

Enhancing Action & International Cooperation for Early Warning Systems

Discussion paper

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Center for Climate and Energy Solutions

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A. Summary

1. The period from the end of the global stocktake (GST) at COP28 (2023) through to COP30 (2025) is critical. During this time period we will learn the collective level of ambition of new climate targets, whether countries have taken into account the outcomes of COP28 in formulating them, and whether countries have put in place the domestic plans, legislation, finance, and investment needed to implement those new targets. In the context of the Paris Agreement’s ambition cycle, 2024 is a crucial year for preparation, action, and enhanced international cooperation.
2. The GST decision from COP28 sets out a number of key, transformational global targets and signals to Parties to: (i) inform their next nationally determined contributions (NDCs) (as well as national adaptation plans [NAPS] and adaptation communications, as appropriate); and (ii) enhance implementation and international cooperation.¹ Parties are expected to communicate their NDCs by February 10, 2025, with an end date of 2035.² The GST targets and signals form part of the guidance and requirements that have been set out from Paris to date,³ including that:

- Each Party’s successive NDC will represent a “progression” beyond its previous NDC and reflect its “highest possible ambition,” reflecting its common but differentiated responsibilities and respective capabilities (CBDR-RC), in the light of different national circumstances.⁴
 - Parties “shall pursue domestic mitigation measures, with the aim of achieving the objectives” of their NDCs.⁵
 - Parties include, as part of the information to facilitate clarity, transparency, and understanding of NDCs:
 - How the Party considers that its NDC is fair and ambitious in the light of its national circumstances⁶
 - How the NDC contributes towards achieving the objective of the UN Framework Convention on Climate Change (UNFCCC), as set out in its Article 2⁷
 - How the NDC is informed by the outcomes of the GST, in accordance with Article 4, paragraph 9, of the Paris Agreement.⁸
 - Parties come forward with ambitious, economy-wide emission reduction targets, covering all greenhouse gases, sectors, and categories and aligned with limiting global warming to 1.5 degree C, as informed by the latest science, in the light of different national circumstances.⁹
 - Parties commit to accelerate action in this critical decade on the basis of the best available science, reflecting equity and the principle of CBDR-RC in the light of different national circumstances and in the context of sustainable development and efforts to eradicate poverty.¹⁰
 - Parties put in place new or intensify existing domestic arrangements for preparing and implementing successive NDCs.¹¹
 - Parties present their next NDCs at a special event to be held under the auspices of the United Nations Secretary-General.¹²
3. The Presidencies’ Troika letter from March 21, 2024, recognizes the need for leadership among an apparent wealth of actors, events, and pathways for Parties to avail themselves in their efforts to take forward the GST targets and signals.¹³ Their second letter from July 23, 2024 further elaborates their Mission 1.5 work plan to engage Parties in a targeted set of activities for the remainder of 2024 to enhance ambition and enable action towards COP29.¹⁴ While this establishes a welcome platform, Parties and non-Party stakeholders (NPS) may find a more elaborated vision helpful in guiding them to effectively action each of the GST targets, reflect them in new NDCs, and achieve them.
 4. In order to implement the GST targets and signals through enhanced NDC ambition and implementation, major barriers must be meaningfully addressed, turned into opportunities for enhanced international cooperation, and translated into development priorities and domestic policies. In the context of making the case for clear leadership to enable such action, this paper:
 - focuses on the GST decision’s call to Parties to strengthen adaptation action by **building accessible, user-driven early warning systems (EWS) for all by 2027**.¹⁵
 - sets out barriers and solutions, as identified by our work and others, that must be addressed and implemented to enable real action in 2024¹⁶
 - sets out key leadership considerations, how such a leadership role can be effectively utilized, and key priorities for 2024–26.
 5. Many of the obstacles to implementing EWS can largely be attributed to the lack of **finance; insufficient coordination; gaps in risk knowledge; and gaps in communication technologies and data across the value chain system**, particularly in developing countries.
 6. Parties must respond quickly and tangibly to the UN Secretary General’s (UNSG) call for Early Warnings for All (EW4All) by 2027, recognizing that a third of the world does not have access to EWS.¹⁷

A number of solutions and opportunities exist to help overcoming the obstacles to implementing EWS. At the same time, clear leadership that is inspiring, inclusive, respects the nationally determined nature of NDCs and NAPs and meets Parties and NPS where they are in terms of capacity, is essential. Enhanced international cooperation is vital to move from incrementalism to transformative levels of action in 2024 and beyond for implementation of EWS.

To accelerate building accessible, user-driven EWS for all by 2027, **Parties should outline in their NDCs, NAPs, long term strategies and/or national development plans how they are implementing and integrating EWS.**

For example, Mozambique’s updated 2021 NDC set out its strategies to enhance and strengthen EWS domestically and aligned national policies and priorities with its NDC targets. In February 2023, Mozambique launched a national roadmap that established a multi-hazard EWS (MHEWS). Increased funding, coupled with more effective planning and improved coordination and implementation, has led to lives being saved. The enhanced NDC implementation and national roadmap planning significantly reduced the impact of Tropical Cyclone Freddy on vulnerable communities in Mozambique.¹⁸

The COP Presidency Troika’s leadership approach, including Mission 1.5 and Brazil’s Presidency of the G20, provides a unique opportunity to set out a new model of collaborative leadership. Building on the GST targets and signals from the UAE Consensus, COP29 must give Parties assurance that climate finance—drawn from a variety of sources—will be available such that: (i) they can come forward with ambitious NDCs and (ii) subsequently implement those NDCs. COP30 in Belém must reflect on the level of ambition presented by the NDCs and set the new direction as we head towards the end of this critical decade.

Questions for Consideration

- How are Parties planning to take forward the signal to build accessible, user-driven EWS? How will this be reflected in NDCs, NAPs, long-term strategies and/or national development plans?
- How can Parties be supported in setting out their efforts to build accessible, user-driven EWS in NDCs, NAPs, long-term strategies and/or national development plans?
- What is the plan to enhance international cooperation toward building accessible, user-driven EWS and implementing the UNSG’s EW4All initiative by 2027?
- Which regions, Parties, organization(s), or countries are best placed to show leadership on this, and build momentum to show progress at COP29 and ahead of the NDC deadline?

