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Review of the implementation of the 2030 Agenda for Sustainable Development in Asia and the Pacific and issues pertinent to the subsidiary structure of the Commission: disaster risk reduction

Early warning and action for all by 2027: transformative adaptation measures to address increased risks in the Asia-Pacific region

Note by the secretariat

Summary

Early warning and action are key adaptation measures that save lives and livelihoods and minimize 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 Early Warnings for All initiative and the Executive Action Plan on Early Warnings for All, 2023–2027, to ensure that every person on Earth will be covered by early warning systems by 2027. The disaster mortality ratio in countries with limited early warning coverage is eight times higher than in countries with high coverage. The Executive Action Plan calls for initial new targeted investments of \$3.1 billion between 2023 and 2027, which is a fraction of the expected returns. It also calls for \$50 billion for adaptation measures.

The Early Warnings for All initiative is more critical in the Asia-Pacific region, as it is the world's most disaster-prone and populous region. Noting that the impacts of warming climates are diverse across the subregions, the present document contains an analysis of loss and damage being experienced by the social and economic sectors that have been affected most, including the food and energy sectors, and includes risk profiles for these sectors in future climate scenarios. The document also contains an investment strategy that addresses gaps and promotes key enablers of multi-hazard early warning and risk-informed early action.

Mindful of its resolution 78/1, in which the Economic and Social Commission for Asia and the Pacific (ESCAP) recognized the need to address the outstanding and emerging development challenge of vulnerability to natural disasters and climate change, the secretariat also proposes four pathways for translating the Executive Action Plan into strategic action, aimed at preparing for disasters with foresight at the regional level. Notably, this consists of ways to scale up regional cooperation, in particular through the Asia-Pacific Disaster Resilience

* ESCAP/79/1/Rev.2.

Network, the ESCAP multi-donor trust fund on tsunami, disaster and climate preparedness and the Regional Space Applications Programme for Sustainable Development.

The document focuses on underserved high-risk developing countries, least developed countries and small island developing States that are on the front lines of climate change.

The Commission may wish to consider the findings and policy recommendations contained in the document and provide further guidance to the secretariat in that regard.

I. Introduction

1. During the period 1970–2022, Asia and the Pacific experienced an average of nearly 10 disasters per month related to weather, climate, water and seismic activity. As a result, each month the region suffered the loss of approximately 3,200 lives and \$3.8 million in economic damages.¹ Over the same 53-year period, there was a fivefold increase in recorded disasters globally and a fourfold increase regionally. The Early Warnings for All initiative is a key adaptation measure that can save lives and livelihoods and minimize 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 Early Warnings for All initiative and the Executive Action Plan on Early Warnings for All, 2023–2027, to ensure that every person on Earth will be covered by early warning systems by 2027.² The disaster mortality ratio in countries with limited to moderate early warning coverage is eight times higher than that in countries with high coverage. The Executive Action Plan calls for initial new targeted investments of \$3.1 billion between 2023 and 2027.

A. 2022: a year of compounding and cascading disasters

2. As the eighth consecutive year in which global temperatures rose at least 1°C above pre-industrial levels,³ 2022 was yet another reminder that Asia and the Pacific is the world’s most disaster-prone region. The major disasters of 2022 affected countries across the entire development spectrum. Among those disasters were floods in Afghanistan, Australia, Bangladesh, India, Pakistan and Thailand; drought in China, Kiribati and Tuvalu; Supertyphoons Megi and Nalgae, which struck the Philippines; heatwaves in India, Japan and Pakistan; and earthquakes in Afghanistan, Fiji and Indonesia. Floods were the deadliest, accounting for over 65 per cent of disaster-related fatalities regionally and 56 per cent globally.

B. Risk drivers: climate and geophysical factors

3. The tropical Pacific subregion has been experiencing a protracted La Niña event, and the period from August to October 2022 marked the third consecutive year, becoming the century’s first “triple-dip” La Niña.⁴ Coupled with a warmer planet, the protracted event has created a series of extreme

¹ Centre for Research on the Epidemiology of Disasters, EM-DAT: The International Disaster Database. Available at www.emdat.be (accessed on 13 January 2023).

² See https://library.wmo.int/doc_num.php?explnum_id=11426.

³ United Nations, “2022 confirmed as one of warmest years on record: WMO”, 12 January 2023.

⁴ World Meteorological Organization (WMO), “WMO predicts first ‘triple-dip’ La Niña of the century”, press release, 31 August 2022.

weather events worldwide. One notable example is the 2022 flood in Pakistan, which affected 33 million people and caused 1,739 deaths. In a study recently published by the World Weather Attribution, it was found that climate change had likely increased extreme monsoon rainfall in Pakistan.⁵ In 2022, Bangladesh and India also experienced floods, which affected 7.2 million and 1.3 million people, respectively. Notably and in contrast, from June to August 2022, China experienced its most severe heatwave on record, dramatically lowering the levels of the Yangtze River and adversely affecting the national energy sector.

4. In 2022, the months of March and April were the hottest on record in both India and Pakistan. The pre-monsoon period in South Asia is usually marked by excessively high temperatures, especially in May; however, scientists believe that the early heatwaves were a consequence of persisting north-south low-pressure patterns that had formed over India during winter, which is when the La Niña phenomenon occurs in the equatorial part of the Pacific Ocean.

5. Indonesia, located on the Ring of Fire, experienced a deadly earthquake that claimed over 330 lives in November 2022. Afghanistan, located on the Alpide belt, the second most seismically active after the Pacific Ring of Fire, also experienced a deadly earthquake, which occurred in June 2022 and resulted in over 1,000 deaths.

