APP
ASIAN PREPAREDNESS PARTNERSHIP

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Building Nexus between Risk Analytics, Early Warning Systems and Emergency Operations Centers in the APP Countries

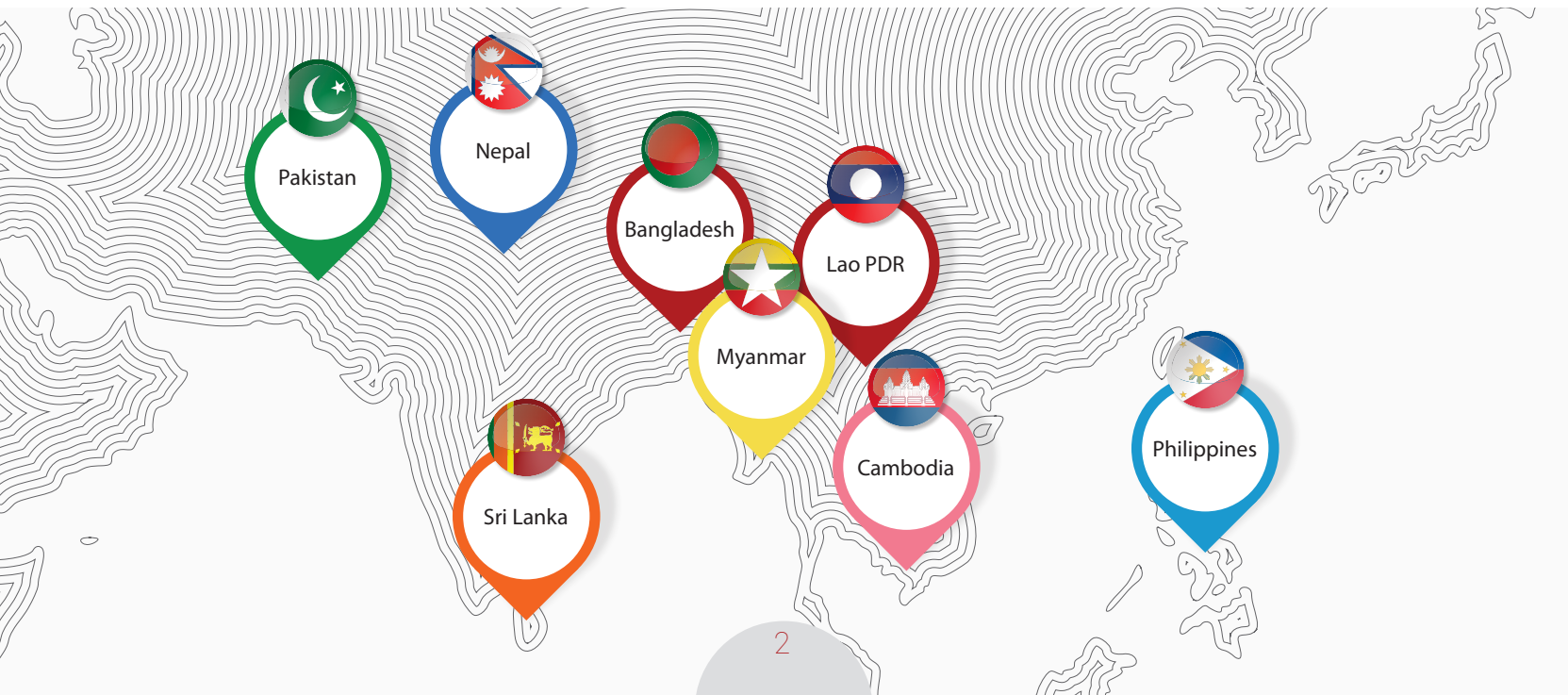
Inside

Introduction

The Asian Preparedness Partnership (APP) is a unique multi-stakeholder regional partnership established by its founding member countries which include Cambodia, Myanmar, Pakistan, Philippines, Nepal, and Sri Lanka. Formed in 2017 with technical and secretariat support from the Asian Disaster Preparedness Center (ADPC) as well as assistance from the Bill & Melinda Gates Foundation (the Foundation) and the United States Agency for International Development Bureau for Humanitarian Assistance (USAID BHA), its goal is to achieve "safer and well-prepared communities through locally-led disaster risk management (DRM) actions, so that disaster impacts on at-risk communities of Asia will be reduced".

The need for Emergency Operations Centers (EOC) was clear as more and more hazards became disasters. The EOC is normally a nerve center for the central communication and coordination of emergency responses. The EOC also gathers critically required information, coordinates the response activities, and manages resources by making informed decisions. Early warning is a major element of disaster risk reduction. Early action can often prevent a hazard from turning into a disaster by preventing loss of life and reducing the economic and infrastructural impacts.

The EOC also serves as the hub for disseminating early warning to all concerned parties. Early warning needs to be issued following carefully gathered information about potential risks that a hazard poses, as well as the measures needed to prepare for and respond to its adverse impacts. Risk Analytics is an essential component of EOC and Early Warning Systems (EWS) as it provides a shared understanding of risks for planning and the coordination of required responses. It is critical to strengthen the nexus between EOCs, EWS, and Risk Analytics for monitoring and coordinating the preparedness and response to disasters.



The Regional Technical Working Groups (RTWGs) are part of the governing structure for the APPRSC.

