

**Economic and Social Commission for Asia and the Pacific****Seventy-second session**

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Item 3 (f) of the provisional agenda*

**Review of issues pertinent to the subsidiary structure
of the Commission, including the work of the regional
institutions: disaster risk reduction****Building resilience to cross-border disasters*****Summary*

The Asia-Pacific region is the most disaster-prone in the world. Each year, natural disasters of many types strike a vast swathe of the region, affecting millions of people and wreaking massive economic destruction. Many of the disasters are transboundary in nature. Often natural disasters wipe out gains made in sustainable development. The present document contains a description of the secretariat's efforts to help member States achieve the Sustainable Development Goals, particularly those related to poverty eradication, food security and climate adaptation through disaster risk reduction. To facilitate concerted national and regional actions, the secretariat is continuing to scale up regional cooperation to address cross-border disasters, including through the Multi-Donor Trust Fund for Tsunami, Disaster and Climate Preparedness in Indian Ocean and Southeast Asian Countries of the Economic and Social Commission for Asia and the Pacific (ESCAP), the Regional Cooperative Mechanism for Drought Monitoring and Early Warning, the ESCAP/World Meteorological Organization (WMO) Typhoon Committee and the WMO/ESCAP Panel on Tropical Cyclones. Further, the secretariat's support to member States for the utilization of innovative space technology applications to address cross-border disasters is highlighted. The document also contains an outline of the secretariat's initiatives to extend regional cooperation for flood forecasting and early warning, and plans for setting up research networks for flash floods, glacial lake outburst floods and landslides, as guided by Commission resolution 71/12 and the fourth session of the Committee on Disaster Risk Reduction. The Commission may wish to provide guidance on how the secretariat can further strengthen its work on cross-border disasters.

* E/ESCAP/72/L.1.

** This document was submitted late owing to the ongoing discussions on the Regional Cooperative Mechanism for Drought Monitoring and Early Warning and its upcoming activities, and with partners.

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I. Introduction

1. In the last decade, 1,624 disasters were reported in the Asia-Pacific region. Approximately 400,000 people lost their lives, around 1.4 billion were affected, and there was more than half a trillion dollars' worth of economic damage.¹

2. In 2015, disasters continued to undermine hard-won development gains across the region. These disasters included the Tropical Cyclone Pam in March, the Nepal earthquake in April, heatwaves in India and Pakistan in May and June, floods in Myanmar in July and August, earthquakes in Afghanistan and Pakistan in October, floods in India in November and December, and a number of slow-onset disasters such as droughts, forest fires and haze. Impacts of disasters constitute a serious threat to the attainment of the Sustainable Development Goals, particularly those related to poverty eradication, food security and climate adaptation. It was evident from the Nepal earthquake that it seriously set back the country's aspiration to graduate from its status of least developed country.

¹ Centre for Research on the Epidemiology of Disasters, EM-DAT: The OFDA/CRED International Disaster Database. Available from www.emdat.be (accessed on 4 March 2016).

3. Many of the disasters in the region are also transboundary. The region hosts the world's two most seismically active fault lines which cross many national frontiers. It has three major ocean basins where a cyclone developing in one basin can affect multiple countries simultaneously. Countries in the region also share rivers and river basins with floods regularly spreading across national boundaries. Some recent examples show the magnitude of cross-border impacts of disasters:

(a) The Nepal earthquake in 2015 affected regions of Bangladesh, China, India and Myanmar. Cross-border seismic risk also includes tsunamis, as seen in the case of the 2004 Indian Ocean tsunami, which affected millions of people in 14 countries;

(b) Out of the 43 storms that hit the Asia-Pacific countries in 2015, 33 were high-intensity cyclones that affected many countries.² Tropical Cyclone Winston in February 2016, which was the strongest cyclone to make landfall in Fiji, also hit Australia and Tonga;

(c) Transboundary river basin flooding, glacial lake outburst flooding, flash floods and landslides cause widespread destruction in riparian countries. For example, the transboundary floods in India and Pakistan in September 2014 resulted in economic damage of \$18 billion;³

(d) Climate and monsoon variability often causes droughts in multiple countries in the region; for example, the 2015-2016 El Niño phenomenon that affected many countries in Asia and the Pacific.