C. **Compounding and cascading impacts of disasters**

6. Driven by the hazard characteristics, as well as the underlying diverse socioeconomic vulnerabilities and exposure of populations and critical infrastructure, the major disasters that occurred in 2022 were complex and had compounding and cascading impacts. For example, the earthquakes in Afghanistan and Indonesia were mild, with magnitudes of 5.9 and 5.6, respectively, but the impacts of both were relatively severe. The fundamental reason for this was the critical vulnerability of the communities at risk and the presence of economic and social assets near the epicentres of the earthquakes.

7. Hazard events that occurred simultaneously or in rapid succession of one another also led to compounding impacts. One such example occurred in Afghanistan, which is one of the countries most affected by long-term conflict. In addition to facing the coronavirus disease (COVID-19) pandemic, the country also experienced a devastating earthquake of June 2022, followed in quick succession by unseasonal heavy rainfall and floods. The convergence of these hazard events triggered risk multipliers that compounded impacts.

8. Cascading disasters, in which a chain of hazard events are unleashed after the initial event, have also been occurring. One unique example occurred in Pakistan in 2022, when glaciers that were melting as a result of the record spring heat combined with a “monsoon on steroids”⁶ to trigger historic flooding. The scale of the flooding devastated a large part of the country and cascaded into protracted flooding. The resulting stagnant water gave rise to

⁵ “Climate change likely increased extreme monsoon rainfall, flooding highly vulnerable communities in Pakistan”, 14 September 2022.

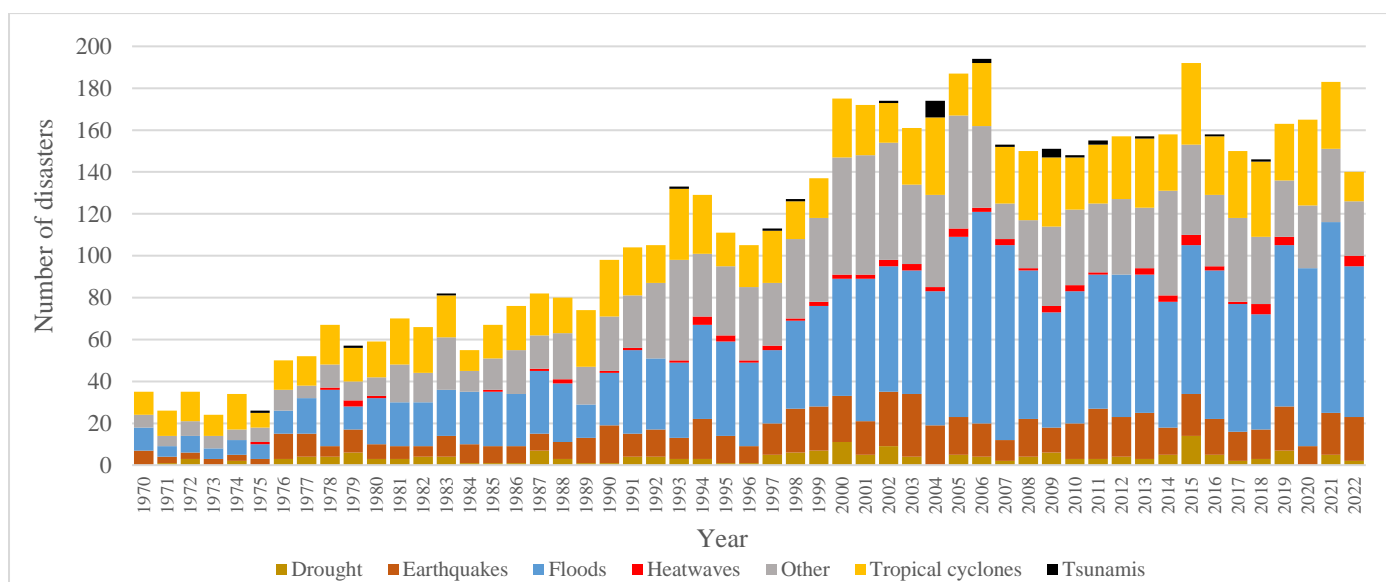
⁶ United Nations, “Pakistan facing monsoon ‘on steroids’ climate catastrophe, Secretary-General says, urging global support of flash appeal for flood response plan”, press release, 30 August 2022.

large-scale water-borne diseases and food scarcity, at a time when the country was facing rising food and fuel prices and significant economic challenges.

II. Subregional increases in the number of people affected and the size of economic losses

9. Asia and the Pacific is the most disaster-prone region in the world. Of all the disasters that have occurred globally since 1970, disasters in the Asia-Pacific region have been responsible for almost 86 per cent of the people affected, 60 per cent of the fatalities and 43 per cent of the economic losses. Between 1970 and 2022, natural hazards in Asia and the Pacific affected over 7 billion people. They were also responsible for the deaths of over 2 million people, which is equivalent to 105 people per day, or one person every 13 minutes. The number of natural disasters has been increasing since 1970, with floods responsible for the largest increases (figure I). In 2022 alone, there were more than 140 natural hazard events in the region, which directly affected 62.45 million people, caused over 7,300 fatalities and resulted in estimated economic losses of \$29 billion.⁷

Figure I
Disasters in Asia and the Pacific in the period 1970–2022, by disaster type



Source: Economic and Social Commission for Asia and the Pacific (ESCAP) calculations based on data from Centre for Research on the Epidemiology of Disasters, EM-DAT: The International Disaster Database. Available at www.emdat.be (accessed on 13 January 2023).

