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Item 4 of the provisional agenda*

Supporting the implementation of the Executive Action Plan on Early Warnings for All, 2023–2027, through a regional strategy

Regional strategy to achieve early warnings for all by 2027 in Asia and the Pacific

Note by the secretariat

Summary

Early warnings that reach all is a key adaptation measure that saves lives and livelihoods and reduces loss and damage. On 8 November 2022, during the twenty-seventh session of the Conference of the Parties to the United Nations Framework Convention on Climate Change, the Secretary-General launched the Executive Action Plan on Early Warnings for All, 2023–2027, which is aimed at ensuring that everyone on the planet is protected by early warning systems by 2027. Achieving this objective is critical in Asia and the Pacific, the world's most populous and disaster-affected region. Furthermore, not only are climate-related disasters on the rise, their impacts are increasingly transboundary. Efforts to implement the Executive Action Plan at the country level could benefit from a regional strategy that seeks to build transboundary synergies.

The present document contains the elements of a regional strategy to support the implementation of the Executive Action Plan in Asia and the Pacific. In preparing the document, the secretariat has been guided by Economic and Social Commission for Asia and the Pacific (ESCAP) resolutions 71/12, 73/7 and 76/1, as well as the draft resolution entitled “Accelerating climate action in Asia and the Pacific for sustainable development”, which is expected to be adopted on 19 May 2023 at the seventy-ninth session of ESCAP, in which members and associate members are called upon to strengthen regional and subregional cooperation to accelerate climate action in Asia and the Pacific, including by promoting the implementation and strengthening of early warning systems for all as key adaptation strategies in the region. The secretariat has also been guided by the Executive Action Plan on Early Warnings for All, 2023–2027, the Sendai Framework for Disaster Risk Reduction 2015–2030 and the political declaration of the high-level meeting on the midterm review of the Sendai Framework for Disaster Risk Reduction 2015–2030, which is expected to be adopted by the General Assembly on 19 May 2023. The proposed elements of a regional strategy contained in the present document are expected to enhance foresight planning through improved knowledge and data generated using the Risk and Resilience Portal hosted by ESCAP, as well

* ESCAP/CDR(8)/1/Rev.1.

as the secretariat's biennial *Asia-Pacific Disaster Report* and its subregional reports. A regional strategy could also serve as a basis for strengthened regional cooperation through existing mechanisms, for example the Asia-Pacific Disaster Resilience Network, the ESCAP multi-donor trust fund for tsunami, disaster and climate preparedness, the ESCAP/WMO Typhoon Committee, the WMO/ESCAP Panel on Tropical Cyclones and subregional climate outlook forums.

The Committee on Disaster Risk Reduction is invited to provide guidance to the secretariat on the further development of a regional strategy to achieve early warnings for all by 2027 in Asia and the Pacific.

I. Introduction

1. In March 2022, the Secretary-General set out an ambitious new United Nations target: to ensure that by 2027 everyone on Earth would be protected by early warning systems against increasingly extreme weather events and climate change. Recognizing that human-caused climate disruption is now damaging every region and that each increment in global warming will further increase the frequency and intensity of extreme weather events, the Early Warnings for All initiative is an effort to accelerate action on adaptation and resilience in a riskier world. Based on partnerships involving the United Nations, international agencies and international financing institutions, the Executive Action Plan on Early Warnings for All, 2023–2027, also supports efforts to achieve global target G of the Sendai Framework for Disaster Risk Reduction 2015–2030 to substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments by 2030.

2. The present document is intended to promote discussion on advancing regional and subregional approaches to multi-hazard early warning systems to support the implementation of the global Early Warnings for All initiative at the country level, the Sendai Framework and Economic and Social Commission for Asia and the Pacific (ESCAP) resolutions 71/12, 73/7 and 76/1, as well as the draft resolution entitled “Accelerating climate action in Asia and the Pacific for sustainable development”, to be adopted by ESCAP on 19 May 2023.

3. The proposed elements of a regional strategy contained in the present document cover the four pillars set out in the Executive Action Plan. The aim is to strengthen early warning systems through subregional partnerships to reduce disaster-related mortalities and associated costs in the multi-hazard risk hotspots identified in the *Asia-Pacific Disaster Report 2023*.

II. Criticality of early warnings for all

4. As outlined in the note by the secretariat containing a summary of the *Asia-Pacific Disaster Report 2023*,¹ Asia and the Pacific remains the world's most disaster-affected region. Since 1970, 2 million people have lost their lives to disasters in the region. This represents 60 per cent of the global disaster-related death toll and is equivalent to 105 lives being lost to disasters every day.²

¹ ESCAP/CDR(8)/2.

² *Asia-Pacific Disaster Report 2021: Resilience in a Riskier World – Managing Systemic Risks from Biological and Other Natural Hazards* (United Nations publication, 2021).

5. Ensuring access to early warning systems is a key adaptation measure that saves lives and livelihoods and minimizes economic losses. Countries with limited-to-moderate multi-hazard early warning systems coverage have nearly eight times the mortality rate of countries with substantial-to-comprehensive coverage.³ While just over 50 per cent of countries in Asia and the Pacific report providing climate services at an average level, many countries are only able to provide basic or no climate services.⁴ Gaps in early warning systems should be addressed in order to reduce the fatality rates of the region. In addition to saving lives, early warning systems also provide a tenfold return on investment – the greatest of any adaptation measure.⁵ Warnings issued only 24 hours prior to a coming storm or heatwave can reduce the ensuing damage by 30 per cent, and an investment of \$800 million on such systems in developing countries would avoid losses of \$3 billion to \$16 billion per year.⁶ Despite these known benefits, however, one third of the global population is still not covered by early warning systems, and vulnerable people, including those living in geographically remote areas, are disproportionately affected.⁷

6. Investments into multi-hazard early warning systems should address the gaps in current systems by comprehensively strengthening each of the four pillars of early warning systems, namely: disaster risk knowledge and management (pillar 1); observations and forecasting (pillar 2); dissemination and communication (pillar 3); and preparedness to respond (pillar 4). In Asia and the Pacific, much progress has been made under pillars 1 and 2, while considerable gaps remain for many countries under pillars 3 and 4. For instance, although the 2022 floods in Pakistan demonstrated the capacity of technical agencies with regard to observations, analysis and forecasting of the specific hazards, the disaster brought to light the limitations of authorities to take preparedness measures.⁸

7. The effectiveness of an early warning system is also dependent on the seamless integration of the meteorological value chain, with the first three links being established globally and the last three being implemented nationally (figure I). Accurate weather and climate forecasts, especially those that extend beyond 24 to 36 hours, require the use of global observational data and models that are already readily available owing to global collaboration. Low-capacity nations, such as the least developed countries and small island developing States, have the least mature climate services and early warning products, which also affects the quality of forecasting on a global level. The global-to-local link in early warning systems is especially critical for addressing transboundary hazards and achieving economies of scale. This is where the regional and subregional components of the global-to-local early warning information value chain assume particular significance.