4. It is within this context of increasing impacts of cross-border disasters that member States of the Economic and Social Commission for Asia and the Pacific (ESCAP) have recognized building resilience to disasters through regional cooperation as a priority underpinning sustainable development in the region. Consequently, in its resolution 71/12, the Commission underscores the role of the secretariat in deepening and extending regional cooperation mechanisms. It calls on the secretariat to guide actions at the regional level through agreed regional and subregional strategies and mechanisms to strengthen disaster risk modelling, assessment, mapping, monitoring and multi-hazard early warning systems of common and transboundary disasters, particularly those related to hydrometeorological issues, by deepening existing regional cooperation mechanisms such as the ESCAP/World Meteorological Organization (WMO) Typhoon Committee, the WMO/ESCAP Panel on Tropical Cyclones and the Regional Cooperative Mechanism for Drought Monitoring and Early Warning, as well as by extending regional cooperation for floods, glacial lake outburst floods and landslides.

II. Progress made in regional cooperation to address cross-border disasters

A. Overview

5. As the formal United Nations platform for policymaking and sharing of regional knowledge and experience in the Asia-Pacific region, and as a catalyst for the creation of a strong regional voice, ESCAP plays an important role in building regional cooperation to formulate strategies that address

² Economic and Social Commission for Asia and the Pacific, "Disasters in Asia and the Pacific: 2015 year in review", 2016. Available from www.unescap.org/.

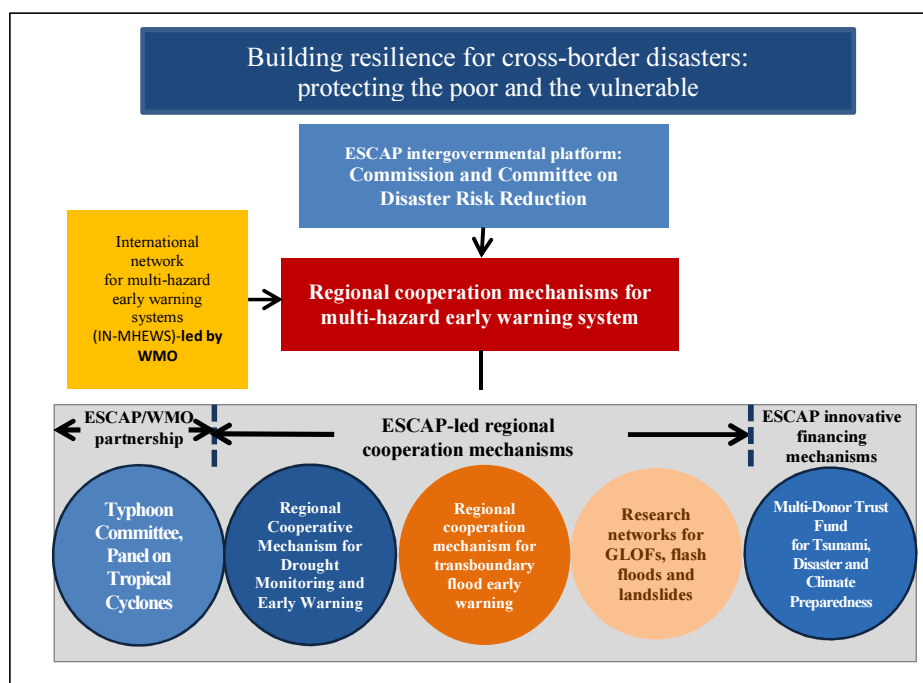
³ Economic and Social Commission for Asia and the Pacific, "Disasters in Asia and the Pacific: 2014 year in review", 2015. Available from www.unescap.org/.

shared risks in the context of sustainable development. The secretariat combines analytical and capacity-building work with efforts to facilitate and support regional collaboration among member countries to collectively address cross-border disaster risks. Since the seventy-first session of the Commission, the secretariat has focused on deepening regional cooperation in early warning, supporting intergovernmental platforms for sharing knowledge and experience, and facilitating the use of innovative technologies, such as space applications, to monitor cross-border disasters (figure I). In addition, a specialized regional institution of ESCAP, the Asian and Pacific Centre for the Development of Disaster Information Management, will be established in order to enhance regional cooperation and coordination among countries and organizations in the region and to strengthen the region's capacity in the field of disaster information management. Its function, among others, will be to facilitate access to regional and global disaster information and data sources by creating appropriate standards, frameworks and mechanisms and developing regional programmes, such as a regional disaster database, particularly for high-risk, low-capacity countries.

6. The following sections highlight the progress made in this regard.

Figure I

Regional cooperation mechanisms for multi-hazard early warning systems



Note: Regional cooperation on transboundary flood early warning and research networks for glacial lake outburst floods, flash floods and landslides are at the conceptual level.

