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Item 2 of the provisional agenda*
Targeting transformative adaptation

Summary of the *Asia-Pacific Disaster Report 2023*

Note by the secretariat

Summary

Asia and the Pacific is a vast region that is exposed to complex, compounding and cascading risks that are expected to increase under all climate warming scenarios. The cost of inaction, measured in average annualized losses, is estimated to be $953 billion if temperatures rise by 1.5°C above pre-industrial levels and $980 billion if temperatures rise by 2°C above pre-industrial levels.

If people and economic gains are to be protected, taking piecemeal adaptation actions is no longer an option. Investments in transformative adaptation are imperative because some parts of the region are reaching their adaptive limit; the window of opportunity for taking action is closing.

Nevertheless, we are still at the stage where investments in transformative adaptation present an opportunity for building a more resilient future. Transformative adaptation, which is based on a just transition to climate adaptation and a "think resilience" approach, relies on taking the following actions, among others: (a) leaving no one behind by investing in early warnings for all by 2027, especially in countries with special needs and where risk hotspots are both intensifying and emerging; (b) transitioning from a sector-specific approach to a systems approach in which disaster and climate risk management is comprehensive and designed to increase resilience in infrastructure, food and energy systems for poverty reduction; and (c) scaling up innovations in digital technologies and space science applications. Expanding the range of available financing instruments could also help to close the financing gap in climate adaptation. Furthermore, subregional and regional cooperation could enhance the cost-effectiveness of initiatives, given that climate change-related risk hotspots are increasingly transboundary.

The Committee on Disaster Risk Reduction is invited to discuss the issues set out in the present document and to provide guidance on the proposals for scaling up regional and subregional cooperation.

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

I. Introduction

1. The present document provides a summary of the key findings contained in the *Asia-Pacific Disaster Report 2023*, which will be launched at the eighth session of the Committee on Disaster Risk Reduction, to be held from 25 to 27 July 2023.

2. The disaster riskscape of the region is complex, compound and cascading and, with global temperatures rising, existing risk hotspots are intensifying and new ones are emerging.[1]

3. The cost of inaction is very high, and the financing gaps need to be addressed urgently.[2] It is equally important to move away from taking piecemeal actions to taking system-wide, transformative adaptation measures.

4. The present document contains: an overview of the region's riskscape, in other words the hotspots where risks are intensifying, the hotspots where risks are emerging and the costs of inaction; a section on protecting people and advancing sustainable development in four action areas of transformative adaptation, including the need to enhance investments in people-centric multi-hazard early warnings for all; a section on the three building blocks of transformative climate adaptation and the financing options available for making them a reality; and a section on the way forward, which sets out areas where regional and subregional cooperation could more effectively lead to the achievement of this three-pronged transformative action agenda.

II. Understanding the region's riskscape and the costs of inaction: the time to act is now

5. In 2022, 140 disasters struck the Asia-Pacific region, resulting in 7,304 deaths, affecting over 62 million people in a range of ways and wreaking economic damages estimated at $28 billion.

A. Asia-Pacific disasters in review

6. Floods led to the greatest loss of life, killing 4,796 people in Afghanistan, India, Iran (Islamic Republic of), Nepal and Pakistan and disrupting the lives of 33 million people in Pakistan alone. Record rainstorms swept across central China, affecting 14.5 million people. Earthquakes caused significant damages – estimated at $9.5 billion – primarily in China, Iran (Islamic Republic of) and Japan. Unprecedented heatwaves hit India and Pakistan, drought persisted in Afghanistan and a volcanic eruption followed by a tsunami in Tonga clearly illustrated the cascading and compounding nature of risks.

7. Between 2013 and 2022, the number of lives lost to disasters decreased by 20 per cent, in part due to enhanced forecasts, increased awareness and resilience-building. Extreme events, however, continue to happen, and the first quarter of 2023 has already witnessed disasters on an unprecedented scale. Multiple earthquakes, the strongest measuring 7.7 on the Richter scale, struck

[1] Economic and Social Commission for Asia and the Pacific (ESCAP), *Asia-Pacific Disaster Report 2021: Resilience in a Riskier World – Managing Systemic Risks from Biological and Other Natural Hazards* (Bangkok, 2021).

[2] ESCAP, *Asia-Pacific Disaster Report 2022 for ESCAP Subregions: Asia-Pacific Riskscape @ 1.5°C – Subregional Pathways for Adaptation and Resilience* (Bangkok, 2022).

northern Syrian Arab Republic and southern Türkiye in February 2023, taking a heavy toll on life and displacing close to 2.7 million people. Initial estimates indicate that the earthquake in Türkiye resulted in over $84 billion in economic losses.[3] Sitting along the Pacific Ring of Fire (a string of volcanoes and sites of seismic activity on the edges of the Pacific Ocean), Vanuatu experienced twin cyclones and an earthquake in just 48 hours that affected over 80 per cent of the population, demonstrating the convergence of seismic and climate risks.[4]

B. Fingerprints of climate change: intensifying risk hotspots, emerging risk hotspots and cascading risk clusters

8. Climate change is increasing the number and intensity of extreme weather events and clustering them in hotspots with fragile environments and critical vulnerabilities. Many locations, for example the small island developing States, are exposed to specific types of risk. In the *Asia-Pacific Disaster Report 2023*, intensifying risk hotspots (see table 1) and emerging risk hotspots (see table 2) are identified under two global warming scenarios: if temperatures rise by 1.5°C and 2°C above pre-industrial levels. Intensifying risk hotspots are defined as areas where the impacts of hazards are increasing social, economic and environmental vulnerabilities, while in emerging risk hotspots the impacts of hazards are putting new populations and economies at risk.

