

ESCAP Multi-Donor Trust Fund for Tsunami,
Disaster and Climate Preparedness

2016 - 2017

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ESCAP Multi-Donor Trust Fund for Tsunami, Disaster and Climate Preparedness

Annual Report 2016 - 2017

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Contributions

As of 31 December 2017, the ESCAP Multi-Donor Trust Fund for Tsunami, Disaster and Climate Preparedness (hereinafter referred to as “the Fund”) had received US\$ 15.5 million in contributions from the following donors:



Bangladesh
US\$10,000



Germany
US\$999,380



India
US\$1,000,000



Japan
US\$400,000



Nepal
US\$2,000



Philippines (the)
US\$20,000



Sweden
US\$2,868,139



Thailand
US\$10,000,000



Turkey
US\$200,000

The Netherlands provided an Associate Expert from September 2008 to April 2011. Germany has contributed with an Associate Expert since July 2016. ESCAP contributed in-kind technical expertise and administrative assistance to the Fund.

Member countries and partners

Special thanks are extended to the ESCAP member countries in the Indian Ocean, Southeast Asia and the Pacific that are covered by the Fund, as well as the partners that work together with ESCAP to contribute to more resilient coastal communities, and ultimately to save lives and reduce loss and damage from disasters.



Preface

Since its inception in 2005, thanks to the visionary leadership of the founding partners Thailand and Sweden and subsequently Germany, Japan and India, the Trust Fund has served as a highly effective vehicle for building resilience to natural disasters in our region. The Trust Fund has supported initiatives promoting South-South and regional cooperation, strengthening capacities and facilitating the sharing of data, tools and expertise.

As the only dedicated regional funding mechanism that delivers coordinated support to the development of multi-hazard early warning systems, the Trust Fund has achieved significant results to date. In 2016 and 2017, the Trust Fund has strengthened its efforts in improving the region's climate preparedness. In the area of climate variability, the Fund has contributed to the achievement of effective end-to-end early warning systems, with substantial benefits in terms of reduced risks to end-users in the agriculture, water and energy sectors and a reduction in direct and indirect disaster losses.

More recently, the role of the Trust Fund in responding to slow-onset disasters has been of particular note. These are phenomena that often do not spur early action because of a lack of ground level understanding of the action required by the warning and of institutional mechanisms for considering such information on a regular basis. To help overcome these challenges, the Trust Fund has supported activities aimed at building capacities for climate preparedness in highly vulnerable countries such as Cambodia, Myanmar and Sri Lanka. As a result, national climate outlook forums (or "monsoon forums" as they are popularly known due to their convening around the onset of the monsoon season), have supported dissemination of seasonal forecast information to understand potential impacts.

In 2017, the Fund's Advisory Council made an important decision in approving a new strategy for 2017-2020, which sets the priorities for the next phase of the Fund. Looking forward the Trust Fund will continue playing a key role in the region in promoting effective and sustainable end-to-end early warning systems for coastal hazards such as tsunamis, tropical cyclones, flooding and storm surges. Towards this end it will focus its support on (i) expanding and interlinking regional early warning cooperation mechanisms and partnerships, (ii) strengthening 'last mile' multi-hazard early warning, (iii) investing in climate risk management, and (iv) harnessing innovation, science and technology.

The report for 2018-2019 is under preparation and will be published in early 2020.

Results Summary

Since its establishment in 2005, the ESCAP Trust Fund for Tsunami, Disaster and Climate Preparedness has contributed significantly to the progress made in building regional and national warning systems for coastal hazards. In 2011, a key milestone was reached with the operationalization of the Indian Ocean Tsunami Warning and Mitigation System (IOTWMS), which was established through the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC-UNESCO).

The Fund was one of the many contributors to the IOTWMS, through support for the adaptation of standard operating procedures (SOPs) for tsunami warning and emergency response, combined with training and other capacity building at regional, national and local levels. The Fund also supported the establishment of the Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES), which is closely linked to the IOTWMS.

RIMES is an intergovernmental institution that provides cost-effective warning products and services, particularly for tsunamis and extreme weather systems. These are especially useful for countries that are at high-risk of disasters but possess limited domestic capacity in hazard monitoring and early warning. RIMES also assists countries in applying hydro-meteorological risk information more effectively for decision making at the national and local levels. Services include the provision of daily numerical weather predictions, severe weather information forecasts and seasonal climate outlooks for risk management and preparedness, all delivered within the framework of the World Meteorological Organization (WMO).

At the national level, some of the most valuable and sustainable results of the Fund's projects involve the strengthening of monitoring and warning services. More recently, of particular note is the role of the Trust Fund in slow-onset disasters, phenomena that lend themselves to early warning. However, often they do not spur early action because of a lack of understanding of the action required by the warning at the ground level as well as the absence of institutional mechanisms to consider such information on a regular basis. To help overcome these challenges, through the Trust Fund, ESCAP has supported activities aimed at building capacities for climate preparedness in highly vulnerable countries. As a result, national climate outlook forums, or monsoon forums as they are popularly known due to their convening around the onset of the monsoon season, have supported dissemination of seasonal forecast information to understand potential impacts.

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1 Introduction

The 2004 Indian Ocean Tsunami resulted in widespread loss of human life and livelihoods, severe damage to infrastructure and ecosystems and large economic costs. Following this disaster, there was a strong recognition across the Asia-Pacific region of the need to undertake a coordinated, long-term effort to mitigate the impact of natural disasters through effective preparedness and prevention measures, including the establishment and further strengthening of early warning systems.

The ESCAP Trust Fund for Tsunami, Disaster and Climate Preparedness was established in 2005 following a US\$ 10 million contribution from the Royal Thai Government. The Fund is part of the overall United Nations effort to strengthen resilience across the Asia-Pacific region. It contributes to the narrowing of capacity gaps and supports the development of an integrated, regional early warning system comprised of a network of collaborative centres. In 2011, the scope of the Fund was expanded to also cover disaster and climate preparedness, while retaining a focus on end-to-end early warning for coastal hazards.

ESCAP is entrusted with managing and administering the Fund, and draws on its mandate as the commission for Asia and the Pacific to promote regional cooperation and integration for effective disaster risk reduction.

In accordance with the Fund's Terms and Conditions, this Annual Report provides an overview of the results of the Fund in 2016 and 2017. It also describes the financial status of the Fund and the activities carried out by the Secretariat.

2 Results of Fund-supported Projects

Portfolio

As of the end of 2017, 28 projects with a combined budget of US\$ 13.4 million had been approved since the Fund's inception in 2005 and 26 projects were completed. At the 16th Advisory Council Meeting on 25th of October 2016, donors reviewed projects submitted as part of the 10th call for proposals. Two new projects were approved with a start date in early 2017.

Through the various projects, the Fund is supporting priority areas such as risk assessments, development of hazard monitoring and warning services, development and testing of SOPs, education and awareness raising, strengthening of warning dissemination and emergency drills.

Monsoon Forums connecting the generators and the users of seasonal forecasts and warnings

The project 'Capacity Building on Generation and Application of Downscaled Climate Change Projections' (TTF-24), implemented jointly by RIMES and WMO, contributed to support climate-resilient development planning and improved resource management in Cambodia, Lao PDR, Myanmar, Pakistan, and Sri Lanka.

A key component of the project was the strengthening of the Monsoon Forums. Each Monsoon Forum serves as a platform for the National Hydrological and Meteorological Services (NMHS) and the main users of risk information to identify lessons learned from previous monsoon seasons, take stock of available tools and services, share forecasts for the upcoming season and plan preparedness activities. Additionally, the Forums help the NMHS adjust its products to the needs of end users, and are supplemented by WMO technical training of forecasters. Initially piloted in other parts of the region (e.g. Sri Lanka), the model was then rolled out in Cambodia and Lao PDR, with biannual, multi-stakeholder forums now established in both countries.

Box: Averting disaster through weather and climate forecasting in Sri Lanka

An example of how the Monsoon Forum assisted in averting disaster, through weather and climate forecasting, was observed in Sri Lanka in 2015. The South Asian Regional Climate Outlook Forum predicted normal to above normal rainfall for the second inter-monsoon 2015 (October-November) and the north-east monsoon seasons (December-January). The Sri Lanka Department of Meteorology downscaled this general forecast for Sri Lanka. This was then shared at the monsoon forum in October 2015 which was attended by various sectoral agencies, the Department of Irrigation and the Department of Agriculture.

After careful assessment of current water levels in the reservoirs, the Irrigation Department issued special instructions to the engineers responsible for reservoir operations, to maintain reservoir levels one metre below the full capacity, allowing for flood retention and for smooth operation of radial gates in the spillways. The forecast for above-normal rainfall was confirmed, and these actions minimised flood damage, and avoided flooding that would have resulted from rapid release of water.

Moreover, this project included the transfer of datasets, software and hardware for generating improved weather forecast and downscaled climate projections, in addition to intensive training of NMHS technical staff. The secondment opportunities offered to NMHS staff to RIMES headquarters in Bangkok, Thailand, was highly appreciated by participants and their seconding agencies. However, one institution noted the challenge with the

limited existing human resources and constraints resulting from sparing an officer for up to 3 months. Flexible options for capacity development are therefore to be considered in the future.

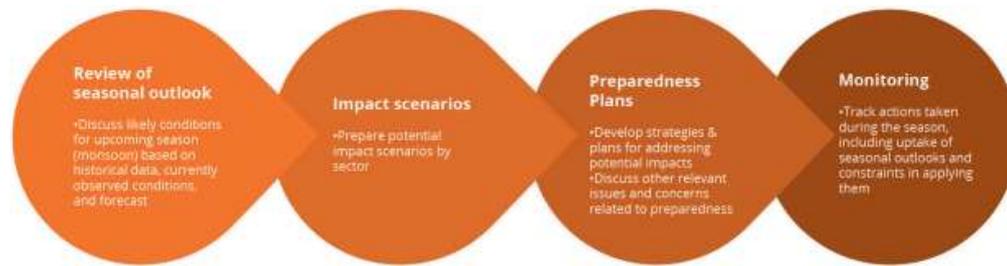


Figure: The climate outlook forum process (Source: ESCAP, Asia Pacific Disaster Report 2017)

The project developed a web-based interface for access to an analysis of climate data and scenario products, for generation of downscaled projections. To do this, RIMES worked with the Myanmar Department of Meteorology and Hydrology (DMH), the Pakistan Meteorological Department (PMD) and the Sri Lanka Department of Meteorology (DOM), to provide access to the Climate Data Access and Analysis System (CDAAS). CDAAS is a user interface capable of extracting smaller subsets of data from large climate model datasets, archived in the backend server through a user-friendly interface. Country-specific landing pages for CDAAS were created to enable linking to DMH, PMD, and DOM websites, through which these NMHSs, researchers, and other key stakeholders could have access to the CDAAS.

Each downscaled model spans the period 1980-2005, representing the baseline period, and future projections for the period until 2100. These datasets enable telescopic downscaling of climate baseline and projections, from coarse resolution (~180km) to downscaled information of up to ~25km, from multiple climate models, enabling development of robust climate change projections. A total of 81 institutions were reached and introduced to the downscaled climate projection outputs from the project. This allowed discussions among stakeholders on the potential impacts from future climate, as well as policy options to respond to the threats.

Through the application of the Climate Data Access and Analysis System, between 2015 and 2016, it was possible to make predictions of rainfall and temperature for the project countries. Over the next decades, it is expected that Myanmar, Pakistan and Sri Lanka will experience an increase in minimum and maximum temperatures and in rainfall. Other features of this interface include allowing to access climate scenarios, and performing multi-model analysis for selected locations and regions. Consequently, the CDAAS contributed to decision-making systems and specific interventions for operational needs of sectoral agencies, such as: Specialized Expert System for Agro-Meteorological Early Warning for Climate Resilient Agriculture (SESAME), Climate Risk Information System for public Health (CRISH), System for Multi-Hazard

potential impact Assessment and Emergency Response Tracking (SMART), Ocean State Forecast and Advisory System (OSFAS -Ocean Services) and managing water resources, from floods to reservoir systems.

Products generated through the project were first presented to users in user workshops in June 2016 in Myanmar and in August 2016 in Colombo. A ‘user workshop’ was not convened in Pakistan due to scheduling difficulties. Key users were, however, included in the national training for technical staff of the PMD.