Abbreviation: GLOF, glacial lake outburst flood.

B. ESCAP/WMO Typhoon Committee and WMO/ESCAP Panel on Tropical Cyclones

7. In partnership with WMO, ESCAP is supporting two intergovernmental platforms to address cross-border risks from tropical cyclones (known as typhoons if they originate from the western Pacific): the ESCAP/WMO Typhoon Committee, which covers storms emerging from the Western

Pacific, and the WMO/ESCAP Panel on Tropical Cyclones, which covers the Bay of Bengal and the Arabian Sea. Over the four decades that have passed since they were established, both platforms have expanded and strengthened their activities, giving rise to closer regional cooperation in early warning.

8. In particular, the Typhoon Committee and the Panel on Tropical Cyclones have helped integrate the fields of meteorology, hydrology and disaster risk reduction, building capacities and developing joint strategies across countries and professional fields. The two platforms have also undertaken original research and piloted innovative projects to further improve the understanding of tropical cyclones and related hazards. One of these projects, implemented jointly by both platforms with financial support from the ESCAP Multi-Donor Trust Fund for Tsunami, Disaster and Climate Preparedness in Indian Ocean and Southeast Asian Countries, led to the development of a regional manual on multi-hazard standard operating procedures for early warning.

9. In February 2015, the secretariat hosted a joint session of the Typhoon Committee and the Panel on Tropical Cyclones, the first of its kind in 18 years. The joint session served to strengthen cooperation between the two platforms, especially in sharing experience, knowledge and tools for early warning and monitoring of tropical cyclones and other climate-related disaster risks. As a result, several joint capacity-building activities have taken place, including through the Regional Specialized Meteorological Centres in New Delhi and Tokyo. With their record of achievement, the Typhoon Committee and the Panel on Tropical Cyclones offer successful models of regional cooperation that could potentially be replicated in other subregions and for other cross-border hazards in Asia and the Pacific.

C. Regional Cooperative Mechanism for Drought Monitoring and Early Warning

10. Agricultural drought remains a silent and forgotten disaster in Asia and the Pacific. Over the past four decades, drought has affected more than 1.6 billion people in the region, increasing risks for people that rely on the agricultural sector for their livelihoods and causing damage worth more than \$53 billion.⁴ In agrarian economies, drought hits the poor, small and marginal farmers the hardest. Driven by monsoon variability, El Niño, aridity anomalies and dry spells, drought is a transboundary issue that can affect multiple countries at the same time and requires regional solutions.

11. With this background, ESCAP launched the Regional Cooperative Mechanism for Drought Monitoring and Early Warning, a flagship programme of the Regional Space Applications Programme for Sustainable Development, which mobilizes regional resources in space technology and geographic information system (GIS) applications and enhances capacities for integrated analysis of space and in-season ground data and information to build resilience among agrarian communities perennially affected by drought.

12. To date, eight pilot countries participate in the Drought Mechanism, reflecting a variety of climate and socioeconomic circumstances: Afghanistan, Bangladesh, Cambodia, Kyrgyzstan, Mongolia, Myanmar, Nepal and Sri Lanka. Two regional service nodes support the Drought Mechanism – the National Remote Sensing Centre of China and the National Remote Sensing Centre of the Indian Space Research Organization – by

⁴ Centre for Research on the Epidemiology of Disasters, EM-DAT: The OFDA/CRED International Disaster Database. Available from www.emdat.be (accessed 4 March 2016).

providing space-based data and products and capacity-building assistance to the national team of the pilot country for effective drought monitoring and early warning.

13. The Drought Mechanism is increasingly expanding its work to move beyond monitoring and early warning to incorporate seasonal forecasts, longer-term risk analysis, impact assessment and other tools for managing and adapting to drought. For example, information on the long- and medium-term impact of drought and other climate scenarios on various sectors of the economies of member States and the region in general will help with long-term planning and adaptation to changing climate risks. The joint advisory note entitled “El Niño 2015-2016: impact outlook and policy implications”, issued by ESCAP and the Regional Integrated Multi-hazard Early Warning System for Africa and Asia in December 2015, was an effort in this direction. The advisory note specifically focused on assessing the imminent risk of El Niño for Pacific island developing States, including the various sectors such as water resources, health, fisheries and agriculture. This evidence-based approach can help policymakers understand the real impact of slow-onset disasters like drought, and can be a tool to guide policymaking, develop seasonal and long-term adaptation strategies and ultimately build resilience against these types of forgotten disasters.