10. The Sendai Framework for Disaster Risk Reduction 2015–2030, adopted in 2015, is aimed at achieving substantial reductions by 2030 with regard to disaster risk; losses of life, livelihood and health; and losses of the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.⁸

⁷ Centre for Research on the Epidemiology of Disasters, EM-DAT: The International Disaster Database. Available at www.emdat.be (accessed on 13 January 2023).

⁸ 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).

11. In the Paris Agreement, also adopted in 2015, adaptation is identified as a global challenge. As of June 2022, 194 parties to the Agreement, including 51 from the Asia-Pacific region, had submitted a nationally determined contribution. Of those contributions, all of them included climate change mitigation as a priority, and 88 per cent included priorities around specific adaptation and climate-related services measures.⁹ A key driver of policy action is the achievement of the 2030 Agenda for Sustainable Development, pillared on the 17 Sustainable Development Goals. However, in its *Asia and the Pacific SDG Progress Report 2022*,¹⁰ the Economic and Social Commission for Asia and the Pacific (ESCAP) noted that sufficient progress had not been achieved on any of the Goals. In fact, there had been continued regression in the achievement of Goal 13 (Climate action). Insufficient progress had been made on achieving targets and respective indicators, including indicators 13.1.1, on the number of deaths, missing persons and directly affected persons attributable to disasters, and 13.1.2, on the adoption and implementation of national disaster risk reduction strategies.

12. Furthermore, conducting analyses of the region as a whole can mask issues specific to particular subregions, which are important to know when considering the existing capacities and resilience needs of different population groups. As shown in table 1, when measuring the effects of disasters as a percentage of the subregion's population, the Pacific small island developing States registered the largest percentage in 2022 (6.04 per cent of the population). In addition, the subregion experienced events that accounted for the largest loss of life (an earthquake in Papua New Guinea) and the largest number of people affected and greatest economic damage (volcanic ash from an eruption in Tonga).¹¹ Risks vary by subregion, and each subregion will have to be prepared to adapt under climate change scenarios of either 1.5°C or 2°C above pre-industrial levels. According to the ESCAP analysis of the climate projection under the Representative Concentration Pathways models, there are emerging and expanding population risk hotspots in each of the subregions. Investing in early warning systems for these hotspots can decrease mortality rates and assist in making people and economies more resilient. For example, in terms of floods and drought, the main hotspots that are intensifying include the basins of the Mekong and Indus Rivers. With recurring floods, a hotspot that will continue to intensify is the Ganga-Brahmaputra-Meghna basin, which is home to the largest concentration of poor people in the world. In the medium term, the hotspots for intensifying surface winds (potentially resulting in an increased risk of tropical cyclones) will be in the Pacific small island developing States. In the longer term, however, an emerging hotspot is the Bay of Bengal, which may face increases in cyclone frequency and intensity. Almost 23 million people in the area are likely to be exposed to the risk of tropical cyclones, a risk they have not faced previously. Finally, with the increasing variability in climate, heatwaves are set to increase in all subregions, which will place a heavy burden in terms of mortality, morbidity and livelihoods. Of all the natural disasters, heatwaves have perhaps the most direct linkages to human health. Establishing robust early warning systems that take heatwaves into account will help build long-term resilience, even for the most vulnerable population groups. However, as a percentage of the

⁹ WMO analysis of the nationally determined contributions of 51 parties in the Asia-Pacific region from 2016 to March 2022, updated in June 2022 in WMO, "State of the climate in the South-West Pacific 2021" (Geneva, 2022); and WMO, "State of the climate in Asia 2021" (Geneva, 2022).

¹⁰ *Asia and the Pacific SDG Progress Report 2022* (United Nations publication, 2022).

¹¹ Centre for Research on the Epidemiology of Disasters, EM-DAT: The International Disaster Database. Available at www.emdat.be (accessed on 13 January 2023).

subregional gross domestic product (GDP), the adaptation cost for the Pacific small island developing States, at 1.4 per cent of GDP, is estimated to be the highest.¹²

Table 1
Disasters and their effects, by subregion, 2022

<i>Subregion</i>	<i>Number of disasters</i>	<i>Number of people affected (percentage of the population)</i>	<i>Fatalities</i>	<i>Economic losses in United States dollars</i>	<i>Key events</i>
Pacific small island developing States	4	0.17 million (6.04)	12	142 million	Morobe earthquake (Papua New Guinea); Hunga Tonga-Hunga'Ha'apai volcanic eruption, tsunami and ashfall (Tonga)
Pacific	6	0.16 million (0.32)	31	9,375 million	Floods (Australia)
South and South-West Asia	40	43.16 million (2.02)	5,786	585 million	Floods (India and Pakistan); earthquakes (Afghanistan)
South-East Asia	59	12.50 million (1.08)	1,108	117 million	Cianjur earthquake (Indonesia); Supertyphoons Megi and Nalgae (Philippines)
East and North-East Asia	25	6.43 million (0.22)	339	18,361 million	Sichuan earthquake (China); floods (China); heatwave (Japan)
North and Central Asia	6	0.02 million (0.04)	28	N/A	Wildfire and convective storm (Russian Federation); floods (Russian Federation and Uzbekistan)

Source: ESCAP calculations based on data from Centre for Research on the Epidemiology of Disasters, EM-DAT: The International Disaster Database. Available at www.emdat.be (accessed on 13 January 2023).