B. Context

7. The GST is a key part of the Paris Agreement’s “ambition cycle.”¹⁹ Parties to the Paris Agreement are required to undertake a GST every five years “to take stock of the implementation of this Agreement to assess the collective progress towards achieving the purpose of this Agreement and its long-term goals...It shall do so in a comprehensive and facilitative manner, considering mitigation, adaptation and means of implementation and support, and in light of equity and the best available science.”²⁰

8. The outcome of the GST shall inform Parties in: (i) updating and enhancing, in a nationally determined manner, their actions and support (including their NDCs); and (ii) enhancing international cooperation for climate action.²¹ The GST outcome also reaffirms sustainable and just solutions founded on meaningful, inclusive participation of all stakeholders and underlines that just transitions can support more robust and equitable mitigation outcomes.²²
9. Parties are encouraged to communicate their NDCs by February 10, 2025, with an end date of 2035.²³ There are guidance and requirements for NDCs set out by Parties (see “[Summary](#)” above).
10. The year 2024 is a crucial year to take forward the GST targets and signals, translating them into effective domestic policies and measures as well as enhancing international cooperation on climate action. The moment of truth as to whether the GST, in the wider context of the Paris Agreement’s ambition cycle, will have succeeded in increasing ambition will be February 10, 2025 when new NDCs must be tabled by all Parties. The collective impact of these will be set out in a synthesis report to be made available ahead of COP30.²⁴ Furthermore, COP30 in Belém should not be seen as a cliff edge; it will need to set out the world’s response to level of ambition that countries have come forward with.

Early Warning Systems: Ensuring Universal Protection from Hazardous Weather, Water, and Climate Events

11. Early Warning Systems are vital for protecting livelihoods, reducing poverty and economic loss, saving lives, and reducing the impact of disasters and extreme weather events.²⁵ According to the Intergovernmental Panel on Climate Change (IPCC), EWS can reduce the exposure or vulnerability for most people in the world (i.e., more than 5 billion people with high confidence).²⁶ Large gaps exist in developing countries and significant financial resources are needed to rapidly implement EWS. Parties located in Africa, Least Developed Countries (LDCs), Caribbean, Latin America, and small island developing states (SIDS) suffer the greatest gaps in data and finance for implementing EWS.²⁷
12. In March 2022, the UNSG called for every person on Earth to be covered by EWS by 2027. The initiative is called Early Warnings for All. The EW4All initiative is closely aligned with and bolsters key aspects of Target G of the Sendai Framework for Disaster Risk Reduction, which emphasizes the need for comprehensive and accessible MHEWS.^{28,29} It actively supports the attainment of targets outlined in the 2030 Agenda for Sustainable Development, including those related to poverty alleviation, food security, public health, access to clean water and energy, climate action, and the promotion of sustainable urban environments. Furthermore, EWS are crucial for achieving several Sustainable Development Goals (SDGs) in the 2030 Agenda, even though EWS are not explicitly listed as a stand-alone goal. EWS play a key role in SDG 1 (No Poverty) by helping build resilience in vulnerable populations, SDG 11 (Sustainable Cities and Communities) by reducing disaster impacts on urban and rural areas, and SDG 13 (Climate Action) by enhancing capacity to respond to climate-related hazards.³⁰
13. The EW4All initiative takes a programmatic approach and has rolled out national workshops, conducted a gap analysis for national MHEWS roadmaps, and established global MHEWS implementation guidelines. Additionally, an implementation toolkit is being utilized by countries, with national consultative workshops held in over seven of the original 30 countries to implement MHEWS. These workshops aim to assess MHEWS, align national and subnational initiatives with EW4All objectives, identify priority areas, address challenges, and develop or leverage a national roadmap for coordinating resources and technical assistance.³¹

14. In the last NDC Synthesis Report, 55 percent of NDCs that included adaptation described measures for enhancing disaster risk management and EWS.³² Of NAPs submitted, 19 percent mention early warning and disaster risk reduction.³³
15. Recognizing the potential of the EW4All initiative and that a third of the world does not have access to EWS, the GST decision calls on Parties to **strengthen adaptation action by building accessible, user-driven climate services systems including EWS.**³⁴

Barriers and Solutions for Early Warning Systems

16. Many of the challenges to implementing EWS are primarily due to inadequate finance, poor coordination, limited risk knowledge, insufficient communication technologies, and a lack of data throughout the value chain, especially in developing countries.³⁵

Barriers

17. Parties still face a number of political, economic, social, and technological barriers to expanding and implementing successful EWS. As identified by C2ES³⁶ as well as the GST's Technical Dialogue Synthesis report,³⁷ these challenges include:
 - legal and institutional arrangements
 - technology
 - infrastructure, and forecasting capability in developing countries
 - capacity, including human resources and expertise
 - addressing impacts of climate change on disaster risks
 - public engagement, empowerment, and community outreach
 - response co-ordination and disaster preparedness
 - governance barriers, including insufficient coordination among national institutions and development partners³⁸
 - lack of sustainable, context-responsive investment.
18. These obstacles can largely be boiled down to four main, immediate challenges: the lack of finance; insufficient coordination; gaps in risk knowledge; and gaps in data and communication technologies across the value chain system. These obstacles continue to increase especially, in developing countries.
19. The GST decision notes that developing countries need an estimated U.S. \$5.8–5.9 trillion for their efforts to implement their current NDCs for the pre-2030 period (yet alone new and more ambitious ones due by February 10, 2025). Climate finance pledged and provided is nowhere near that scale. In this context, the adoption of a new collective quantified goal (NCQG) at COP29 will be vital for setting out a way forward on the scale and type of finance needed to sustain and augment the climate action needed to achieve the goals of the Paris Agreement and net zero by 2050.³⁹

Solutions

20. A number of high-impact solutions and opportunities to address key challenges have been identified through a wealth of efforts across different fora. The following list draws from C2ES's work as well as the High Level Climate Champions' (HLCs) *2030 Climate Solutions*:⁴⁰

EWS actions, solutions, and enablers
<ul style="list-style-type: none"> • Investing U.S. \$3.1 billion by 2027 to bridge the gap in MHEWS by building and improving infrastructure capacity, preparedness, and systems to disseminate communications relating to MHEWS (Source: 2030 Climate Solutions)