The Regional Technical Working Groups (RTWGs) are a part of the governing structures of the Asian Preparedness Partnership Regional Steering Committee (APPRSC). They are need-based and assist the APPRSC. The importance of the linkages between EOCs, EWS, and Risk Analytics for strengthening the preparedness for emergency response was identified as one of the priority thematic areas.

The RTWG on 'Nexus between EOC, EWS and Risk Analytics interconnect these components to strengthen the EOC's role both in preparedness and response. RTWG looks at the challenges, opportunities, and good practices on participation, consultation, and coordination for effective stakeholder engagement before, during, and after a disaster event. It is not a decision-making body.

The RTWG for nexus between EOC, EWS, and Risk Analytics is comprised of one regional technical working group representative (RTWGR) from each country nominated by the National Preparedness Partnerships. The RTWG includes a cross-section of representatives from different APP countries.

The specific roles and responsibilities of the RTWG are to

- Identify and develop mechanisms for utilizing risk analytics and EWS for preparedness and better response;
- Develop toolkits and guidelines for utilizing risk analytics and EWS for EOC operations including coordination mechanisms, communications, dissemination, and response actions;
- Conduct technical reviews of knowledge products, tool kits and guidelines developed and endorse them for approval before the APPRSC;
- Document good practices and success stories on linking the Risk Analytics with EWS and EOCs;
- Partner with regional and national knowledge workshop(s) on EOC.

Cambodia

The authorities in Cambodia realize there is an urgent need to address the safety of the families and communities affected by climate change-related threats and to mitigate these threats for the future. Cambodia is at the forefront of strategically integrating digitalization with government development priorities to support policy interventions. Safety is the key priority for the government, and to promote it for the communities, they have introduced and implemented the 1294 Early Warning System (EWS 1294). This system is an innovative technology that uses GSM-enabled automated water gauges to provide important hazard-forecasting information to disaster management authorities.

The system also includes a dissemination platform that shares timely warnings with people who need to take extra precautionary measures for protection from impending natural hazards. The platform shares alert via Interactive Voice Response (IVR) technology, which informs vulnerable populations of rising water levels and adverse weather conditions, and gives instructions on safety measures for registered users when an incoming natural disaster is detected. It was first launched in 2013 by People in Need (PIN) in coordination with National Committee for Disaster Management (NCDM) and has evolved to become one of the government's most important communication tools. Officials in the 25 municipalities/provinces have been trained on how to operate the system. So far 27 sensors have been installed nationwide to monitor river levels. When water levels rise quickly, the sensors trigger alerts that the Provincial Committees for Disaster Management (PCDMs) use to craft recorded messages for registered users.

This system is now recognized as the national EWS for Cambodia. The system is also used for delivering awareness messages on COVID-19, and for sharing information about the pandemic. Users just need to sign up by dialing a free call to 1294 and following the prompts to register province, district, and commune. Smart Sensors are used like Tepmachcha, a solar-powered, solar-based water gauge, and are continuously recording meteorological information around the country. Tepmachcha is an automated flood sensor designed by the DAI Maker Lab with funding from United States Agency for International Development's (USAID) Development Innovations project. Data has then been disseminated through smart sensors that send the acquired information across the internet via the Cambodian cellular mobile phone networks (only Smart, Cellcard, and Metfone currently).

The Provincial Committees for Disaster Management (PCDM) also regularly monitors to detection of natural disasters. If required, EWS 1294 sends warning messages via the Interactive Voice Response (IVR) Platform. Registered users receive calls via their mobile phones and take appropriate action to protect themselves, their families, and their livelihoods. At the PCDM secretariat, there are two focal points responsible for the EWS 1294. PIN donated one laptop and one voice recorder to each province to operate the system. When any hazard event is seen to happen and required to release the alert, the focal points record the voice (warning information) and send it to the provincial governor for approval before releasing it to the registered phone numbers via laptop and tools. Finally, the registered users receive calls to take action appropriately.

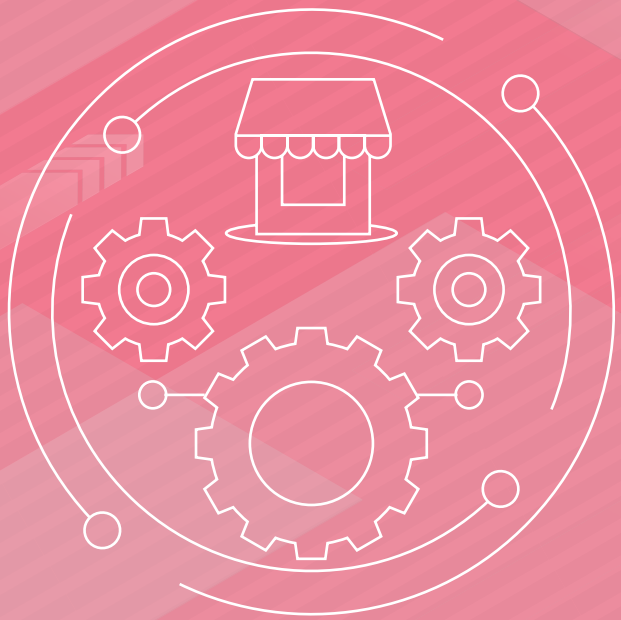
125,467 users have registered with the system and 2,389,734 alerts have been sent out. EWS 1294 helped the people be prepared to evacuate timely by themselves. This occurred in the 2021 flood in Banteay Meanchey province. By receiving the calls from EWS 1294, the people in the flooded Serei Sophorn district were staying homeless this year

than the last year. However, they were able to move to pointed safe areas already after they got alert calls from EWS 1294. Twenty-seven sensors were installed nationwide to monitor river levels. NCDM in close cooperation with PIN provided training to villages, communes, districts, provincial, and NCDM staff on EWS 1294 and how to operate it as well to disseminate messages to the people.