D. Access to space technology applications through regional cooperation

14. The secretariat, through its long-standing regional cooperation mechanism, the Regional Space Applications Programme for Sustainable Development, has made concerted efforts to promote the applications of space technology to support disaster risk reduction and sustainable development. The Programme brings together national space agencies in the Asia-Pacific region to work together to help disaster-prone countries through the provision of regional support in satellite-derived data, products and services. It has been strengthened by enhanced networking and harmonization among the global and regional initiatives, in particular the Asia-Pacific Regional Space Agency Forum, the Group on Earth Observations, Global Earth Observation System of Systems, the International Charter on Space and Major Disasters, Sentinel Asia, the United Nations Platform for Space-based Information for Disaster Management and Emergency Response, the United Nations Initiative on Global Geospatial Information Management and the Operational Satellite Applications Programme.

15. For example, since the seventy-first session of the Commission, ESCAP has provided close to 300 satellite images and damage maps to Fiji, Malaysia, Myanmar, Nepal, Pakistan, the Philippines, the Solomon Islands, Vanuatu and Viet Nam for early warning, response and damage assessment of floods, typhoons/cyclones and landslides. This included more than 90 scenes and 12 damage maps for Fiji in the aftermath of Cyclone Winston from members of the Operational Satellite Applications Programme and the Regional Space Applications Programme for Sustainable Development. These space-based data, products and services were provided freely by member States through regional cooperation networks and partnerships and have been estimated to be worth the equivalent of \$640,000 (data and products) and \$350,000 (services) respectively.

16. Furthermore, in order to validate the use of space-based data and products by end users in disaster-affected countries, the secretariat, in collaboration with the South Asian Association for Regional Cooperation Disaster Management Centre, has prepared a manual on rapid assessment for resilient recovery through the use of innovative tools, techniques and space

applications, and training has been provided to government agencies in several South Asian countries. Likewise, the secretariat and the Association of Southeast Asian Nations Coordinating Centre for Humanitarian Assistance on Disaster Management and relevant United Nations agencies are developing standard operating procedures for acquiring and using space-based data and products during disasters.

17. Since 2014, ESCAP capacity-building programmes on space applications have benefited approximately 470 government officials, practitioners and managers from more than 30 member States in the region. Capacity-building activities have also been supported by the Centre for Space Science and Technology Education in Asia and the Pacific in India. With support from Japan, the secretariat is launching a programme to strengthen the capacity of Pacific island developing States for timely access of space applications and GIS for disaster preparedness and early warning.

E. Innovative financing: the ESCAP Multi-Donor Trust Fund for Tsunami, Disaster and Climate Preparedness in Indian Ocean and Southeast Asian Countries

18. The ESCAP Multi-Donor Trust Fund for Tsunami, Disaster and Climate Preparedness in Indian Ocean and Southeast Asian Countries, established in 2005 following the Indian Ocean tsunami, promotes innovative pilots and upscaling of successful early warning systems, especially those that strengthen links to communities at risk, along the so-called “last mile”. The Trust Fund has grown into a broad partnership connecting member States to international organizations, regional institutions, non-governmental organizations and academic institutions working on early warning. As of February 2016, the Trust Fund had received contributions totalling \$15.5 million from the following nine donors: Thailand (\$10 million), Sweden (\$2.9 million), India (\$1 million), Germany (through the German Agency for International Cooperation) (\$1 million), Japan (\$400,000), Turkey (\$200,000), Philippines (\$20,000), Bangladesh (\$10,000) and Nepal (\$2,000).

19. The Trust Fund contributed to the establishment the Indian Ocean Tsunami Warning and Mitigation System, which became operational in 2011. The system brings together 28 member States that now share information and pool capacities in tsunami early warning. The establishment and continued operation of this system represents a major achievement in the efforts to build resilience to cross-border disasters in Asia-Pacific.

20. The Trust Fund also established the Regional Integrated Multi-hazard Early Warning System for Africa and Asia, an intergovernmental institution that focuses on the generation and application of early warning information and provides technical support for capacity-building. The products and services of this system are particularly useful for high-risk, low-capacity countries that often lack the necessary domestic capacity in early warning.

21. The Trust Fund provided valuable support for individual countries to strengthen their national warning systems, for example by establishing seismic and sea-level stations in Myanmar, the Philippines and Viet Nam. The operations of the stations were taken over by the respective national Governments. In total, nineteen countries have received support in strengthening their standard operating procedures for early warning.