<ul style="list-style-type: none"> Improving climate and weather observations to close the substantial basic weather and climate data gap and build robust Earth observation systems and related long-term data records (C2ES)
<ul style="list-style-type: none"> Facilitating stakeholder mapping (Source: 2030 Climate Solutions)
<ul style="list-style-type: none"> Promoting and supporting the establishment of national frameworks for climate services and enhancing the Climate Services Information System (CSIS) component of the Global Framework for Climate Services (GFCS) (Source: C2ES)
<ul style="list-style-type: none"> Organizing consultative workshops on the national level (Source: 2030 Climate Solutions)
<ul style="list-style-type: none"> Conducting gap analysis to identify key gaps, needs, and priorities (Source: 2030 Climate Solutions)
<ul style="list-style-type: none"> Developing national roadmaps for EWS implementation at scale (EW4All roadmaps) (Source: 2030 Climate Solutions)
<ul style="list-style-type: none"> Improving access to climate science information, both historical climate data and projected impacts (Source: C2ES) and build country capacity to collect, generate, and interpret high-quality data
<ul style="list-style-type: none"> Catalyzing new and pre-existing innovative finance solutions (Source: C2ES)

21. The **HLCs and the Marrakech Partnership for Global Climate Action** identify impactful climate solutions and opportunities for international cooperation.⁴¹ At COP28, in the context of the conclusion of the GST and building on prior work, the HLCs presented the *2030 Climate Solutions*—an Implementation Roadmap that sets out solutions framed in specific actions, with insights from a wide range of NPS on effective measures being undertaken that need to be scaled up and replicated as well as current gaps that need to be bridged.⁴² The *Climate Solutions* recommend key actions and means of implementation, which seek to achieve key targets for EWS.⁴³ These recommendations for actions and support overlap with high-impact opportunities and solutions to address barriers to building successful EWS, as also identified in work by C2ES.
22. To effectively advance the development and implementation of EW4All, collaborative partnerships and coordinated financing, leveraging mechanisms like Climate Risk and Early Warning Systems Initiative (**CREWS**) and Systematic Observations Financing Facility (**SOFF**), and engaging with MDBs and climate funds are needed. Integrating adaptation and mitigation into national development agendas will ensure these initiatives are effective and aligned with broader priorities.

C. Leadership for EWS

The Troika, G20, G7, and UNSG EW4All

23. The UNSG designated the UN Office for Disaster Risk Reduction (UNDRR) and the World Meteorological Organization (WMO) as the co-leads for the EW4All initiative. Additionally, the UNSG created the EW4All Advisory Panel, to ensure the effective execution and strategic coherence. The Advisory Panel consists of the Heads of a multitude of UN organizations, the private sector, civil society, regional development banks, as well as current and incoming UNFCCC COP Presidencies. The panel among other things cultivates broader political support for the EW4All initiative.⁴⁴ The objectives of the Advisory Panels are to:
- assess progress of the EW4All initiative against its goals and targets
 - build political and overall momentum and support for the EW4All initiative
 - provide overall recommendations for the mobilization of resources
 - monitor scientific and technical development related to early EWS.

24. The *2023 Global Status of Early Warning of MHEWS* report and *First Report of the Advisory Panel of Early Warnings for All Initiative to the UNSG* outlines current progress on the EW4All Initiative, and highlights case studies and good practices.⁴⁵ At the 2023 SDG Summit, the UNSG showcased the EW4All initiative as part of the Acceleration Agenda to deliver on efforts to reduce emissions and deliver on climate justice.⁴⁶
25. At COP28, the presidency released the COP28 Declaration on Climate, Relief, Recovery, and Peace which reaffirms the commitment to limiting global warming to 1.5°C and calls for enhanced climate pledges and support for vulnerable nations. It emphasizes the need for effective disaster relief, timely humanitarian aid, and robust funding mechanisms. It underscored the importance of advancing EWS to improve preparedness and response to climate-related disasters, while calling for global solidarity and inclusive cooperation to address these challenges effectively.⁴⁷
26. As an outcome of the UAE Consensus, the COP28 Presidency (UAE) will work together with the incoming Presidencies—Azerbaijan (COP29) and Brazil (COP30)—to drive ambitious collective action, including through the “Roadmap to Mission 1.5C,” an initiative to significantly enhance international cooperation and the international enabling environment to stimulate ambition in the next round of NDCs.⁴⁸ This configuration has been called “the Troika.” The Troika, together with the G7 and G20 and including through the Roadmap to Mission 1.5C, broadly seek to drive ambition and enhanced international cooperation.
27. Brazil, in its role as Presidency of the G20, established a working group on disaster risk reduction which focuses on strengthening the role of G20 countries as leaders and advocates in knowledge sharing, technology, finance and capacity support for EWS.⁴⁹

2024 Early Warning System-related Events

28. EWS-related organizations, coalitions, and initiatives may meet or engage at a number of high-level - related events for the remainder of 2024. These events include:

FEBRUARY
27-28 February, 1 st G20 Disaster Risk Reduction Meeting under the Brazilian Presidency
MARCH
12-15 March, 25th Meeting of the Adaptation Committee (Bonn, Germany)
18-19 March, Annual Adaptation Forum 2024 by the Adaptation Committee (Bonn, Germany)
18-20 March, First meeting of the Advisory Board of the Santiago Network for loss and damage (Geneva, Switzerland)
21-22 March, Copenhagen Climate Ministerial (Copenhagen, Denmark) <i>Presentation of the Troika vision and approach and officially launch of its work for the year</i>
APRIL
17-19 April, World Bank, International Monetary Fund Spring Meetings (Washington, DC)
22-25 April, NAP Expo (Dhaka, Bangladesh)
25-26 April, Petersberg Climate Dialogue (Berlin, Germany) <i>Troika’s first majlis with a focus on enabling the implementation of the energy transition outcomes from the first GST</i>
MAY
15-17 May, First meeting of the UAE-Belém work programme on indicators (Paro, Bhutan)
28-29 May, Second Disaster Risk Reduction working group meeting (Virtual)
JUNE
3-13 June, UNFCCC 60th Subsidiary Bodies Meeting (Bonn, Germany)
17-19 June, G7 Summit (Putignano, Puglia, Italy)