³ United Nations Office for Disaster Risk Reduction and World Meteorological Organization (WMO), “Global status of multi-hazard early warning systems: target G” (Geneva, 2022).

⁴ WMO, “State of the climate in Asia 2021” (Geneva 2022); and WMO, “State of the climate in the South-West Pacific 2021” (Geneva, 2022).

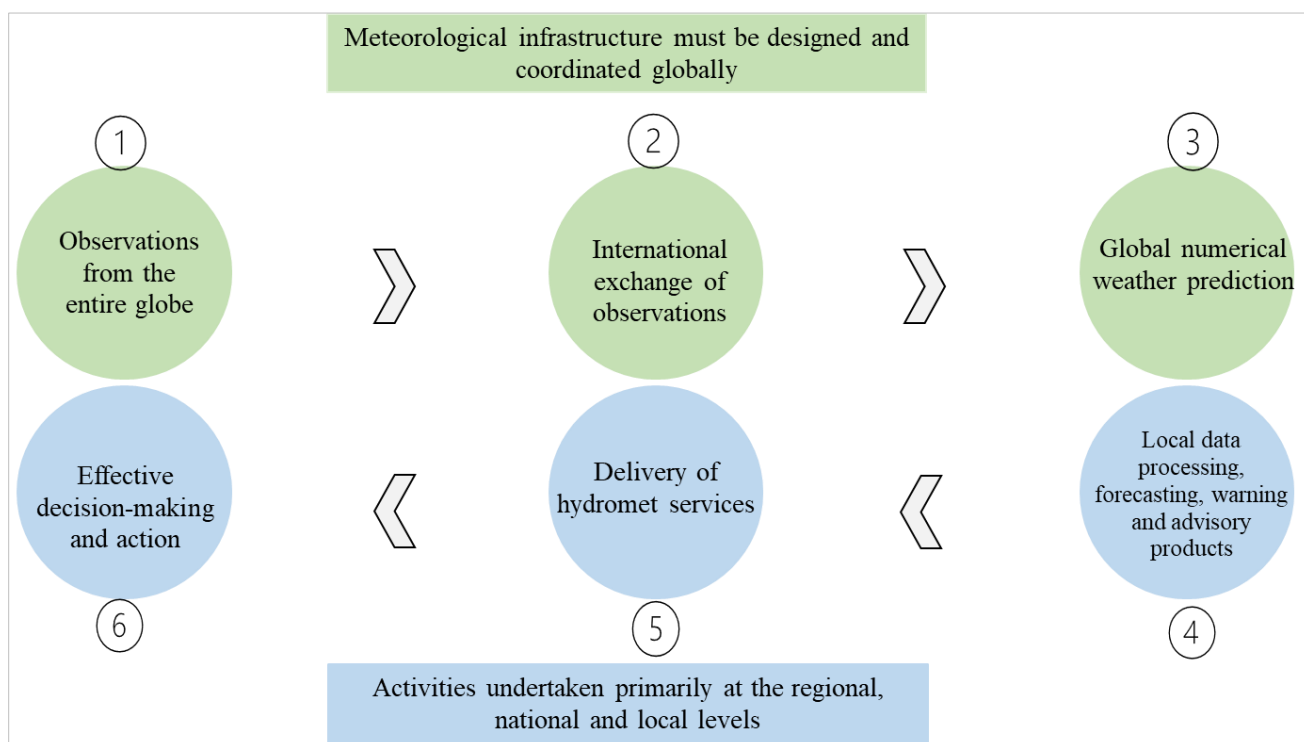
⁵ Global Commission on Adaptation, *Adapt Now: A Global Call for Leadership on Climate Resilience* (Rotterdam, Kingdom of the Netherlands, 2019).

⁶ Ibid.

⁷ See also ESCAP/79/11, paras. 17 and 20.

⁸ Pakistan, Ministry of Planning, Development and Special Initiatives, *Resilient Recovery, Rehabilitation, and Reconstruction Framework: Pakistan (4RF)* (Islamabad, 2022). See also ESCAP/79/11, paras. 19 and 21.

Figure I
Meteorological value chain



Source: Adapted from Alliance for Hydromet Development, *Hydromet Gap Report 2021* (Geneva, 2021).

8. Multi-hazard early warning systems should be strengthened in an inclusive and participatory manner and investments in people-centred multi-hazard early warning systems should be tailored to the needs of users, including their social and cultural requirements, to ensure that early warnings lead to early action.⁹

