Activity Report

# 5th Monsoon Forum

Colombo, Sri Lanka

The 5th Monsoon Forum, in Sri Lanka, was made possible through the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)-supported "Reducing risks of tsunamis, storm surges, large waves, and other natural hazards in low elevation coastal zones", with technical assistance from the World Meteorological Organization (WMO) and the Regional Integrated Multi-hazard Early Warning System (RIMES). The 5th Monsoon Forum was organized by the Department of Meteorology (DOM).

**Background**

The Monsoon Forum was established in Sri Lanka through the programme *"Facilitating the integration of tsunami warning by strengthening the multi-hazard warning system"* supported by the American Red Cross (ARC). The programme supported the first three (3) Monsoon Forums in the country.

The programme "*Reducing risks of tsunamis, storm surges, large waves, and other natural hazards in low-elevation coastal zones*" also takes forward the Monsoon Forums, as a platform for interface between forecast producers and users, targeted at enhanced application of risk information. The UNESCAP-supported program took on the 4th Monsoon Forum in Sri Lanka, which was conducted on 4 November 2011. One of the agreements, among stakeholders, during the 4th Monsoon Forum, was for the same to be conducted twice a year, in anticipation of the Southwest and Northeast monsoon seasons and the *Yala* and *Maha* agriculture seasons.

The 5th Monsoon Forum, conducted on 22 May 2012, was attended by a total of 40 participants coming from DOM, Department of Irrigation (DOI), agricultural research institutions, Coast Conservation Department (CCD), Department of Agriculture (DOA), Sri Lanka Navy, Ceylon Electricity Board (CEB), media organizations, Central Environment Authority (CEA), Rubber Research Institute of Sri Lanka (RRISL), Mahaweli Authority of Sri Lanka (MASL), Coconut Research Institute (CRI), Ministry of Health (MOH), Airport and Aviation Services (AAS), National Water Supply and Drainage Board (NWSDB), Horticultural Research and Development Institute (HRDI), National Building and Research Organization (NBRO), Disaster Management Center (DMC), and representatives from pilot sites. The 5th Monsoon Forum was organized to review the Northeast Monsoon and 1st Intermonsoon outlook and performance, present and discuss the Southwest Monsoon outlook, and share experiences and lessons learnt during the 11 April 2012 tsunami warning.

**Opening Program**

Participants were welcomed to the 5th Monsoon Forum by Mr. S.H. Kariyawasam, Director General, DOM. Mr. Kariyawasam thanked the participants for attending the Monsoon Forum. He emphasized that the Monsoon Forum was an important undertaking that promotes collaboration between DOM and forecast user institutions. He continued to explain that it is also geared towards enhancing the understanding, by forecast users, of the products and services provided by DOM, including their limitations and uncertainties, as well as the understanding of DOM of the information needs of the different sectors. He espoused that feedback from user institutions will help DOM tailor its products and services to suit users requirements.

The welcome remarks was followed by the inaugural address by His Excellency Mahinda Amaraweera, Minister of Disaster Management. In his inaugural address, His Excellency Minister Amaraweera espoused the importance of the seasonal forecast for the planting season. He said that the forecast can guide farmers in their decision-making, to take advantage of possible opportunities and/or mitigate possible impacts. He proceeded to thank UNESCAP, WMO and RIMES for supporting the project.


*His Excellency Disaster Management Minister Mahinda Amaraweera delivering the inaugural address during the 5th Monsoon Forum*

Subsequently, a ceremonial turn-over of communication equipment to the programme pilot sites – Pottuvil Division and Kaluta District – was spearheaded by His Excellency Minister Amaraweera.

*Ceremonial turn-over of megaphones to representatives from programme pilot sites - Kalutara District and Pottuvil Division*

The vote of thanks, from DOM, followed.

**Proceedings**

***Overview of the Monsoon Forum***

This session was delivered by RIMES. RIMES presented the programme and highlighted the Monsoon Forum as among its components. The objectives, features, and process of the Forums were discussed. Subsequently, the most common participating institutions to the Forums were cited. The functions of the forum were then presented. These include 1) ensure receipt, interpretation, and communication of climate/risk information; 2) facilitate the integration of climate forecast and other risk information applications into agency operations, practice, development policies, plans and laws; 3) serve as mechanism for soliciting feedback from users on the forecasts/risk information issued by DOM; and 4) serve as a long-term process of understanding risks of different timescales, including long-term climate change. Following that, the Monsoon Forum target outputs were discussed. Examples of forecast provider and user forums, in Asia, were provided.