13. Taking into consideration the context discussed above of existing and projected disaster and climate risks for each subregion, it also helps to disaggregate economic losses by sector in order to better identify subregional adaptation and early warning priorities. In Asia and the Pacific, disaster impacts are predominantly felt within the social (housing, education and social protection) and productive (subsistence livelihoods) sectors. The impact on

¹² *Asia-Pacific Riskscape @ 1.5°C: Subregional Pathways for Adaptation and Resilience – Asia-Pacific Disaster Report 2022 for ESCAP Subregions – Summary for Policymakers (ST/ESCAP/3011).*

social sectors is even greater in the least developed countries.¹³ For instance, the economic damages caused by the 2022 floods in Pakistan were attributed to the following sectors: housing (37 per cent); agriculture, food, livestock and fisheries (24 per cent); and transport and communication (22 per cent).¹⁴ Moreover, damages to irrigation and flood infrastructure were largely attributed to the absence of early warning systems in catchment areas.¹⁵ As a result of the Hunga Tonga-Hunga'Ha'apai eruption and tsunami in Tonga, economic damages were accounted for by non-residential buildings (34 per cent); agriculture, forestry and fishing sectors (24 per cent); and other infrastructure, notably from the tourism sector (24 per cent). In terms of economic damages, the impact of the event was equivalent to 18.5 per cent of the country's GDP. However, it occurred during the first wave of the COVID-19 pandemic and the health sector was already under heavy strain.¹⁶ Tropical Cyclone Seroja and the Easter flood in Timor-Leste, which both occurred in 2021, resulted in damages totalling \$307.7 million. The sectors that were hardest hit were transport (55 per cent), housing (23 per cent) and agriculture (7 per cent).¹⁷ Strengthening multi-hazard forecasting, monitoring and early warning systems to meet the current and growing disaster risks and climate projections for each subregion is a key long-term strategic adaptation pathway aimed at reducing risks to these critical sectors.¹⁸

14. Disasters have also been shown to change agricultural trade flows and cause losses in agricultural-dependent manufacturing subsectors.¹⁹ In 2022, the heatwave that struck India and the floods that swept Pakistan are the latest examples of how disasters have compounded the food crisis by destroying agricultural output during the disruption to wheat exports resulting from the war in Ukraine. Furthermore, periods of drought and elevated temperatures have led to increased cooling demands and reduced electricity production, with commensurate increases in prices. As a result, additional strains have been placed on food and commodity prices, especially for the poor, who were already disproportionately affected by the impacts of the COVID-19 pandemic and a number of climate-related disasters.

15. On the other hand, there are also a growing number of examples in which sector resilience tends to absorb disaster shocks, providing communities with the economic capacity to prepare for, cope with and bounce back from disasters. Investments should therefore be made in early warning systems for the purpose of reducing sector-specific disaster risks.

¹³ *Asia-Pacific Disaster Report 2019: The Disaster Riskscape across Asia-Pacific – Pathways for Resilience, Inclusion and Empowerment* (United Nations publication, 2019), pp. 29–30.

¹⁴ Pakistan, Ministry of Planning, Development and Special Initiatives, *Pakistan Floods 2022: Post-Disaster Needs Assessment* (Islamabad, 2022).

¹⁵ Pakistan, Ministry of Planning, Development and Special Initiatives, *Resilient Recovery, Rehabilitation, and Reconstruction Framework: Pakistan (4RF)* (Islamabad, 2022).

¹⁶ World Bank, “The January 15, 2022: Hunga Tonga-Hunga Ha'apai eruption and tsunami, Tonga – global rapid post disaster damage estimation (GRADE) report” (Washington, D.C., 2022).

¹⁷ Timor-Leste, *Timor-Leste: Post Disaster Needs Assessment – Tropical Cyclone Seroja and Easter Flood April 2021* (Dili, 2021).

¹⁸ Pakistan, Ministry of Planning, Development and Special Initiatives, *Resilient Recovery, Rehabilitation, and Reconstruction Framework*.

¹⁹ Food and Agriculture Organization of the United Nations, *The Impact of Disasters and Crises on Agriculture and Food Security* (Rome, 2021).

III. Early warnings for all: adapting to climate change and more extreme weather

16. In March 2022, the Secretary-General set out an ambitious new United Nations target, which is aimed at ensuring that by 2027 every person on Earth will be protected by early warning systems against increasingly extreme weather and climate change. Recognizing that human-induced climate disruption is causing damage in every region and that each incremental rise in global warming will further increase the frequency and intensity of extreme weather events, the Early Warnings for All initiative is aimed at accelerating action to adapt and enhance resilience. It can also serve to accelerate the achievement of target G of the Sendai Framework for Disaster Risk Reduction to substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030.

17. Early warning systems are estimated to provide more than a tenfold return on investment – the greatest of any adaptation measure. Warnings issued only 24 hours prior to a coming storm or heatwave can cut 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.²⁰ 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. Early warning systems and disaster risk management activities have also been recognized as key cross-cutting adaptation strategies that enhance the benefits of other adaptation measures when combined.²¹ Therefore, the Early Warnings for All initiative assumes critical significance in Asia and the Pacific – the world’s most disaster-prone region.

A. Executive Action Plan on Early Warnings for All, 2023–2027

18. The World Meteorological Organization (WMO) is leading in the implementation of the Executive Action Plan on Early Warnings for All, 2023–2027. Developed in partnership with key organizations, the Executive Action Plan sets out a concrete way forward to achieve that goal by 2027. It outlines how the United Nations system and a wide range of partners will work together to effectively deliver on that objective.