A subregional and transboundary imperative

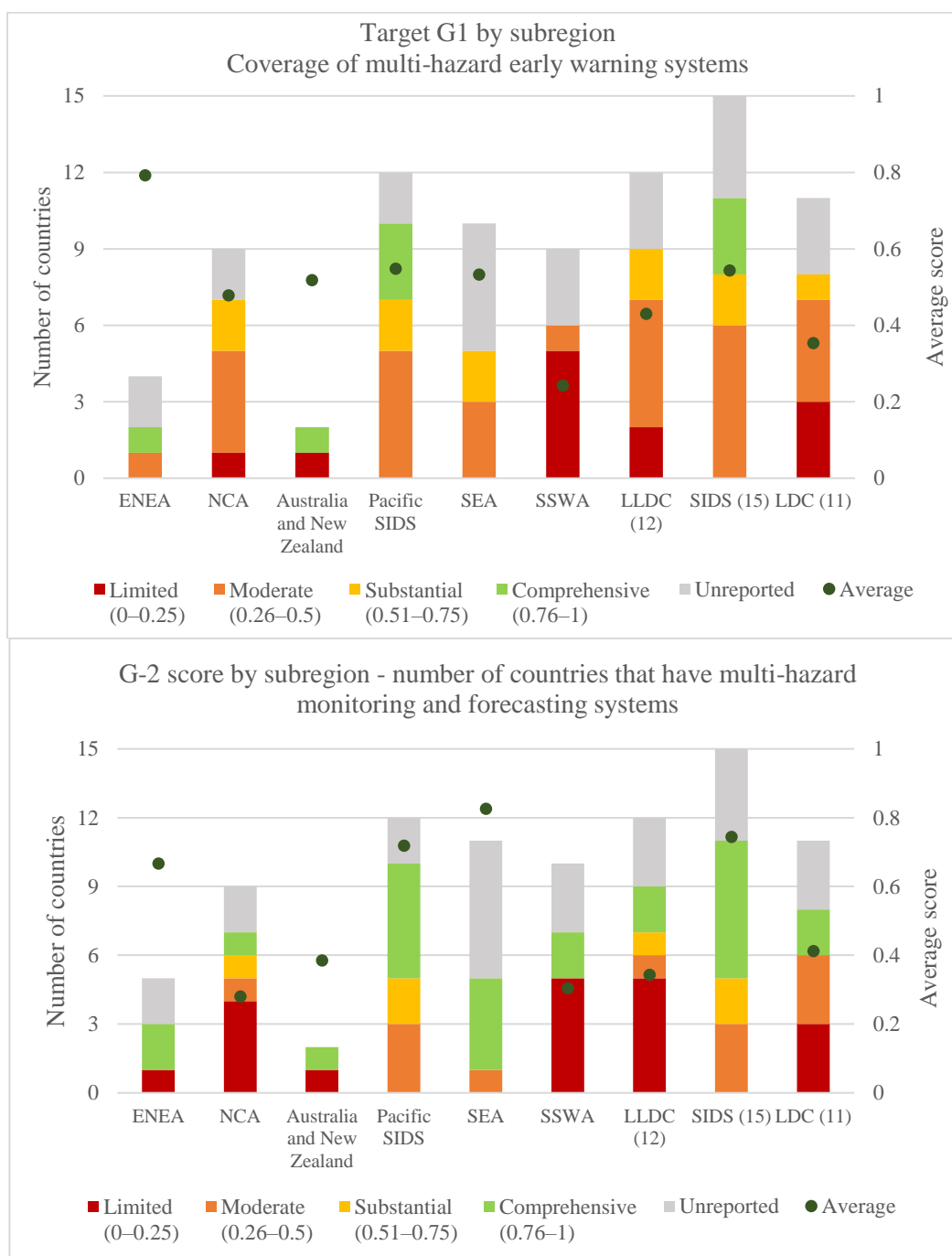
9. Since 1970, disasters in Asia and the Pacific have been responsible for over 2 million deaths, which is equal to 60 per cent of the global disaster-related death toll. Across the region, disaster-related fatalities have been unevenly distributed, with more than 1 million, or 50 per cent of the fatalities, occurring in South and South-West Asia. As a percentage of the population, the most fatalities have been recorded in South-East Asia and in South and South-West Asia. Least developed countries have experienced mortality rates that are two to six times those of other countries. These high rates of fatalities in South-East Asia, in South and South-West Asia and in least developed countries also correspond with the lowest relative multi-hazard early warning systems capacity as indicated in the latest reporting on the implementation of global target G of the Sendai Framework. With the share of people exposed to multi-hazard risks in the region forecast to increase from 82 per cent under the baseline global warming scenario to 85 and 87 per cent under the 1.5°C and 2°C global warming scenarios respectively, addressing

⁹ See the political declaration of the high-level meeting on the midterm review of the Sendai Framework for Disaster Risk Reduction 2015–2030, which is expected to be adopted by the General Assembly on 19 May 2023, paras. 36, 38 and 39 (c).

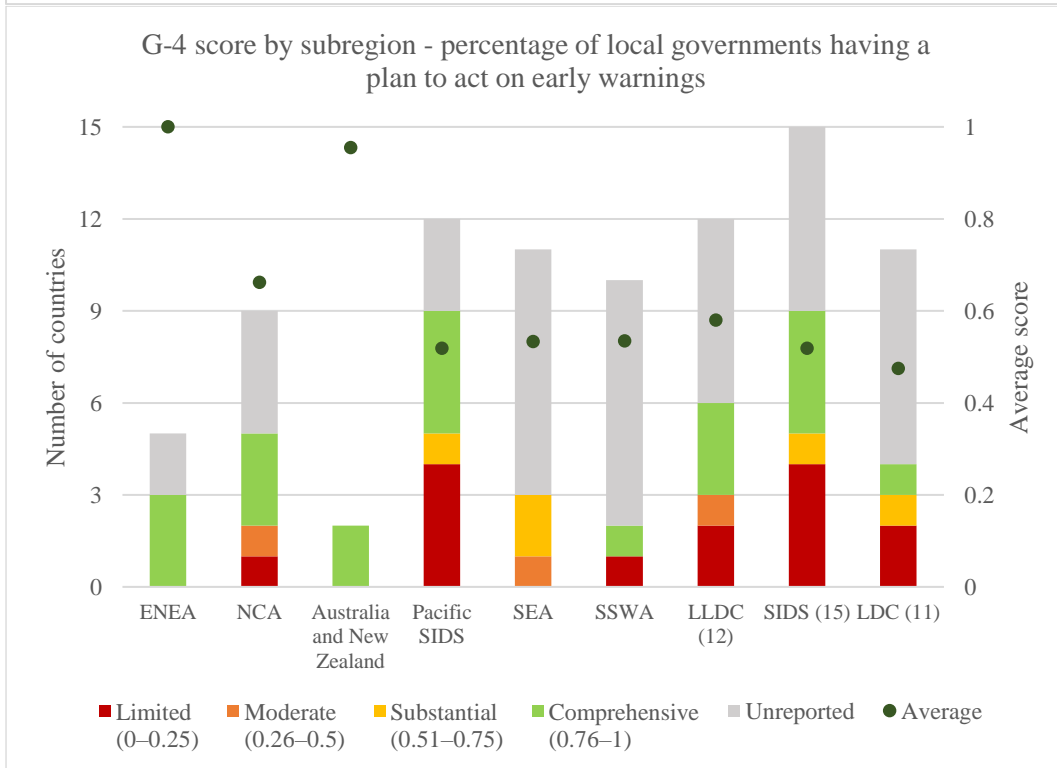
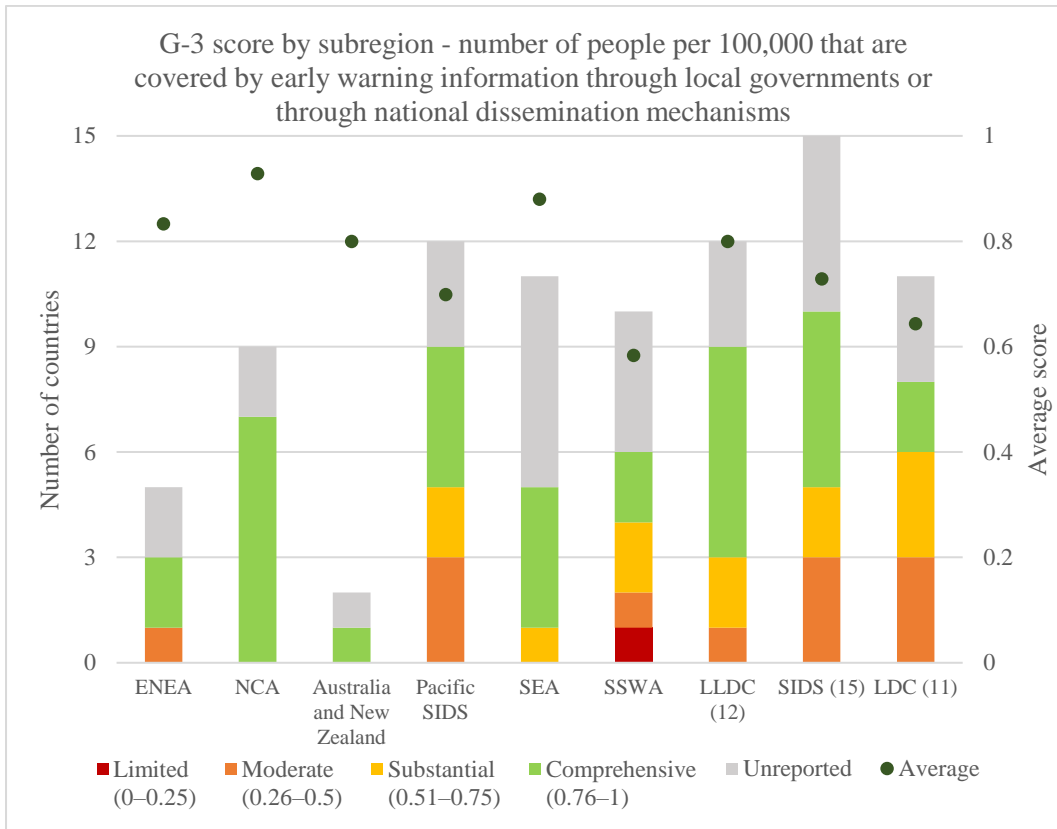
multi-hazard early warning gaps will be critical for protecting at-risk populations.¹⁰