JULY
2-4 July, Second meeting of the Advisory Board of the Santiago Network for loss and damage (Geneva, Switzerland)
8-17 July, High-Level Political Forum 2024 (New York, NY)
22-23 July, Ministerial on Climate Action (Wuhan, China) <i>Troika's second majlis with a focus on supporting the conservation, protection and restoration of forests, sinks and reservoirs, including through synergies between biodiversity and climate</i>
26-27 July, Presidency Heads of Delegation retreat (Shamakhi, Azerbaijan)
29-30 July, 3rd G20 Disaster Risk Reduction working group meeting (Rio de Janeiro, Brazil)
AUGUST
12-16 August, NDCs 3.0 Regional Forum for the Pacific (Apia, Samoa)
27-29 August, NDCs 3.0 Regional Forum for Latin America and the Caribbean (Bogota, Colombia)
SEPTEMBER
3-5 September, NDCs 3.0 Regional Forum for Eastern Europe and Central Asia (Istanbul, Türkiye)
5-6 September, Fifth Global Conference on Strengthening Synergies between the Paris Agreement and the 2030 Agenda for Sustainable Development (Rio de Janeiro, Brazil) <i>Troika's third majlis with a focus on galvanizing political momentum to enhance adaptation action and global resilience by 2030, including by addressing the adaptation finance gap</i>
10-24 September, UN General Assembly (New York, NY) <i>A high-level Troika event to showcase the leadership of early movers of 1.5 aligned NDCs</i>
9-13 September, 26th meeting of the Adaptation Committee (Bonn, Germany)
10-24 September, UN General Assembly (New York, NY) <i>A high-level Troika event to showcase the leadership of early movers of 1.5 aligned NDCs</i>
19-20 September, 12th International Conference on Sustainable Development (New York, NY)
22-23 September, Summit of the Future (New York, NY)
23-25 September, NDCs 3.0 Regional Forum for the Middle East and North Africa (Tunis, Tunisia)
30 September to 2 October, NDCs 3.0 Regional Forum for Asia (Bangkok, Thailand)
OCTOBER
7-9 October, NDCs 3.0 Regional Forum for Africa (Kigali, Rwanda)
8-9 October, 4th G20 Disaster Risk Reduction working group meeting (Belém, Brazil)
8-9 October, UAE-Belém work programme on indicators (Sharm el-Sheikh, Egypt)
10 October, G20 Disaster Risk Reduction working group ministerial meeting (Belém, Brazil)
10-11 October, Pre-COP28 (Baku, Azerbaijan) <i>Troika High-level Dialogue to focus on NDC ambition and implementation to date</i>
23-25 October, G20 Joint Meeting of Climate Change and Finance Ministers (Washington, DC) <i>High-level Troika event on climate finance and investment frameworks to enhance ambition and enable implementation of NDCs</i>
22-27 October, Annual Meetings of the World Bank Group and the International Monetary Fund (IMF) (Washington, DC)
NOVEMBER
11-24 November, COP29 (Baku, Azerbaijan) <i>A leaders-level event to focus on taking stock of the Troika's work and opportunities for strengthened ambition in 2025</i>
18-19 November, G20 Summit (Rio de Janeiro, Brazil)
DECEMBER
10-11 December, 21st Replenishment of the International Development Association (IDA21) Final Pledging and Replenishment Meeting (TBD)

Capacity Building and Support for the Development of Early Warning Systems and NDCs/NAPs

29. Other initiatives can provide critical capacity-building support for the development of climate policy and NDCs. One key initiative is **UN Development Programme (UNDP)'s Climate Promise**.⁵⁰ Climate Promise leverages Parties' NDCs and brings together UNDP's infrastructure, networks and breadth of substantive offers to provide comprehensive support on NDC implementation. UNDP provides support to help countries take bold action to reduce their emissions, increase their resilience to climate impacts and support sustainable development priorities.
30. In April 2024, UNDP unveiled the next stage of Climate Promise, Climate Promise 2025, which will support countries in developing and delivering their pledges and draws on UNDP's newly established Climate Hub.⁵¹ Climate Promise 2025 will link climate diplomacy and thought leadership with climate action and sustainable development at national and local levels to align the next generation of NDCs with the Paris Agreement goals.
31. Another key initiative is the **NDC Partnership**.⁵² Leveraging more than 200 members and more than 80 institutions, the Partnership responds to requests for support needed to translate identified NDC implementation priorities into actionable policies and programs. Based on these requests, the membership offers a tailored package of expertise, technical assistance, and funding. This collaborative response provides developing countries with efficient access to a wide range of resources to adapt to and mitigate climate change and foster more equitable and sustainable development.
32. In June 2024, the NDC Partnership and the UNFCCC secretariat launched the NDC 3.0 Navigator. The NDC 3.0 Navigator is an interactive tool designed to support countries in raising NDC ambition and accelerating the implementation of the next round of NDCs. It brings together expert-created strategies, resources, and country insights to support countries in updating their NDCs.⁵³ The NDC Navigator also set out strategies for Parties translating adaptation goals for infrastructure and human settlements as well as for livelihoods, poverty, and cultural heritage from the first GST into national adaptation efforts.⁵⁴
33. In July 2024, UN Environment Programme (UNEP), the UNDP, and the NDC Partnership, in collaboration with the UNFCCC Secretariat announced that they are organizing NDCs 3.0 Regional Fora.⁵⁵ The closed-door Fora will use insights from COP28 and the GST to focus on mitigation options, adaptation solutions and inclusion of super pollutants (short-lived non-carbon dioxide pollutants), such as methane and black carbon in the NDCs. Participants, invited from government ministries engaged in NDC development and implementation, will engage in peer-learning, explore innovative financing models, and share how to develop policy roadmaps that lead to implementation. The Fora will encourage countries to consider the co-benefits of climate action and share examples on how to align climate targets with other international commitments on nature, pollution, and sustainable development in their NDCs.
34. The **NAP Global Network** established at COP20 in Lima, Peru connects practitioners and policy makers working on NAPs in 155 countries for drafting and implementing NAPs.⁵⁶ Additionally, **UN4NAPs** is a UN-wide initiative that provides support and technical expertise for NAPs and developing country Parties. Launched in 2021 by the UNFCCC secretariat it also works with a network of 50 IGOs for NAP drafting and implementation and technical expertise.⁵⁷
35. Within the UNFCCC, the Technology Executive Committee (TEC), as the policy arm of the Technology Mechanism, also provides important capacity building support. TEC focuses on identifying policies

that can accelerate the development and transfer of low-emission and climate resilient technologies. Technology plays a crucial role in enhancing risk knowledge, strengthening EWS, and informing climate development and investment policies, particularly in vulnerable regions. The TEC is supporting EW4All and will, in coordination with the Group on Earth Observations (GEO), produce a policy brief on innovation for risk knowledge that will highlight the importance of context-specific technology and locally led, people-centered solutions.⁵⁸