Photo: Monsoon forum participants in Myanmar (Source: RIMES)

As part of the project, the Monsoon Forum model was extended to Cambodia, Lao PDR and Pakistan. In Lao PDR, a forum recommendation was to work with the media to raise their understanding and capacity to communicate forecasts. The training provided fostered dialogue between media and weather forecasters. In Pakistan, the forum highlighted the need to further raise awareness among the public specifically on heatwaves, and to promote multi-agency, multi-level preparedness.



Photo: 17th monsoon forum in Sri Lanka, conducted with support from the Trust Fund (TTF-27) (Source: RIMES)

The respective departments of meteorology are committed to periodically convene these multi-stakeholder forums. In Cambodia, the DOM has requested for continued financial and technical support for the Monsoon Forum. RIMES has received similar requests for continued technical support from Lao PDR, Myanmar, and Pakistan. Support is still required to fully institutionalise these forums and ensure related costs are part of the normal budgetary planning of the NHMS.

Improving response capacity through Common Alerting Protocol (CAP)

The project "CAP on a MAP - Improving Institutional Responsiveness to Coastal Hazards through Multi-Agency Situational Awareness" (TTF-25), was implemented by the Asian Institute of Technology (AIT) and the Sahana Software Foundation.

The project assisted the Maldives, Myanmar and the Philippines in implementing the Common Alerting Protocol (CAP) using an alerting and messaging broker system. CAP is a digital format for exchanging emergency alerts for multiple hazards, which allows a consistent alert message to be disseminated simultaneously over many different communication systems and channels (e.g. SMS, email templates, RSS web feed). It is a global standard promoted by the World Meteorological Organization (WMO) and the International Telecommunications Union (ITU).

The Sahana Alerting and Messaging Broker (SAMBRO) system is a messaging broker designed to publish and subscribe Common Alerting Protocol (CAP V1.2) warnings fostering 'all-hazard, all-media' warnings.

SAMBRO delivers:

- a) a platform to share a common alerting picture;
- b) coordination among multiple-agencies (alert hub for filtering, originating and relaying alerts);
- c) interoperability fostering common policies and procedures;
- d) risk mapping and impact-based early warnings (aligning warning classifications with alerting areas); and
- e) CAP stewardship and a community of practice in Asia-Pacific (but not limited to).

National meteorological agencies such as the Myanmar Department of Meteorology and Hydrology (DMH) and the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) were well positioned organizations for hosting SAMBRO from an operational and maintenance perspective. In the case of the Maldives, the National Disaster Management Center (NDMC) had limited technical knowledge on early warning systems and capabilities to implement the system compared to the Maldives Meteorological Services (MMS).

The SAMBRO is currently operational in all the three beneficiary countries, and in use in Myanmar and the Philippines. For example, the system served

PAGASA as an alert hub during the recent typhoon event (La Nina - December 2016). However, although the SAMBRO is operational in the Maldives since 13 October 2016, the NDMC had not issued any alerts or early warnings. Alerts and early warnings are generated by MMS, which go to the NDMC for further dissemination and it is important that MMS and NDMC cooperate closely to operationalize the system successfully.



Photo: SAMBRO workshop in Myanmar (Source: Sahana Foundation)

The early warnings require customization according to the system and warning dissemination framework in place in each country. For example, in Myanmar, early warning announcements to the public are disseminated through national and regional languages. For this reason, it was important to ensure flexibility in SAMBRO to incorporate more than one language; the system therefore includes both English and the national language of Myanmar.

Furthermore, the introduction of the 'all-hazard, all-media' warning concept enhanced the early warning and cross-agency situational-awareness. The design and implementation of this concept requires that all disaster management agencies collaborate to develop the CAP implementation plan and strategy. A closer collaboration between early warnings generating and disseminating agencies is essential to succeed. One illustration is how the National Disaster Management Center (NDMC) has worked closely with the Maldives Meteorological Service (MMS). Furthermore, the Maldives Department of Health expressed interest in implementing SAMBRO for public health and emergency medicine alerts.

The CAP-enabled SAMBRO system will enhance the interoperability of responsiveness to coastal hazards. For example, in Myanmar and the Philippines, the National Red Cross Societies are subscribing to the system. Since the early warnings are in CAP format, the early warnings can be easily disseminated by officials and volunteers. Moreover, the system implementation will enhance the cooperation between the national disaster

management agency and the other relevant technical agencies within a country. Trainers in all the beneficiary countries have direct access to the experts through email, online chat and telephone. The experts are also monitoring the operation in all the three beneficiary countries and they are providing necessary guidance, as well as further improving the system.

In recognition of the progress made in the Fund-supported project, AIT was requested to host the global CAP Implementation Workshop in September 2016. This is an event held every two years to promote CAP implementation worldwide. In conjunction with the Workshop, AIT and the Sahana Software Foundation convened a regional dissemination meeting to showcase the results achieved specifically through the Fund-supported project.

‘Last mile’ tsunami early warning in Pakistan

Reaching the most remote and vulnerable communities with timely and relevant warning information, particularly for infrequent hazards such as tsunami, is a common challenge across Asia and the Pacific. This activity is referred to as reaching “the last mile”.

The project "Enhancing Tsunami Resilience in Pakistan" (TTF-26), implemented by Oxfam GB and its' local partners TCCR (Trust for Coastal Conservation Resources) and PFF (Pakistan Fisher Folk Forum), had the main objective of increasing the awareness of, and preparedness for, tsunamis in five districts located in the provinces of Sindh and Baluchistan. The project was implemented in close cooperation with the Government of Pakistan and local stakeholders. It built on previous work supported by the Fund (e.g. TTF-11, TTF-21). Specifically, TTF-26 focused on strengthening tsunami early warning at the "last mile", conducting awareness raising, developing response plans, conducting training sessions with local communities, and supporting the involvement of women and girls. The results exceeded the initial targets; 40 % of the targeted people being women and girls.

In cooperation with NED University in Karachi, inundation modelling and risk mapping for Gwadar and Pasni districts of Baluchistan province were completed, considering the 1945 tsunami event as a baseline. These coastal areas are economic hubs which provide livelihoods to millions of people. With the upcoming China-Pakistan Economic Corridor (CPEC) project, it was assessed that the economic activities in these areas will increase significantly. The risk maps produced were used to develop Evacuation Response Plan and Disaster Risk Management Plan for Gwadar. This plan is instrumental to identify the roles, responsibilities, authority, capacities, and resources of relevant stakeholders for decision making.

The positive interaction and partnership with local officials and Provincial Disaster Management authorities to develop District Disaster Management

Plan and Evacuation Response plans was considered a success. It has enhanced their capacity to systematically plan and monitor the activities for preparedness and risk reduction. Oxfam also supported the process to develop a regular mechanism for updating the database of stakeholders. These efforts are a significant step forward for planners and implementers to work and enhance coordination and efficiency of warnings.



Photo: Evacuation drill at high school in Baluchistan (Source: Oxfam GB)

Notwithstanding these results, several challenges have emerged. The first is the reach of the satellite-based early warning system. In this terrain, one siren pole reaches approximately 3 km at night and 1.5 km to 2 km during daytime. Three additional siren poles were therefore required to cover all communities of Gwadar City alone. The siren poles were successfully installed through collaboration with the PMD, which also transferred 2 personnel to the MET Pasni district office with the technical capacity to maintain the system.

Additionally, the understanding and technical expertise related to the tsunami hazard among community members and organisations related to disaster management remains quite limited. The project has addressed various aspects of this issue through multiple targeted activities, including its own research into the extent of knowledge gaps, community awareness raising initiatives, and workshops for key figures in tsunami preparedness and mitigation strategies. Existing knowledge among various stakeholders has also been collated, through a national consultation into readiness for tsunami and its impact on local economy which gathered individuals from government organisations, NGOs, UN agencies, and academics, as well as various

activities that collated and disseminated experiences of elder community members of the Makran tsunami.

This comprehensive approach to building knowledge of the local context has yielded further learning point. For example, it is noted that a database of national and international experts may enhance understanding and knowledge sharing, by providing the stakeholders with a pool of expertise to call on when needed. Furthermore, more attention is needed to understand how to best connect the relevant stakeholders and authorities, as well as engage the private sector. In the meantime, Oxfam established a strategic partnership with UNDP and IOC-UNESCO for further technical expertise and support.

This project has also provided an opportunity to participate in regional DRM activities. In September 2016, Oxfam and TCCR, participated in the Indian Ocean-wide tsunami IOWave16 exercise organized by the Intergovernmental Oceanographic Commission of UNESCO, and with support from ESCAP. This exercise was carried out in Pakistan as well as 23 other Indian Ocean countries, to test standard operating procedures of the emergency services. The learning from the simulation exercise highlighted the need for improvements such as enhancing public awareness, providing warnings in local languages and strengthening the economic and technical capabilities for multiple scenarios.

Enhancing Weather and Climate Resilience through Capacity Building on Impact Forecasting

A key challenge to promoting risk-informed development and thus reducing disaster risk concerns barriers to integrating weather and climate information into decision making. The project “Enhancing Weather and Climate Resilience in RIMES Member States through Capacity Building on Impact Forecasting” (TTF-27) addresses this in Cambodia, Myanmar, Sri Lanka, Fiji, Papua New Guinea, and Samoa, by building the capacities necessary for decision making and seasonal planning that are informed by weather and climate information. The project aims to address at least 3 climate-sensitive sectors within each country, including agriculture, disaster management, water resources, fisheries and power. It therefore fosters coherence among various development-related sectors and promotes DRM as a cross-sectoral issue in line with resilience thinking. Further, it follows a sustainable approach based on knowledge sharing and local ownership.

In the Southwest Pacific countries, this is being implemented through several activities including the training of trainers in impact forecasting and climate applications. Convened by NWS and supported by RIMES, they have included trainers from a variety of NGOs and national organizations and have focused on building understanding of multi-hazard, multi-timescales information and how to incorporate it into planning and decision making. The project gained

expertise and fostered local ownership by capitalizing on RIMES's relationships with sectoral stakeholders in Fiji and Samoa, who have years of experience in applying local climate information. This has also meant that following the success of the sessions, trainers have expressed interest in leading further sessions both as a regular occurrence within their own country and in further countries in the Southwest Pacific.

In addition, several multi-hazard seasonal forums have been established to facilitate the use of impact and risk assessments to inform seasonal planning. So far, an initial forum in Fiji involved 20 stakeholders from FMS (Fiji Meteorological Service) and 10 from national sectoral institutions, whilst a third forum in Papua New Guinea involved 23 stakeholders. Efforts are ongoing to establish a forum in Samoa; accordingly, RIMES is working with SMD (Samoa Meteorology Division), to produce training data to sensitize stakeholders to the operational roles of preparedness, which are necessary to support a successful forum.

In Cambodia, Myanmar, Sri Lanka, and Papua New Guinea, the project is also enhancing decision-support systems to aid potential impact and risk analysis in the agriculture sector. Through collaboration with FAO, this is achieved by expanding SESAME Specialized Expert System for Agro-Meteorological Early Warning for Climate-Resilient Agriculture). Multiple approaches have been utilized according to the needs in each country, from extending the system to cover more regions, providing trainings in how to use the system, and collecting more data to input. Here there are also opportunities to promote collaboration between the many national stakeholders that support SESAME within each country. This is particularly true in Myanmar, where the system is hosted by the Department of Meteorology and Hydrology but used by the Department of Agriculture.

For Cambodia, Myanmar and Sri Lanka, RIMES is also supporting the integration of earth observations into impact forecasting and risk analysis. To this end, the monsoon forums are used as a platform for knowledge sharing between a wide variety of stakeholders including government institutions, development organizations, media, research institutions, UN organizations and businesses.

Working with such a wide variety of stakeholders has yielded an additional benefit, as RIMES has developed an in-depth and balanced understanding of various challenges that may influence the success of the project. This provides an opportunity for well informed, evidence based further projects.

Synergized Standard Operating Procedures for Coastal Multi-Hazard Early Warning Systems

Standard Operating Procedures (SOPs) are used to promote efficiency and to facilitate communication and collaboration between multiple stakeholders. This is particularly important for coastal hazard warning systems, in which communication between stakeholders must be rapid and reliable. In an earlier project of the Trust Fund (TTF-22), The Typhoon Committee therefore promoted SOPs through consultations with the 27 members of the Typhoon Committee and the Panel on Tropical Cyclones, and further workshops in three pilot countries of Bangladesh, Pakistan and the Philippines. By reviewing their SOPs, the committee then identified best practices, gaps and needs, and recommendations on how to further build institutional capacity and strengthen the SOPs. Ultimately the committee then combined these to produce a manual on Synergized Standard Operating Procedures (SSOPs) that was distributed to member countries. This project entitled SSOP Phase II: Synergized Standard Operating Procedures (SSOPs) for Coastal Multi-Hazard Early Warning Systems (TTF-28) builds on this earlier work by supporting member countries to follow the recommendations set out in the manual, as they revise or establish their own SOPs.