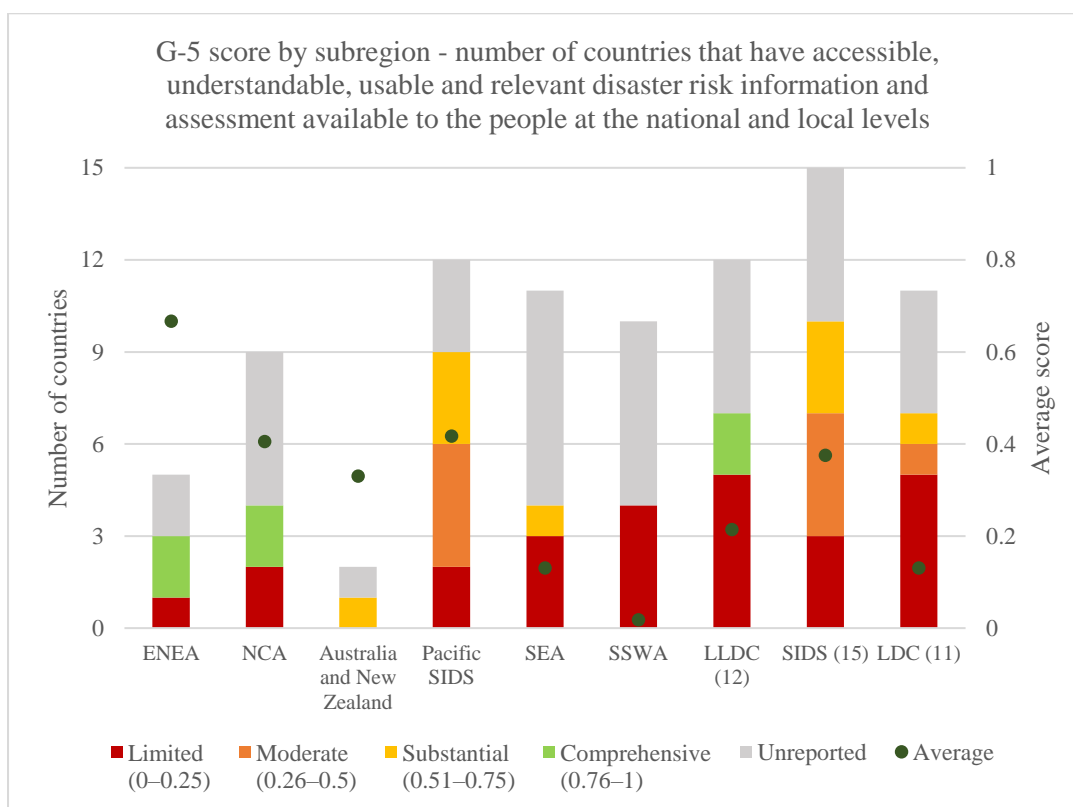
10. The Sendai Framework includes the expansion of multi-hazard early warning systems as a distinct target: global target G. Analysing the midterm review scores for global target G by subregion shows the existing capacities and the gaps that should be addressed in a regional contextualization of the Early Warnings for All initiative (see figure II).

Figure II
Global target G scores (G1–G5), by Asia-Pacific subregion and country type



¹⁰ *Asia-Pacific Disaster Report 2023* (United Nations publication, forthcoming). See also ESCAP/CDR(8)/2.





Source: ESCAP calculations based on unpublished data received from the United Nations Office for Disaster Risk Reduction in February 2023.

Abbreviations: ENEA, East and North-East Asia; NCA, North and Central Asia; SEA, South-East Asia; SSWA, South and South-West Asia; LLDC, landlocked developing countries; SIDS, small island developing States; LDC, least developed countries.

11. South and South-West Asia is the subregion with the lowest coverage of multi-hazard early warning systems, with significant gaps in national- and local-level information on disaster-related risks (pillar 1) and monitoring and forecasting systems (pillar 2). Considering that approximately 50 per cent of the population of South and South-West Asia is affected by droughts, floods, heatwaves and surface winds, access to comprehensive multi-hazard early warning systems is critical.

12. In North and Central Asia, significant progress has been made by local and national governments to establish adequate warning dissemination systems (pillar 3). Critical gaps remain, however, in monitoring and forecasting systems (pillar 2) and there is additional room for improvement under all the other pillars. Developing a multi-hazard early warning system that prioritizes droughts and heatwaves will be important, as will enhancing the capacity to monitor sand and dust storms, which affect over one fifth of the population.

13. Of all the subregions, South-East Asia is faced with the highest number of fatalities as a proportion of the population. One underlying cause may be the subregion’s varying capacities under each of the early warning pillars, with notable gaps in providing disaster risk information at the national and local levels (pillar 1). The low rate of reporting on the implementation of the Sendai Framework, however, makes it difficult to analyse subregional capacities.

Nevertheless, existing information suggests that targeted flood warning systems are critical for nearly 100 per cent of the population.¹¹

14. East and North-East Asia is the subregion that is best equipped in terms of multi-hazard early warning systems, thanks to strengths in local government planning (pillar 4) and warning dissemination (pillar 2). Those efforts will need to be continued and further expanded, as 60–80 per cent of the subregion’s population is heavily exposed to flooding and surface winds under the baseline, 1.5°C and 2°C global warming scenarios. Thus, every effort should be made to strengthen early warning systems so that they cover over 80 per cent of the population and result in significant reductions in fatalities and the number of those affected by disasters.