36. Since 2018, the WMO and the Green Climate Fund (GCF) have collaborated to enhance climate science information for NAPs and NDCs. This partnership focuses on providing access to climate data, tools, and technical resources to support effective climate action. WMO has developed methodologies and guidance to help countries, particularly LDCs and SIDS, interpret climate data and make informed decisions. This initiative includes capacity building for 38 developing countries and organizing Global Forums on Climate Science Information to improve the co-design of climate services.⁵⁹
37. The International Federation of Red Cross and Red Crescent Societies (IFRC), GCF, the Global Environment Fund (GEF), CREWS, Adaptation Fund, MDBs, the World Bank Group, and partner countries (through bilateral aid) fund projects and programs related to EWS implementation. The IFRC uses weather forecasts and risk analysis to release humanitarian funding before extreme weather events.⁶⁰ The GCF has invested almost U.S. \$ 933 million in early warning projects, including 42 in LDCs and 35 in SIDS. The GEF's the latest work program for the Least Developed Countries Fund and the Special Climate Change Fund includes support and investments in EWS.⁶¹ The Adaptation Fund was created to support communities against the impacts of climate change and disaster risk reduction. EWS now account for around 18 percent of all the projects it funds.⁶²
38. The GST also invited development partners, international financial institutions, and the operating entities of the UNFCCC Financial Mechanism to provide support for implementation of the EW4All initiative.⁶³

Recommendation

39. To accelerate the building of accessible, user-driven EWS for all by 2027, **Parties should outline in their NDCs, NAPs, long term strategies, and/or national development plans how they are implementing and integrating EWS.**
40. EWS implementation strategies in NAPs, NDCs, long-term plans, and national development frameworks enhance national sovereignty, attracts investment, builds capacity, and ensures sustained momentum by fostering ownership among stakeholders and effectively channeling finance for disaster preparedness and climate resilience. To ensure timely access to EWS, and their sustainable use, it is essential that the necessary governance mechanisms implementation is put into place.
41. For example, Mozambique's updated 2021 NDC set out its strategies to enhance and strengthen EWS domestically and aligned national policies and priorities with its NDC targets. In February 2023, Mozambique launched a national roadmap that established a MHEWS. Increased funding, coupled with more effective planning and improved coordination and implementation, has led to lives being saved. The enhanced NDC implementation and national roadmap planning significantly reduced the impact of Tropical Cyclone Freddy on vulnerable communities in Mozambique.⁶⁴
42. The Troika, as a leader on ambition, can, in turn, leverage its role to support this cooperative leadership by:

- highlighting the work of EW4All and the G20 Disaster Risk Reduction working group to increase international cooperation on the implementation of EWS
 - supporting technological advancement of EWS
 - highlighting existing initiatives, such as the CREWS Initiative and the SOFF
 - catalyzing finance for implementation of EWS, such as through bilateral aid and the inclusion of private sector financing
 - enabling collaboration and sharing best practice on key barriers to progress towards EW4All, such as enhancing coordination between national metrological and hydrological services (NMHSs) and disaster risk management agencies⁶⁵
 - calling on Parties to continue to support ongoing efforts to strengthen the Santiago Network's capacity for risk knowledge and data sharing that can advance EWS in LDCs, SIDS, the Caribbean, Latin America, and African Parties
 - support regional-level leaders in the development of frameworks and/or roadmaps for implementation of EWS
 - calling on Parties to include progress on EWS implementation in their updated NDCs, long-term strategies, national developments plans, and NAPs.
43. In UNFCCC the loss and damage (L&D) negotiations, relevant actors were encouraged to increase their support for activities that enhance response L&D through the EW4All, CREWS, and the SOFF.⁶⁶ The Troika could consider using the high-level dialogue on funding arrangements for L&D included in the decision as a point to leverage finance and resources for EWS.⁶⁷
44. Enhanced international cooperation on EWS can significantly strengthen countries' resilience and contribute to the achievement of the SDG 2030 Agenda.

Ongoing Leadership is Needed

45. The Troika and the Roadmap to Mission 1.5 provide a promising model of collaborative leadership that can provide continuity and a trajectory for enhanced international cooperation across critical years. The Troika's high-level events planned for the latter half of 2024 can be critical for calling upon ministers and government leaders to lead on action to channel resources, finance and knowledge sharing in support of EWS implementation.
46. The Troika should look for one or more political high-level events such as the October G20 Disaster Risk Reduction working group ministerial meeting or a high-level dialogue on EWS that could call on existing mechanisms within and outside of the UN system.
47. The near-term goal is action and implementation that inform enhanced NDCs and ambition up through the deadline for new NDCs by February 10, 2025. In the longer term, such leadership will be critical for informing subsequent implementation.
48. The outcome of the negotiations on the NQCG in 2024 and broader financial developments will impact the environment for international cooperation. Once there has been sufficient time to analyze the NDCs in the annual update of the NDC synthesis report that will be made available ahead of COP30, it will become clearer whether the GST will have succeeded.⁶⁸ But this also means that Belém will not be the "NDC COP."
49. As such, 2025 will demonstrate how much more Parties are willing to commit to achieving the Paris goals. It is also possible that NDCs will reveal themselves to more usefully be investment plans or tools.⁶⁹

50. The year 2025 will also mark the year that the Paris Agreement’s enhanced transparency framework will be fully operational. New processes, like the facilitative multilateral consideration of process, provides opportunities for Parties to share best practices and lessons learned in implementing their NDCs.
51. Troika leadership and the incoming Brazilian Presidency must utilize the Roadmap to 1.5C and the outcomes of COP29 to skillfully build on the picture of progress drawn earlier in 2025 to a successful outcome at COP30 that nevertheless remains critical to ambition and enhanced international cooperation in 2026. COP30 in Belém should not be seen as a cliff edge, but a steppingstone to COP31 and beyond. In 2026, the second GST process begins again.