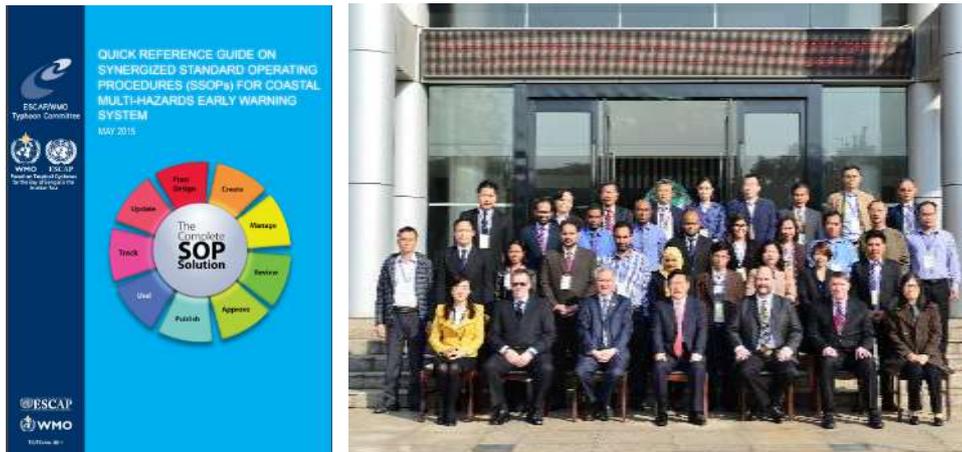


Photo: Manual on SSOP and training workshop in Nanjing (Source: ESCAP/WMO Typhoon Committee)

This is being realized through a variety of training workshops. Firstly, a course for DRR experts held at the WMO RTC (Regional Training Centre) in China during 2017 was attended by representatives from 8 of 10 targeted beneficiary countries. Attendees were trained in how to implement the manual through both lectures and table-top exercises focusing on practical applications. Knowledge sharing between countries was also facilitated, through open discussions regarding their experiences of implementing SOPs within their own context. This was well received by participants, several of whom noted that they will continue to collaborate when working within their own countries.

In addition to strengthening the capacity of individual countries to implement SSOPs, this combination of multiple training workshops is designed to strengthen the relationships between member countries of the Typhoon Committee and the Panel on Tropical Cyclones, to support collaboration for disaster management and knowledge sharing. In doing so, the projects aims to be sustainable, as the relationships between countries will outlast the project itself, and knowledge sharing for SOPs can continue. Similarly, the very concept of synergy in disaster management necessitates relations between many organizations and sectors within and above the national scale. It is anticipated that this project will therefore yield additional benefits, by promoting coherence between different organizations across different scales that will have broader benefits for the management of typhoons, tropical cyclones and other hazards.

Programmatic Approach for Regional Cooperation to Strengthen Tsunami Early Warning in the Makran region

Since 2009, the Trust Fund has been raising awareness on the tsunami risk posed by the Makran Subduction Zone (MSZ) to countries in the North Western Indian Ocean (NWIO). In order to develop a programmatic approach to the Trust Fund's engagement in the Makran region and based on the decision by the TTF Advisory Council, ESCAP commissioned an expert consultant in 2017 to elaborate recommendations on strategic areas of regional cooperation between ESCAP and IOC-UNESCO and other key stakeholders to strengthen the Tsunami early Warning Systems (TEWS) for the Makran region. The prepared recommendations outline concrete actionable measures to enhance regional cooperation in the field of TEWS including phases in cooperation. The recommendations are based on the results from a preceding desk study regarding the status quo and existing gaps of TEWS in the NWIO countries, the discussions and interviews held during the NWIO Working Group (NWIO-WG) meeting of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS) in Teheran, Iran on 27th / 28th February as well as the outcomes from an analytical workshop organized by ESCAP and ICG/IOTWMS on 1st of March 2017.

The programmatic approach embraces all four elements as well as cross-cutting issues defined by the United Nations Office for Disaster Risk Reduction (UNISDR) **framework of people-centred early warning**, which aims to empower individuals and communities threatened by hazards to act in sufficient time and in an appropriate manner to reduce the possibility of personal injury, loss of life and damage to property and the environment. A complete and effective early warning system comprises four inter-related elements, spanning knowledge of hazards and vulnerabilities through to preparedness and capacity to respond. The inter-linkages and effective communication channels between the four elements are essential for effective

warning systems. Furthermore, a number of cross-cutting issues like effective governance and institutional arrangements, a multi-hazard approach as well as community involvement and cultural and gender perspectives need to be considered.

The programmatic approach builds on **regional cooperation** to strengthen national TEWS in the four countries involved with an end to end perspective and a multi-level approach. The focus is on India, Iran, Pakistan and Oman. Oman is not an ESCAP member state, but member of the NWIO-WG and considered as a partner and provider of expertise and financial resources in the framework of the intended programmatic regional approach.

For Iran, Pakistan and Oman the main threat from the MSZ are near field tsunamis, with minimum travel times of even less than 30 minutes. India is in a slightly different situation with minimum tsunami travel times from the MSZ of > 1hour. The programme explicitly addresses the challenges and requirements of TEW in the context of **near-field tsunamis**. It is worth noting that India faces near-field tsunamis threat in the eastern Indian Ocean along the Andaman Islands. To cope with near-field tsunamis, the following considerations have been discussed during the NWIO-WG meeting in Teheran:

- Set-up of early warning systems, policies and procedures must be designed in a way to be executed realistically in the short time frame available. The required procedures and decision-making processes for near-field tsunamis most possibly will differ from already established procedures in the downstream part for other hazards with longer warning times.
- Tsunami early warning is complementary and people should never wait for an official warning. People must be able to recognize natural warning signs and act on it.
- Tsunami warning is essential, especially in cases that the earthquake wasn't felt strongly but has the potential to trigger a tsunami (slow earthquakes). EWS are required to call off an evacuation process if data shows that the previously felt earthquake does not have potential to trigger a tsunami and to issue an "all clear" message once the tsunami threat is over
- The threat of near field tsunamis requires to set a strong focus on strengthening the capacities of the communities at risk towards self-protection. In this regard, it is considered important that communities have a high level of awareness and sufficient knowledge to react independently and properly during a tsunami threat. National and local authorities must provide all necessary services and references to

enable the communities for this, especially timely warnings and evacuation plans based on solid hazard assessments.

The proposed programmatic approach comprises two phases of intervention of approx. two and a half years each and follows the logic of a structured process to build tsunami early warning and preparedness.

Phase 1 will support the countries to establish the required preconditions to strengthen self-protection capacities at community level. This includes the improvement of warning services at NTWC level and the organization of the national warning chains (with an end to end perspective) to assure timely warnings as well as the development of evacuation plans in line with the requirement of the threat by near-field tsunamis. Furthermore, support should be provided to enable countries to develop solid hazard and inundation maps for all tsunami prone areas in their respective territories that still lack this information. This involves initiatives by the science community to create a better understanding of the dynamics in the MSZ as well as enhancing capacities for tsunami modelling by the specialized institutions in the region.

Phase 2 will build up on the achievements of the first phase and provide support for the achievement of a clear understanding of national TEW in the countries by all stakeholders involved and the public in general as well as to addresses mechanism for up-scaling and roll-out of the developed and tested approaches regarding evacuation planning and the set-up of warning mechanism at local level. Additionally, capacities for self-protection arrangements at community level shall be supported as the establishment of local 24/7 mechanism and warning dissemination technologies, the development of sub-district and institutional evacuation planning in line with the district or city plans as well as the development of strategies to strengthen tsunami awareness and knowledge at community level. Other fields of intervention relates to the development of the better understanding of the tsunami hazard in the MSZ, tsunami risk assessments and mitigation strategies. Details for the second phase still need to be discussed within the NWIO-WG.

UN Coordination and Aid Effectiveness

The Fund benefits from strong partnerships, particularly with other United Nations entities (IOC-UNESCO, UNISDR, OCHA, UNDP, UNEP and WMO). In 2016, several of these UN partners attended Advisory Council meetings as observers and reviewed new project proposals as members of the Inter-Agency Task Force. The partnerships were highly useful for the management of the Fund, and helped increase overall coherence and coordination of efforts in early warning.

Fund-supported projects incorporated strong partnership arrangements. For example, in support of SOPs for multi-hazard early warning, ADPC, ABU, the ESCAP/WMO Typhoon Committee (TC) and the WMO/ESCAP Panel on Tropical Cyclones (PTC) worked closely together and undertook joint activities in Bangladesh, Pakistan and the Philippines.

Implementing partners are strongly encouraged to integrate projects into wider regional and national early warning and DRR programmes. For project TTF-24, RIMES and WMO worked to strengthen existing national platforms and institutions in early warning, instead of creating new ones.

3 Strategic Context for the Trust Fund

Initial Rationale for the Trust Fund and Early Progress

Since 1970 a person living in the Asia-Pacific region has been five times more likely to be affected by natural disasters than a person living outside the region. As of 2017, Asia and the Pacific continues to be the world's most disaster-prone region. The disaster risks emanate from multiple hazards with transboundary and socio-economic origins and impacts, and they are set to increase. As the climate system has warmed, the number of weather-related hazards globally has tripled, and the number of people living in flood-prone areas and cyclone-exposed coastlines has doubled. At the same time, the number of people and economic assets exposed to these hazards is continuously growing. Furthermore, the Asia-Pacific region is characterized both by its economic growth achievements as well as its social disparities and economic development gaps between countries. This ultimately means that the region accounts for over half of the world's absolute poor, who are the most severely impacted by disasters.

The lack of EWSs for coastal hazards has been identified as one of the most crucial capacity gaps that prevents an effective response to such disasters within the region. This has fatal consequences; of the 2 million lives lost over the past half century; the largest share is attributable to the lack of timely and location-specific early warning ahead of disasters. The lack of EWSs is prevalent across much of the region. For example, prior to 2004 the Indian Ocean had no multi-country TEWS in place. This lack is particularly dangerous for countries surrounding the Makran Subduction Zone, as wave travel times can be less than 30 minutes in the case of a tsunami for the Islamic Republic of Iran, Pakistan and Oman, and less than one hour for India, yet the national TEWSs for each are currently not fully operational. Many of the countries in the region shared similar barriers to implementing such a system, particularly relating to risk analysis, warning chains, SOPs and response capacity at community level. It is therefore clear that, whilst the provision of tsunami warning is ultimately the responsibility and mandate of national governments, there is scope for regional cooperation to address shared challenges to support governments meet this responsibility.

The ESCAP Multi-Donor Trust Fund for Tsunami, Disaster and Climate Preparedness in Indian Ocean and South East Asian Countries was developed in response to this need. Established in 2005, its main objective initially was to use regional cooperation to build and enhance tsunami early warning capacities at various levels in response to the needs of Indian Ocean and South East Asian countries. Through regional cooperation using the ESCAP platform, the Fund acts as an effective vehicle for accessing and pooling resources such as data, tools and expertise, in order to support innovative pilot initiatives. As a result, it contributes to building more resilient coastal communities, and ultimately help to save lives and reduce loss and damage from disasters.

Key milestones have included the operationalization of the Indian Ocean Tsunami Warning and Mitigation System (IOTWMS) through the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC-UNESCO), and the Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES).

Continued Challenges for Resilience and Rationale for the Fund

Despite the success of reaching this key milestone, there remains much more to be done in order to strengthen EWSs in the region. The scope of the Trust Fund has therefore been expanded. It now takes a multi-hazard approach that focuses on the full range of coastal hazards in the region, including tsunamis, tropical cyclones, storm surges and coastal zone flooding. In 2011, it was expanded to cover the broader concepts of climate and disaster preparedness, while retaining a focus on early warning. Despite important progress made by the Fund, there remains a clear need to continue its work. The Fund has identified the following problems with EWSs. They continue to a) mostly fall short of being multi-hazard; b) often have limited coverage and do not always reach the 'last mile'; c) struggle to secure and sustain funding; d) present a level of disconnect between different initiatives; e) fail to address fragility, conflict and complex crisis; and, f) have not yet adapted to risk-multipliers such as climate change and rapid urbanisation. Such challenges are prevalent throughout the region, and therefore efforts to address them continue to benefit from the regional cooperation promoted by ESCAP.