15. While the Pacific suffers almost twice the annual average gross domestic product loss (8 per cent) as a result of disasters compared to other subregions, it has achieved considerable improvements in its monitoring and forecasting systems (pillar 2), largely thanks to shared service modalities. There are major gaps, however, in local government planning (pillar 4) and disaster risk knowledge (pillar 1) that would benefit from similar approaches. For multi-hazard early warning systems to cover every person in the Pacific, tropical cyclone and flood early warning systems need to reach vulnerable populations (these account for 80 per cent of the total) in order to significantly reduce fatalities and the number of those affected by disasters.

16. It is in the least developed countries, landlocked developing countries and small island developing States, however, that the most significant gaps lie in terms of ensuring disaster risk information at the national and local levels (pillar 1) and in terms of monitoring and forecasting (pillar 2). In both areas there are well-established avenues for tripartite and regional support.

III. An enabling international arena to anchor early warnings for all in Asia and the Pacific

A. Global frameworks and initiatives

17. At the global level, countries have been urged to shock-proof their progress on the Sustainable Development Goals by strengthening risk management governance and adopting a multi-hazard and multisectoral approach to challenges that can disrupt societal and economic networks, such as pandemics or climate change.¹² Furthermore, in line with the commitment made by Member States to protect our planet,¹³ most countries need to adapt their economies, their infrastructure and their services to account for the impact of climate change, with increased adaptation support for developing countries.¹⁴ Similarly, and given the regression on many of the Sendai Framework targets,¹⁵ Member States have been called upon to promote the further development of and investment in effective local, national and regional multi-hazard early warning mechanisms that lead to early action and to provide

¹¹ See ESCAP/CDR(8)/2.

¹² See A/78/80-E/2023/64.

¹³ General Assembly resolution 75/1.

¹⁴ A/75/982, para. 86.

¹⁵ See A/77/640.

support for the implementation of early warning systems.¹⁶ The Executive Action Plan on Early Warnings for All, 2023–2027, which was launched by the Secretary-General at the twenty-seventh session of the Conference of the Parties to the United Nations Framework Convention on Climate Change, contains a call for \$3.1 billion in new targeted investments to ensure that everyone on the planet is protected by early warning systems within five years.

18. In March 2015, the International Network for Multi-Hazard Early Warning Systems was announced at the Third United Nations World Conference on Disaster Risk Reduction, held in Sendai, Japan, to facilitate the sharing of expertise and good practices on multi-hazard early warning systems as part of a national strategy for disaster risk reduction, climate change adaptation and resilience-building. The Network supports the strengthening of user interface platforms as a contribution to the disaster risk reduction priority of the Global Framework for Climate Services and has systematically supported national-level progress on global target G of the Sendai Framework. As outlined in the report of the Committee on Disaster Risk Reduction on its sixth session,¹⁷ ESCAP is active in the Network through the Asia-Pacific Disaster Resilience Network. The Committee has highlighted the important role of regional cooperation in enhancing multi-hazard early warning systems in the Asia-Pacific region through this mechanism.¹⁸

19. Under the Presidency of India, the Group of 20 has established the Working Group on Disaster Risk Reduction, which is focused on achieving early warnings for all. To support the deliberations of the Working Group, the ESCAP secretariat, in partnership with the World Meteorological Organization (WMO), the United Nations Office for Disaster Risk Reduction and the Regional Integrated Multi-hazard Early Warning System for Africa and Asia, has produced the *Compendium of Multi-hazard Early Warning Cooperation* and an input paper entitled “Early warnings for all in Asia and the Pacific: opportunities for action”.¹⁹ These documents contributed to the discussions of the Working Group and led to an agreement on the recommendations for priority 1, on global coverage of early warning systems:

- (a) Financing early action: compendium of fit-for-purpose and fit-for-budget early warning business models;
- (b) Regional and subregional plans of action: complement the ESCAP study with regional and subregional analyses for managing transboundary multi-hazard risk hotspots;
- (c) Digital platform for knowledge-sharing: structure around the four pillars.

B. Regional commitments and action

20. At the regional level, the *Asia and the Pacific SDG Progress Report 2022*²⁰ shows that insufficient progress has been made on achieving certain Sustainable Development Goal indicators, for example indicators 13.1.1 (number of deaths, missing persons and directly affected persons attributed to

¹⁶ See the political declaration of the high-level meeting on the midterm review of the Sendai Framework for Disaster Risk Reduction 2015–2030, which is expected to be adopted by the General Assembly on 19 May 2023, para. 39 (c).

¹⁷ ESCAP/CDR/2019/3.

¹⁸ See ESCAP/CDR/2019/2 and E/ESCAP/CDR(5)/2.

¹⁹ See <https://g20drrwg.preventionweb.net/>.

²⁰ United Nations publication, 2022.

disasters per 100,000 population) and 13.1.2 (number of countries that adopt and implement national disaster risk reduction strategies in line with the Sendai Framework). With regard to target 13.a, climate finance remains primarily targeted at addressing mitigation, however, and financing for adaptation measures continues to lag. Systematically integrating risk considerations into planning for the 2030 Agenda for Sustainable Development and comprehensive multi-hazard early warnings can reduce the consequences of shocks, especially for those most vulnerable.

21. While disaster-related financing has increased since 2010, most of the resources have continued to support disaster response and recovery, and countries with the highest disaster-related mortality rates receive only a negligible share of funding for disaster risk reduction per capita.²¹ The multi-donor trust fund for tsunami, disaster and climate preparedness, the establishment of which was welcomed by ESCAP in its resolution 62/7 and the strengthening of which was called for in ESCAP resolutions 71/12 and 73/7, is the only dedicated regional trust fund that delivers coordinated financial and technical support to address the unmet needs and gaps in the early warning systems in Asia and the Pacific. By pooling resources, the trust fund facilitates South-South and triangular cooperation to strengthen disaster resilience in high-risk, low-capacity countries while supporting the improvement of climate preparedness, multi-hazard early warning and disaster response in the region. The secretariat has therefore proposed that the trust fund be scaled up and used as a mechanism that can readily mobilize support with financing for the attainment of early warning systems for all by 2027. The trust fund can also promote strengthened financial architectures that link the global to the regional and local and view investments in early warning and climate adaptation as an investment in present and future economic, social and environmental sustainability.²²

22. Because hazards and disasters often occur across borders, Asia-Pacific countries have developed cooperation mechanisms to improve regional disaster risk management and are considering establishing other such mechanisms, for instance the United Nations special programme for the Aral Sea basin, which is expected to promote regional and international cooperation to study, mitigate and minimize the consequences of disasters in the water basin of the Aral Sea.²³ Similarly, the ESCAP/WMO Typhoon Committee and the WMO/ESCAP Panel on Tropical Cyclones are intergovernmental platforms that address the transboundary hazards caused by storms in the Western Pacific and in the Bay of Bengal and the Arabian Sea, respectively. The activities of these two intergovernmental organizations are supported by regional specialized meteorological centres in New Delhi and Tokyo. Looking ahead, shared hazards like the increasing heatwaves experienced by urban populations, the seismic activities affecting countries along the Pacific Ring of Fire and the floods experienced by transboundary river basin communities

²¹ United Nations Office for Disaster Risk Reduction, *Global Assessment Report on Disaster Risk Reduction 2022: Our World at Risk – Transforming Governance for a Resilient Future* (Geneva, 2022).