22. In May 2015, the Commission, through its resolution 71/12, requested the expansion of the geographical scope of the Trust Fund to include small island developing States in the Pacific. In September 2015, this expansion

was formally endorsed by the Trust Fund's Advisory Council, thus making ESCAP members in the Pacific eligible for support and setting the stage for a new phase of Trust Fund activities that will also benefit the small island states in the Pacific.

III. Extending regional cooperation mechanisms

A. Overview

23. While good progress has been made in strengthening early warning for tsunami and tropical cyclones, significant gaps still exist for other cross-border hazards. In this regard, the Commission, in its resolution 71/12, requested the secretariat to work on extending regional cooperation for river basin floods, glacial lake outburst floods, flash floods and landslides. The Committee on Disaster Risk Reduction, at its fourth session held in October 2015, recommended the secretariat to work towards the establishment of a regional cooperation mechanism for early warning for transboundary river basin floods and requested the secretariat to collaborate with partners to take that priority forward, in line with Commission resolution 71/12. The Committee further recommended that the secretariat address gaps in early warning for glacial lake outburst floods, flash floods and landslides, including by setting up a research network.

B. Establishing a regional cooperation mechanism for early warning for transboundary floods

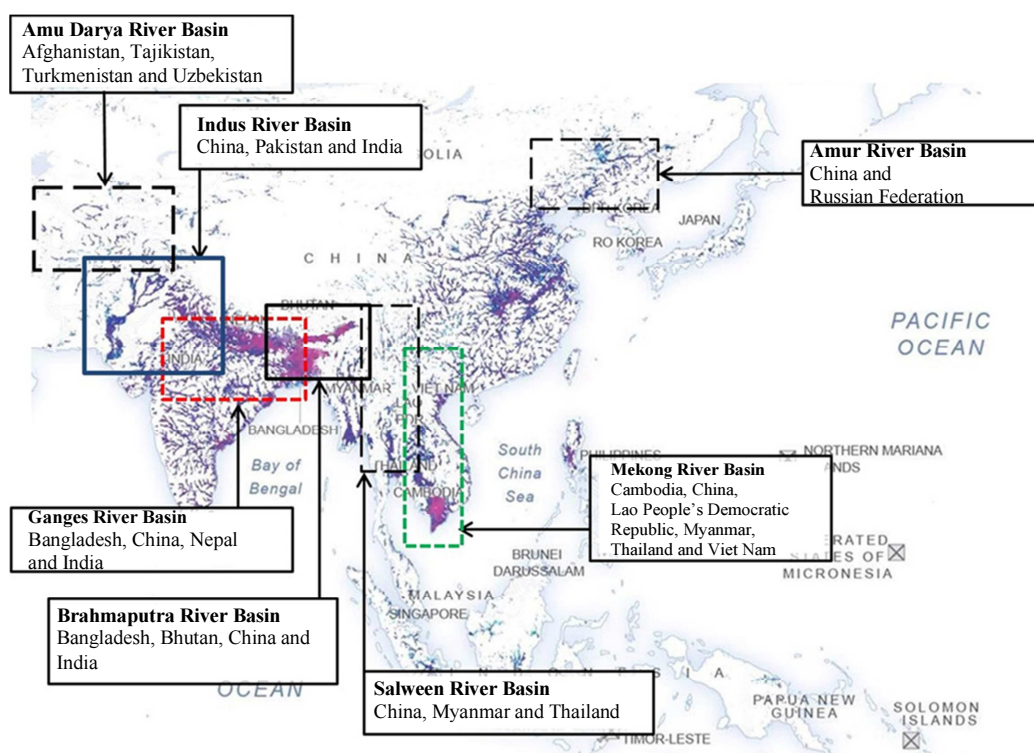
24. Among all the disasters in the region, floods have been the most frequent and devastating. Floods in the transboundary river basins have had severe impacts beyond geographical boundaries. Many of the largest rivers emanate from the Tibetan Plateau and the Himalayas, and are fed by glacial and snow melting as well as monsoon rainfall. A large cross section of the region's population resides in the vast agrarian belts along the Yellow, Yangtze, Mekong, Irrawaddy, Ganges, Brahmaputra and Indus river basins, each of which is subject to periods of widespread and seasonal flooding (See figure II). According to the World Resources Institute, 10 out of the top 15 countries in the world in terms exposure of people and economies to annual river floods are in the Asia-Pacific region. They are, by order of population exposed to flood risk, India, Bangladesh, China, Viet Nam, Pakistan, Indonesia, Myanmar, Afghanistan, Thailand and Cambodia (see box I).