The Fund has also expanded its scope geographically, in recognition of the success that it has had so far within the Indian Ocean, and in response to the needs elsewhere in the Asia-Pacific region that would benefit from similar success. In 2015, the Advisory Council endorsed the expansion of the reach of the Fund to include Small Island Developing States (SIDS) of the Southwestern Pacific, as requested by the Commission in its resolution 71/12. These states are exposed to a range of coastal hazards, that result in the greatest economic losses as a proportion of GDP of the entire region, with average annual losses close to 4 per cent of the GDP. Thus far, three pilot SIDS, namely Fiji, Papua New Guinea and Samoa, have received support through TTF-27, which strengthens weather and climate resilience by building capacity for impact forecasting, through the training of trainers in impact forecasting and climate applications.

By expanding its scope to address more hazards, across a wider area, the Fund continues to be relevant to the needs of the region. Additionally, it represents a positive example for other efforts to address disasters within the region. In the Asia-Pacific region, investments in hydro-meteorological warning services could have a benefit-cost ratio of between four and 36. The Fund utilizes this, in its proactive approach to strengthening resilience by funding climate and disaster preparedness. This is in contrast to the prevailing trend within the region, whereby the majority of funding is allocated to disaster response and recovery, and other development initiatives. The marginal increases in funding for DRR are greatly surpassed by the growth of disaster risks, so this trend seems set to continue for the near future at least. This is part of a global issue, with US\$3.3 trillion spent on development assistance but only US\$13.65 billion spent on DRR, from 1991-2010 (Kellett and Caravani, 2013). Another global trend sees funding for DRR concentrated in a small number of countries, with the top ten recipient countries receiving 59% of the total finance within the same period. The Fund addresses this imbalance within the Asia-Pacific region, by mobilising and rationalising multiple sources of funding to help numerous countries, many of which receive little other DRR funding.

The Fund also promotes greater cost efficiency across the region as a whole. The costs of establishing and maintaining EWSs are substantially reduced when multi-hazard systems are used, and when these are realized through regional cooperation, as opposed to individually within each country. The Fund also promotes efficiency within countries through initiatives to promote greater synergies and efficiencies, including the CAP on the Map project aiming to improve institutional responsiveness to hazards through multi-agency situational awareness.

The added value of the Fund therefore lies in the work that it supports, its innovative approach that is much needed in the region, the example that it therefore sets for other world regions, and its attention to countries that are otherwise marginalised by international funding for DRR. To that end, its strategy for 2017-2020 is structured around four pillars:

- 1) Expanding and interlinking regional early warning cooperation mechanisms and partnerships
- 2) Strengthening 'last mile' MHEWS in complex situations of human insecurity
- 3) Investing in climate risk management
- 4) Harnessing innovation, science and technologies including from civil society and the private sector

The Fund is able to meet these pillars due to the following comparative advantages:

- a) The regional cooperation mandate and convening power of ESCAP
- b) Coherence with the SDGs and Post 2015 agreements
- c) Building on a decade of achievements supporting EWS
- d) A geographic coverage allowing for greater synergies and sharing of learning and good practice across sub-regions
- e) The Fund's ability to partner with diverse partners including the United Nations, Government Agencies, INGOs, inter-governmental bodies, research institutes and civil society
- f) Dedicated Trust Fund secretariat providing 'hands-on' support
- g) Synergies with other ESCAP initiatives and beyond

The continued relevance of the Fund within the region is clear. It is evident that it has made important progress in strengthening EWS capacity within the region, but also that more progress is needed. The Fund is well placed to address these continuing needs because of the comparative advantages that it has benefited from so far. Moreover, the continuation of the Fund is particularly important given that it is the only initiative that is channeling resources from member states in order to address the key funding shortages within the region.

The Fund's Position at the Forefront of Sustainable Development and DRR

The Fund is well aligned with broader objectives throughout the DRR and sustainable development communities. Its focus on disaster and climate preparedness supports efforts to achieve disaster risk reduction and adaptation to climate change, following global agreements such as the SFDRR, and Paris Agreement. DRR is also interrelated with poverty in the Asia-Pacific region. According to the Asian Development Bank, approximately 1.2 billion people in Asia and the Pacific are below the poverty line of \$3.10 a day. This both causes and results from disasters. In strengthening DRR, the Trust Fund therefore reduces poverty and contributes to efforts to achieve the 2030 Agenda for Sustainable Development. By utilizing regional collaboration in order to do so, it follows ESCAP resolution 73/7 and General Assembly Resolution 71/226, which state the need for effective coordination and coherence in the implementation of those agreements. The fund also follows requests directly from ESCAP member countries. ESCAP resolution 73/7 recognizes that the executive secretary is requested to reach out to new potential donors, as well as explore innovative resource mobilization opportunities to strengthen the Fund, and to support and facilitate MHEWSs impact-based forecasting and disaster risk assessment to strengthen regional cooperation mechanisms. The Fund addresses these requests through the objectives of individual initiatives and its resource mobilization strategy.

The fund is also aligned with key contemporary ideas at the forefront of DRR and sustainable development, particularly following its recent evolution.

South-South Cooperation

South-South cooperation is a broad framework of collaboration within which developing countries share knowledge, skills, expertise and resources to meet their development goals through concerted efforts. When traditional donor countries and multilateral organizations facilitate South-South cooperation through the provision of support such as funding, training, management and technological systems, it is known as triangular cooperation. The importance of these interrelated approaches in accelerating sustainable development has gained continued momentum over the last decades, particularly where used to address common transnational development challenges that would be difficult to tackle independently. This has also been reflected within DRR, with SFDRR Target F aiming to substantially enhance international cooperation to developing countries to complement their national actions for implementation of the present Framework by 2030. The regional cooperation mandate and convening power of ESCAP allow the Fund to apply South-South approaches, to tap into the existing capacities in the region. It also uses triangular approaches, as contributions from Germany, Japan, Sweden and Turkey are used to fund various projects. Contributions have also been received from Thailand, Bangladesh, Nepal, and Philippines. The Fund therefore demonstrates how developing countries can act as donors and providers of technical cooperation through the modality of South-South cooperation.

South-South cooperation is defined by several key principles, from which the Fund benefits from following. For example, the principle that initiatives must be determined by the countries of the South, guided by the principles of respect for national sovereignty, national ownership and independence, equality, non-conditionality, non-interference in domestic affairs and mutual benefit, supports the country ownership of the fund's various DRR projects. This approach also supports broader goals of ESCAP. By fostering the collective self-reliance of developing Asia Pacific countries, it enhances their creative capacity to find solutions to their development problems through the sharing of experiences, technical and other resources, and the development of complementary capacities. This also strengthens communications between member countries, which can promote a greater awareness of shared problems and ways to address them, not only for DRR, but also for development more broadly.

Transboundary Disaster Resilience

Utilizing South-South cooperation also supports the Fund as it evolves to focus increasingly on transboundary disasters. Many of the disasters in the region are transboundary in their origins and impacts. For example, coastal hazards such as tsunamis and cyclones affect multiple countries at the same time. River basin flooding is the most common and is becoming even more significant, with the risk likely to increase 2 to 6 times under moderate and severe climate scenarios. The impacts of river basin flooding are also high, as a large number of poor and vulnerable populations dependent upon agriculture live here. River basin flooding therefore sets back efforts to achieve SDG 1 and SDG 2, which tackle poverty and food security, though this can be reduced through effective EWSs. Nevertheless, for such transboundary disasters, the monitoring, forecasting and communicating activities needed to develop an effective EWS are often beyond the capabilities of individual countries to carry out, and require regional-level action. The Fund is responding through initiatives that engage with multiple countries to address shared hazards. This places the Fund at the forefront of the DRR efforts in the region, which are increasingly focusing on strengthening transboundary disaster resilience.

Multi-Hazard Approach

The Fund is also at the forefront of calls for multi-hazard approaches to DRR, following the second pillar of its 2017-2020 strategy. Its promotion of MHEWSs allow it to utilize economies of scale that maximizes the efficiency of resource and time expenditure, and reduce the likelihood that reducing the risk for one type will increase exposure and vulnerability to others. This is in line with the SFDRR, specifically Target G which seeks to substantially increase the availability of and access to multi-hazard early warning. In utilizing a multi-hazard approach, the Fund represents an example to many DRR initiatives across the region and beyond that are encouraged to move from a limited focus on individual hazards, to a more comprehensive focus on vulnerability reduction. Furthermore, its recent evolution to consider not only natural but also man-made hazards allow the Fund to be even more effective in dealing with hazards with cascading impacts. Subsequently, the fund addresses the full complexity of disaster risk.

Slow-Onset Disasters

Another way that the Fund is evolving to build a more comprehensive approach to underlying vulnerability is through its recent additional focus on slow-onset disasters. Many such disasters are expected to increase with climate change, this focus is therefore part of the third pillar of the Fund's 2017-2020 strategy, which promotes investment in climate risk management. Compared to rapid-onset disasters caused by near-field tsunamis and flash floods, slow-onset disasters

caused by hazards such as drought and slow-onset floods may develop over weeks, months or even years. Often these do not provoke early action, due to gaps in the knowledge regarding how to respond at the ground level, and gaps in the institutional mechanisms needed to process the relevant on the ground information. However, where slow-onset disasters are recognized, there is more time to prepare and thus reduce the impacts on the population. The Fund is addressing these capacity gaps through collaboration with the National Meteorological and Hydrological Services and WMO to establish seasonal, multi-stakeholder monsoon forums. These forums are now held regularly within 14 Asia-Pacific countries and allow networks of technical experts from various sectors to share lessons learned from previous monsoon seasons, take stock of available tools and services, share forecasts for the upcoming season, and develop required preparedness activities, all of which help to prepare monsoon response further in advance.

Private Sector Engagement

The Fund will continue to evolve further in the future, as the needs and capacities in the region change. It will harness innovation and technologies from the private sector, in line with the fourth pillar of its 2017-2020 strategy. This is anticipated to reveal new solutions to challenges for strengthening disaster resilience, and to help to secure continuous funding for the projects, which has been and will continue to be one of the main challenges and priorities of the Trust Fund. Addressing this challenge through engagement with the private sector is in response to direct requests from member countries, as well as guidance from the SFDRR to increase collaboration with the private sector. The SFDRR states that such collaboration will not only enable initiatives such as the Fund to collect knowledge and experiences from a wider range of actors, but also encourage businesses to integrate disaster risk into their management practices.

Thus, engaging with the private sector will allow the Fund to respond directly to a need that has already been expressed by member countries, and to encourage new actors to recognize their own needs and potentials to implement with DRR.

Conclusion

The use of South-South cooperation to focus on multi-hazard, transboundary and slow-onset disasters is supported by the Fund's comparative advantages, which provide access to the cooperation mandate and convening power of ESCAP and to expertise and experience that has accumulated during a decade of supporting EWSs. These enable the Fund to work with the many countries needed to strengthen transboundary resilience, and to draw on knowledge regarding EWS for a range of hazards. Furthermore, the Fund's diverse partnership including the United Nations, Government Agencies, INGOs, inter-governmental bodies, research institutes, civil society and the private sector provides access to the most

up to date research and knowledge. This enables the fund to effectively address new ideas as they emerge, such as the need to focus on slow-onset disasters. access to innovative funding mechanisms. The Fund now expects to use this access to establish new funding mechanisms with the private sector, to further address the funding shortages within the region.

Utilizing these innovative approaches whilst expanding across a broader geographic scope aligns the Fund to the needs of the Asia-Pacific region. This evolution also places the Fund at the forefront of key contemporary themes within sustainable development and DRR. These themes are prevalent across the globe. As a result, the relevance of the Fund extends beyond the Asia-Pacific region that it directly addresses, through the examples that it sets.

4 Governance and Management

The Trust Fund for Tsunami, Disaster and Climate Preparedness is managed by ESCAP on behalf of the Member States in cooperation with other partners and stakeholders. Its governance structure includes the Advisory Council, the Inter-Agency Task Force and the Secretariat.

Advisory Council

The Advisory Council makes funding and policy decisions related to the Fund. In 2016, the Council included the Deputy Executive Secretary of ESCAP and representatives from the founding donor Thailand and key donors¹ Germany, India and Japan. Representatives from the other donors to the Fund, including Bangladesh, Nepal, the Philippines and Sweden served as observers. The following United Nations partners also participated as observers: OCHA, UNDP, and UNEP.