²² Roger Pulwarty and others, “Risk to resilience: climate change, disasters and the WMO-United Nations Office for Disaster Risk Reduction Centre of Excellence”, *WMO Bulletin*, vol. 71, No. 1 (2022). See also ESCAP/79/11, para. 30.

²³ See the draft resolution entitled “Consideration of the modalities for the establishment of the United Nations special programme for the Aral Sea basin”, which ESCAP is expected to adopt on 19 May 2023, during its seventy-ninth session.

could be better addressed through collective action to establish robust early warning systems.

23. The Regional Integrated Multi-hazard Early Warning System for Africa and Asia, established with the support of the multi-donor trust fund for tsunami, disaster and climate preparedness, is an intergovernmental institution owned and managed by its 22 member States and 26 collaborating States. It is a regional early warning system that generates and communicates early warning information and provides capacity-building opportunities in the areas of preparedness and response to transboundary hazards. It connects global observational capacities with national and local networks, especially in low-capacity developing countries and small island developing States, which can be missed out by the WMO Global Telecommunication System.²⁴ In its resolution 70/1, ESCAP noted that it was important to strengthen the Regional Integrated Multi-hazard Early Warning System for Africa and Asia, and continues to work in partnership with it through the multi-donor trust fund for tsunami, disaster and climate preparedness.

24. In the aftermath of the 2004 Indian Ocean tsunami, a major milestone of regional cooperation was the establishment of the Indian Ocean Tsunami Warning and Mitigation System, which became operational in 2011. In the framework of that System, Australia, India and Indonesia are responsible for issuing tsunami bulletins to 27 member States. In total, 24 Indian Ocean countries have since established national tsunami warning centres as a result of this mechanism. The System was modelled on and was initially supported by the Pacific Tsunami Warning and Mitigation System. Established in 1968, that System has remained a gold standard in early warning. Today, it can issue tsunami warnings in only a few minutes. It is estimated that the Indian Ocean Tsunami Warning and Mitigation System, which is now fully operational, will save some 1,000 lives every year over the next 100 years.

IV. Translating the Executive Action Plan on Early Warnings for All, 2023–2027, into a regional strategy

25. As outlined above, Asia and the Pacific has a long-established history of recognizing the public good of hydrological and meteorological services and achieving economies of scale when collectively establishing multi-hazard early warning systems. Through relevant regional and international organizations, ESCAP members and associate members have been actively sharing expertise – in assessing risks, developing sustainable monitoring and warning services, improving dissemination and building capabilities for response. Regional cooperation has made it possible to bridge gaps in early warning information value chains and has been shown to deliver concrete benefits, in particular to small island developing States and other high-risk developing countries.²⁵

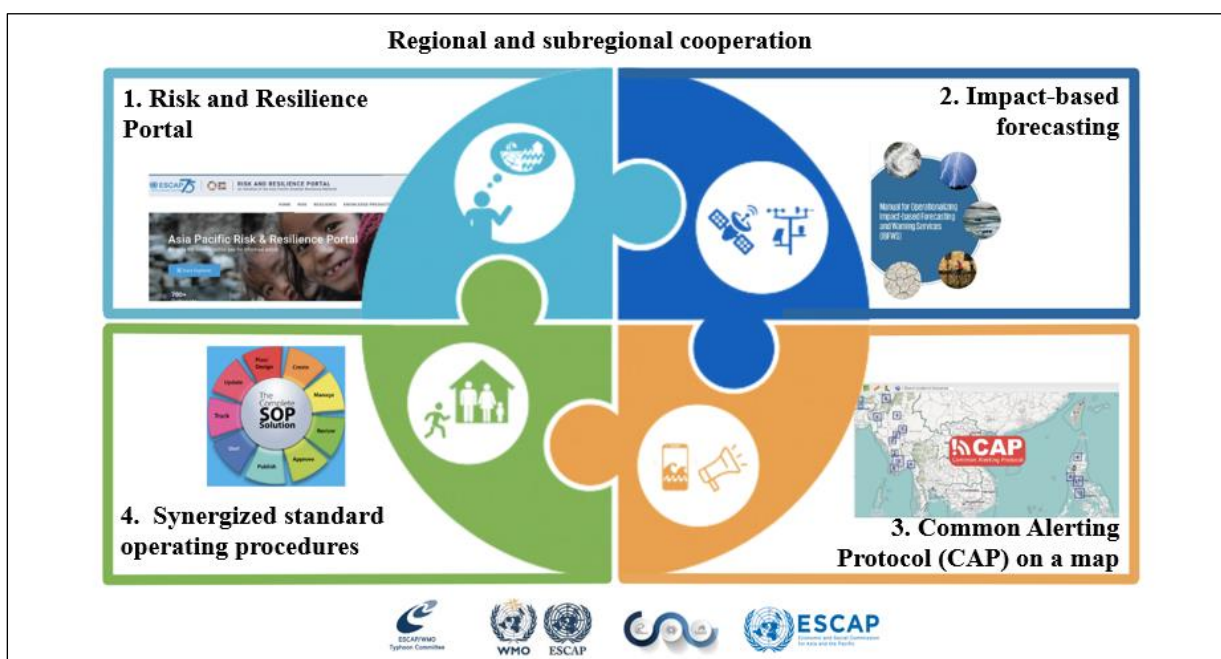
26. In its draft resolution entitled “Accelerating climate action in Asia and the Pacific for sustainable development”, ESCAP encourages its members and associate members to strengthen regional and subregional cooperation to accelerate climate action, including by promoting the implementation and strengthening of early warning systems for all as key adaptation strategies in the region. Moreover, it requests the secretariat to build the capacities of members and associate members, in particular least developed countries, landlocked developing countries and small island developing States, to develop

²⁴ *Asia-Pacific Disaster Report 2015: Disasters without Borders – Regional Resilience for Sustainable Development*, chap. 3 (United Nations publication, 2016).

