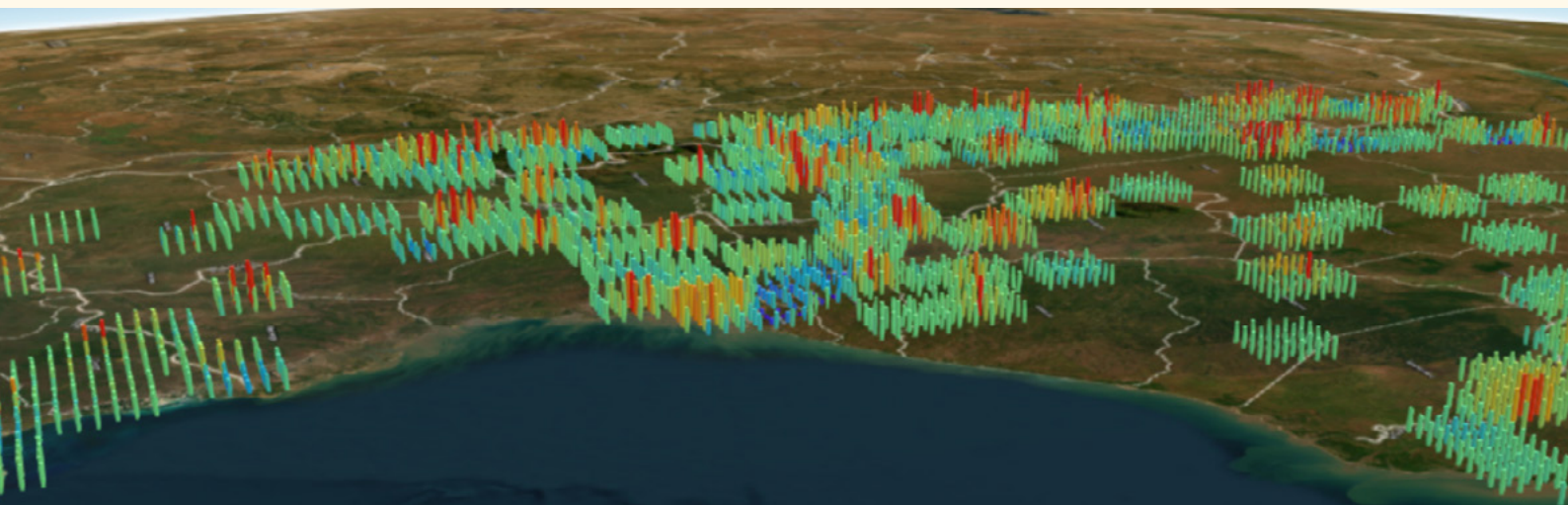
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GEO GROUP ON EARTH OBSERVATIONS

www.earthobservations.org

United Nations Framework Convention on Climate Change

https://unfccc.int/ttclear

Early Warnings for All

https://earlywarningsforall.org/