9. **Intensifying risk hotspots.** Areas already vulnerable to transboundary disasters are expected to experience more intense and more frequent hazards (such as floods, droughts and heatwaves). Among such areas are the river basins of the Ganges-Brahmaputra-Meghna, the Mekong and the Indus, as well as the Aral Sea basin. The countries situated on the Ring of Fire are set to experience compounding risks from climate hazards such as flooding and tropical cyclones under both 1.5°C and 2°C global warming scenarios (see table 1).

10. **Emerging risk hotspots.** Under a multi-hazard warming scenario, large swathes of the northern Asia-Pacific region are emerging as areas at major risk, primarily because of heatwaves, for populations, food security and energy systems (see table 2).

[3] ESCAP, “Türkiye and Syria earthquake reminds all of the unmitigated risks of a deadly disaster”, 23 February 2023.

[4] ESCAP, “Vanuatu twin cyclones underscore the Pacific’s vulnerability to compounding climate-disaster risks”, 9 March 2023.

Table 1
Intensifying risk hotspots under 1.5°C and 2°C global warming scenarios

Subregion	*Multi-hazard risks*	*Floods*	*Droughts*	*Heatwaves*	*Surface winds*
South and South-West Asia	Afghanistan, Iran (Islamic Republic of), Sri Lanka and Türkiye, as well as parts of the Ganges-Brahmaputra-Meghna and the Indus river basins	Ganges-Brahmaputra-Meghna river basin, southern India and Sri Lanka	South-east India, Iran (Islamic Republic of) and southern Türkiye	Parts of India, large parts of Iran (Islamic Republic of) and some parts of Türkiye, as well as the Indus River basin (Afghanistan, India and Pakistan)	Western India
East and North-East Asia	Parts of China	China, the Democratic People's Republic of Korea, Japan and the Republic of Korea	..	..	Parts of China, the Democratic People's Republic of Korea, Japan, the Republic of Korea and the Russian Federation
South-East Asia	Indonesia, as well as the Mekong River basin	Parts of Indonesia, Malaysia and Singapore, as well as the Mekong River basin (Cambodia, Lao People's Democratic Republic, Myanmar, Thailand and Viet Nam)	Southern Myanmar	Parts of Cambodia, Myanmar and Thailand	..
North and Central Asia	Turkmenistan, as well as the Aral Sea basin	..	Aral Sea basin	Aral Sea basin	Mongolia, as well as the Aral Sea basin
Pacific	Northern and western Australia, as well as New Caledonia	Northern Australia, Fiji, Kiribati and Papua New Guinea, as well as the Cook Islands and New Caledonia	Northern and western Australia	Southern Australia	Parts of Australia and New Zealand

Note: In intensifying risk hotspots, the risks are expected to be more intense under the 2°C global warming scenario than under the 1.5°C global warming scenario.

Table 2
Emerging risk hotspots under 1.5°C and 2°C global warming scenarios

Subregion	*Multi-hazard risks*	*Floods*	*Droughts*	*Heatwaves*	*Surface winds*
South and South-West Asia	Bhutan, northern India, Nepal and Türkiye	Northern Nepal and parts of Türkiye, as well as the Indus River basin (north-west India and Pakistan)	Bangladesh, southern India, northern Nepal, Sri Lanka and north-west Türkiye	Parts of Afghanistan, Bangladesh, southern India and large parts of Türkiye	Parts of Afghanistan, south-west India, Iran (Islamic Republic of), southern Pakistan and Türkiye
East and North-East Asia	Parts of China, Japan, Mongolia, the Democratic People's Republic of Korea, the Republic of Korea and the Russian Federation, as well as countries on the Ring of Fire	Parts of China and the Russian Federation	Northern and western China (with western China becoming particularly affected under the 2°C global warming scenario)	Large parts of north-eastern China. Potential impacts in the Democratic People's Republic of Korea, Japan, the Republic of Korea and the Russian Federation	China and parts of the Russian Federation
South-East Asia	Indonesia, Malaysia and Singapore, as well as countries on the Ring of Fire	..	Cambodia, Indonesia, northern Myanmar and parts of Thailand	Cambodia, parts of Indonesia, the Lao People's Democratic Republic, Myanmar and Viet Nam	Indonesia and Thailand
North and Central Asia	Northern Kazakhstan, Kyrgyzstan and Uzbekistan	..	Kazakhstan and Kyrgyzstan	Large swathes of land in Kazakhstan, Kyrgyzstan and Mongolia	Parts of Kazakhstan, Mongolia and Turkmenistan
Pacific	Australia, Fiji, Kiribati, Nauru, New Zealand, Papua New Guinea and Samoa	Southern Australia	Southern Australia and Nauru	Eastern Australia and parts of Papua New Guinea	Parts of Australia and Papua New Guinea

Note: In emerging risk hotspots, more risks are expected to emerge under the 2°C global warming scenario than under the 1.5°C global warming scenario.

C. Costs of inaction

11. Climate disaster-related losses are already huge, but the future costs of inaction today are greater still. Current annual losses from droughts, floods, heatwaves and tropical cyclones and related biological hazards, tsunamis and earthquakes are estimated at $924 billion. Under the 1.5°C global warming scenario, such losses are estimated to increase to $953 billion and, if temperatures rise by 2°C, it is likely that losses will amount to almost $1 trillion. The cost to Pacific small island developing States is expected to be particularly high, and is estimated to be equivalent to close to 8 per cent of gross domestic product (GDP), which is almost twice the average loss of GDP suffered by other States in the region. South-East Asia and South and South-West Asia face losses amounting to at least 5 per cent of GDP. China is set to suffer the highest absolute losses, followed by India and Japan.