²⁵ *Ibid.*

early warning systems for all at the regional level. Focusing on the nominated pilot countries²⁶ in Asia and the Pacific and in partnership with the United Nations Office for Disaster Risk Reduction and WMO, the global co-leads for the Executive Action Plan on Early Warnings for all, 2023–2027, the secretariat proposes targeted workstreams and capacity-building in line with each of the pillars (as shown in figure III and as outlined in the paragraphs below), taking into account the existing regional cooperation mechanisms and the gaps identified under the four pillars of the Executive Action Plan. Priorities will vary from country to country and from subregion to subregion, but the aim is to provide a collective and renewed commitment to achieving early warnings for all by taking into consideration the evolving situation regarding climate risks and the exposure of populations and critical infrastructure to those risks²⁷ and by capitalizing on the benefits and gains achieved so far through regional cooperation.

Figure III
Translating the Executive Action Plan on Early Warnings for All, 2023–2027, into a regional strategy for Asia and the Pacific



27. The ESCAP secretariat will draw on a twin-track partnership approach to implement the proposed elements of a regional strategy. Such an approach is based on existing partnerships. Firstly, led at the national level by United Nations resident coordinators, the ESCAP secretariat is working with United Nations country teams across all four pillars to support the Early Warnings for All initiative and national priorities, while promoting further action at the transboundary and subregional levels. Secondly, working in partnership with each of the global pillar leads for the Executive Action Plan, the ESCAP secretariat is working in partnership with the United Nations Office for Disaster Risk Reduction on pillar 1, on enhancing the sharing of disaster risk knowledge; WMO on pillar 2, on detecting, observing, monitoring, analysing and forecasting hazards; the International Telecommunication Union on pillar 3, on disseminating and communicating early warnings by leveraging

²⁶ As of 12 May 2023, the pilot countries in Asia and the Pacific are Bangladesh, Cambodia, Fiji, Kiribati, the Lao People’s Democratic Republic, Maldives, Nepal, Samoa, Solomon Islands, Tajikistan and Tonga.

²⁷ See ESCAP/CDR(8)/2.

digital technologies; and the International Federation of Red Cross and Red Crescent Societies on pillar 4, on enhancing, in particular, disaster preparedness capabilities (see figure IV).

Figure IV
Partnerships for achieving early warnings for all in Asia and the Pacific



A. Pillar 1: disaster risk knowledge and management

28. According to the results of the midterm review of the Sendai Framework, Asia-Pacific countries scored lowest on indicator G-5 (number of countries that have accessible, understandable, usable and relevant disaster risk information and assessment available to the people at the national and local levels). Two thirds of the countries reporting against this indicator reported limited-to-moderate availability of disaster risk and assessment information to the people at the national and local levels. While considerable investment has been made to assess existing and evolving disaster risks at the global and regional levels, it is evident that more work needs to be done to translate these risk analyses to the national and subnational levels. Furthermore, as disaster risks in the region are increasingly transboundary in nature, investments into activities under pillar 1 should aim to facilitate cooperation between neighbouring countries.

Risk and Resilience Portal

29. The ESCAP secretariat has developed climate scenario analyses and science-based policy recommendations using the latest data from the Coupled Model Intercomparison Project 6 and taking into consideration the Shared Socioeconomic Pathways that have been developed recently by experts.²⁸ The analyses available at the ESCAP Risk and Resilience Portal²⁹ aim to pre-emptively identify areas at high risk of natural hazards and assist

²⁸ See also ESCAP/CDR(8)/2 and ESCAP/CDR(8)/3.

²⁹ See <https://rrp.unescap.org/>.

Governments and communities to evaluate the cost-effectiveness of early warning systems for disaster mitigation.

30. The secretariat is also developing subnational risk scenarios for small island developing States, such as Maldives, to understand the nuances of climate variability at the local level. By downscaling the global models, ESCAP is able to guide risk-informed local development planning for small island developing States.

31. Through the Risk and Resilience Portal, the secretariat is able to share information not only about disaster risks, but also about population and critical infrastructure exposure to transboundary hazards under multiple climate scenarios. The Aral Sea storyboard is the first product to set the latest climate projections against data on exposure and vulnerability to transboundary hazards.³⁰ The tool highlights risk hotspots, especially for people and agriculture, and underscores the need for a subregional approach and cooperation to address transboundary hazards.

B. Pillar 2: observations and forecasting

32. Regarding indicator G-2 of the Sendai Framework (number of countries that have multi-hazard monitoring and forecasting systems), the least developed countries and landlocked developing countries have the most limited monitoring and forecasting systems in Asia and the Pacific. This suggests that there is an untapped opportunity to share monitoring and forecasting systems beyond national borders, especially in subregions where most hazards are transboundary in nature.

33. Impact-based forecasting is a structured approach that involves combining data on exposure and vulnerability to hazards in order to identify risks and support decision-making. Impact-based forecasting that uses seasonal and subseasonal data helps to translate forecasts into actions that enable national disaster management agencies to prepare in advance for the likely event of hydrometeorological hazards in collaboration with representatives of different sectors and local communities.

Seasonal impact-based forecasting

34. In the Asia-Pacific region, climate outlook forums are held to discuss and develop consensus-based seasonal forecasts that are then used by the secretariat to conduct impact-based forecasting for the season. In close collaboration with WMO, ESCAP contributes seasonal impact-based forecasts to regional climate outlook forums, including the Association of Southeast Asian Nations Climate Outlook Forum, the South Asian Climate Outlook Forum and the Forum on Regional Climate Monitoring, Assessment and Prediction for Asia.

35. Notably, through the ESCAP multi-donor trust fund for tsunami, disaster and climate preparedness, the Regional Integrated Multi-hazard Early Warning System for Africa and Asia and national meteorological and hydrological services have been instrumental in organizing these multi-stakeholder forums, which help participants to reach a collective understanding of the risk-informed early actions needed and to foster a culture of preparedness each season.

³⁰ See <https://rrp.unescap.org/aral-sea>.

36. Regarding slow-onset disasters like droughts, impact-based forecasting that uses seasonal data can serve as an early warning system that triggers preparatory adaptation actions, such as adjusting crop types and cycles and preparing anticipatory social protection payments. The secretariat is also currently working on pilot projects to integrate seasonal forecast data into the ESCAP Risk and Resilience Portal to automate the impact-based forecasting process.

C. Pillar 3: dissemination and communication

37. Indicator G-3 of the Sendai Framework (number of people per 100,000 that are covered by early warning information through local governments or through national dissemination mechanisms) is arguably the one on which countries across the region have scored highest. Yet, the Pacific small island developing States and the least developed countries have reported gaps in dissemination capacities, often due to challenges in the ability of telecommunication networks to distribute warnings effectively and quickly to people at the last mile – that is, those who live in out-of-the-way areas or who are hard to reach owing to socioeconomic circumstances. High self-reported rates of comprehensive warning dissemination systems in Asia and the Pacific should be recognized and countries with universal or close to universal coverage are in a good position to share their good practices.