Conclusion

52. While there is a strong case for clear leadership to respond to the call to build accessible, user-driven EWS for all by 2027, there is also a need to be inclusive. Clearer leadership on implementing and coordination on the EWS target, including how efforts are enacted on the ground, may elicit reactions that Parties are “being told what to do.” As such, the national determinedness of NDCs and NAPs and their domestic implementation must be clearly reiterated and respected.
53. At the same time, collaborative leadership on the EWS target will enable far greater and faster implementation than would otherwise be the case. Tracking progress towards the achievement of the target at COP29 and COP30 is crucial to generate further momentum. Early action must be captured in the next round of NDCs due by February 10, 2025, laying a strong foundation for further efforts.

Annex: Early Warning System Actors and Action in 2024

54. Rather than starting anew, momentum to implement the global stocktake targets and signals from COP28 might more effectively be built by activating existing international organizations, coalitions, and initiatives.
55. In the context of building accessible, user-driven early warning systems (EWS), initiatives and organizations well placed to focus attention and effort towards these efforts include (and are not limited to):
- The UN Early Warning Initiative for the Implementation of Climate Adaptation (“Early Warnings for All”), co-led by the World Meteorological Organization (WMO) and the UN Office of Disaster Risk Reduction (UNDRR)
 - Climate Risk and Early Warning Systems Initiative (CREWS) Initiative of the World Bank, UNDRR, and WMO and the Systematic Observations Finance Facility (SOFF)
 - The Sendai Framework for Disaster Risk Reduction
 - UN Environment Programme ClimWarm Project⁷⁰
 - Strengthening Climate Information and Early Warning Systems (SCIEWS) implemented through UN Development Programme and Global Environment Facility.⁷¹
 - Alliance for Hydromet Development⁷²
 - Risk-informed early action partnership (REAP).⁷³
56. Discussions on EWS implementation and cooperation are addressed under the UN Framework on Climate Change (UNFCCC) through the Adaptation Committee, Santiago Network, and the Warsaw International Mechanism Executive Committee (WIM ExCom). The Adaptation Committee, Advisory Board of the Santiago Network, and the WIM ExCom meet throughout the year.
57. Additionally, the GST outcome at COP28 also included the adoption of the UAE Framework for Global Climate Resilience, which recognized the need for enhancing adaptation action and support for all Parties to have established Multi Hazard EWS and climate information services by 2027.⁷⁴ Further, developing indicators on progress for achieving this target is slated for adoption at COP30/7th Conference of the Parties Meeting as Parties to the Paris Agreement (CMA7) (November 2025). Further development of these indicators will take place through the new UAE-Belém work programme that will conclude in 2025.

Endnotes

¹ United Nations Framework Convention on Climate Change [hereinafter UNFCCC], *Outcome of the first global stocktake*, Decision 1/CMA.5, ¶ 79 (December 13, 2023), <https://un.int/documents/637073>.

² UNFCCC, *Outcome of the first global stocktake*, Decision 1/CMA.5, ¶ 170. See also, UNFCCC, *Paris Agreement*, Art. 4.9, conclusion date: December 12, 2015, United Nations Treaty Series Online, registration no. I-54113, https://unfccc.int/sites/default/files/english_paris_agreement.pdf; UNFCCC, *Adoption of the Paris Agreement*, Decision 1/CP.21, ¶¶ 22-25 (January 29, 2016), <https://unfccc.int/resource/docs/2015/cop21/eng/10a01.pdf#page=2>; UNFCCC, *Common time frames for nationally determined contributions referred to in Article 4, paragraph 10, of the Paris Agreement*, Decision 6/CMA.3, ¶ 2 (March 8, 2022), https://unfccc.int/sites/default/files/resource/CMA2021_10_Add3_E.pdf (Encourages Parties to communicate in 2025 a nationally determined contribution with an end date of 2035, in

2030 a nationally determined contribution with an end date of 2040, and so forth every five years thereafter); UNFCCC, *Report on the 11th meeting of the Paris Agreement Implementation and Compliance Meeting*, PAICC/2024/M11/4, ¶ 19 (April 17-19, 2024),

https://unfccc.int/sites/default/files/resource/PAICC_11_meeting_report.pdf.

³ *Features and Normative Requirements for Nationally Determined Contributions* (Arlington, VA: Center for Climate and Energy Solutions [hereinafter C2ES], June 2024), <https://www.c2es.org/wp-content/uploads/2024/06/20240619-C2ES-NDC-Features-Normative-Requirements.pdf>.

⁴ UNFCCC, *Paris Agreement*, Arts. 3, 4.3; UNFCCC, *Further guidance in relation to the mitigation section of decision 1/CP.21*, Decision 4/CMA.1, Annex I, ¶ 4(c) (March 19, 2019), https://unfccc.int/sites/default/files/resource/cma2018_3_add1_advance.pdf.

⁵ UNFCCC, *Paris Agreement*, Art. 4.2.

⁶ UNFCCC, *Paris Agreement*, Arts. 3, 4.3; UNFCCC, *Further guidance in relation to the mitigation section of decision 1/CP.21*, Decision 4/CMA.1, Annex I, ¶ 6.

⁷ UNFCCC, *Paris Agreement*, Arts. 3, 4.3; UNFCCC, *Further guidance in relation to the mitigation section of decision 1/CP.21*, Decision 4/CMA.1, Annex I, ¶ 7.

⁸ UNFCCC, *Further guidance in relation to the mitigation section of decision 1/CP.21*, Decision 4/CMA.1, Annex I, ¶4(c).

⁹ UNFCCC, *Outcome of the first global stocktake*, Decision 1/CMA.5, ¶ 39.

¹⁰ UNFCCC, *Outcome of the first global stocktake*, Decision 1/CMA.5, ¶ 6.

¹¹ UNFCCC, *Outcome of the first global stocktake*, Decision 1/CMA.5, ¶ 171.

¹² UNFCCC, *Outcome of the first global stocktake*, Decision 1/CMA.5, ¶ 179.

¹³ Sultan al Jaber, Mukhtar Babayev, and Marina Silva, “COP Presidencies Troika Letter to Parties,” UNFCCC, March 2024, https://unfccc.int/sites/default/files/resource/presidencies_troika_letter_to_parties.pdf.