12. Disasters and extreme weather events undermine productivity. Heat stress – the exposure to extreme heat – undermines the ability of workers to do their jobs effectively and negatively affects GDP. In Cambodia, for example, almost 1.2 per cent of working hours will be lost to heat stress; that total will increase to almost 2 per cent under the 1.5°C global warming scenario.

D. Achieving the Sustainable Development Goals remains a distant objective

13. **Regression on the Sustainable Development Goals.** Of particular concern is the fact that inadequate climate action is undermining progress towards the Sustainable Development Goals. Since 2015, damage to critical infrastructure in the Asia-Pacific region has increased. Progress towards reducing economic losses from disasters has been slow in all subregions. While disaster risk reduction strategies have been developed at the national level, their adoption and implementation at the local level have been slow.

14. **Increasing inequalities.** The intersection between risks from disasters, inequalities of income and poverty is pronounced in the region because of the high exposure of the population to disaster risks. In some least developed countries and landlocked developing countries, including Bhutan, Mongolia, Myanmar, Nepal, Solomon Islands and Timor-Leste, disaster-related losses could become a driving force of persistent inequality.

15. **Decreasing food security.** Disaster-related losses in the agricultural sector pose the greatest threat to food security and could undermine efforts to tackle persistent malnutrition, thus driving inequalities. Among those most affected by a decline in agricultural productivity will be the many farming communities that are already living on the brink of poverty and the urban poor, who are vulnerable to food price inflation. It is in countries in South and South-West Asia and South-East Asia that food security and freshwater availability are most threatened by climate change. The populations of the Pacific small island developing States face the highest risk of undernourishment.

16. **Decreasing energy security.** Climate change will affect the supply of fuel, the production of energy and the physical resilience of current and future energy infrastructure. Heatwaves and droughts are already stretching countries' capacities to generate energy. Countries whose populations are already exposed to a high risk of multiple climate hazards will also have their capacity to generate energy stretched, both under the baseline scenario and the 2°C global warming scenario.

17. **Environmental degradation.** Biodiversity hotspots in South and South-West Asia and the Pacific will come under particular threat in the coming years.[5] Conservative projections estimate that the biodiversity hotspots of the Western Ghats in India and of Sri Lanka will shrink by 50 per cent, while those in Australia and New Zealand will shrink by more than 20 per cent by 2030.[6]

III. Protecting people and advancing sustainable development: four transformative action areas

18. Four action areas of transformative adaptation have been identified to protect people and hard-earned development gains and to advance the sustainable development agenda.

A. Protecting people in multi-hazard risk areas and hotspots

19. Multi-hazard early warning systems are among the most effective ways to reduce mortality from natural disasters. The World Bank estimates that upgrading all developing countries' hydro-meteorological information production and early warning capacity to standards equivalent to those in developed countries could save some 23,000 lives each year.[7] Enhancing early warning systems has also been highlighted as a critical tool in addressing climate change-related risks in the Sendai Framework for Disaster Risk Reduction 2015–2030 and the Paris Agreement. Expanding the coverage of effective multi-hazard early warning systems, especially in risk hotspots, is critical to reducing the number of fatalities resulting from disasters.

20. Population exposure[8] under the 1.5°C global warming scenario is highest in South-East Asia for intensifying risks and in North and Central Asia for emerging risks. Under the 2°C global warming scenario, population exposure is highest in South and South-West Asia for intensifying risks and in South-East Asia for emerging risks (see figures I and II).

[5] Jan C. Habel and others, "Final countdown for biodiversity hotspots", *Conservation Letters*, vol. 12, No. 6 (November/December 2019).

[6] ESCAP estimates based on Jan C. Habel and others, "Final countdown for biodiversity hotspots".

[7] Stéphane Hallegatte, "A cost-effective solution to reduce disaster losses in developing countries: hydro-meteorological services, early warning, and evacuation", Policy Research Working Paper No. 6058 (Washington, D.C., World Bank, May 2012).

[8] The population exposure figures refer to exposure to multi-hazard risks. It is noteworthy that, for the Pacific small island developing States, the current hazard-specific exposure to surface winds, which includes risks from tropical cyclones, is very high. The area of the Pacific small island developing States will also become a hotspot for multi-hazard risks under both the 1.5°C and 2°C global warming scenarios, reinforcing the concentration of risks from cascading and compounding disasters.

Figure I

Exposure of the population to intensifying risks under the 1.5°C and 2°C global warming scenarios