The Fund's sixteenth Advisory Council meeting was held on 25 October 2016. At this meeting, the Council approved new allocations of US\$ 602,873 for RIMES/WMO (TTF-27) and US\$ 250,000 for the Typhoon Committee (TTF-28) and approved the 2017 budget for the Trust Fund Secretariat.

In 2017, two Advisory Council Meetings were held. At the Ad-hoc meeting, chaired by the Executive Secretary on 22 August 2017, donors and observers came together to discuss the selection of a third proposal to be implemented in the ongoing tenth round of funding. A decision was postponed by Council members. The 18th regular meeting of the Advisory Council was held on 18 December 2017. At this meeting, the Council endorsed the new Strategic Note 2017-2020 and approved the 2018 budget for the Trust Fund Secretariat.

¹ Donors that have contributed more than 20 per cent of the remaining balance of the Fund are considered key donors.

Inter-Agency Task Force

The Inter-Agency Task Force provides technical guidance to the Fund. As such, it reviews project proposals; provides technical advice in response to Advisory Council information requests; and, reviews substantive amendments to ongoing projects supported by the Fund.

The Task Force is chaired by the Chief of the Information and Communications Technology and Disaster Risk Reduction Division (IDD) of ESCAP, with the Senior Regional Coordinator of the UNISDR acting as Alternate Chairperson. The Task Force also includes representatives from the Social Development Division and the Environment and Development Division of ESCAP; and representatives from IOC-UNESCO and UNDP. The Fund's Programme Officer acts as the Secretary. In 2016, the Task Force provided technical comments on proposals for decision by the Advisory Council.

Secretariat

As the administrator of the Fund, ESCAP acts as the Secretariat. One Programme Officer is financed by the Fund. Since July 2016, the Government of Germany has provided the Trust Fund secretariat with an Associate Expert with expertise in water-related hazards. This expert also contributes to regional cooperation on transboundary flooding. ESCAP also provides administrative support staff to the Fund. In addition, professional staff of IDD provides managerial guidance and technical advice to the Secretariat.

General Trust Fund Management

The ESCAP Secretariat managed agreements with implementing organizations for three projects that were completed in 2016. The Secretariat also reviewed progress reports and project evaluations, tracked financial resources, periodically updated the Fund's website with information on progress on Fund-supported projects and carried out overall reporting, including the annual report of the Fund.

Tenth Round of Funding

The Fund's tenth round of funding was launched on 28 July 2015, with a closing date of 15 November 2015. A total of 124 project proposals were received. The Inter Agency Task Force reviewed the proposals and finalized recommendations to the Advisory Council for decision at its meeting in 2016. Two projects were approved in 2016, and a decision on two more was postponed to a decision by the Council in 2017.

Transfer of Ownership of Fund-supported Equipment

There were no activities to report under this item in 2016 and 2017.

Advocacy

The Trust Fund was represented at the 49th Session of the ESCAP/WMO Typhoon Committee, which was held in Yokohama, Japan, on 21-24 February 2017. The Trust Fund was also represented at the ICG/IOTWMS Sub-Regional Working Group meeting in Tehran, Islamic Republic of Iran, 27-28 February 2016. At this meeting ESCAP showcased the Fund's past and current work in the Makran region, which was considered a best practice at the meeting. ESCAP also used the meeting to promote strengthened regional cooperation on tsunami early warning among the countries in the Makran region through the new subregional Working Group. Following the meeting, an analytical workshop was organized on 1 March 2017, to discuss a programmatic approach for the work of the Trust Fund in the Makran Subduction Zone.



Photo: Participants UNESCAP Programme Approach Workshop in Tehran / Iran (Islamic Republic of)

The Trust Fund was also represented at the 11th Session of the Intergovernmental Coordination Group of the Indian Ocean Tsunami Warning and Mitigation System (ICG-IOTWMS) held in Kuala Lumpur, Malaysia in April 2017. At these meetings, ESCAP raised awareness of the role of the Fund among the member States and advocated for greater attention to collective early warning mechanisms. The Secretariat also held bilateral discussions aimed at increasing participation among member States in ongoing projects supported by the Fund.

The achievements of the Trust Fund were highlighted by the Director of the ICT and Disaster Risk Reduction Division at the UNISDR Global Platform on DRR and the Multi-Hazard Early Warning Conference held on 22-26 May 2017 in Cancun, Mexico during a dedicated session on regional cooperation and partnerships. ESCAP and implementing partners emphasized how the Trust Fund contributed to providing cost-effective warning products and services for tsunamis and extreme weather systems, in particular through its contributions to the establishment of the Indian Ocean Tsunami Warning and Mitigation System (IOTWMS) as well as the Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES). The Trust Fund was also featured in a side event on "Best practices, challenges and next steps towards the implementation of impact-based, people-centered multi-hazard early warning systems". The event highlighted how the Trust Fund has promoted innovative pilot initiatives to address the unmet needs of end-to-end early warning systems, particularly in low capacity, high risk countries. The event showcased how, in line with the SFDRR,

the Fund is currently working towards strengthening regional cooperation to capitalize on harnessing scientific advances and developments in disaster risk reduction throughout the region, thus increasing risk knowledge and impact information – two essential components of integrated MHEWS.

The Trust Fund was represented at the 9th Meeting of the RIMES Council, the 3rd Ministerial Conference as well as the official inauguration of RIMES' new subregional hub on 23-24 August 2017, in Port Moresby, Papua New Guinea. The meeting contributed to raising awareness on work of the Fund, including its key role in establishing and supporting the development of RIMES. The participation also gave ESCAP the opportunity to monitor the implementation of ongoing project TTF-27 “Enhancing Weather and Climate Resilience in RIMES Member States through Capacity Building on Impact Forecasting”.

In September 2017, the Government of Thailand and ESCAP co-organized a side event on “Disaster Risk Reduction in Asia-Pacific: Achievements in Regional Cooperation for Tsunami, Disaster and Climate Preparedness” during the 72nd United Nations General Assembly in New York. The side event gave visibility to the achievements of the Trust Fund and linkages were also built with partners involved in multi-hazard early warning.



Photo: H.E. Mr. Don Pramudwinai, Minister of Foreign Affairs of Thailand, delivering his keynote speech at side event in New York (Source: Ministry of Foreign Affairs of the Kingdom of Thailand)

The side event was organized as a high-level panel discussion. The opening ceremony was presided over by H.E. Mr. Don Pramudwinai, Minister of Foreign Affairs of Thailand and Dr. Shamshad Akhtar, Under-Secretary-General of the United Nations and Executive Secretary of ESCAP. The panel was comprised of

representatives of countries that received support from the Trust Fund and representatives of Donor countries.

In November 2017, ESCAP participated at the 17th National Monsoon Forum held in Colombo, Sri Lanka. This mission offered a further opportunity to monitor implementation of the on-going project TTF-27 “Enhancing Weather and Climate Resilience in RIMES Member States through Capacity Building on Impact Forecasting”. Sri Lanka offers several good examples of how the Trust Fund contributed to enhancing climate resilience in the region. In addition to facilitating sharing of knowledge and information, and better preparing stakeholders for the next monsoon season, seasonal outlooks were also translated into local programming, e.g. for irrigation. The involvement of the private sector has helped to improve supply chain management and contingency planning.

6 Resource Management²

In 2015, an agreement was signed with Government of India for a new contribution of US\$ 1 million, and funds totalling US\$ 350,000 were programmed with the Government of Japan. These resources have been received by ESCAP in 2015 and were recorded in the 2016 budget. In addition to this, a new contribution of US\$ 30,000 was received from the Government of Thailand in 2017.

As of 31 December 2017, the Fund's total balance available for new programming and Secretariat support was US\$ 1,427,706.63.

Table 4.1: Unallocated resources as of 31 December 2016 (US\$)

Balance on 31 Dec 2015	Allocations (2016)	Interest (2016)	Unspent balance (Projects and Secretariat costs)	Contributions (2016)	Adjust to Beg Bal (2016)	Balance at 31 Dec 2016
618,880.57	-259,492.02	+23,334.40	+709,293.61	+1,350,000.00	-4,168.39	2,437,848.17
Total unspent Fund balance (US\$)						2,437,848.17
Estimated Secretariat support in 2017 (including PSC)						259,492.02
Available for programming and Secretariat support						2,178,356.15

Table 4.2.1: Unallocated resources as of 31 December 2017 (US\$)

Balance on 31 Dec 2015	Allocations (2016)	Interest (2016)	Unspent balance (Projects and Secretariat costs)	Contributions (2017)	Adjust to Beg Bal (2017)	Return to Donor (2017)	Balance at 31 Dec 2017
2,437,848.17	-1,136,967.12	+20,157.64	+83,516.53	+30,000.00	-607.20	-6,241.39	1,427,706.63
Total unspent Fund balance (US\$)						1,427,706.63	
Estimated Secretariat support in 2018 (including PSC)						227,115.00	
Available for programming and Secretariat support						1,200,591.63	

* The figures in this report are interim figures only.

² Funds are "programmed" when the Advisory Council has agreed to support an activity. Funds are "allocated" when ESCAP has transferred them from the Global Tsunami Trust Fund account to a specific project account. Funds are "expended" or "committed" when ESCAP has made a formal funding commitment through a Letter of Agreement signed between ESCAP and the implementing organization.

Table 4.3: Resources allocated but unspent as of 31 December 2017 (US\$)

Item	Unspent resources at 31 Dec 2017	Notes
<i>Grant agreements</i>		
Grant TTF-16	529,240.66	Funding recovered (unspent terminal balance)
Grant TTF-20	-1,257	Funding recovered (unspent terminal balance), Adjustment
Grant TTF-21	57.84	Funding recovered (unspent terminal balance)
Grant TTF-23	98,878	Funding recovered (unspent terminal balance)
PSC on grants	18,807.59	PSC per 3% rate
PSC on Grants (Adj for 2016)	475.53	PSC adjustment for 2016
Grant TTF-25	18,761	Funding recovered (unspent terminal balance)
PSC on grants for TTF-25	562.83	PSC per 3% rate for TTF-25
Total grants	665,526.45	
<i>Secretariat support</i>		
Support activities	38,108.80	Unspent funding that had been allocated for Secretariat support in 2016
PSC	6,265.56	Includes PSC adjustment for Grants
Support activities	80,494.51	Unspent funding that had been allocated for Secretariat support in 2017
PSC	2,414.82	Includes PSC adjustment for Grants
Total Secretariat	127,283.69	
Total	792,810.14	

*** Funds return indicative only. They are received and processed in 2017.**

As of end December 2017, the Fund had programmed grants to 28 projects for a total of US\$ 13,688,392. Of this amount, US\$ 13,450,974 had been transferred to implementing organizations, with an expenditure of US\$ 13,162,833.94 as per the latest terminal reports. An overview of the status of grants is provided in Table 4.3.

Table: 4.4 Financial status of grants (as of 31 December 2017) (US\$)

Project number	Implementing Organization (IO)	Funds programmed	Funds committed/ expended by ESCAP	Funds transferred to IO	Funds expended by IO ³	Status
TTF-01	ADPC	247,901.00	247,901.00	247,901.00	247,901.00	completed
TTF-02	ADPC	2,358,984.75	2,358,984.75	2,358,984.75	2,358,984.75	completed
TTF-03	Asian Disaster Reduction Center	79,819.00	79,819.00	79,819.00	79,819.00	completed
TTF-04	IOC-UNESCO	339,067.55	339,067.55	339,067.55	339,067.55	completed
TTF-05	UNDP-Maldives	122,276.69	122,276.69	122,276.69	122,276.69	completed
TTF-06	Disaster Management Centre, Sri Lanka	153,282.65	153,282.65	153,282.65	153,282.65	completed
TTF-07	ADPC	774,674.00	774,674.00	774,674.00	774,674.00	completed
TTF-08	Maldives Meteorological Service	276,128.00	276,128.00	276,128.00	276,128.00	completed
TTF-09	UNDP Indonesia	1,552,779.36	1,552,779.36	1,552,779.36	1,552,779.36	completed
TTF-10	UNESCO Office Jakarta	573,003.21	573,003.21	573,003.21	573,003.21	completed
TTF-11	IOC-UNESCO	128,603.89	128,603.89	128,603.89	128,603.89	completed
TTF-12	ABU	312,275.82	312,275.82	312,275.82	312,275.82	completed
TTF-13	UNDP APRC	344,385.60	344,385.60	344,385.60	344,385.60	completed
TTF-14	Raks Thai Foundation	514,162.96	514,162.96	514,162.96	514,162.96	completed
TTF-15	UNDP APRC	381,066.40	381,066.40	381,066.40	381,066.40	completed
TTF-16	RIMES	1,289,033.00	1,289,033.00	1,289,033.00	1,289,033.00	completed
TTF-17	RIMES	342,754.69	342,754.69	342,754.69	342,754.69	completed
TTF-18	ADPC	447,490.00	447,490.00	447,490.00	447,490.00	completed
TTF-19	ABU	237,692.00	237,692.00	237,692.00	237,692.00	completed
TTF-20	IOC-UNESCO	394,226.97	394,226.97	394,226.97	394,226.97	completed
TTF-21	IOC-UNESCO	101,821.15	101,821.15	101,821.15	101,821.15	completed
TTF-22	Typhoon Committee	417,283.15	417,283.15	417,283.15	417,283.15	completed
TTF-23	RIMES	606,413.00	606,413.00	606,413.00	606,413.00	completed
TTF-24	RIMES	329,115.00	329,115.00	329,115.00	329,115.00	completed
TTF-25	AIT	281,279.00	281,279.00	281,279.00	281,279.00	completed
TTF-26	Oxfam GB	230,000.00	230,000.00	230,000.00	230,000.00	completed

³ As of the most recent progress report or terminal report.