Problems encountered were responsible staff operating the system had left. Any voice message more than one minute long was not able to work or couldn't be sent out. Also, some community people were less interested in the system because they believe there are no problems with hazards as they have been living there for a long. They are used to it as well. Some registered users were confused with EWS 1294 as the phone company's voice was used to introduce any trade promotion so they didn't accept the call and often rejected it.

It was concluded that increased awareness-raising and campaigning efforts for the EWS 1294 are needed to have more users registered. Officials should train and put out more relevant alerts to people to have them accustomed to these alerts. Request PIN to provide support to solve technical errors. The PIN should provide further technical support to interlink the system with the Facebook platform. The EWS 1294 should be mainstreamed into the school curriculum.

PIN confirmed early warning messages will be accessible even to those who are not registered with the EWS 1294 system. The system advertisements on social media, radio, billboards, and meeting with schools, authorities, and the military will increase. The activation campaign ran through December 2021 in the hopes of further increasing awareness and application of the system.



Nepal

Nepal is prone to floods and landslides. About 80% of Nepal's annual precipitation occurs between June and September. Monsoons bring heavy rain resulting in flooding and landslides causing death and property damage. For five days in October 2021, post-monsoon rainfall recorded 561 millimeters (mm) in one station in western Nepal in just 48 hours. Total losses reached USD 8 million which hit the agriculture and livestock sector shaving off up to 0.6% of the gross domestic product (GDP). The paddy destruction was a major setback for the national economy as it is 7% of the GDP and a major source of income.

Bardiya and Kailali districts were hardest hit by flooding: in Bardiya, 42,000 hectares (ha) of paddy was destroyed, and in Kailali, 22,500 ha. The Department of Hydrology and Meteorology (DHM) is the designated government body for predicting and disseminating weather forecasts and warnings. It has a network of 110 hydrological stations and more than 215 rainfall meteorological stations equipped with telemetry systems. Several hydrometric stations are being upgraded with telemetry. EW information is provided through the DHM's portal. More than 75 rainfall and 32 river flow gauge stations are equipped with communication systems providing efficient and timely flood warning information. The real-time telemetry system is integrated with community-based communication, dissemination, and response mechanisms. All telemetry stations are equipped with mobile network communications systems. The DHM integrated a "rainfall-runoff model" into the EWS monitoring and warning systems to increase the lead time by three days for communities living in downstream stretches of the Karnali and other major basins.

Practical Action also supported the DHM in developing a flood forecasting model providing 3-5 hours additional lead-time to communities living in downstream stretches of the Karnali basin. The DHM also used the Global Flood Awareness System (GLoFAS), providing information regarding stream flow levels in Nepal's major river basins up to a month in advance. The existing flood watch system used by the DHM generates a siren at some district emergency operation centers (DEOCs) when water levels exceed set flood warning levels. The Nepal Red Cross Society's (NRCS) head office team monitors the weather forecast portal of the DHM, analyzing the situation and disseminating EW messages to field-level volunteers by SMS. Local government-issued warnings are sent on loudspeakers and FM radio. Flash flood warnings are given at precipitation stations when rainfall exceeds a threshold within three hours.

When water levels crossed the danger level in Karnali and its tributaries, the National emergency operation center (NEOC) mobilized its district emergency operation centers (DEOCs) through proper communication, coordination, and information management per its standard operating procedures (SOPs). EWs went out but success was limited. DEOCs once played a significant role in coordination warnings distribution but not now. Local disaster management centers (LDMCs) worked with local emergency operation centers (LEOCs) to respond to disasters at the ward and village levels in cooperation with CDMCs, DHM gauge readers, and community-level task forces. Still, capacity is limited and performance was mediocre.