19. Furthermore, the Executive Action Plan contains a summary of the initial actions required to achieve the goal and includes a pathway to implementation. It includes a call for an estimated \$3.1 billion in new targeted investments to be made between 2023 and 2027 from scientific and technical, policy and financial perspectives to advance the four pillars of a multi-hazard early warning system: disaster risk knowledge and management; observations and forecasting; warning dissemination and communication; and preparedness to respond. In order to optimize international efforts, the key areas for advancing universal disaster risk knowledge are identified in the Plan, and the top technical actions required are prioritized. These actions include enhancing

²⁰ Global Commission on Adaptation, *Adapt Now: A Global Call for Leadership on Climate Resilience* (Rotterdam, Netherlands, 2019).

²¹ Intergovernmental Panel on Climate Change, *Climate Change 2022: Impacts, Adaptation, and Vulnerability – Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, Hans-Otto Pörtner and others, eds. (Cambridge, United Kingdom of Great Britain and Northern Ireland, Cambridge University Press, 2022).

capacity to detect hazards; closing the observations gap; and advancing global forecast data processing systems and data exchange. The infrastructure, governance and people-centred approach required to effectively disseminate and communicate warnings are highlighted in the Plan. Furthermore, the policies, capacities, finance and collaboration needed to improve preparedness and response capabilities in the period 2023 to 2027 are outlined.

B. Taking stock in Asia and the Pacific

20. Countries with multi-hazard early warning systems that offer only limited to moderate coverage have a mortality ratio that is nearly eight times that seen in countries with substantial to comprehensive coverage.²² While just over 50 per cent of countries in Asia and the Pacific have reported that they provide climate services at an average level, many countries are still only able to provide basic climate services, or none at all.²³ Gaps in early warning systems should be addressed in order to reduce the fatality rates of the region.

21. Investments into multi-hazard early warning systems should address the gaps in current systems by comprehensively strengthening each of the four pillars of an early warning system. In Asia and the Pacific, progress related to the components is most advanced in the areas of risk knowledge, monitoring and warning dissemination, while many countries still have gaps in communication and response capacity. For instance, although the 2022 floods in Pakistan demonstrated the capacity of technical agencies with regards to observations, analysis and forecasting of the specific hazards, the disaster brought to light the limitations of authorities to undertake preparedness measures. Strengthening multi-hazard early warning systems should also address the gaps in the existing systems to meet the needs of women, people with disabilities, older persons and any other group that has been identified as vulnerable.²⁴ In table 2 below, areas that require special focus, including the sectors at greatest risk, are identified by subregion.

²² United Nations Office for Disaster Risk Reduction and WMO, “Global status of multi-hazard early warning systems: target G” (Geneva, 2022).

²³ WMO, “State of the climate in Asia 2021”; and WMO, “State of the climate in the South-West Pacific 2021”.

²⁴ Pakistan, Ministry of Planning, Development and Special Initiatives, *Resilient Recovery, Rehabilitation, and Reconstruction Framework*.

Table 2
Early warning systems: subregional needs, by hazard and sector

<i>Subregion</i>	<i>Intensifying hazards in need of focus</i>	<i>Priority at-risk sectors</i>
Pacific small island developing States	Tropical cyclones or storms, floods and drought	Critical infrastructure (energy, transport, information and communications technology), water management, dry land agriculture and marine ecosystems
South and South-West Asia	Floods, drought, glacial lake outburst floods, aridity and heatwaves	Food, water and energy, critical infrastructure, marine ecosystems, earthquakes and tsunamis
South-East Asia	Earthquakes, floods, tropical cyclones or storms and drought	Food, water and energy, critical infrastructure, marine ecosystems, earthquakes and tsunamis
East and North-East Asia	Earthquakes, heatwave and drought	Food, water and energy, critical infrastructure, marine ecosystems, earthquakes and tsunamis
North and Central Asia	Drought, aridity, desertification, heatwaves, cold waves and earthquakes	Food, water and energy, critical infrastructure, marine ecosystems and earthquakes

Source: Risk and Resilience Portal. Available at <https://rrp.unescap.org/> (accessed on 2 March 2023).

Note: The table was adapted using all five of the subregional *Asia-Pacific Disaster Reports 2022*, which were prepared using data and analysis derived from the Risk and Resilience Portal.