***Review/verification of the Northeast Monsoon and 1st Intermonsoon outlook and performance***

DOM presented the following analysis of the observed rainfall during the Northeast Monsoon and 1st Inter-Monsoon seasons:

- Above average rainfall was recorded in most stations in Northern and Northeastern parts of the country during the November and December 2011 and January 2012 periods. These were records from 17 principal observation stations
- Observed values at hydro-catchment stations indicate below average rainfall for the November and December 2011 and January 2012 periods
- Most stations in the Southwestern part of the country received above average rainfall from March to April 2012

***Sectoral feedback on the monsoon performance***

*CEB*

CEB discussed the daily demand curve for power, indicating the peak demand at from 6.30 pm to 10.30 pm, the demand pegged at 2050 MW. CEB provided the following statistics: annual energy consumption – 10,800 GWh; full storage capacity – 1,250 GWh; annual average inflow of energy: 3,300 GWh. CEB espoused that to achieve reliable power supply, hydro-thermal share should be properly analyzed. CEB discussed that the Northeast Monsoon feeds reservoirs in Victoria, Randenigala, and Semamalawewa. According to CEB, better prediction of inflows can assist to achieve optimum operation of reservoirs.

*DOI*

The Irrigation Department discussed its functions and presented gauging stations in different locations. It also explained is roles and responsibilities in early warning for floods. According to DOI, Kelani Kalu, Gin and Niwala are the main river basins in the wet zone of Sri Lanka which are prone to frequent flooding. DOI explained that the river stages and rainfall along the said rivers are monitored closely. The presenter cited that when excessive rainfall occur, water level in the above-mentioned rivers are monitored on an hourly basis. In the presentation, DOI mentioned that maximum flood of 5.76 meters occurred on 28 May 2011 in the area covered by Hanwella Gauging Station. Flood hazard maps for different areas were likewise presented to the stakeholders. According to DOI, the most immediate problems that arise because of floods are power failures and disrupted communication network.

*DOA*

The DOA discussed that in Sri Lanka, there is a very high spatial variability of rainfall, and that the country has 46 agro-ecological regions. The presenter mentioned that the average annual rainfall in the dry zone is less than 1,750mm; around 1,750 mm to 2,500 mm in the intermediate zone; and more than 2,500 mm in the wet zone. He explained that the wet zone is mainly for plantation crops while the bottom of valleys usually hosts rainfed paddy. He said that during the *Yala* season, paddy receives water from the Southwest Monsoon and any negative anomaly in rainfall may induce water stress, and positive anomalies would result to floods.

Intermediate zones are for coconut plantations, and paddy which are also located at the bottom of valleys. In the intermediate zone, during the *Yala* season, paddy fields receive water from Southwest Monsoon. In the intermediate zone, even a very small negative anomaly lead to severe water stress.

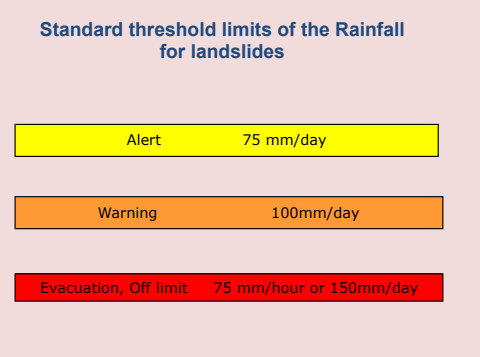
DOA continued that the dry zone is not under the influence of Southwest Monsoon. According further to DOA, in the dry zone, there is high crop water requirements, and frequent soil moisture stress conditions in upland crops. Cloud-free condition favors high photosynthetic assimilation due to high solar radiation. There is an indirect beneficial effect to the dry zone by the trans-basin diversion of the Mahaweli river (about 335 km long), as about 5% of the entire dry zone of Sri Lanka is benefitted.

*NBRO*

NBRO emphasized that landslide vulnerability is spread in several districts in the country. Landslide prone areas account for approximately 20% of Sri Lanka's total land area. Due to land use practices, cut slope failures is increasing in areas in Gampha and Colombo districts. According to NBRO, rainfall has direct and indirect effect to landslides. He also cited developmental projects and other man made activities which triggered landslides in some

areas. He summarized that from November 2010 to February 2011, there were a total of 154 landslide incidents in Nuwra Eliya, Matale, Badulla, Kandy, and Kegalle Districts. On 26-27 May 2011, 75 landslide incidents were recorded, and four (4) people died.