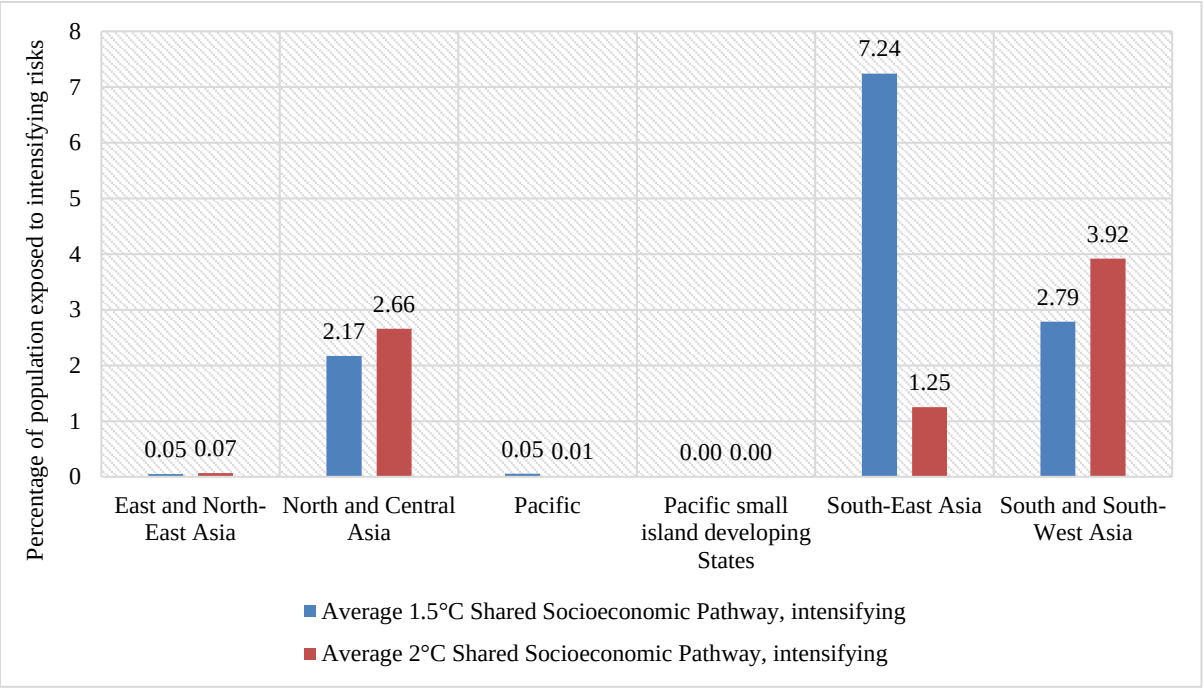
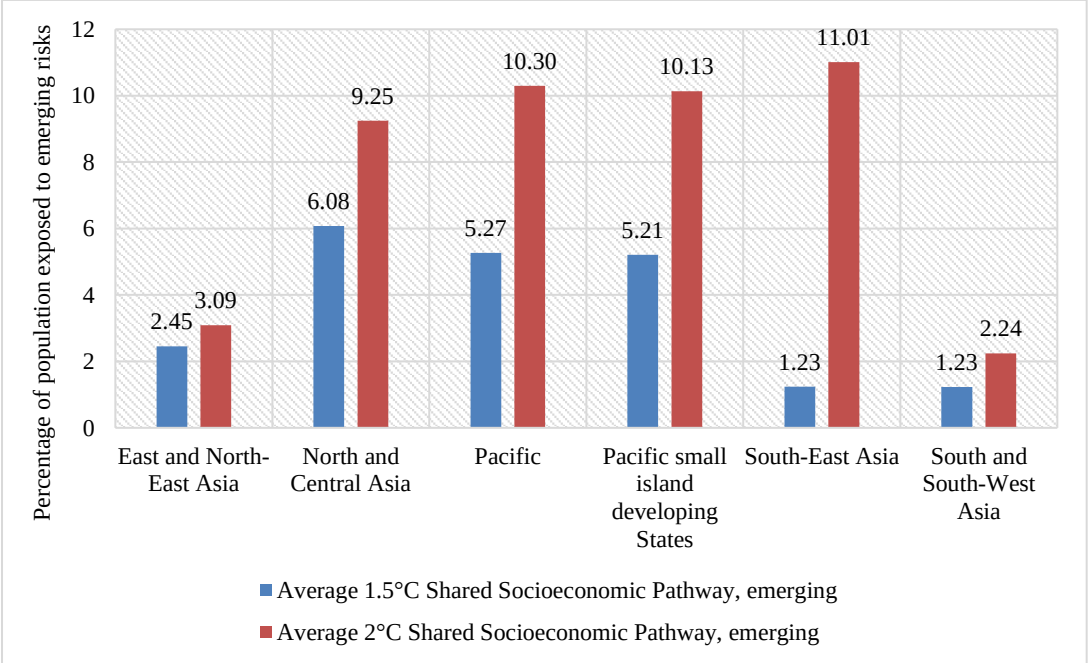


Figure II

Exposure of population to emerging risks under the 1.5°C and 2°C global warming scenarios



21. The share of people exposed to multi-hazard risks is expected to increase to 85 per cent under the 1.5°C global warming scenario and to 87 per cent under the 2°C global warming scenario. Countries with the highest share of the population exposed to intensifying hazards under the 1.5°C global warming scenario include Cambodia (47.75 per cent), Thailand (17.46 per cent) and Turkmenistan (8.85 per cent). For emerging risks, under both the 1.5°C and the 2°C global warming scenarios, Samoa would experience the greatest increase, with over 97 per cent of its population exposed, followed by Azerbaijan and Kazakhstan, both of which would have over 15 per cent of their populations exposed.