TTF-27	RIMES	602,873.00	602,873.00	457,231.00	284,233.00	Ongoing
TTF-28	TC	250,000.00	250,000.00	158,224.00	43,081.940	Ongoing
Total		13,688,392.00	13,688,392.00	13,450,974.00	13,162,833.94	

Abbreviations

ABU	Asia-Pacific Broadcasting Union
AIT	Asian Institute of Technology
ADPC	Asian Disaster Preparedness Centre
CAP	Common Alerting Protocol
CREWS	Climate Risk Early Warning System Initiative
DMC	Disaster Management Centre, Sri Lanka
DMH	Department of Meteorology and Hydrology, Myanmar
DRR	Disaster Risk Reduction
ESCAP	UN Economic and Social Commission for Asia and the Pacific
GAATES	Global Alliance on Accessible Technologies and Environments
GTS	Global Telecommunication System
ICG/IOTWMS	Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System
IDD	ESCAP Information and Communications Technology and Disaster Risk Reduction Division
IOC-UNESCO	Intergovernmental Oceanographic Commission of UNESCO
IP PSC	Implementing Partner - Project Support Costs
IRIS	Incorporated Research Institutions for Seismology
ISDR	United Nations Office for Disaster Risk Reduction
ITU	International Telecommunications Union
JICA	Japan International Cooperation Agency
NED	University of Engineering and Technology, Karachi, Pakistan
NEDC	DMH's National Earthquake Data Center
NMHS	National Meteorological and Hydrological Services
OCHA	UN Office for the Coordination of Humanitarian Affairs
PAGASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration

PMD	Pakistan Meteorological Department
PSC	Project Support Costs
PTC	WMO/ESCAP Panel on Tropical Cyclones
RCC	Regional Consultative Committee on Disaster Management
RIMES	Regional Integrated Multi-Hazard Early Warning System for Africa and Asia
SOP	Standard Operating Procedure
TC	ESCAP/WMO Typhoon Committee
TTF	Tsunami Trust Fund
UNEP	United Nations Environment Programme
UNESCO	UN Educational, Scientific and Cultural Organization
UNDP	United Nations Development Programme
UNDP APCR	UN Development Programme Asia Pacific Regional Centre
WMO	World Meteorological Organization

Annex 1: Status of Fund-supported Projects

(Note: Completed projects listed with shaded background.)

Project No. / Organization/ Project Dates ⁴	Project name	Project Results
TTF-01 ADPC August 2006 - April 2010	Support to the establishment of capacities in the region to observe and evaluate anomalous sea level conditions for early warning of tsunamis in the Indian Ocean and Southeast Asia	Near real-time sea level stations were established/upgraded in the Philippines (Subic, Lubang) and Viet Nam (Qui Nhon and Vung Tau). The stations are operational, with station data shared globally through the WMO's Global Telecommunication System. Technical staff members of relevant Government agencies were trained on station operation and maintenance. Ownership of the stations was transferred to national Government counterparts.
TTF-02 ADPC July 2007 - June 2010	End-to-end early warning of tsunamis and other natural hazards for disaster preparedness and mitigation in the Indian Ocean and Southeast Asia: Phase 1	Seismic stations were established in Myanmar (Sittwe), the Philippines (Santa) and Viet Nam (Dalat and Son La). The stations are operational, and ownership was transferred to national Government counterparts. The Tsunami Alert Rapid Notification System (TARNS) was prepared in Sri Lanka, the Maldives and Myanmar, detailing the warning dissemination procedure at national and local levels. The Incident Command System (ICS) was adapted for use in the Maldives and Myanmar. Concept of Operations (CONOPS) documents for the tsunami warning services in the Maldives and Myanmar were finalized. Coastal Community Resilience (CCR) frameworks were introduced in the Maldives, Myanmar, and Sri Lanka.
TTF-03 Asian Disaster Reduction Center (ADRC) July 2007 - March 2008	Trainers training programme on community-based hazard map development	Community-based hazard mapping was strengthened in India and Bangladesh. A total of 90 trainers were trained on community-based hazard map development in five Indian provinces and two Bangladeshi divisions. By involving local communities in hazard mapping, the project built tsunami awareness among community members that otherwise might run danger of neglecting the continuing tsunami threat due to the prolonged period between each tsunami.
TTF-04 IOC-UNESCO September 2007 - March 2011	Strengthening tsunami warning and emergency responses: training workshops on the development of SOPs for the Indian Ocean and Southeast Asia	<p>The project contributed to the readiness of the Indian Ocean Tsunami Warning System to enter into operation on 12 October 2011. A total of 12 workshops (two regional; ten country-specific) were delivered to 20 Indian Ocean and Pacific Ocean countries (over 370 participants) to integrate SOPs for effective end-to-end warning and response, with emphasis on robust communication networks between key agencies. At the regional workshops, participants developed their own country-specific SOPs. A draft Manual on SOP for Tsunami Warning and Emergency Response was developed.</p> <p>Regional and sub-regional cooperation between National Tsunami Warning Centres and National Disaster Management Organizations was fostered.</p> <p>Because of the training, SOPs for tsunami warning and emergency response were developed and/or improved in four target countries (Myanmar, Pakistan, the Philippines and Viet Nam).</p>

⁴ Start Date: Date of signature of Letter of Agreement.

<p>TTF-05 UNDP Maldives January 2008 - December 2009</p>	<p>Strengthening national and community capacities for effective early warning dissemination and response</p>	<p>National and local early warning capacities were strengthened. Fourteen related sets of standard operating procedures for early warning were finalized. Relevant agencies were trained in these procedures as well as weather research and forecasting, global telecommunication systems and tsunami modelling.</p> <p>Community-based preparedness plans were developed and signed by ten islands within two Atolls of the Maldives.</p> <p>Community mobilization led to the inception of early warning task force teams. Public awareness was raised through the International Day for Disaster Reduction, a televised debate, and a public awareness campaign encompassing newspapers, a website (http://www.rakkaa.mv), television and hand-out materials.</p>
<p>TTF-06 Disaster Management Centre, Sri Lanka February 2009 - January 2011</p>	<p>Enhancing national capacity for early warning dissemination in Sri Lanka</p>	<p>A reliable and cost-effective radio communication system (hand-held radios, repeaters and VHF base station) became fully operational. The system is facilitated by the Disaster Management Centre (DMC) and can serve during emergency situations. The DMC has committed to contribute its own funding to maintain the radio communication system. The SOPs for early warning were revised, tested, documented and distributed.</p> <p>Staff of the Emergency Operation Centers and members of the District Disaster Management Committees and Divisional Disaster Management Committees of Colombo, Galle and Batticaloa were trained to form a resource pool that can support other Centers and Committees.</p> <p>In line with the Disaster Management Act, Road Map and National Disaster Management Plan, the Government of Sri Lanka is mobilizing resources to expand the communication system to other disaster-prone Districts.</p>
<p>TTF-07 ADPC March 2008 - December 2010</p>	<p>End-to-end early warning of tsunamis and other natural hazards for disaster preparedness and mitigation in the Indian Ocean and Southeast Asia: Phase 2</p>	<p>In April 2010, the regional early warning centre started experimental operations for earthquake monitoring and tsunami watch (see project TTF-02 above). The system became fully operational in 2011. Located at the RIMES regional facility in Pathumthani, Thailand, with capabilities to receive and analyse seismic, sea level, and deep ocean sensor data, the RIMES Tsunami Watch Center utilizes data generated from its own monitoring stations and from global networks to evaluate the tsunamigenic potential of an earthquake.</p> <p>RIMES incorporated tsunami early warning into existing national warning systems through its interrelated components including regional tsunami and earthquake monitoring, advisory dissemination, decision-support tool development, potential impact and risk assessments and other related research on trans-boundary hazards.</p> <p>A web-based portal for real-time tsunami forecasting (PRECISE) was completed, tested and evaluated, giving the regional early warning centre near real-time tsunami forecasting capability. A tsunami risk assessment tool (INSPIRE) was also developed.</p>

<p>TTF-08 Maldives Meteorological Service (MMS) May 2009 - June 2012</p>	<p>Towards sustaining the Indian Ocean and Southeast Asia End-to-End Multi- Hazard Early Warning System</p>	<p>The Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES) was established on 30 April 2009 as a result of projects TTF-01, TTF-02 and TTF-07. The membership and demand for RIMES services grew during the project period. The RIMES Council had 13 Member States of which India, Papua New Guinea and Sri Lanka joined in 2011. India served as RIMES Council Chair.</p> <p>The draft RIMES Five-Year Master Plan (2010-2014), which documents Member States' priority needs in hazard observation, forecasting and warning, capacity building, and research and development, was adopted by the RIMES Executive Board.</p> <p>Mongolia assumed the RIMES Secretariat functions in April 2011 from the Maldives. Mongolia focused on resource mobilization for Master Plan implementation and accelerating the process of having more countries sign the RIMES Cooperation Agreement. The Maldives continued to represent RIMES in the ICG/IOTWMS.</p> <p>Bangladesh and Nepal contributed financially to RIMES through donor-funded projects, while India contributed through fixed institutional support and programme funding.</p>
<p>TTF-09 UNDP Indonesia March 2009 - December 2011</p>	<p>Making Provincial Communities Safer Through Disaster Risk Reduction in Development (SCDRR)</p>	<p>A Provincial Platform for DRR was established in West Sumatra, including an established structure, work plan and executive body. With the support of SCDRR, the West Sumatra Provincial DRR Forum is now fully operational and able to facilitate the implementation of the Forum's activities.</p> <p>The processes of community-based DRR were tested on how to facilitate the formulation of village disaster management plans, contingency plans and action plans, in more than 40 target locations covered by SCDRR.</p> <p>Draft disaster management, contingency and community action plans were developed in Jorong (sub-village). In Nagari (village) Salayo, DRR officially became the local development policy for 2011-2015.</p> <p>Padang City developed a risk map (district level), while West Sumatra Province developed a hazard map.</p>
<p>TTF-10 UNESCO Jakarta March 2009 - July 2011</p>	<p>Tsunami Awareness and Preparedness Tools and Materials Assessment</p>	<p>A regional depository for tsunami awareness and training resources was established. The project developed the structure of Jakarta Tsunami Information Centre (JTIC) website and translated the content into five different languages (English, Bahasa Indonesia, Thai, Tagalog and Tetun). The website was regularly updated by focal points of each country.</p> <p>A total of 20 education materials on tsunami awareness were produced, translated and promoted in Indonesia, Timor-Leste, Thailand and the Philippines. Activities in the Philippines were scaled up using national budgets.</p> <p>The lessons were shared to a wider number of countries through a regional lessons learned workshop at the end of the project implementation.</p>
<p>TTF-11 IOC-UNESCO November 2009 - August 2011</p>	<p>Assessment and awareness of Makran tsunami hazards</p>	<p>The project contributed to increased awareness of the Makran tsunami hazard in key national and local institutions (Baluchistan) in Pakistan. A future strategy to further the work on understanding the Makran tsunami hazards and create awareness was agreed.</p> <p>Trainings in assessment of tsunami hazard and paleo tsunami field techniques were held in Iran (Islamic Republic of), Pakistan and Indonesia.</p> <p>A network of experts from Pakistan, India, Oman and Iran (Islamic Republic of) was established. An international support network for Makran research was also established, with participation from Thailand, Indonesia, Sri Lanka, USA and Chile.</p>