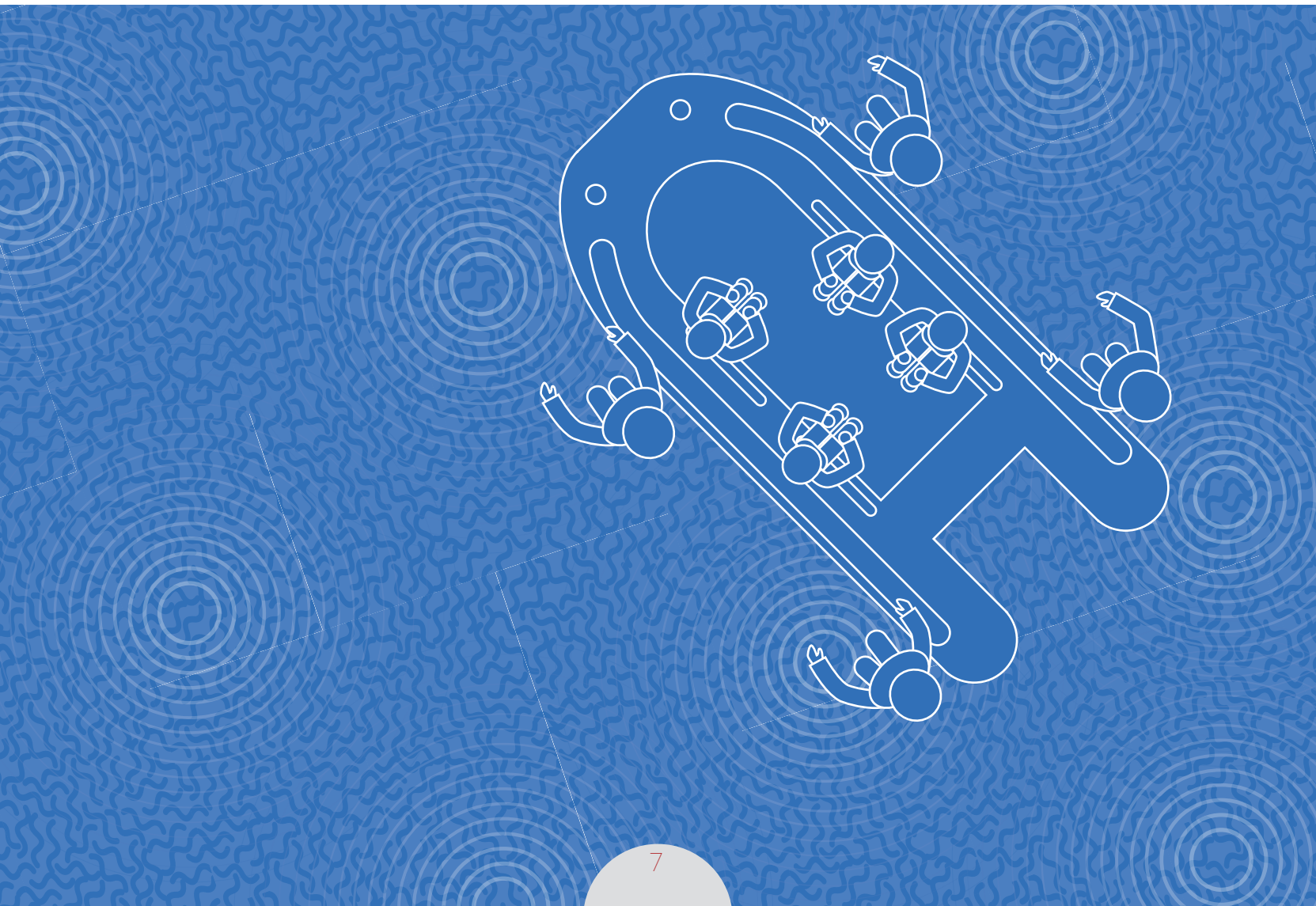
The forecast was issued more than 48 hours from when rainfall fell but other agencies like the National Disaster Risk Reduction Management Authority (NDRRMA), Department of Agriculture, and Nepal Agriculture Research Council (NARC) were not able to analyze the extent of risk and communicate that risk properly to farmers soon enough. Farmers kept on cutting paddy until the rains came and fields were submerged.

The EWS' ineffectiveness was associated with a failure to monitor the network, a poor data-keeping system, and limited access during the peak monsoon to forecasts and warnings by end-users. The DHM does not yet coordinate well with local governments regarding weather crisis information.

In both districts, EWSs and communication channels were mobilized to warn farmers. Limited capacity and practical knowledge during actual emergencies hampered success.

Though people were clearly warned to take necessary precautions 48 hours ahead of the rain, farmers either were not reached or messaging was ignored and people assumed the monsoon passed.

The current EW system and messages are still general and do not address everyone. Coordination is not effective. LEOCs should be more central to issuing messages but their capability is also limited and coordination sketchy.



Pakistan

Nullah Lai is a Tributary Stream which crosses two densely populated cities of Pakistan and both have business districts. The flooding in 2001 marked the start of a paradigm shift and the development of a comprehensive Lai Nullah Flood Control Program. This caused 74 deaths and 400,000 people were affected while 742 heads of cattle drowned. More than 1,000 houses were completely damaged while 2448 additional houses were affected. Total losses to infrastructure, government property, and small and medium-scale business enterprises were estimated to be USD 250 million (Pakistani Rupee 15 billion).

This disaster event moved policymakers to take disaster risk reduction measures to save lives and property in these thickly populated twin cities of Pakistan. In the Islamabad jurisdiction, the river system is composed of three major tributaries: Saidpur Kas, Tenawali Kas, and Bedarawali Kas. They originate from the Margalla Hills and flow into the mainstream of Lai Nullah just upstream from Kattarian Bridge, at I.J. Principal Road forming the administrative boundary between Islamabad and Rawalpindi.

After the project was conceived due to the damage of the 2001 flooding, a team of experts surveyed the flooded area in 2003. The team marked the most flooded areas in the past 100 years. On the basis of the study, Installation work of the automated telemetry system started in 2006 and the EWS was operationalized in March 2007. Data collection and dissemination related to rainfall, river floods, etc. is managed through a network of flood warning centers connected with the Flood Forecasting Division (FFD) of the Pakistan Metrological Department (PMD) at the national level.