Common Alerting Protocol on a Map

38. The Common Alerting Protocol is a simple and widely agreed-upon format for exchanging all-hazard emergency alerts and public warnings over all kinds of information and communications technology networks, allowing a consistent warning message to be disseminated simultaneously, thus maximizing warning effectiveness. Many countries face difficulties in operationalizing the Common Alerting Protocol and synergizing multiple Common Alerting Protocol feeds between sectors and at the subnational level. Through the ESCAP multi-donor trust fund for tsunamis, disaster and climate preparedness, the project entitled “Common Alerting Protocol on a Map” has offered countries the software and procedures to manage their own Common Alerting Protocol through a common information exchange hub for better coordination at the time of a disaster. More work is needed to synergize Common Alerting Protocol feeds across sectors and at the subnational level and to ensure its sustainability. Initially piloted in Maldives, the Philippines and Sri Lanka, the project has since been implemented more widely.

39. In partnership with WMO and the International Telecommunication Union, the ESCAP secretariat proposes supporting WMO Global Multi-hazard Alert System initiatives in least developed countries. Facilitated by the Risk and Resilience Portal, the Common Alerting Protocol can be linked to geo-referenced dynamic risk information leading to location-based warning services being made available to those high-risk countries most in need. The Risk and Resilience Portal can support such initiatives by providing the digital risk data and a platform for mapping the cascading hazard alerts and predicting potential impacts.

40. The secretariat also notes the untapped potential of artificial intelligence-based technologies to increase the efficiency of early warning dissemination by providing shared, scalable and real-time early warnings to at-risk populations. Developments in machine learning, such as those employed by search engines for public alert features, offer scalable methodologies for streamlining, validating and disseminating location-based

early warnings and alert services in support of the authoritative warnings released by each country's national meteorological and hydrological services.

41. Furthermore, spacefaring nations in the region have been providing satellite imagery to countries on a timely basis. This includes multi-spectral satellite imagery, tailored tools and specific training activities free of charge to disaster-affected countries for early warning, response and damage assessment efforts. Through the Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018–2030),³¹ the secretariat has been developing flood hotspots and risk maps using open-source and easy-to-use models that integrate the use of digital technology applications with satellite-derived geospatial data such as artificial intelligence, big Earth data and cloud computing. Intended for use by national disaster management organizations and early warning agencies, academic institutions and think tanks, these models can be used to augment the capacities of national early warning systems for floods and wildfires.

D. Pillar 4: preparedness to respond

42. Regarding indicator G-4 of the Sendai Framework (percentage of local governments having a plan to act on early warnings), a clear dichotomy has been observed in the self-reported scores of countries with local plans to act on early warnings and those without. Notably, only half of the Pacific small island developing States reporting on indicator G-4 said that they had limited local plans in place. Landlocked developing countries in North and Central Asia, South Asia and South-East Asia also reported significant gaps in this area.

43. Furthermore, critical gaps were reported in the development of regional and provincial disaster risk reduction plans and strategies that took into account specific local conditions and hazards and in the subsequent delineation of responsibilities.³² Existing national policy frameworks indicate that multisectoral, multi-agency and multi-stakeholder disaster councils or committees from the national to the local levels have been established. However, limitations exist in terms of the financial and human resources needed to translate multi-country and national policies into local action.

Synergized standard operating procedures

44. Despite significant progress being made to shift from single-hazard to multi-hazard approaches from a technical standpoint, many countries have yet to integrate internal policies and procedures for multi-hazard approaches, which is why the ESCAP multi-donor trust fund for tsunami, disaster and climate preparedness has provided support for the development of a methodology on synergized standard operating procedures for coastal multi-hazard early warning systems and a manual on that topic.³³ Capitalizing on existing single-hazard standard operating procedures, countries are supported in developing integrated and effective standard operating procedures to simultaneously address multiple coastal hazards. It is proposed that this methodology be further scaled up through subregional cooperation

³¹ ESCAP/75/10/Add.2.

³² United Nations Office for Disaster Risk Reduction, *The Report of the Midterm Review of the Implementation of the Sendai Framework for Disaster Risk Reduction 2015–2030* (Geneva, 2023).

³³ ESCAP/WMO Typhoon Committee, *Manual on Synergized Standard Operating Procedures (SSOPs) for Coastal Multi-Hazards Early Warning System* (Coloane, Macao, China, 2015).

mechanisms to support Governments in synergizing standard operating procedures for addressing single and multiple hazards at the national, subnational and local government levels.

V. Issues for consideration by the Committee

45. While the number of disasters has increased by a factor of five over the past 50 years, thanks to improved early warning and disaster management systems, the number of deaths from disasters has decreased almost threefold.³⁴ The experiences of the region clearly indicate that strengthening early warning systems can play a pivotal role in enabling anticipatory action for enhanced preparedness and reduce the impact of hazards.³⁵ Despite the progress made, in South and South-West Asia, in South-East Asia and in the least developed countries, which have the lowest capacities in terms of multi-hazard early warning systems, high numbers of fatalities are still being recorded, highlighting the need for concerted action at the regional, subregional and transboundary levels. Moreover, under a 2°C global warming scenario, investments in multi-hazard early warning systems need to cover at least 87 per cent of the total population of Asia and the Pacific, as this represents the portion of the total population that is exposed to multi-hazard risks. The availability of and access to multi-hazard early warning systems enables exposed populations to take pre-emptive action to stay out of harm's way and minimize the impact of disasters. This not only protects lives and livelihoods, but also helps to protect development gains in the long run.³⁶

46. Considering how critical it is to ensure that everyone is covered by early warning systems by 2027 and to enhance strategic foresight capabilities for dealing with emerging complex, compounding and cascading risks and climate adaptation, the Committee on Disaster Risk Reduction may wish to do the following:

- (a) Provide guidance to the secretariat on the further development of a regional strategy to achieve early warnings for all by 2027 in Asia and the Pacific;
- (b) Endorse the strategy workstreams set out in the present document with a view to supporting the implementation in Asia and the Pacific of the Executive Action Plan for Early Warnings for All, 2023–2027;
- (c) Encourage members and associate members and partner organizations to continue to support the implementation and acceleration of efforts aimed at achieving early warnings for all through financial and in-kind contributions, including through the ESCAP multi-donor trust fund for tsunami, disaster and climate preparedness.

³⁴ WMO, *WMO Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes (1970–2019)* (Geneva, 2021).

³⁵ WMO, “State of the Climate in Asia 2021”. See also ESCAP/79/11, para. 22.

³⁶ See www.preventionweb.net/understanding-disaster-risk/key-concepts/anticipatory-action#pubs. See also ESCAP/79/11, para. 22.