B. Investing in people-centric multi-hazard early warning systems

22. The Secretary-General's Early Warnings for All initiative, developed with the World Meteorological Organization (WMO) and the United Nations Office for Disaster Risk Reduction, was launched in 2022 with the aim of ensuring that every person on Earth would be protected by early warning systems within five years. It is based on four pillars: disaster risk knowledge and management; detection, observation, monitoring, analysis and forecasting; warning dissemination and communication; and preparedness and response capabilities. In the Executive Action Plan on Early Warnings for All, 2023–2027, a call was made for the mobilization of $3.1 billion in new targeted investments to implement the initiative. The biggest investment needed is in local capacities to respond effectively and rapidly to early warning alerts, followed by investments to expand global satellite data use and to strengthen networks and services to disseminate early warning messages. Implementing the Early Warnings for All initiative depends on making investments in multi-hazard early warning systems in collaboration with those who need the warnings. Multilevel cooperation and stakeholder engagement should shape systems that reflect the needs of those most at risk and should underpin warning messages that are informative, clear and relevant to the context and the existing capabilities.

23. WMO and the United Nations Office for Disaster Risk Reduction have estimated that countries with limited-to-moderate multi-hazard early warning system coverage have nearly eight times the mortality rate of countries with substantial-to-comprehensive coverage.[9]

24. Global target G of the Sendai Framework is used to monitor the availability of and access to multi-hazard early warning systems and disaster risk information and assessments by 2030. As of March 2022, 120 countries had provided information on progress made in achieving global target G, 95 of which had reported having multi-hazard early warning systems. While this represents a twofold increase compared to 2015, still fewer than half of all countries in the world have multi-hazard early warning systems.[10] Of the top 10 countries exposed to intensifying risks, only Thailand reported a high score for forecasting (0.81). Of these top 10 countries, eight either did not report on progress in achieving global target G or did not fully report on all its aspects.[11]

[9] "Global status of multi-hazard early warning systems: target G" (Geneva, 2022).

[10] Ibid.

[11] ESCAP calculations based on data provided by the United Nations Office for Disaster Risk Reduction.

25. To reach 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 – an integrated approach built on multilevel cooperation and stakeholder engagement for early warning must be adopted. Such an approach must also be based on and take into consideration the needs, priorities, capacities and cultures of those most at risk. Only 21 per cent of countries in the Asia-Pacific region indicated providing climate services at an advanced level, while 48 per cent reported providing climate services only at an essential level.[12]

26. The strengthening of early warning systems is the low-hanging fruit of climate change adaptation. It is a cost-effective way of protecting people and assets and provides a tenfold return on investment. The World Bank estimates that the economic benefits of weather prediction services could reduce disaster-related losses by up to 60 per cent.[13] Reporting on annualized average losses as a percentage of GDP and on multi-hazard early warning system coverage can help to identify which countries and sectors in Asia and the Pacific have the most to gain from implementing adaptation measures such as early warning systems to reduce economic losses.

C. Protecting food and energy systems

27. Early warning systems need to be anchored in comprehensive risk management policies to build resilience, especially in the agriculture and energy sectors. It is possible to identify countries where food and energy security are at risk and where it is particularly important to strengthen early warning systems.

28. In Afghanistan, Bangladesh, India and Nepal, the agricultural sector and vulnerable populations are at particularly high risk of exposure to disaster, a situation that is made all the more critical by low early warning system capacity. For countries whose economies are not very diverse, it is important to ensure that those industries that form their economic backbones are protected from disaster. Among the countries with low multi-hazard early warning system coverage and economies that are highly dependent on agriculture, Afghanistan, India, Solomon Islands, Tajikistan and Uzbekistan stand out. In order to address such vulnerability, sector-specific early warning systems need to be established to protect agricultural assets and strengthen food security. The agricultural sectors of countries like Fiji, Myanmar and Vanuatu too are exposed, which suggests that continuous efforts are needed to maintain and improve early warning systems.[14]

29. Sector-specific early warning systems to safeguard power plants and reduce vulnerability in the energy sectors are needed in many countries in Asia and the Pacific. Australia, Bangladesh, Bhutan, India, Sri Lanka and Thailand, for example, have not only relatively low levels of multi-hazard early warning system coverage and economies that are highly exposed, they are also energy insecure because of at-risk power plants. Similarly, the energy sectors of Kazakhstan, Myanmar, the Republic of Korea, the Philippines and Uzbekistan

[12] WMO, “Guidelines for national meteorological and hydrological services on capacity development for climate services” (Geneva, 2017).

[13] See Stéphane Hallegatte, “A cost-effective solution to reduce disaster losses in developing countries”.

[14] ESCAP estimates based on reports submitted to the United Nations Office for Disaster Risk Reduction on efforts to achieve global target G.

require improvements to early warning systems to protect power plants from the increasing risks.[15]

30. Some countries are at great risk from the combined effect of high water stress and high exposure of energy systems to climate hazards. Some of the countries at the fiftieth risk percentile under the baseline scenario are in North and Central Asia (Azerbaijan, Kazakhstan and Turkmenistan), the Pacific (Australia, Fiji and Solomon Islands), South-East Asia (Cambodia, Indonesia, Myanmar and Timor-Leste), South and South-West Asia (Afghanistan, Bangladesh, Bhutan, India, Iran (Islamic Republic of) and Sri Lanka). Under the 2°C global warming scenario, China and Uzbekistan are added to the list. Of the 18 countries that are at the highest risk, 11 are least developed countries and landlocked developing countries.[16]

D. Investing in nature-based solutions

31. Environmental degradation is driving disaster risk in Asia and the Pacific. Estimates show that around 40 per cent of climate actions can be achieved through nature-based solutions, especially through forest restoration and sustainable agriculture,[17] so it is critical for low-income countries to preserve or regenerate their natural resources. Wetlands, coastal plains and forests reduce the intensity of extreme weather events, floods and droughts. Such ecosystems control water-related extreme weather events by increasing water storage capacity in the flood plains, wetlands and urban areas. Moreover, they reduce the impact of droughts by maximizing groundwater storage and supporting agroforestry and blue-green infrastructure. Parks and urban green spaces moderate temperatures and help cope with heatwaves and droughts in cities.