<p>TTF-12 ABU November 2009 - July 2011</p>	<p>ABU Early Warning Broadcast Media Initiative</p>	<p>The project created a platform for continuous advancement of integration of broadcast media in Early Warning Systems on a national scale in six pilot countries (Cambodia, China, Malaysia, the Philippines, Thailand, and Viet Nam). It was implemented through two complementary series of workshops. The first series of workshops, dealing with early warning broadcast and disaster risk reduction messaging through traditional knowledge, targeted television and radio broadcast journalists. Four in-country content development workshops were held in Cambodia, Malaysia, Thailand and Viet Nam. The second series, the 'Early Warning Broadcast System Road Show', dealt primarily with the technology and operation of an early warning broadcasting system (EWBS). Demonstration kits for EWBS were produced and tailor-made for each pilot country.</p> <p>ABU assisted the Thai Public Broadcasting Service and Radio and TV Malaysia (workshop participants) to establish Early Warning units within their organizations. The Thai PBS team has produced several features.</p> <p>The ABU Team has continued to conduct consultations on EWBS after the termination of the project as part of national and regional EWBS development.</p>
<p>TTF-13 UNDP Asia Pacific Regional Centre Dec 2009 - August 2012</p>	<p>Building risk knowledge to enhance early warning, preparedness and mitigation in tsunami-affected countries</p>	<p>An interactive CD-ROM containing training material on tsunami risk assessment and mitigation, including the social dimensions of vulnerability was completed and applied by experts in Sri Lanka and Indonesia. Indonesia conducted a review of its SOPs and assessed gaps for further follow-up. Final National Guidelines on Tsunami Risk Assessment for Indonesian Context incorporating recommendations from two pilots in Simeulue and Majene were prepared and shared with the BNPB.</p> <p>A case study of the Port City of Galle, Sri Lanka on "Risk Assessment and Management for Tsunami Hazard" was finalized and used by the regional IOTWMS Working Group.</p> <p>A significant contribution was made to the IOTWMS capacity, including through the regional SOP Training Workshop in September 2011 in Jakarta, Indonesia. The outcomes of this workshop provided direct inputs to the IOWave 2011, which tested SOPs before the IOTWMS became fully operational in October 2011.</p>
<p>TTF-14 Raks Thai Foundation January 2010 - July 2012</p>	<p>Strengthening Community-based Disaster Risk Management in Asia: shifting from lessons observed to lessons learned.</p>	<p>A regional network for community-based disaster risk management was developed. CARE Netherlands, CARE Australia and CARE Denmark supported additional countries to take part in the regional component, beyond the ones supported through the project (India, Indonesia, Sri Lanka and Thailand). E-learning modules on Disaster Risk Management were developed and used to support capacity building in participating countries.</p> <p>A Learning Lab was developed in two pilot communities in Krabi province, Thailand, where local disaster preparedness plans were rolled out in collaboration with the provincial governor. Six other nearby communities adopted the implementation strategy after seeing the two pilot communities' progress, and received mini-grants to develop and implement local disaster management plans. An independent survey of the target communities found that awareness of climate change and natural disasters had increased significantly during the lifetime of the project.</p>

<p>TTF-15 UNDP Asia Pacific Regional Centre May 2011 - October 2014</p>	<p>Strengthening Early Warning Systems for Extreme Weather Events to Advance Climate Risk Management in the South East Asian Region (Cambodia and Timor-Leste)</p>	<p>Through this project, UNDP and RIMES worked together to develop national capacities and provide early warning services to Cambodia and Timor-Leste.</p> <p>Assessments of weather forecasting capacities and infrastructure were completed in Cambodia and Timor-Leste. Based on the findings, technical personnel from both countries were sent to RIMES for a targeted, two-month training programme on the generation and interpretation of weather forecasts. A regional SOP workshop in data sharing on extreme weather events was held with the participation of 17 officials from the two target countries. A dedicated server was procured and installed at RIMES, providing 3-day, 10-day and site-specific weather forecasts for Cambodia and Timor-Leste.</p> <p>Disaster loss databases were established / strengthened in Cambodia and Timor-Leste, following technical training and other capacity-building activities for government officials in both countries. Experts from Indonesia were mobilized to support Timor-Leste.</p> <p>National trainings on SOPs for improving climate risk information were organized in Cambodia and Timor-Leste. High-resolution weather forecasts for application in the agriculture sector were highlighted as a priority need in both countries.</p> <p>UNDP and the Government of Cambodia mobilized over US\$ 4 million in new funds to take the project outcomes, including the national disaster loss database, forward.</p>
<p>TTF-16 RIMES May 2011 - December 2015</p>	<p>Reducing Risks for Tsunami, Storm Surges, Large Waves and other Natural Hazards in Low Elevation Coastal Zones</p>	<p>Multi-stakeholder national monsoon forums were established and supported in Bangladesh, India, Maldives, Myanmar and Sri Lanka, in collaboration with the National Meteorological and Hydrological Services and WMO. Additionally, a state-level forum was established in Tamil Nadu, India. Local-level dialogues with users of warning information were held in the five target countries.</p> <p>An early warning system evaluation guide was drafted, covering assessment of risks, hazard observation and monitoring, hazard prediction and forecasting, forecast translation into potential impacts and response options, communicating risks and response and options, and community readiness to receive and respond to risk information. The guide was piloted during early warning audits in Bangladesh, Maldives and Myanmar, and used during field activities and dialogues in India and Sri Lanka. Cambodia, China, Lao PDR, Pakistan, the Philippines, and Viet Nam expressed interest to replicate similar activities in their countries.</p> <p>Selected communities at risk were connected to the early warning system and 24-hour warning focal points were established in ten pilot sites in Bangladesh, India, Maldives, Myanmar and Sri Lanka (two sites per country). Capacity building activities for the application of warning information products were initiated in the target countries, and 130 disaster managers in India, Myanmar and Sri Lanka were trained on preparing disaster impact outlooks and management response options.</p> <p>WMO in collaboration with the Typhoon Committee trained forecasters from the project countries in interpretation and application of advanced forecasting products from global and regional centres, with emphasis on timely delivery of improved forecasts and warnings to the public.</p>

<p>TTF-17 RIMES July 2012 - December 2014</p>	<p>Enhancing coastal hazard early warning and response: tools and institutional strengthening</p>	<p>Technical staff members from government agencies in Myanmar, the Philippines and Sri Lanka were trained on the generation of high-resolution data for tsunami risk assessment using near-shore bathymetric, topographic and exposure surveys. Selected staff also received a month-long training at RIMES in near-shore field survey data processing and development of related outputs.</p> <p>The INSPIRE system (see project TTF-07) for tsunami risk assessment was installed in the three project countries. Officers from a range of government agencies were trained on evacuation mapping using the ESCAPE platform developed by RIMES, and produced maps showing evacuation zones and routes incorporating the outputs generated from INSPIRE. Evacuation exercises using the IOC tsunami manual were held in pilot sites.</p>
<p>TTF-18 ADPC July 2012 - October 2014</p>	<p>Technical assistance for enhancing the capacity of end-to-end multi-hazard Early Warning Systems (EWS) for coastal hazards in Myanmar, Sri Lanka and the Philippines</p>	<p>National level early warning systems gap assessments were initiated during workshops held in Myanmar, Sri Lanka and the Philippines.</p> <p>A regional capacity building workshop on Weather Research and Forecasting (WRF) modelling was held, with participation from the national hydro-meteorological services of Myanmar, Sri Lanka and the Philippines. Three professionals from each target country received intensive training on WRF.</p> <p>Technical staff members from national forecasters in the three project countries were trained in storm surge modelling by experts from the Japan Meteorological Agency. Training on climate forecast downscaling held in Sri Lanka to further strengthen capacity for coastal hazard mapping.</p> <p>Hazard mapping for pilot sites and associated areas were initiated in Myanmar, the Philippines and Sri Lanka. National workshops were held to gather feedback on the risk maps and the methods used.</p> <p>Evacuation maps and SOPs for evacuation produced and tested in eight pilot sites (three in Myanmar, three in the Philippines and two in Sri Lanka). Communications equipment installed at pilot sites.</p> <p>In collaboration with GAATES and ABU, research undertaken and manual developed on disaster preparedness for persons with disabilities.</p>
<p>TTF-19 ABU July 2012 - April 2015</p>	<p>ABU Disaster Risk Reduction Broadcast Initiative</p>	<p>Country profiles were developed for India, Indonesia, Maldives, Myanmar, Pakistan, the Philippines, Sri Lanka and Thailand.</p> <p>Induction meeting focusing on the role of broadcasters in early warning and disaster risk reduction was held with 60 participants from 25 countries.</p> <p>Workshops for broadcasters and disaster managers held in the Maldives, Sri Lanka and Viet Nam. Broadcasters from India, Iran (Islamic Republic of), Malaysia and Pakistan trained at regional workshop in Malaysia. A field mission was undertaken to Myanmar to identify national focal points and agree on next steps. In the Maldives and Sri Lanka, broadcasters and disaster managers were supported in drafting SOPs for the role of broadcasters in early warning.</p> <p>The Early Warning Broadcasting Systems Handbook was updated. Work was also completed on manuals on emergency communications for people with disabilities (in close collaboration with GAATES and ADPC).</p>

<p>TTF-20 IOC-UNESCO July 2012 - June 2015</p>	<p>Enhancing Tsunami Risk Assessment and Management, Strengthening Policy Support and Developing Guidelines for Tsunami Exercises in Indian Ocean Countries</p>	<p>Multi-stakeholder process undertaken to revise and expand guidelines on tsunami risk assessment, which was completed in 2015. Detailed training modules developed on tsunami exercises, with pilots implemented in Bangladesh, Myanmar and Timor-Leste.</p> <p>Tools for stocktaking surveys of policies on disaster risk reduction including tsunami exercises were developed, with pilot surveys completed in Bangladesh, Myanmar and Timor-Leste.</p> <p>Training on tsunami risk assessment and tsunami exercises held in Bangladesh, Myanmar and Timor-Leste, using modules developed by the project. Case study on tsunami risk assessment completed for Galle City, Sri Lanka.</p>
<p>TTF-21 IOC-UNESCO July 2012 - June 2015</p>	<p>Communicating the effects of the 1945 Makran tsunami to increase awareness and preparedness of tsunami hazards in the Makran region</p>	<p>Field missions conducted to India, Iran (Islamic Republic of), Oman and Pakistan to review literature/historical documents and obtain eyewitness accounts of 1945 Makran tsunami. The missions gathered a wealth of information and received many eyewitness accounts, particularly in Pakistan.</p> <p>A website hosting the historical documents and eyewitness accounts was launched in November 2014, and will be managed by the Indian Ocean Tsunami Information Centre. The website also contains the educational booklet produced as part of the project, which was translated into local languages.</p>
<p>TTF-22 Typhoon Committee August 2012 - May 2015</p>	<p>Synergized Standard Operating Procedures (SSOPs) for Coastal Multi-Hazard Early Warning Systems</p>	<p>Kick-off workshop was held in May 2013 on the status of coastal multi-hazard early warning systems, with participation from 27 member countries in the Typhoon Committee and the Panel on Tropical Cyclones. In country-workshops held in the three pilot countries (Bangladesh, Pakistan and the Philippines) to review existing SOPs; identify best practices, gaps and needs; make recommendations on how to further build institutional capacity and strengthen SOPs. Expert missions were undertaken to six additional countries to review SOPs for early warning.</p> <p>Work completed on a manual on synergized standard operating procedures for coastal multi-hazard early warning systems (the SSOP manual). The finalized manual was published and distributed to members of the Typhoon Committee and the Panel on Tropical Cyclones.</p>
<p>TTF-23 RIMES June 2013 - December 2015</p>	<p>Strengthening of Myanmar's Multi-Hazard Early Warning System</p>	<p>This project assisted Myanmar's Department of Meteorology and Hydrology (DMH) in developing a capacity building program framework for addressing capacity gaps, as well as fill immediate capacity gaps in earthquake monitoring and tsunami warning, and decision-support tools for disaster risk management.</p> <p>RIMES assisted DMH in undertaking a self-assessment of current capacities in hazard observation and monitoring, which was incorporated into a capacity building document highlighting priority main needs and gaps.</p> <p>A high-capacity computer was delivered to DMH and installed with SeisComp3, and ShakeCast software. Software was also installed to enable access to data from the California Integrated Seismic Network. Hands-on training on SeisComp3 was provided 13 staff members at the DMH's National Earthquake and Data Center (NEDC). Two servers were installed at NEDC for acquiring near real-time sea-level information. Tide Tool software was installed, and training provided to 14 NEDC staff. DMH staff members were trained on WRF system installation, operation, and maintenance.</p> <p>Upgrading of 17 agro-meteorological stations, including sensors and telemetry, was completed in 2015.</p>