¹⁴ Sultan al Jaber, Mukhtar Babayev, and Marina Silva, “Troika Second Letter to Parties and Observers,” UNFCCC, July 23, 2024,

https://unfccc.int/sites/default/files/resource/troika_second_letter_to_parties_and_observers_july_2024.pdf.

¹⁵ UNFCCC, *Outcome of the first global stocktake*, Decision 1/CMA.5, ¶¶ 49-50 and 64(a).

¹⁶ Kaveh Guilanpour et al., *A Solutions-oriented Approach to the Paris Agreement’s Global Stocktake* (Arlington, VA: Center for Climate and Energy Solutions, November 2023), <https://www.c2es.org/document/a-solutions-oriented-approach-to-the-paris-agreements-global-stocktake/>; UNFCCC, *Technical dialogue of the first global stocktake: Synthesis report by the co-facilitators on the technical dialogue* (September 8, 2023), https://unfccc.int/sites/default/files/resource/sb2023_09E.pdf; <https://climatechampions.unfccc.int/wp-content/uploads/2023/12/2030-Climate-Solutions-Publication-Implementation-roadmap.pdf>.

¹⁷ UN Office of Disaster Risk Reduction [hereinafter UNDRR], and World Meteorological Organization [hereinafter WMO], *Global Status of Multi-Hazard Early Warning Systems 2023* (Geneva, Switzerland: WMO and UNDRR; 2023), <https://wmo.int/publication-series/global-status-of-multi-hazard-early-warning-systems-2023>.

¹⁸ UNDRR Regional Office of Africa and UN Mozambique, “Cyclone Freddy puts Mozambique’s early warning system to the test,” UNDRR, accessed July 12, 2024, <https://www.undrr.org/feature/cyclone-freddy-puts-mozambique-s-early-warning-system-to-the-test#:~:text=MAPUTO%2C%20Mozambique%20%2D%20Days%20before%20Cyclone,to%20shelters%20on%20high%20ground>.

¹⁹ The process of increasing commitment to climate action through the global stocktake to inform climate action—including updating nationally determined contributions and national adaptation plans—is part of what is known as the Paris Agreement’s “ambition cycle.” It also includes the “enhanced transparency framework,” the process for countries to gather and report greenhouse gas inventory data, track their progress against the overarching goals of the Paris Agreement and their own nationally determined contributions and deliver updates on the financial support they are providing or receiving. Parties are required to submit their first biennial transparency report and national inventory report by the end of December 2024.

²⁰ UNFCCC, *Paris Agreement*, Arts. 14.1, 14.2.

²¹ UNFCCC, *Paris Agreement*, Art. 14.3.



²² UNFCCC, *Outcome of the first global stocktake*, Decision 1/CMA.5, ¶¶ 9-10.

²³ UNFCCC, *Outcome of the first global stocktake*, Decision 1/CMA.5, ¶ 170; UNFCCC, *Paris Agreement*, Art. 4.9; UNFCCC, *Adoption of the Paris Agreement*, 1/CP.21, ¶¶ 22-25; UNFCCC, *Common time frames for nationally determined contributions referred to in Article 4, paragraph 10, of the Paris Agreement*, Decision 6/CMA.3, ¶ 2 (Encourages Parties to communicate in 2025 a nationally determined contribution [hereinafter NDC] with an end date of 2035, in 2030 a NDC with an end date of 2040, and so forth every five years thereafter).

²⁴ UNFCCC, *Glasgow Climate Pact*, Decision 1/CMA.3, ¶ 30 (March 8, 2022), https://unfccc.int/sites/default/files/resource/cma2021_10a01E.pdf.

²⁵ WMO, *Early Warnings for All: Executive Action Plan 2023-2027* (Geneva, Switzerland: WMO, November 2, 2022), 13, <https://www.preventionweb.net/publication/early-warnings-all-executive-action-plan-2023-2027#:~:text=This%20Executive%20Action%20Plan%20summarizes,out%20the%20pathway%20to%20implementation.>

²⁶ Intergovernmental Panel on Climate Change [hereinafter IPCC], “Summary for Policymakers,” in *Climate Change 2023 Synthesis Report. Contribution of Working Group II to the Sixth Assessment Report of the IPCC*. Ch. 17, figure 17.3 (Geneva, Switzerland: IPCC, 2023), doi: 10.59327/IPCC/AR6-9789291691647.001.

²⁷ UNDRR and WMO, *Global Status of Multi-Hazard Early Warning Systems*.

²⁸ Multi-hazard early warning systems [hereinafter MHEWS] are an integrated system that can warn of multiple hazards and their impacts, whether they occur at the same time, alone or over time. As of 2022, 101 countries reported the existence of a MHEWS.

²⁹ UNDRRR, *Sendai Framework for Disaster Risk Reduction 2015-2030* (Geneva, Switzerland, UNDRR, 2015), <https://sustainabledevelopment.un.org/content/documents/2157sendaiframeworkfordrren.pdf>.

³⁰ The Sendai Framework for Disaster Risk Reduction, which aligns with the sustainable development goals, emphasizes the importance of early warning systems in understanding and managing disaster risk, strengthening governance, and enhancing preparedness. For more information see: “Transforming our world: the 2030 Agenda for Sustainable Development,” UN, accessed on July 12, 2024, <https://sdgs.un.org/2030agenda>.

³¹ UNDRR and WMO, *Global Status of Multi-Hazard Early Warning Systems*.

³² UNFCCC, *Nationally determined contributions under the Paris Agreement: Synthesis report by the secretariat* (October 26, 2022), https://unfccc.int/sites/default/files/resource/cma2022_04.pdf.

³³ UNFCCC, *National Adaptation Plans 2023, Progress in the Formulation and Implementation of National Adaptation Plans* (Bonn, Germany: UNFCCC, December 4, 2023), <https://unfccc.int/sites/default/files/resource/NAP-progress-publication-2023.pdf>.

³⁴ UNFCCC, *Outcome of the first global stocktake*, Decision 1/CMA.5, ¶¶ 49, 50, 64(a).

³⁵ This prevents them from being able to engage in decision-making and implementation processes adequately and effectively for adaptation and climate risk management. Enhancing international cooperation, coordination, action, and support for systematic observation, climate services, and EWS can help to close these gaps.