C. Implementing the Executive Action Plan at the regional level

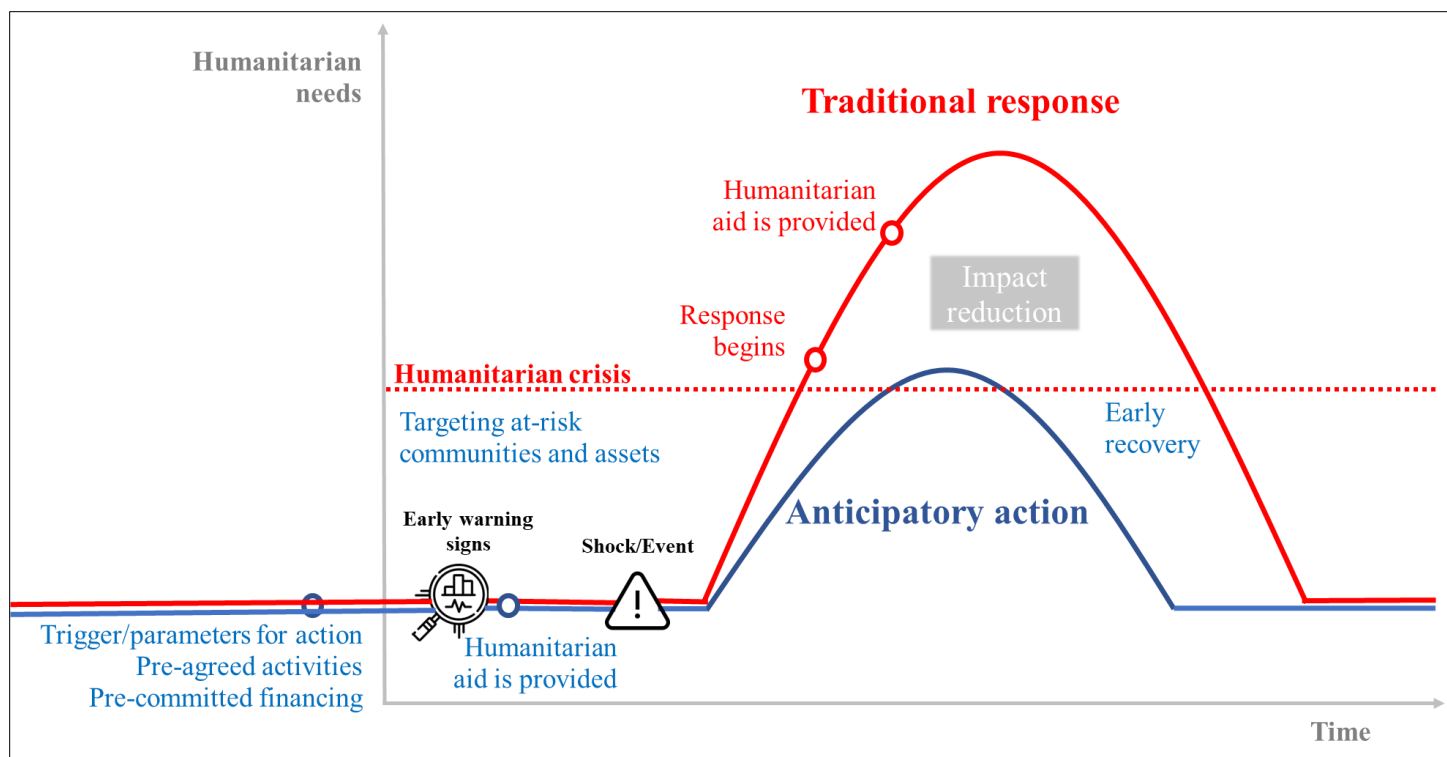
22. Building on the Executive Action Plan, the secretariat is developing a regional plan of action to achieve early warning for all by 2027 in Asia and the Pacific. The experiences of the region clearly indicate that strengthening early warning systems can play a pivotal role in strengthening foresight, which enables anticipatory action to be taken, thereby enhancing preparedness and reducing the impact of these hazards.²⁵ The availability of multi-hazard early warning systems and access to them enables communities to take pre-emptive action, thereby staying out of harm’s way or minimizing the impact, which protects lives and livelihoods and helps protect development gains in the long run (figure II).²⁶ During the period 1970–2022, the average number of annual disasters increased fivefold, driven by climate change, more extreme weather and improved reporting. However, thanks to improved early warnings and

²⁵ WMO, “State of the climate in Asia 2021”.

²⁶ United Nations Office for Disaster Risk Reduction, “Understanding disaster risk: anticipatory action”. Available at www.preventionweb.net/understanding-disaster-risk/key-concepts/anticipatory-action#pubs (accessed on 13 January 2023).

disaster management, there has been an almost threefold decrease in the number of deaths.²⁷

Figure II
Reducing disaster mortality and humanitarian crises through anticipatory action



Source: Adapted from United Nations Office for Disaster Risk Reduction, “Understanding Disaster Risk – Anticipatory Action”. Available at www.preventionweb.net/understanding-disaster-risk/key-concepts/anticipatory-action#pubs.

23. The COVID-19 pandemic has added to a daunting spectrum of hazards emanating from natural and human-made sources. The resulting cascade of compounding events has put enormous pressure on health and disaster management systems. It is unknown what extreme event could happen next: another pandemic; a rapidly evolving extreme climate event; or an event driven by technological or scientific developments gone awry. It is important therefore to employ strategic foresight. Rather than being a specialized sector, risk governance should be considered as part of strengthened national and local governance supported by a regional framework of common principles (figure III).