The beneficiaries of this project are

- Local population
- Local governments
- District administration
- Business community
- Provincial Disaster Management Authority (PDMA)
- National Disaster Management Authority (NDMA)

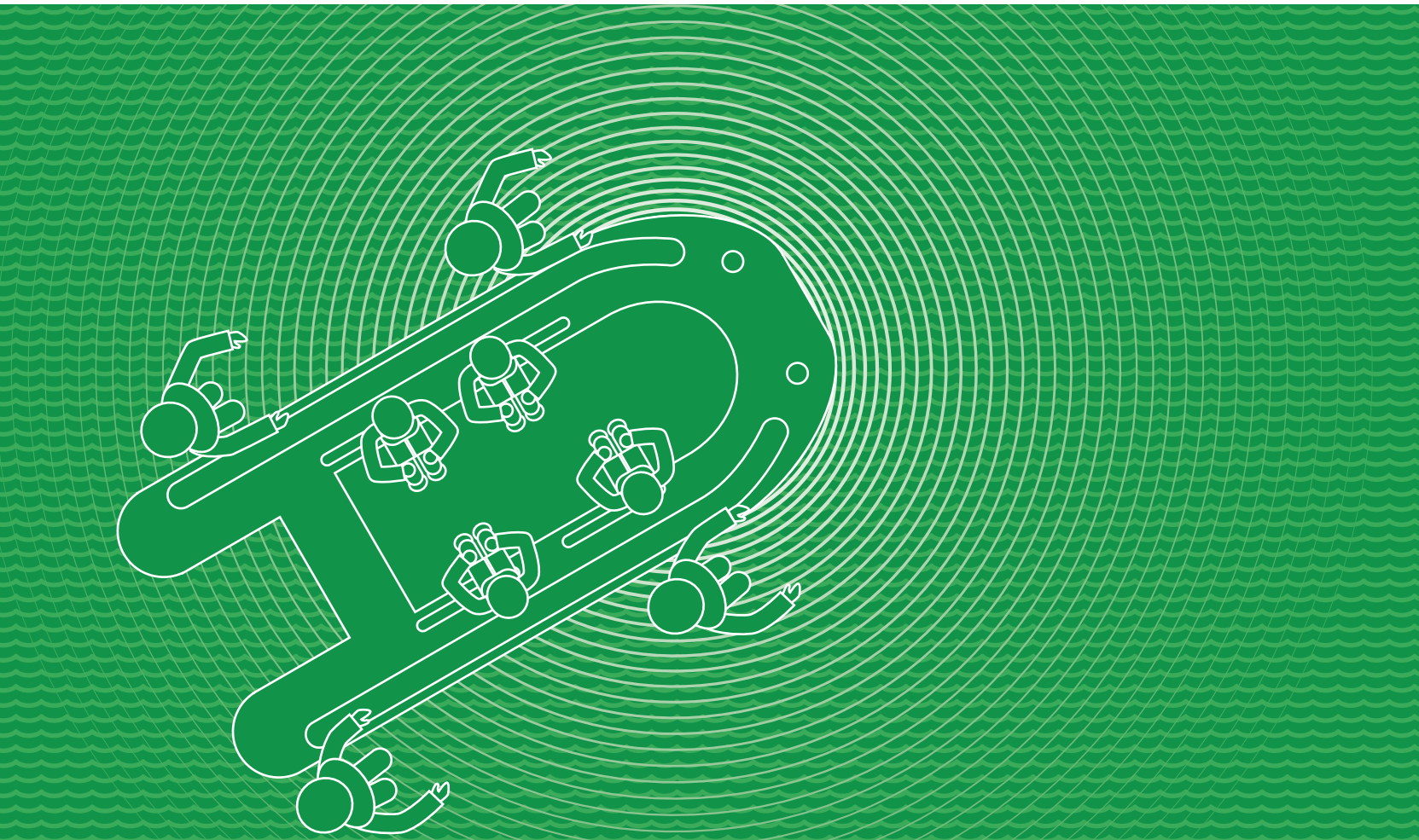
The local population was involved in marking flood levels during the design of the project. This project was completed through the involvement of local stakeholders like city governments and district administrations. Local stakeholders were trained to learn different levels of threat and prepare their response in case of any evacuation.

The Nullah Lai Early Warning System has provided the following to support approximately 700,000 people:

- Real-time and accurate observation of rainfall/water level through an automated telemetry system comprising six rainfall gauging stations and two water level gauging stations.
- Flood can be forecasted before river banks overflow
- Ten warning posts cover the inundation area

- Prompt and integrated warning operation is possible
- Saving precious lives through timely evacuation.

Despite the success of the project, there is more to be done regarding the loss of assets. Additional limitations include the narrow response time for evacuation in case of flash floods during monsoons and greater cooperation from local citizens in danger zones. NDMA Pakistan is trying to replicate this system in other parts of the country in the hopes for state-wide resilience.



The Philippines

Philippine Disaster Resilience Foundation (PDRF) responds to compound risks. Looking at two fronts—the COVID-19 pandemic and Taal volcano's increased alert level in July 2021. PDRF coordinates disaster risk and reduction management and joins competing businesses to address a common agenda.

The PDRF's EOC is the first private-sector-led center in the region to use advanced communications software and technology to monitor climate-related and natural hazards. The EOC provides and coordinates warnings, disaster evacuation, asset inventory, and emergency services integration. It also provides commercial and civic inputs to total disaster efforts.