32. Conserving and restoring floodplains, mangroves and forests also promote carbon sequestration and resilience through nature-based flood defences. In China, the flood plains of the Yangtze River have been restored by removing embankments to increase floodwater retention capacity. These measures have helped to gradually reduce the population's exposure to danger, fatality rates and economic losses linked to severe flooding. Flood-retention basins such as farmlands, sports fields, parks and wild areas improve the water quality of nearby rivers. In Japan, many flood-retention basins have been constructed that have decreased risks from floods and cyclones. Well-planned crop diversification and agroforestry measures can mitigate the worst impacts of droughts and water scarcity in agriculture and subsequently enhance food security.

33. Future urban resilience depends on nature-based solutions being integrated into urban planning. Urban populations are vulnerable because they live in densely populated areas where human activities have a significant impact on the environment. Nature-based solutions and grey and green infrastructure can help mitigate urban flooding and must become integral to inclusive urban planning. This involves improving water management infrastructure to reduce stormwater run-off, increase stormwater retention and enable wastewater treatment and restoring urban water bodies such as streams, rivers and lakes to enhance water drainage. These measures can also reduce

[15] Ibid.

[16] Ibid.

[17] Yvonne Walz and others, "Disaster-related losses of ecosystems and their services: why and how do losses matter for disaster risk reduction?", *International Journal of Disaster Risk Reduction*, vol. 63 (September 2021).

urban heat island effects and improve water and air quality. Furthermore, flooding and erosion in urban areas can be prevented by preserving wetlands.

34. Mangrove and coral reef restoration is critical for combating coastal flooding. Without the existing mangroves, 15 million more people worldwide would experience flooding every year.[18] Mangroves reduce wave height, prevent the generation of wind waves and act as a buffer to surface wind. Studies show that up to 66 per cent of wave height can be reduced by around 100 metres of mangrove cover.[19] They reduce the depth of flooding and related loss of life caused by cyclones. Like mangroves, coral reefs reduce storm surges and tidal floods by wave breaking and buffering the ocean currents.

IV. Targeting transformative adaptation

35. Targeting transformative adaptation presents a major opportunity to become better prepared for a warming world. Taking a transformative adaptation approach means changing societal values, choices and socioeconomic governance structures, as well as developing new strategies and redirecting financial resources. Centred on promoting just climate adaptation measures that leave no one at risk behind, transformative adaptation requires the adoption of a "think resilience" approach that engenders deep, long-term societal changes. Transformative adaptation entails transitioning from a sector-specific approach to a systems approach that encompasses comprehensive disaster and climate risk assessments and leverages, inter alia, innovations in digital technologies and big Earth observation data from space science.

A. Building blocks of transformative adaptation

1. Leaving no one behind by investing in early warnings for all by 2027

36. For a just transition to climate adaptation to occur, social protection measures and climate change interventions need to be aligned. Furthermore, a well-financed social protection system designed for transformative adaptation disbursements strengthens the capacity of the poor and of those vulnerable to climate change to adapt, absorb and transfer risks, thus building resilience at both the household and community levels. Together, social protection and climate response measures can help better protect assets and livelihoods and strengthen capabilities for a climate-resilient graduation out of poverty. In this regard, people-centred early warning systems are central to a just transition to climate adaptation because they enable the timely preparation and disbursement of income and non-income support for the poor.

2. Transitioning from a sector-specific approach to a systems approach

37. System-wide interlinkages need to be managed, as there are significant synergies between disaster risk reduction and climate change adaptation efforts. Such comprehensive disaster and climate risk management relies on open channels for intersectoral communication and coordination. In this regard, the setting up of interministerial coordination mechanisms, for example, has been shown to promote a more systematic, collective and

[18] Michela De Dominicis and others, "Mangrove forests can be an effective coastal defence in the Pearl River Delta, China", *Communications, Earth and Environment*, vol. 4, No. 13 (2023).

[19] Pelayo Menéndez and others, "Assessing the effects of using high-quality data and high-resolution models in valuing flood protection services of mangroves", *PLoS ONE*, vol. 14, No. 8 (2019).

meaningful transition to transformative adaptation. Through such a systems thinking approach, comprehensive disaster and climate risk management can be used to identify mutually beneficial opportunities across policies and programmes. Similarly, the inclusion of scientists in policymaking and decision-making organs can help bridge science-policy gaps and strengthen the evidence base for system-wide policymaking. For maximum impact, improved metrics on adaptation and risk management are needed to measure and forecast the degree to which the climate emergency is undermining resilience and efforts to achieve the targets of the Sustainable Development Goals and the Sendai Framework. Furthermore, local-level implementation through government and community involvement in disaster risk reduction planning needs to be enhanced.

38. The Risk and Resilience Portal hosted by the Economic and Social Commission for Asia and the Pacific (ESCAP)[20] supports such processes by addressing critical gaps in understanding the climate risk with a view to building resilient systems. It helps users to identify multi-hazard risk hotspots and develop risk scenarios that take into consideration the economic costs to and the adaptation priorities for the 53 members and nine associate members of ESCAP.