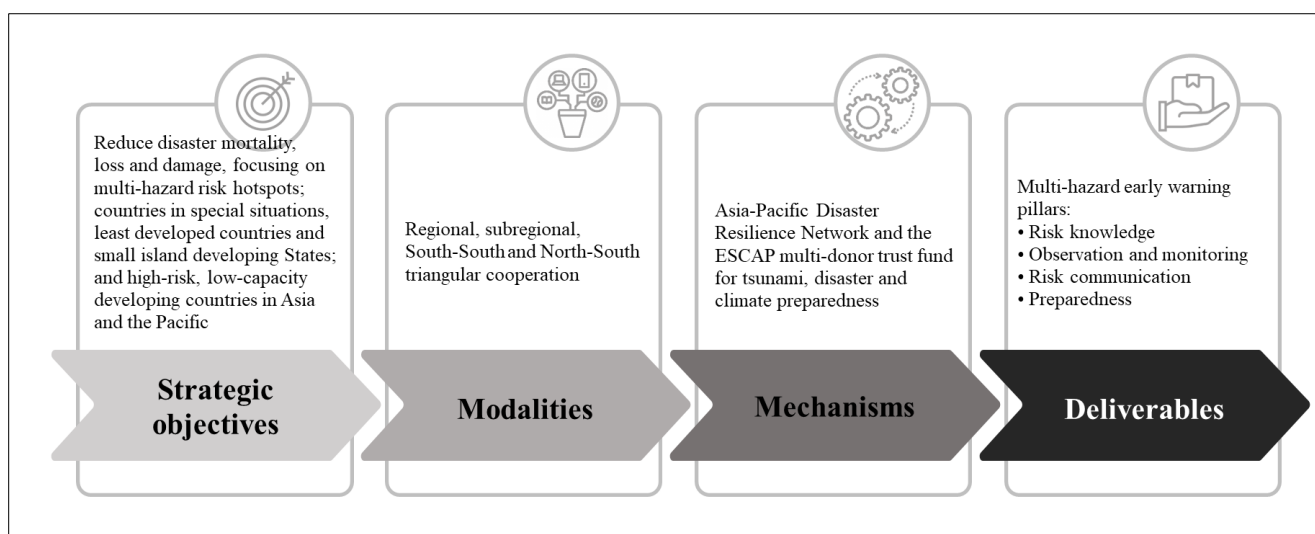
²⁷ WMO, *WMO Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes (1970–2019)* (Geneva, 2021).

Figure III
Strategic foresight for managing systemic risk



24. An Asia-Pacific regional action plan should rely on the scaling up of ESCAP regional cooperation mechanisms to address the unmet needs of early warning systems. This consists of identifying gaps in early warning information value chains and finding ways to close them; and identifying those parts of the value chain where regional cooperation can enhance synergies and reduce fixed investment costs. As shown in figure IV, the proposed regional action plan consists of four components.

Figure IV
Executive Action Plan on Early Warnings for All, 2023–2027, in Asia and the Pacific: pathways for strategic action



25. The strategic objective of the regional action plan is to reduce disaster mortality and associated loss and damage in multi-hazard risk hotspots, which are intensifying and expanding, with a specific focus on countries in special situations, least developed countries and small island developing States. The plan also provides the anchor for regional, subregional, South-South and North-South triangular cooperation modalities. It also leverages existing

cooperation mechanisms, including the Asia-Pacific Disaster Resilience Network; the ESCAP multi-donor trust fund for tsunami, disaster and climate preparedness; the ESCAP/WMO Typhoon Committee and the WMO/ESCAP Panel on Tropical Cyclones; and regional climate outlook forums. These mechanisms and the biennial Asia-Pacific Disaster Reports are all supported by the analytical and informational evidence base generated using the Risk and Resilience Portal.

26. Working through these mechanisms, ESCAP will draw on its existing partnership network to support the implementation of the regional plan of action. This network comprises the key United Nations entities involved in the Executive Action Plan on Early Warnings for All, 2023–2027, at the global level: the United Nations Development Programme; the United Nations Office for Disaster Risk Reduction; WMO; the issue-based coalition on building resilience; the Regional Integrated Multi-hazard Early Warning System for Africa and Asia; and the International Federation of Red Cross and Red Crescent Societies. In addition, substantive contributions to the regional plan will be made by ESCAP knowledge partners, including the Asian Institute of Technology; the Institute for Global Environmental Strategies, through its Asia-Pacific Climate Change Adaptation Platform; and the Association of Pacific Rim University, through its multi-hazard programme.

27. Furthermore, ESCAP partnerships with subregional intergovernmental organizations offer opportunities to align the implementation of the regional plan of action with respective priorities and work programme activities across the subregions of Asia and the Pacific and beyond. Such organizations include the Association of Southeast Asian Nations, the Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation, the Pacific Islands Forum and associated secretariat of the Pacific Regional Environment Programme and the Pacific Community, the Organisation for Economic Co-operation and Development, the North-East Asian Subregional Programme for Environmental Cooperation, and the South Asian Association for Regional Cooperation, as well as the Group of 20, currently chaired by India.

28. Finally, the Executive Action Plan is aimed at delivering outputs and services that are focused on generating risk knowledge and communications. In this regard, the Risk and Resilience Portal has supported strategic foresight analysis by deepening humanity's collective understanding of transboundary hazards and associated risks under changing climate scenarios. The Portal provides existing and future risk scenarios, including the economic cost and multi-hazard risk hotspots, as well as customized adaptation priorities for 56 countries across Asia and the Pacific, all of which directly contribute to the first pillar of the Executive Action Plan. The Portal also has the potential to quantify future cost-benefit of early warnings for all as a key adaptation method that, with strategic foresight, improves monitoring and mitigates losses and damages from natural hazards in Asia and the Pacific. Through the seamless integration of climate, seasonal and subseasonal data, the analytics of the Portal ensures that foresight knowledge is built into decision-making and specifically targeted at supporting the most vulnerable.

IV. Key enablers

29. A number of key enablers also need to be put in place to address the gaps and challenges in the early warning information value chain across the Asia-Pacific region.