In March 2021, when new COVID-19 variants were developing, the Philippine Institute of Volcanology and Seismology (PHIVOLCS) raised the Taal volcano alert level. Taal volcano reached level 2 due to the observed number of volcanic activity earthquakes, changes in the main crater, ground deformation, and microgravity changes. A level 2 alert reminds people (in this case, the Taal Volcano Island or TVI) they reside in a Permanent Danger Zone (PDZ). Entry into the area is strictly prohibited, although evacuation is not recommended. The alert level soon escalated, to level 3. The PDRF network quickly responded. Soon after the EOC was fully activated the Taal volcano erupted. On 14 July 2021, PDRF provided hygiene kits and also launched a recovery program to build a disaster-resilient evacuation center. The PDRF EOC monitors the activities of the Taal Volcano through The Philippine Institute of Volcanology and Seismology (PHIVOLCS).

PDRF continues to evolve from its pre-pandemic practices to ensure its team can still respond to disasters with the ongoing pandemic and supports the government's T3 (Test. Trace, Treat)[1] program. The COVID-19 pandemic can pose a serious threat-- if a major eruption occurs, restrictions on movement due to COVID-19 could be deadly as communities usually move to higher areas for safety, security, shelter, and medical attention. The inability to practice social distancing could create a major health disaster.

In general, the EOC has three main responsibilities once the status is raised to blue alert:

- Efforts are shifted to increase monitoring. The EOC releases an advisory to their network companies based on the 8 AM bulletin of PHIVOLCS and the Philippine Atmospheric, Geophysical, and Geophysical Astronomical Services Administration (PAGASA) announcements.

- The EOC conducts needs assessments through its partner stakeholders on the ground, in this case, the Office of Civil Defence (OCD), Batangas Local Government Units (LGU), and the Regional Disaster Risk Reduction Management Council (RDRRMC). PDRF collates the results of the assessments and if needed, sends an appeal for donations to its network as well as advisories for relief operations.

- Information management through the released advisories, situational reports (SitReps), and other materials reported to the National Disaster Risk Reduction Management Council (NDRRMC).

Assessments have shown that hygiene kits were badly needed and determined a priority need—this information was immediately sent to the network for immediate

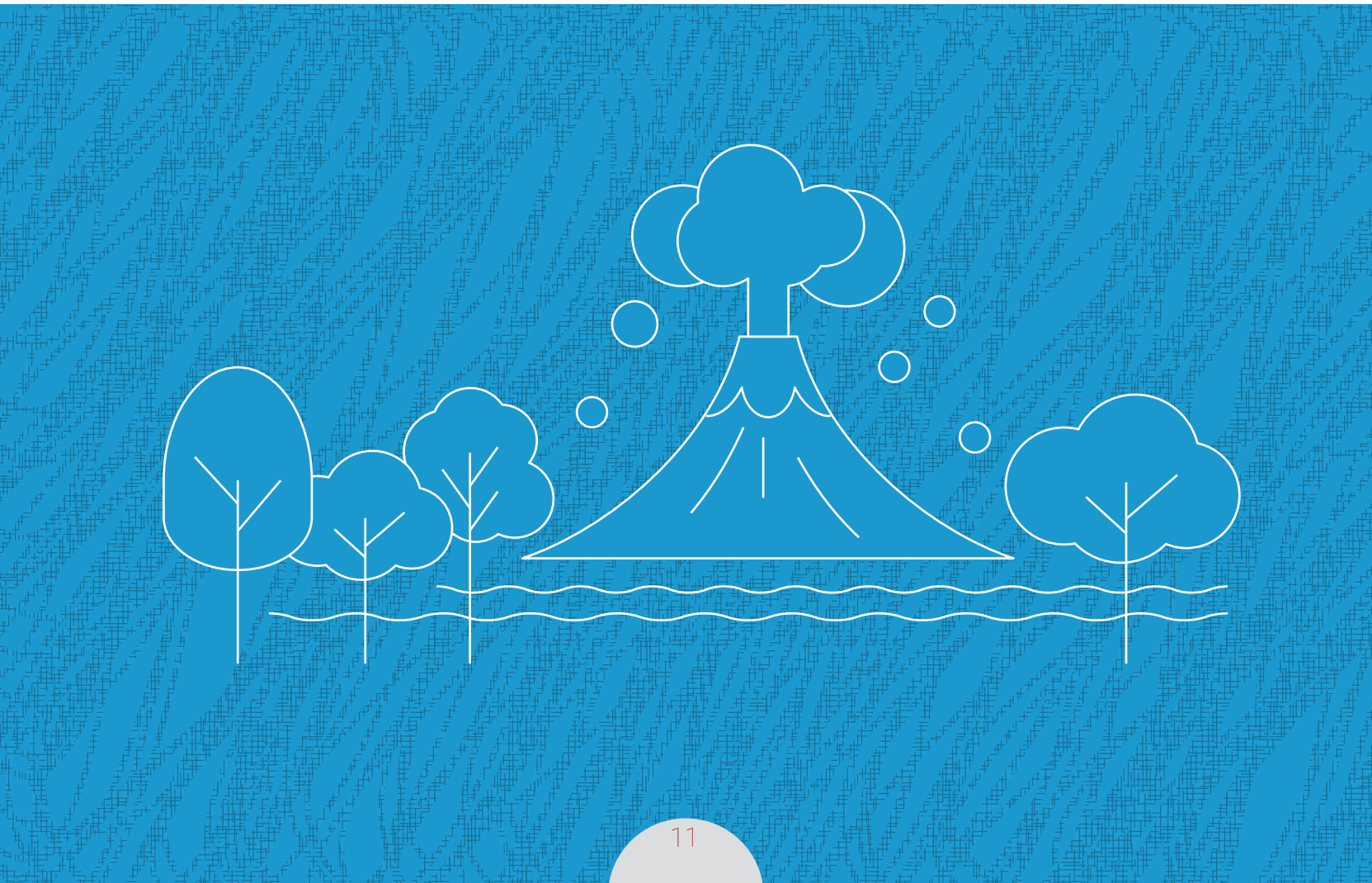
[1] A partnership between PDRF and the national government in response to COVID-19. Initiatives include the provision of medical supplies such as personal protective equipment (PPE), testing kits, others, as well as to assist the implementation of the National Vaccine Roadmap