³⁶ Kaveh Guilanpour et al., *A Solutions-oriented Approach to the Paris Agreement’s Global*; Lavanya Rajamani et al., *Re-invigorating the UN Climate Regime in the Wider Landscape of Climate Action* (Arlington, VA: Center for Climate and Energy Solutions, November 2023), <https://www.c2es.org/document/re-invigorating-the-un-climate-regime/>.

³⁷ UNFCCC, *Technical dialogue of the first global stocktake: Synthesis report by the co-facilitators on the technical dialogue*.

³⁸ Another barrier is the fragmented approaches to MHEWS, where some aspects of the value chain are advanced while others are neglected. The 2024 WMO Hydromet Gap Report shows that funds are often spent ineffectively due to poor coordination and duplication among funding bodies. Despite advanced technology being provided, the country faces basic capacity issues, including a lack of staff and maintenance neglect. There is also insufficient collaboration and data exchange at the national level. Investments frequently lack context and sustainability. WMO and Alliance for Hydromet Development, *Hydromet Gap Report 2024* (Geneva Switzerland: WMO, 2024), <https://library.wmo.int/records/item/68926-hydromet-gap-report-2024>.

³⁹ Eda Kosma, Kaveh Guilanpour, and Leila Pourarkin, *Rising to the Climate Finance Challenge* (Arlington, VA: C2ES, September 2024), <https://www.c2es.org/document/rising-to-the-climate-finance-challenge/>.

⁴⁰ Guilanpour et al., *A Solutions-oriented Approach to the Paris Agreement's Global*; Lavanya Rajamani et al., *Reinvigorating the UN Climate Regime in the Wider Landscape of Climate Action*; UN High Level Climate Champions [hereinafter HLCs], *2030 Climate Solutions: Implementation Roadmap*, Version 1 (December 2023), <https://climatechampions.unfccc.int/wp-content/uploads/2023/12/2030-Climate-Solutions-Publication-Implementation-roadmap.pdf>.

⁴¹ The role of the HLC was established at COP21 to connect the work of governments with the main voluntary and collaborative actions taken by cities, regions, businesses, and investors. The HLCs' initiatives and analytical work are offered as valuable resources to Parties in taking climate action, for more information see: "The High-Level Climate Champions," UNFCCC, accessed on August 28, 2024, <https://climatechampions.unfccc.int/un-climate-change-high-level-champions/>.

⁴² HLCs, *2030 Climate Solutions: Implementation Roadmap*.

⁴³ These actions and enablers have been drawn from the HLCs work on the 2030 Breakthroughs, which sets out a Clean Power Breakthrough aiming for solar and wind to make up at least 40 percent – and all renewables to make up at least 60 percent – of global electricity generation by 2030. "2030 Breakthroughs," Climate Champions, accessed September 13, 2024, <https://climatechampions.unfccc.int/system/breakthroughs/>. They also draw on the Breakthrough Agenda; its aims to make clean power "the most affordable and reliable option for all countries to meet their power needs efficiently by 2030." "Breakthrough Agenda," Climate Champions, accessed September 13, 2024, <https://breakthroughagenda.org/>.

⁴⁴ "The Early Warnings for All Initiative Advisory Panel," UN, accessed September 13, 2024, <https://www.un.org/en/climatechange/earlywarningsforall-advisory-panel>.

⁴⁵ UNDRR and WMO, *Global Status of Multi-Hazard Early Warning Systems*.

⁴⁶ UNDRR, *First Report of the Advisory Panel of the Early Warnings for All Initiative to the UNSG* (Nairobi, Kenya: UNDRR, November 2023), <https://www.undrr.org/media/91943/download?startDownload=20240523>.

⁴⁷ "COP28 Declaration on Climate Relief, Recovery, and Peace," COP28, December 3, 2023, <https://www.cop28.com/en/cop28-declaration-on-climate-relief-recovery-and-peace>.

⁴⁸ UNFCCC, *Outcome of the first global stocktake*, Decision 1/CMA.5, ¶ 191.

⁴⁹ "The Group of 20 [hereinafter G20] Disaster Risk Reduction Working Group," UNDRR, accessed May 6, 2024, <https://g20drrwg.preventionweb.net/>.

⁵⁰ "Climate Promise," UN Development Programme [hereinafter UNDP], accessed April 22, 2024, <https://climatepromise.undp.org>.

⁵¹ UNDP "UN Development Programme launches next phase of flagship climate action initiative" (Press Release), April 23, 2024, <https://climatepromise.undp.org/news-and-stories/un-development-programme-launches-next-phase-flagship-climate-action-initiative>.

⁵² "NDC 3.0 Navigator," NDC Partnership, accessed April 22, 2024, <https://ndcpartnership.org/>.

⁵³ "NDC 3.0 Navigator," NDC Partnership, accessed June 28, 2024, <https://ndcnavigator.org/>.

⁵⁴ "Aligned to the Paris Agreement Temperature Goal: Exploring Sector-Specific Opportunities," NDC Navigator, accessed July 18, 2024, <https://ndcnavigator.org/routes/temperature-goal/sector-specific-opportunities>.

⁵⁵ UNFCCC, "Regional Fora Aim to Increase Country Ambition Ahead of Next Round of Climate Plans" (Press Release), July 23, 2024, <https://unfccc.int/news/regional-fora-aim-to-increase-country-ambition-ahead-of-next-round-of-climate-plans>.

⁵⁶ "About," NAP Global Network, accessed April 29, 2024, <https://napglobalnetwork.org/about/>.

⁵⁷ "UN4NAPs," UNFCCC, accessed April 29, 2024, <https://unfccc.int/UN4NAPs>.

⁵⁸ UNFCCC, "Technology for Early Warnings and Risk-Informed Adaptation," July 5, 2024, <https://unfccc.int/news/technology-for-early-warnings-and-risk-informed-adaptation>.

⁵⁹ WMO, *Developing the Climate Science Information for Climate Action*, WMO-No. 1287 (Geneva, Switzerland: WMO, 2022), <https://library.wmo.int/records/item/53280-developing-the-climate-science-information-for-climate-action>.

⁶⁰ "Early warning, early action," International Federation of the Red Cross, accessed May 9, 2024, <https://www.ifrc.org/our-work/disasters-climate-and-crises/climate-smart-disaster-risk-reduction/early-warning>.