<p>TTF-24 RIMES November 2014 - September 2016</p>	<p>Capacity Building on Generation and Application of Downscaled Climate Projections</p>	<p>National forecasters in Myanmar, Pakistan and Sri Lanka were assisted in developing downscaled, customized climate projections. This involved transfers of necessary datasets, software and hardware, in addition to intensive training of NMHS staff members. Capacity for climate risk analysis and adaptation planning was enhanced within climate sensitive sectors, through training and production of technical guides for government, NGO and research organisations. A total of 81 institutions were reached across the three countries. Further, as part of the same project, the national monsoon forum model was piloted in Cambodia, Lao PDR and Pakistan. This sought to expand the access to climate risk information in resource management. A total of 9 multi-stakeholder forums were held, with widening stakeholder participation over successive forums in each country. These occurred biannually in Cambodia and Lao PDR, and annually in Pakistan. Each country has subsequently requested further financial and technical support in order to sustain the forums.</p>
<p>TTF-25 AIT November 2014 - November 2016</p>	<p>CAP on a MAP - Improving Institutional Responsiveness to Coastal Hazards through Multi- Agency Situational Awareness</p>	<p>National multi-stakeholder consultation meetings were held in the Maldives, the Philippines and Myanmar, focal points were trained and the Sahana open-source software solution was adapted to the specific requirements of each target country. The national focal points received two weeks of intensive training at the AIT Campus in Bangkok, Thailand. This utilised a 'training of trainers' approach, in order to develop in-country capacities that will persist after the project ceases. Further, the Sahana software and the accompanying servers were deployed to each country. National trainings, tests and drills were conducted in 2016, with the full activation of the common alerting protocol (CAP) in the three countries completed mid-2016. Subsequent regional workshops were held to encourage early warning related national agencies in the remaining member countries of the Tsunami Trust Fund to also adopt the CAP standards in their own respective countries, which reached attendees from Bangladesh, Cambodia, Indonesia, the Maldives, Myanmar, the Philippines and Viet Nam, as well as attendees from Australia, the Federated States of Micronesia, Italy and Germany to facilitate further knowledge sharing. Workshops were also held within the three focus countries, to share the results with relevant stakeholders.</p>

<p>TTF-26 Oxfam GB November 2014 - September 2016</p>	<p>Enhancing Tsunami Resilience in Pakistan</p>	<p>This project enhanced tsunami resilience in five districts located in the provinces of Sindh and Baluchistan in Pakistan, by strengthening the EWS and institutional state capacity needed to utilise it and building community-based disaster risk management in target districts, through a variety of activities that prooted sensitisation, awareness-raising and preparedness for tsunami related risks.</p> <p>Through cooperation with NED University in Karachi, inundation modelling and risk mapping for Gwadar and Pasni districts of Baluchistan province have been completed, using the 1945 tsunami event as a base. These maps were used by Oxfam to develop an evacuation response plan and update the disaster risk management plan for Gwadar, through a participatory process involving various stakeholders including authorities at the national and district level, NGOs, civil society groups and representatives of local livelihoods.</p> <p>The Inmarsat Satellite-based Early Warning System at the Pakistan Metrological Department (PMD) Tsunami Centre in Karachi, which utilises a siren pole for early warning information dissemination, was re-activated in Gwadar, and extended to Pasni.</p> <p>To strengthen community resilience, community organisations were established and 12 project orientation meetings were held with the target communities. A focus on knowledge sharing was realised through encouraging elder community members to share memories of the 1945 Makran Tsunami, and the use of participatory processes for hazard mapping and scenario building. Oxfam and its partners conducted awareness-raising and training sessions with 5,598 community members and over 100 officials. Further, tsunami education sessions were implemented for over 15,302 school children and teachers.</p> <p>Awareness was also raised among a broader range of stakeholders, through a commemoration for the Makran Tsunami on the 70th anniversary in 2015, in Karachi, various workshops on preparedness for coastal hazards, and training of community volunteers and media personnel. Further, research papers were produced entitled 'Addressing knowledge gaps in Makran tsunami', and a booklet on 'The untold story of tsunami of 1945 in the Indus Delta'; and a national consultation was held on readiness for tsunami and its impact on the local economy, with 26 participants from government organisations, NGOs, academics and UN organisations.</p>
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<p style="text-align: center;">TTF-27 RIMES January 2017-31 December 2018</p>	<p style="text-align: center;">Enhancing Weather and Climate Resilience in RIMES Member States through Capacity Building on Impact Forecasting</p>	<p>This project aims to ensure that decision making and seasonal planning in at least 3 climate-sensitive sectors in Cambodia, Myanmar, Sri Lanka, Fiji, Papua New Guinea, and Samoa are informed by weather and climate information.</p> <p>For Southwest Pacific countries, the capacities necessary to do so are being enhanced through several activities including training, seasonal forums, institutional mapping, and decision-support system development. So far, the training of trainers in impact forecasting and climate applications has been successfully realized in Papua New Guinea, with trainers from a variety of UN organizations and NGOs. Institutional mapping and user needs assessments have also been completed.</p> <p>Seasonal forums were implemented addressing ways to use impact and risk assessments to inform seasonal planning in Fiji, Papua New Guinea and Samoa, and decision support system development in Papua New Guinea. RIMES, in collaboration with SMD (Samoa Meteorology Division), produced training data to sensitive stakeholders to the operational roles of preparedness, which are necessary to support a successful forum. RIMES collaborated with FAO in order to facilitate the input of agricultural data into SESAME (Specialized Expert System for Agro-Meteorological Early Warning for Climate-Resilient Agriculture) for the development of a decision-support system in Papua New Guinea.</p> <p>For South and Southeast Asian Countries, RIMES is supporting the integration of earth observations in impact forecasting and risk analysis, and the development or expansion of decision-support systems. The use of earth observation is being promoted through national monsoon forums, which have so far been held in Myanmar and Sri Lanka with attendees from government institutions, media, development organizations, etc. The date for an initial forum is also currently being finalized for Cambodia.</p>
<p style="text-align: center;">TTF-28 ESCAP/WMO Typhoon Committee May 2017- October 2018</p>	<p style="text-align: center;">SSOP Phase II: Synergized Standard Operating Procedures (SSOPs) for Coastal Multi- Hazard Early Warning Systems</p>	<p>This project is a continuation of project TTF-22 “Synergized Standard Operating Procedures (SSOPs) for Coastal Multi-Hazard Early Warning Systems”, which produced the manual on Synergized Standard Operating Procedures. Building on these, phase II of this project continues to develop SSOPs.</p> <p>The SSOP-II project will provide resources and opportunities to involve social scientists, DRR experts and warning experts from National Tsunami Warning Centres (NTWCs), National Disaster Management Offices (NDMOs), and Government Sectoral Agencies including national level, local level and community level to improve the training and capacity building on social science aspects of EWS, such as risk and impact assessment, warning communication strategies, partnership/stakeholder engagement, society response capability, etc..</p> <p>SSOP-II will focus on training the "mechanism" of preparing and implementing synergized standard operating procedures for coastal multi-hazards early warning systems in beneficiary countries with the goal of promoting the capacity on coastal community resilience to coastal multi-hazards through extending the achievements of SSOP-I.</p> <p>This has been achieved through training courses for DRR experts in 10 beneficiary countries, national workshops in 3 target countries from TC and PTC regions, and TC/PTC exchanges through attachment trainings delivered by the RSMCs in Tokyo and New Delhi.</p>

Annex 2: Secretariat Monitoring and Advocacy Missions

Location	Dates	Mission/event
Yokohama, Japan	21-24 Feb. 2017	Represented ESCAP at the 49th Session of the ESCAP/WMO Typhoon Committee <u>Main outcome:</u> Awareness of the Fund, including its achievements and future opportunities, was raised among TC members. Progress was also made in building support for project TTF-28, which is being implemented jointly by the Typhoon Committee and the Panel on Tropical Cyclones.
Tehran, Iran (Islamic Republic of)	27-28 Feb. 2017	Represented ESCAP at the ICG/IOTWMS Sub-Regional Working Group <u>Main outcome:</u> The meeting was an important opportunity to showcase the Fund's past and current work in the Makran region, which was considered a best practice at the meeting. ESCAP also used the meeting to promote strengthened regional cooperation on tsunami early warning among the countries in the Makran region through the new Sub-Working Group.
Kuala Lumpur, Malaysia	18-20 Apr. 2017	Represented ESCAP at the 11th Session of the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System (ICG/IOTWMS). Gave a presentation on the Trust Fund for Tsunami, Disaster and Climate Preparedness. <u>Main outcome:</u> Awareness of the Fund, including its achievements and future opportunities, was raised among IOTWMS members. ESCAP also supported the establishment of a new IOTWMS Sub-Working Group for the Northwest Indian Ocean (the Makran region).
Cancun, Mexico	22-26 May 2017	Represented ESCAP at UNISDR Global Platform on DRR and Multi-Hazard Early Warning Conference. Co-organized side event on impact-based, people-centered multi-hazard early warning systems and presented Trust Fund. <u>Main outcome:</u> The side event gave visibility to the work of the Trust Fund and its achievements to date.
Port Moresby, Papua New Guinea	23-24 Aug. 2017	Represented ESCAP at 9th Meeting of the RIMES Council and 3rd Ministerial Conference. <u>Main outcome:</u> Awareness of the Fund, including its key role in establishing and supporting the development of RIMES, was raised. Important feedback on future priorities was also gathered. Participation gave ESCAP the opportunity to monitor the ongoing project TTF-27 "Enhancing Weather and Climate Resilience in RIMES Member States through Capacity Building on Impact Forecasting".
New York, USA	21 Sept. 2017	Co-organized a side on Trust Fund with the Government of Thailand at the 72nd session of the UN General Assembly. Event highlighted linkages between disaster risk reduction and climate change. <u>Main outcome:</u> The side event gave visibility to the experience of Asia and the Pacific in early warning, including the Fund. Linkages were also built with partners involved in multi-hazard early warning.
Colombo, Sri Lanka	2 Nov. 2017	Represented ESCAP at 17th National Monsoon Forum and monitored implementation of on-going project TTF-27. <u>Main outcome:</u> Raised the profile of the Fund and built linkages with partners involved with disaster management and early warning in Sri Lanka. Participation gave ESCAP the opportunity to monitor the ongoing project TTF-27.

ESCAP Multi-Donor Trust Fund for Tsunami, Disaster and Climate Preparedness

The ESCAP Multi-Donor Trust Fund for Tsunami, Disaster and Climate Preparedness was established in 2005 to support tsunami early warning through a multi-hazard, regional approach.

In 2010, the scope of the Fund was broadened to include disaster and climate preparedness. The Fund's focus remains on end-to-end early warning for coastal hazards such as tsunamis, tropical cyclones, storm surges and coastal zone flooding.

The fund covers ESCAP member States in the Indian Ocean, Southeast Asia and the Pacific.

Purpose

To contribute to more resilient coastal communities, and ultimately to help save lives and reduce loss and damage from disasters.

Objective

To build and enhance tsunami, disaster and climate preparedness capacities for early warning for coastal hazards.

The Fund focuses on strategic approaches that build on ESCAP's comparative advantages as a convener of **regional cooperation**. In line with the role of ESCAP, the Fund supports projects and activities that can facilitate:

- Strengthening of regional institutions dealing with early warning.
- Enhancement of regional cooperation for early warning through data sharing, joint standards, resource sharing arrangements and effective networks.
- Sharing of knowledge and good practices.

At the **national level**, the Fund focuses on policy and institutional strengthening in countries facing high-risk and low capacity. In projects targeting specific national capacities, the Fund applies South-South approaches to enhance cooperation between countries covered by the Fund and tap into the existing capacities in the region.

ESCAP Trust Fund for Tsunami, Disaster and Climate Preparedness

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