response action. The Department of Social Welfare and Development (DSWD) was in charge of providing food packs and found that there were sufficient food stocks in the National Resource Operations Center (NROC). The PDRF, following and modifying what is prescribed in the Sphere Standards[2], provided hygiene kits to include surgical face and N-95 masks, hand soaps, alcohols, shampoo, sanitary napkins, toothpaste, and toothbrushes.

[2] The Sphere Standards is an international standard for humanitarian action that ensures the quality of services of humanitarian response

The PDRF EOC also mapped the 13 vaccination sites that were seen inside the 14 kilometers (km) danger zone based on the HANDA platform. This information was shared with the government and private sector partners providing vaccination programs in the area so they can do appropriate modifications to the emerging threat.

Supplies were repacked in the provincial operations center and were endorsed to LGUs, coordinated via inter-EOC. Hygiene kits were procured from the Shell Corporation and Aboitiz Foundation. Eight donors provided resources



outside those kits with UPS in charge of logistics and delivery. A total of 725 affected families were temporarily evacuated from the municipalities of Talisay, Laurel, and Agoncillo and received donations.

The PDRF EOC was successful in responding to the disaster. The center effectively delivered timely activation. Strategic communication strategies were also employed. PDRF coordinated with stakeholders after evacuation to establish needs and instantly sent out a call for donations. The approach was enhanced due to the available information. The private sector was able to bridge the needs gap in the public sector.

The pandemic proved a major response challenge. The approach had to accommodate health protocols instated by the Inter-Agency Task Force (IATF) to avoid transmission. This was particularly challenging when the EOC team had to go to the field and repack donations.

The pandemic meant mobilizations were limited and vital information from the ground was only provided by local partners and LGUs. The PDRF did not conduct effective assessments using the relevant Rapid Damage Assessment and Needs Analysis (RDANA) forms. Although information from the Batangas EOC is still considered primary, it does not contain parameters needed by the PDRF EOC such as the impact on businesses and others.

The better language used in communications materials would help. Advisories were too technical and hard to understand. Staff risk communications training is essential for success.

This is only the third time the PDRF has responded to a volcanic eruption. Several staff has undergone geological and volcanic training. Expanding this program to PDRF staff, not just the EOC staff would greatly improve the organization's response.

In managing crises such as COVID-19 and an impending volcanic eruption, it is critical for PDRF to understand the unintended consequences that may affect local communities. PDRF should work with affected local government units to consider the impact of measures on all sectors and adopt informed, coordinated approaches within their specific context. Adapting current management tools and practices and harnessing the resources of the private sector, academic and civil society will lead to success.

Sri Lanka

On 28 November 2020, a low-pressure area formed off the coast of Aceh and two days later it was upgraded to a cyclonic storm and tropical storm named Burevi. December 2nd, Burevi reached peak intensity with 1-minute sustained winds of around 85 kilometers per hour (km/h) and a barometric pressure of 996 millibar pressure unit (mbar).

More than 75,000 people were evacuated ahead of the storm in Sri Lanka. In India, a red message was issued by the India Meteroglical Department (IMD). A red alert was also issued for parts of Kerala. In Sri Lanka. In advance of Burevi, a red alert was imposed by the Department of Meteorology. Sri Lanka's meteorological department also warned of storm surges, flash flooding, and damage to houses and power lines. Technical warnings were issued alerting fishing and naval communities to suspend activities starting December 1st. The IMD also issued storm surge warnings for the East Coast of Sri Lanka. All relief centers opened in the North-East area. Schools were shut in the Northern and Eastern provinces through December 4th. The Disaster Management Centre (DMC) coordinated all response activities with the coordination of relevant stakeholders. Two people died, six people were injured, 99 houses were fully destroyed 3,486 houses were partially damaged and a total of 95,734 persons were affected by Cyclone Burevi, including 79,564 in Jaffna alone. The two fatalities were residents of the Chankanai and Chavakachcheri areas of the Jaffna district.

The rain continued to lash Jaffna after the center of the cyclone moved off the island, leaving areas flooded. Jaffna continued to experience heavy rains of 193.3 mm as late as 6 December 2020.

The outcome of this event led to the DMC being the main focal point responsible for coordinating early warnings, along with the relevant technical agencies and technical committees.