3. Scaling up innovations in digital technologies and space science applications

39. Innovations in digital technologies and space science applications are on the increase, opening up a range of opportunities, from simple techniques and practices to artificial intelligence-driven cutting-edge applications that help extract information from a large volume of unstructured data, provide real-time predictions and improve forecast accuracy. Artificial intelligence chatbots can provide up-to-date information on the ever-changing disaster environment, analysing data, for example on past disasters and current environmental conditions, from multiple sources, including social media platforms and satellite imagery, to warn communities of potential disasters quickly and accurately. Information can be provided on evacuation routes and safe shelter locations to help prepare for disasters, while chatbots can also improve how early warning messages are shared with community users for early action. Emerging technologies thus play a key role in the implementation of the Secretary-General's Early Warnings for All initiative.

40. In fact, a range of technological innovations are being used to disseminate warnings early. However, to empower developing countries to provide adequate early warnings for all, better access to more data and stronger analytical capacities are needed. Sharing open-source data and collaborating on artificial intelligence-related research can help to build capacities. Furthermore, the creation of internationally recognized guidelines on the use of artificial intelligence for disaster risk reduction could help developing countries to navigate the opportunities and challenges of using emerging technologies for transformative adaptation.

B. Financing transformative adaptation

41. Currently, 92 per cent of existing adaptation costs in the region are not covered. The investments needed for transformative adaptation in the region stand at around $145 billion. This total increases to $150.5 billion under the 1.5°C global warming scenario and to $155 billion under the 2°C global

[20] See https://rrp.unescap.org/.

warming scenario. As a share of GDP, the Pacific small island developing States will need to invest some 1.3 per cent of their GDP in adaptation measures (see table 3).

Table 3
Subregional adaptation costs under different scenarios

Subregion	*Baseline global warming scenario*	*1.5°C global warming scenario*	*2°C global warming scenario*	*Baseline global warming scenario*	*1.5°C global warming scenario*	*2°C global warming scenario*
	Billions of United States dollars			*Percentage of GDP*		
East and North-East Asia	69.59	72.36	74.57	0.34	0.35	0.36
North and Central Asia	5.50	5.52	5.54	0.30	0.30	0.30
Pacific	3.71	3.73	3.77	0.23	0.23	0.24
Pacific small island developing States	0.43	0.44	0.46	1.30	1.34	1.41
South and South-East Asia	23.63	26.24	28.24	0.82	0.91	0.98
South and South-West Asia	42.31	42.65	43.79	0.89	0.90	0.92
Total	**144.74**	**150.50**	**155.90**	**0.46**	**0.47**	**0.49**

42. Financing adaptation is challenging in Asia and the Pacific in part because many countries that are highly vulnerable to disasters and climate change concurrently have high levels of external debt.[21] In these countries, converging crises have compounding impacts: while climate action is financed through domestic public sources of funds, much of the national revenue is used to service external debt. This situation, combined with increasing interest rates and the rising cost of disaster-related losses and climate action investment needs, has resulted in fiscal and debt management becoming a major policy challenge. In the Asia-Pacific region, 19 countries are currently rated at high risk of debt distress. Bhutan, Cambodia, the Lao People's Democratic Republic, Samoa, Tajikistan, Tonga and Vanuatu are among the countries in the region that have a high concentration of climate disaster-induced losses and high levels of external debt; Armenia, Georgia, Kyrgyzstan, Maldives,

[21] ESCAP, *Economic and Social Survey of Asia and the Pacific 2023: Rethinking Public Debt for the Sustainable Development Goals* (Bangkok, 2023).

Marshall Islands and Mongolia have borderline vulnerabilities for both debt and climate distress.[22]

43. Nevertheless, ESCAP has advocated applying an augmented debt sustainability analysis approach[23] that can unlock new investments in transformative climate adaptation by encouraging Governments to make risk-informed investments in climate action now with a view to reducing the fiscal impact and alleviating the public debt distress that increasing levels of climate-change losses and damages will certainly bring over time under the 1.5°C and 2°C global warming scenarios. Governments can thus direct fiscal resources to structural changes for system-wide adaptation actions that have high returns.

44. There are also innovative financing mechanisms that can be used for climate adaptation. Thematic bonds are debt instruments that make it possible to raise funds for projects with environmental benefits by supporting energy efficiency, the shift to renewables, resilience-building and green transportation. These instruments are well-suited to large-scale capital-intensive projects that yield revenues and can facilitate access funding at a discount through blended finance mechanisms. In 2021, in the Asia-Pacific region, close to $43.2 billion in sustainability-linked bonds and close to $23.1 billion in social bonds were issued, both kinds of bonds registering a five-year average annual growth rate of over 100 per cent. The bond market represents a significant potential for growth, at both the national and subnational levels.

45. It is estimated that adaptation financing needs account for 50 per cent of all climate financing needs, but that only 20 per cent of the total currently flows to adaptation. This shortfall means that it is all the more urgent to scale up private sector investments in adaptation. Currently, less than 1.6 per cent of all adaptation financing comes from the private sector. In Asia, this is estimated to have been equal to $294 million in 2020.

46. Instruments that use blended financing, for example, hold promise for bridging the adaptation financing gap. By de-risking, or making a business case for investments in adaptation, without which the private sector would not invest, blended finance options offer an opportunity for both the public and the private sectors to capitalize on each other’s strengths.