25. The transboundary river basins in the region are also home to a large number of poor and vulnerable populations dependent on agriculture. It is estimated that around 40 per cent of the world's poor people live on or close to the major transboundary river basin systems in South Asia; an astounding two thirds of this population live on the Indus, Ganges and Brahmaputra basins.⁵ The climate variability and climate change often manifest themselves in monsoon variability, the incidence of El Niño and La Niña, and other extreme weather events, resulting in large-scale frequent flooding. Recent assessments suggest that by 2030, the number of people affected by flooding is projected to more than double across the basins in the region.⁶ To tackle poverty (Sustainable Development Goal 1) and food security (Goal 2) and achieve sustainable development in the region, it is critical to manage transboundary river basin floods.

⁵ World Bank, *South Asia Water Initiative: Annual Report from the World Bank to Trust Fund Donors, July 2014-June 2015* (Washington, D.C., World Bank Group, 2015).

⁶ Ibid.

Figure II
Transboundary river basins in Asia-Pacific



Source: Asia-Pacific Disaster Report 2015, based on “Asia-Pacific: flood risk” map, Office for the Coordination of Humanitarian Affairs, 2014 (available from http://reliefweb.int/sites/reliefweb.int/files/resources/map_616.pdf; accessed 4 March 2016), with river basin data from the International Centre for Integrated Mountain Development.

Box I River basin flood impacts



Asia-Pacific countries with the highest percentage of gross domestic product (GDP) affected by river floods annually (percentage of the country's total GDP)

Annual expected population affected by river floods in Asia-Pacific countries (millions of people), accounting for 70% of the population exposed to river flood risk worldwide

Source: ESCAP, based on data from World Resource Institute, 2015. Available from www.wri.org/blog/2015/03/world%E2%80%99s-15-countries-most-people-exposed-river-floods (accessed 4 March 2016).

26. Flood forecasting and early warning is critical for reducing the impacts of transboundary flooding. Recent advances in simulated weather forecasting based on innovative space applications have enabled longer lead times of five to eight days for flood forecasts. These advances in science rarely reach the communities living along these vast rivers. On average, they get one day's notice for evacuation. A pilot demonstration of a space technology application for the Flood Forecasting and Warning Centre in Bangladesh showed a capability to forecast river heights up to eight days ahead of time.⁷ Satellites can provide critical information on the heights of rivers for large river basins. Enhancing early warning systems with a longer lead time can thus dramatically strengthen household response and provide tangible benefits to flood warning (see box II).

27. The development of an operational flood forecasting and early warning system in shared river basins requires cooperation between riparian countries to provide wider access to recent scientific innovations, and to build the capacity of countries sharing common risk. In this regard, the secretariat is developing a pilot project for regional cooperation for flood forecasting in selected river basins, with the intention of scaling it up to cover other transboundary river basins. The modalities and experience of the ESCAP/WMO Typhoon Committee and WMO/ESCAP Panel on Tropical Cyclones provide useful lessons. Like these two platforms, the regional cooperation mechanism for flood forecasting would comprise hydrologists, meteorologists and disaster risk management professionals drawn from the operational organizations of the riparian countries.

⁷ Physical Oceanography Distributed Active Archive Center, National Aeronautics and Space Administration, "Utilization of satellite altimetry for Bangladesh flood forecasting and warning system", 11 May 2015. Available from https://podaac.jpl.nasa.gov/OceanEvents/2015_05_11_BangladeshFlood.

Box II

Benefit of early warning system with lead time for flood forecasting: transitioning from early warning to livelihood support