30. One such enabler is the scaling up of investments. 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.²⁸ The ESCAP multi-donor trust fund for tsunami, disaster and climate preparedness 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 to the local and that view investments in early warning and climate adaptation as an investment in the present and future economic, social and environmental sustainability of the region.²⁹

31. The role of technology innovation, in particular in space and digital technology applications and their potential to augment foresight for strengthened risk governance, is another enabler. The ESCAP Asia-Pacific Plan of Action on Space Applications for Sustainable Development (2018–2030) presents a regionally coordinated blueprint that harnesses innovations in space, geospatial and digital applications to advance progress towards the Sustainable Development Goals. The Plan of Action is aimed at enhancing regional cooperation and using it to strengthen the integration of digital innovation with space applications for disaster risk reduction; multi-hazard monitoring and early warning; damage assessment; and emergency response and recovery. The early efforts of the secretariat in this regard included exploring how new digital applications could be used to better forecast extreme events and develop natural hazard maps in ways that could make the resulting information readily available, accessible and actionable. Under the Plan, the Regional Cooperative Mechanism for Drought Monitoring and Early Warning has also been expanded and its work has broadened. Implementation should be accelerated by better integrating digital technologies and innovations with traditional space applications and by furthering geospatial information applications to improve both customization at the country level and the delivery of early warning systems.

²⁸ United Nations Office for Disaster Risk Reduction, *Global Assessment Report on Disaster Risk Reduction 2022*.

²⁹ Roger Pulwarty and others, “Risk to resilience: climate change, disasters and the WMO-UNDRR Centre of Excellence”, *WMO Bulletin*, vol. 71, No. 1 (2022).

32. While the opportunities for applying geospatial artificial intelligence to reduce the risk of disasters are enormous, there are several challenges, including the lack of human capacities, which prohibit countries from maximizing the technology's full potential to reduce disaster risk.³⁰ Seeking to demonstrate strategic foresight to applications of geospatial artificial intelligence, in 2022 the secretariat started to develop flood hotspots and risk maps based on open-source and easy-to-use models that used digital technologies, such as artificial intelligence, big data and cloud computing. Intended for use by national disaster management and organizations and early warning agencies, academia and think tanks, these models will be further calibrated to augment selected national early warning systems for floods and wildfires. Furthermore, the Jakarta Ministerial Declaration on Space Applications for Sustainable Development in Asia and the Pacific, adopted at the Fourth Ministerial Conference on Space Applications for Sustainable Development in Asia and the Pacific in October 2022, recognized the need to accelerate the implementation of phase II (2022–2026) of the Plan of Action. In this regard, States members of the Regional Space Applications Programme for Sustainable Development are working on the establishment of a virtual constellation of satellites that will share high-resolution satellite imagery of disaster risk hotspots for improved disaster early warning and disaster risk management. The Government of Indonesia announced initiatives on disaster risk management tools as a means of accelerating the implementation of the Plan of Action and supporting capacity-building at the regional level to reduce disaster risk.

33. At its seventy-eighth session, ESCAP endorsed the Regional Plan of Action on Sand and Dust Storms in Asia and the Pacific. The Regional Plan of Action was developed on the basis of the report entitled *Sand and Dust Storms Risk Assessment in Asia and the Pacific*, which contained the outcomes of the assessment carried out by the Asian and Pacific Centre for the Development of Disaster Information Management in consultation with the countries of the region. The Regional Plan of Action contains a series of recommendations, including on extending the monitoring system and improving the early warning system to include an impact-based focus; provide timely forecasts of sand and dust storms; and enable targeted measures to minimize exposure and reduce risks. The recommendations on regional cooperation on sand and dust storms include increasing the number and capacity of observation systems of the phenomenon in the region, especially in South and South-West Asia; and producing regular impact-based forecasting at the regional level to facilitate transboundary action in the planning, response and recovery phases of the sand and dust storm disaster risk reduction cycle, including with a view to reducing secondary risks. At the national level, recommended actions include strengthening linkages across the agencies and services responsible for responding to forecasting and early warnings about sand and dust storms, including environmental, air pollution, hydrometeorological and meteorological services; and enhancing the integration of sand and dust storm early warning systems with other natural hazard response systems. A regional coordinating group of interested countries will be established in 2023 to agree on the implementation of specific transboundary actions, as outlined in the Regional Plan of Action; facilitate exchanges of best practices at the national and subregional levels; and guide the work of the secretariat accordingly.

³⁰ Hamid Mehmood, "Strategic foresight to applications of geospatial artificial intelligence (GeoAI) to achieve disaster-related Sustainable Development Goals" (Bangkok, ESCAP, 2022).

V. Next steps

34. In order to further shape the regional plan of action to achieve early warning for all by 2027 in Asia and the Pacific, the secretariat plans to present and discuss its substantive components and operational mechanisms with key stakeholders at the regional learning platform and at the eighth session of the Committee on Disaster Risk Reduction, to be held in Bangkok and online from 25 to 27 July 2023. The use of risk knowledge and the dissemination of risk communications, which are both key elements of early warning information value chains, will be demonstrated through the customization of the Risk and Resilience Portal, the *Asia-Pacific Disaster Report 2023* and related knowledge products (figure V).

Figure V

Contextualizing the Executive Action Plan: proposed steps for shaping the regional plan of action to achieve early warning for all by 2027 in Asia and the Pacific



VI. Issues for consideration by the Commission

35. Considering the criticality of ensuring that every person on Earth will be covered by early warning systems by 2027 and of enhancing strategic foresight, both for climate adaptation and to ensure disaster preparedness for emerging complex, compounding and cascading risks, the Commission is invited to consider and provide further guidance to the secretariat on its future work, including the priority areas and partnerships related to the components of the regional plan of action to achieve early warning for all by 2027, and the scaling up of investments in the early warning information value chain, including through the ESCAP multi-donor trust fund for tsunami, disaster and climate preparedness.