47. In addition, many countries in Asia and the Pacific have begun using mechanisms like biodiversity credits to finance ecosystem adaptation. These credits create incentives for taking actions that lead to the conservation of nature and help reverse the loss of ecosystems. They are tradable and have as their primary objective the improvement of biodiversity in terms of quantity, quality and composition. Also known as “biocredits”, they are useful in areas such as adaptation to climate change, poverty alleviation and promotion of sustainable livelihoods for forest communities. The United Nations, the Plan Vivo Foundation, the Gold Standard Foundation and Verra are some of the organizations engaged in this process of developing and facilitating standard methodologies and frameworks for such credits. The Plan Vivo Foundation has issued certificates for its projects in Fiji, Indonesia, Sri Lanka and Vanuatu.

48. Finally, risk financing facilities can make a positive contribution by scaling up existing catastrophe-triggered financial instruments for long-term investments in adaptation. Such facilities have been instrumental in reducing the cost of capital and offer transparent and accountable mechanisms for risk

[22] Ibid.

[23] Ibid.

financing. Their models and the real-time information they provide are helping policymakers to align their development plans. In the event of a disaster, this enables the relief effort to be managed in a systematic manner, supported by sound analytical assessments. More technical assistance to the facilities, in particular for humanitarian capacity, could significantly improve the delivery of their services while continuing to provide cost-effective risk-financing solutions.[24]

49. Risk pooling through parametric private sector-driven insurance mechanisms is another way to mitigate losses from natural disasters. Yet, over 70 per cent of losses recorded in the Asia-Pacific region in 2022 were uninsured.[25] Climate uncertainty and the increased frequency of hazards add to the costs of insurance. Modelling risks, which is complicated by climate uncertainties, is a technical and expensive exercise. Both of these factors make insurance expensive for the most vulnerable, keeping a key resilience measure out of reach. Open-source software can help overcome part of this challenge by allowing users to calculate potential damage free of charge.

50. More transparent insurance schemes can reinforce trust between people and the private sector, as well as Governments, resulting in more accurate and rapid claims settlements. Blockchain technology can further such objectives as it ensures a system where neither the insurer nor the insured can tamper with the outcome of the contract. The processing of documents, the verification of parameters and the settlement of claims can happen in a decentralized and more transparent manner: as the supervision by insurance companies, manual loss assessments and claim settlements become automated, administrative costs and risks decrease, making insurance more affordable. There is increasing evidence that blockchain technology has helped farmers in emerging market economies to gain access to reliable crop insurance, regardless of the local legal systems.

51. Building economies of scale for climate financing technologies through subregional and regional investments remains an underutilized avenue. While forecasts are becoming more accurate, it is also becoming more difficult for low-capacity countries to gain access to them. Investments should support partnership frameworks such as the South-East Asia Disaster Risk Insurance Facility. There is also ample evidence that savings can be achieved by sharing advanced forecasts, appropriate technologies and accessible services, such as those provided by the Pacific Disaster Centre, the Regional Integrated Multi-hazard Early Warning System for Africa and Asia, the ESCAP/WMO Typhoon Committee and the WMO/ESCAP Panel on Tropical Cyclones. Furthermore, the ESCAP multi-donor trust fund for tsunami, disaster and climate preparedness is an example of how economies of scale can be achieved through coordinated donor funding.

V. Regional and subregional action: the way forward

52. In order to achieve transformative adaptation that is cost-effective and sustainable in the long term, it is key to understand the dynamics of disaster-related risks in the region and their convergence with other crises. This is particularly so for high-risk countries in special situations — least developed countries, landlocked developing countries and small island developing States

[24] ESCAP, *Disaster Risk Financing: Opportunities for Regional Cooperation in Asia and the Pacific* (Bangkok, 2018).

[25] Chandan Banerjee and others, *Natural Catastrophes and Inflation in 2022: A Perfect Storm* (Zurich, Switzerland, Swiss Re Management Ltd., 2023).

– where, compared to middle- and high-income countries, the adaptation financing gap is widening.

53. Towards this end, in both intensifying and emerging risk hotspots, three actions are advocated through regional and subregional cooperation.

54. First, transformative adaptation requires continued investment to bring effective early warning systems to those most at risk in the region's hotspots. Innovations and scientific breakthroughs capable of ensuring access to early warnings need to be championed, supported through multisectoral cooperation and shared among countries.

55. Second, the large-scale introduction of nature-based solutions can have long-term transformative and sustainable climate adaptation results. The wider the scale of implementation, the greater the synergies. Multi-country cooperation, policy coordination and the joint investment of resources can bring mutually reinforcing benefits, especially among those countries sharing common transboundary risk hotspots.

56. Third, a comprehensive regional disaster risk financing strategy for transformative adaptation could play a critical role in advancing the Sustainable Development Goals in the region. Such a strategy should cover contingency planning, the identification of pooled risk management opportunities, collaboration on the climate risk management agenda and the development of pre-agreed disaster response plans. Information-sharing, early warnings and knowledge and technology transfer can take place in an augmented and more coordinated manner for the mutual benefit of all involved under such a joint approach.

VI. Issues for consideration by the Committee

57. The Committee on Disaster Risk Reduction may wish to take the following actions:

(a) Share national policy perspectives pertaining to the analyses and recommendations contained in the *Asia-Pacific Disaster Report 2023*;

(b) Share perspectives on supporting the implementation of the Executive Action Plan on Early Warnings for All, 2023–2027, through a regional strategy, the elements of which are set out in the note by the secretariat on a regional strategy to achieve early warnings for all by 2027 in Asia and the Pacific;[26]

(c) Consider calling upon the secretariat to support ESCAP members and associate members in scaling up regional and subregional cooperation strategies to improve understanding of and mitigate dynamic disaster risks, with a focus on the three actions set out in paragraphs 54–56 above.

[26] ESCAP/CDR(8)/4.