<i>Item</i>	<i>Lead time</i>	<i>Damage reduction (percentage)</i>	<i>Actions taken to reduce damage</i>
Household items	24 hrs	20	Removal of some household items
	48 hrs	80	Removal of additional possessions
	Up to 7 days	90	Removal of all possible possessions including stored crops
Livestock	24 hrs	10	Poultry moved to safety
	48 hrs	40	Poultry and farm animals moved to safety
	Up to 7 days	45	Poultry, farm animals, forage and straw moved to safety
Agriculture	24 hrs	10	Agricultural implements and equipment moved
	48 hrs	30	Nurseries and seed beds saved, 50 per cent of crop harvested, agricultural implements and equipment removed
	Up to 7 days	70	Nurseries and seed beds saved, fruit trees harvested, 100 per cent of crops harvested, agricultural implements and equipment removed
Fisheries	24 hrs	30	Some fish, shrimps and prawns harvested
	48 hrs	40	Some fish, shrimps and prawns harvested, nets erected
	Up to 7 days	70	All fish, shrimps and prawns harvested, nets erected, equipment removed
Open sea fishing	24 hrs	10	Fishing net and boat damage avoided
	48 hrs	15	Fishing nets removed, boat damage avoided
School or office	24 hrs	5	Money and some office equipment saved
	48 hrs	10	Money and most office equipment saved
	Up to 7 days	15	Money and all office equipment including furniture protected

Source: A.R. Subbiah, Lolita Bildan and Ramraj Narasimhan, "Background paper on assessment of the economics of early warning systems for disaster risk reduction", prepared for the Global Facility for Disaster Reduction and Recovery, 2008.

In Bangladesh, in a pilot project on improved availability of five-day forecast warning messages, the average household was able to save around \$472 after receiving the early warning. Average household savings were highest in fisheries (\$768), while agriculture and livestock sectors recorded \$640 and \$678 savings per household respectively. This illustrates the tangible benefits of increased lead-time forecasts, protecting poor people and their assets and livelihoods in transboundary river basins.

Source: Md. Abdul Latif Miah, Md. Amirul Hossain and Raihanul Haque Khan, "Flood forecasting and warning services in Bangladesh", presentation delivered at the regional flood early warning system workshop held in Bangkok, 23-27 November 2015.

C. Networking of regional experts for glacial lake outburst floods, flash floods and landslides

28. In addition to the strengthened regional cooperation on transboundary river basin floods described above, countries in the Asia-Pacific region have also called for better early warning systems for hazards such as flash floods, glacial lake outburst floods and landslides. Landslides, for example, continue to cause high death tolls in some countries despite the availability of tools to largely avert this risk. Sharing solutions and setting up field-based warning systems for these hazards is therefore a priority.

29. The secretariat is conducting feasibility studies on strengthening regional cooperation for flash floods and landslides in addition to transboundary river basin floods. A regional expert meeting is to be organized in the second half of 2016 to review the outcomes of the studies and make recommendations on the appropriate cooperation mechanisms (see box III).

Box III

South-South cooperation to share experiences of a low-cost solution to landslide early warning

In November 2015, the Lao People's Democratic Republic hosted the annual ESCAP/WMO Typhoon Committee roving seminar, which on that occasion focused on early warning for landslides and flash floods. For the seminar, ESCAP supported the participation of four representatives of the WMO/ESCAP Panel on Tropical Cyclones, to further strengthen sharing and cooperation between the two platforms.

The seminar identified the need for cost-effective and easily transferrable solutions for early warning, which could be implemented by least developed countries. In response to this demand, an effective, low-cost solution to landslide early warning, which had first been developed in Latin America, was shared at the seminar. According to the participants, this solution, shared through South-South cooperation, had major potential for replication in the Asia-Pacific region, especially in least developed countries.

D. Renewing regional commitment to enhanced access to space technology applications and geographic information systems

30. Despite the great progress of the Regional Space Applications Programme for Sustainable Development in extending access to space technology applications and GIS, gaps still exist and opportunities remain to further raise awareness and build capacity to access and utilize these tools, information and products. The year 2016 marks the beginning of implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030 and the transition from the Millennium Development Goals to the Sustainable Development Goals. In Asia and the Pacific, successful achievement of the Sendai Framework and the Sustainable Development Goals by 2030 will depend critically on building much greater resilience to disasters. Science, technology and innovation have been clearly identified under the Sendai Framework and the Goals as important means for building resilience to disasters and supporting work towards sustainable development. This fact was recognized by member States of Asia and the Pacific, the world's most disaster-prone region, decades before these agreements, particularly in the context of the value of space applications.

31. In this context, the Committee on Disaster Risk Reduction, at its fourth session, requested that the secretariat hold a space leaders' forum during the Asian Ministerial Conference on Disaster Risk Reduction, to be held in New Delhi in November 2016. The purpose of the forum would be to renew and extend the work of the Regional Space Applications Programme for Sustainable Development to align it with the goals and targets of the 2015 World Conference on Disaster Risk Reduction, held in Sendai, Japan, and the 2030 Agenda for Sustainable Development.