The Emergency Operations Centre of the DMC will be in constant coordination with all technical agencies responsible for natural and man-made hazards and in instances of any imminent disaster. Iit will take action to inform the responsible officers for onward communication to the sub-national levels and communities. DMC has established an effective early warning system for disasters – natural, technological, and man-made - through the EOC of the DMC. Priority will be given to those disasters, such as riverine floods, landslides, flash floods, tropical cyclones, storm/sea surges, etc.

For rarer but very destructive hazards such as tsunamis, systems are in place. Methods of obtaining information about impending disaster events and issuing early warnings would vary from one hazard to another due to the different characteristics of different hazards. With respect to local hazards such as floods and landslides, local systems already available have been strengthened. For other hazards such as earthquakes, tsunamis, adverse weather conditions, and cyclones the relevant agencies will work in constant coordination with the respective regional and international warning centers. Cyclone 'Burevi'entered the island through Mullaitivu and Trincomalee areas.

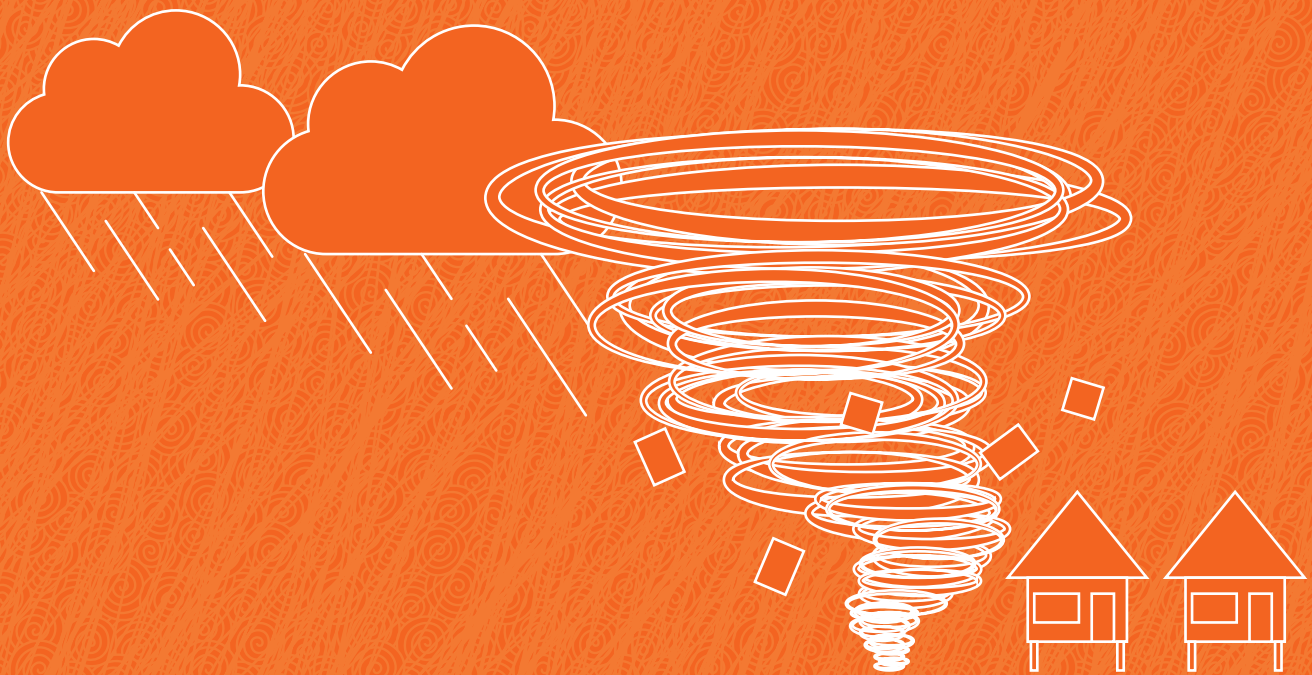
Due to this system storm surge of about one-meter height above the astronomical tide, it was expected to inundate low-lying coastal areas from Trincomalee to Kankasanthurai and from Pooneryn to Puttalam. From 2 December to 3 December 2020, the sea area around the island was rough to high as the wind speed was expected up to 100 kilometers per hour. The DMC warned of property damage, utility structures, sea vessels, flash floods, and seawater flooding in coastal low-lying areas. The center used the following internal provisions and established mechanism for effective information dissemination:

DMC consists of various EWS from national to local and also established various community-based early warning systems to disseminate the warnings to the vulnerable location. Media at the national level, DMC includes early warning towers, police & military communication, cell broadcast/ sms, satellite & radio communication, and telephones

- At the sub-national level DMC consists of many of the above and also more basic forms such as church PA systems, sirens (hand and electric), riders/ push bicycle & motorcycles/messengers, SMS, and early warning committees (door to door).

- Minimize loss of both life and property through effective communication, utilizing all media. Media coordination is done on a 24-hour basis in the Disaster Management Center by appointing a media spokesperson and a media team.

These messages were also adapted according to sea and land areas. The maritime provisions included warnings to naval and fishing communities regarding travelling to sea areas around the island and those who are out in sea regions are advised to return to coasts or be moved to safer areas as soon as possible. In consideration to the scenario in land areas, coastal hutment dwellers are advised to move to safer places and other people were to remain indoors. This advisory also included the awareness of fallen trees and power lines, use of electrical appliances, increase vigalancy or surrounding areas, contacting the local disaster management authorities of the DMC for support, and continued monitoring of the advisories from the Department of Meteorology.



For more information, please contact app@adpc.net

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