32. The Regional Space Applications Programme for Sustainable Development would consider modalities for closer collaboration with end users such as disaster management authorities and early warning agencies. It would also attempt to deepen and extend its operational support to priority areas such as multi-hazard risk assessment and early warning systems for hazards with transboundary origins, regional land cover mapping for a geospatial baseline database, disaster monitoring, damage and loss assessment, and education and training networks. For the purpose of monitoring the implementation of the Sendai Framework and the Sustainable Development Goals, land cover maps and databases will be key tools to monitor changes in land systems and help with many other issues, such as monitoring and planning of agriculture land use, urban development, disaster risk assessment, forestry, water management, environmental monitoring and other natural-resource management.

33. The outcomes will contribute to the discussions of the Asian Ministerial Conference on Disaster Risk Reduction and eventually to a renewal of the five-year plan of action for space technology applications, which is due to expire in 2017.

E. Strengthening regional cooperation mechanisms in the Pacific

34. The countries in the Pacific are frequently impacted by tropical cyclones, yet a regional coordination mechanism similar to the ESCAP/WMO Typhoon Committee and the WMO/ESCAP Panel on Tropical Cyclones does not yet exist. Limited cooperation in meteorology is currently taking place through the WMO Regional Association V Tropical Cyclone Committee for the South Pacific and South-East Indian Ocean. In this regard, there is an opportunity for ESCAP to work with WMO and member States in the Pacific to further strengthen that Tropical Cyclone Committee by extending and sharing the good practices developed by the ESCAP/WMO Typhoon Committee and the WMO/ESCAP Panel on Tropical Cyclones.

35. In particular, to foster an integrated system and support greater resilience to cross-border hazards, there is potential for broadening the focus of the Tropical Cyclone Committee to also include disaster risk reduction and hydrology, in addition to meteorology. The work of the ESCAP/WMO Typhoon Committee and the WMO/ESCAP Panel on Tropical Cyclones, including the development of a regional manual on multi-hazard standard operating procedures for early warning, can serve as a good-practice model for how to also build such an integrated regional platform in the Pacific. To achieve such multidisciplinary cooperation, efforts will be made by ESCAP and its partners to take these mechanisms forward.

36. In addition, ESCAP has initiated a project in the Pacific region, with a key focus on strengthening multi-hazard risk assessment and early warning systems by using GIS, in the Cook Islands, Fiji, Kiribati, the Marshall Islands, the Federated States of Micronesia, Nauru, Niue, Papua New Guinea, Samoa, the Solomon Islands, Tonga, Tuvalu and Vanuatu. The project will

enhance awareness, preparedness and response for multi-hazard risk assessment and early warning systems of Pacific islands through access to socioeconomic data and operation of national portals of geo-referenced information systems for disaster risk management, and will also strengthen the operation of these systems for extreme-weather-related disasters. The capacity of Pacific islands to use space technology applications and GIS will be enhanced, along with subregional cooperation platforms on sharing geospatial data by building a subregional knowledge hub in the Pacific.

IV. Issues for consideration by the Commission

37. As outlined above, particularly with a view to implementing Commission resolution 71/12, the secretariat will continue to deliver on its mandate on disaster risk reduction and building resilience to cross-border disasters by deepening and extending regional cooperation. By aligning its work with the Sendai Framework for Disaster Risk Reduction 2015-2030 and the 2030 Agenda for Sustainable Development, the secretariat will further endeavour to deepen its assistance to member States in enhancing regional cooperation and promoting regional coherence to protect poor and vulnerable people from cross-border disasters in particular.

38. The Commission may wish to provide the secretariat with guidance on strategies and approaches for promoting regional cooperation in addressing natural disasters, and identify priorities for the secretariat's future work, taking into account the newly adopted Sustainable Development Goals.

39. Member States may also wish to share their experience and views on the issues and challenges raised. The Commission may also wish to encourage countries to communicate, coordinate and cooperate to address shared disaster risk, especially through regional platforms offered by ESCAP, including the Multi-Donor Trust Fund for Tsunami, Disaster and Climate Preparedness in Indian Ocean and Southeast Asian Countries, the ESCAP/WMO Typhoon Committee, the WMO/ESCAP Panel on Tropical Cyclones and the Regional Cooperative Mechanism for Drought Monitoring and Early Warning, as well as through ESCAP efforts in relation to regional cooperation for early warning and forecasting of transboundary floods, glacial lake outburst floods, flash floods and landslides.