NBRO emphasized that it was able to develop landslide hazard zonation maps for different areas in the country. It also presented its standard rainfall threshold for landslide alert. NBRO subsequently discussed its dissemination process for landslide early warning.




*NBRO's standard rainfall thresholds for landslide warning*

*RRISL*

RRISL explained that the distribution of rubber plantation, in the country, is concentrated on the wet zone, but there is a tendency for the plantations to move into the intermediate zone and other non-traditional rubber growing areas. The presenter espoused that productivity of rubber plantations depend on good management practices in relation to weather pattern/conditions. According to RRISL, any changes in the seasonal pattern may have adverse impacts on the application of recommended agronomic practices. The presenter continued that for rubber, the most important and critical activity is within May and June, which are the planting seasons. She explained that during the harvesting of latex, higher number of rainy days means low tapping days. If high number of rainy days occur during high yielding months, this causes considerable yield loss. In anticipation of the monsoon, rubber planters put rain guards on rubber trees.

*DMC*

DMC discussed its early warning mechanism in the national and local levels, and its collaboration with different technical warning institutions in the country. Subsequently, DMC discussed the activities it conducted to promote preparedness, in communities, in anticipation of the monsoon seasons. These activities include awareness and education programmes, flood mitigation activities, tree planting, and strengthening of local authorities for enhanced preparedness.

*Participants paying attention to the presentation made by DMC*

***Presentation of seasonal outlook for the 2012 Monsoon Season***

DOM presented that the climate of Sri Lanka is essentially monsoonal, dominated by the Southwest and Northeast Monsoons. According to DOM, the Southwest Monsoon account for about 30% of the average annual rainfall, clearly demonstrating the importance of the monsoon in the country.

DOM subsequently explained that the seasonal forecast was prepared based on: a) forecast from different empirical and dynamical climate models; b) probabilistic forecast using the Climate Predictability Tool; and c) various prevailing global climate conditions. DOM then presented the following summary for the likely conditions over Sri Lanka for the Southwest Monsoon Season:

- Prevailing conditions and forecasts from various statistical and dynamical models suggest that rainfall during the 2012 Southwest Monsoon Season (June to September), for Sri Lanka, is likely going to be below normal
- There is uncertainty partly because of the transition of La Nina conditions to neutral El Nino Southern Oscillation (ENSO) conditions, and some possibility for the emergence of El Nino during the later part of the monsoon season, and also the development of negative Indian Ocean Dipole (IOD)
- There is a need for continued monitoring of the regional and global climatic conditions associated with the Southwest Monsoon

Following the presentation of the seasonal outlook, DOM also explained some commonly used terms and concepts used in forecasts.

*Participants listen to DOM explanation on some issues and concerns relative to the 2012 Southwest Monsoon Season*

***Experience and lessons learnt relative to the 11 April 2012 Tsunami Warning***

*DOM*

DOM discussed its experiences on previous tsunami warnings. DOM then continued to explain that a magnitude 8.7 earthquake occurred near the Western Coast of Northern Sumatra on 11 April 2012, and provided the other parameters of the earthquake event. DOM explained that the earthquake happened at 08:30 UTC (Sri Lanka local time 16.13). According to DOM, its first warning was issued at 16:15, its second warning was issued at 16:30, and cancellation of the warning was at 18.15.

DOM discussed that the institution's internet connection has to be improved, as connection was slow. The templates were also lengthy, hence they need to be revised and shortened. As the tsunami warning was issued in the afternoon of 11 April 2012, sufficient DOM officers were present. Some issues though were discussed had the tsunami warning been issued at night. DOM elaborated that because of such experience, they constituted a task force to handle similar events in the future. Cooperation between institutions involved in tsunami early warning was discussed.

*DMC*

DMC explained that 64 out of 74 early warning towers functioned to provide tsunami early warning on 11 April. DMC explained that early warning towers are only one of the systems used in tsunami warning dissemination, hence other warning mechanisms should be put in place. He mentioned other communication systems which are also used in dissemination of warning information like radio, tv, army and navy communication systems. He expressed that per their assessment, around 95% of people living along the coastal areas evacuated during the event.

According further to DMC, the institution is responsible for the dissemination of warning information. The presenter explained that technical knowledge on earthquakes and tsunamis is entrenched with DOM. He explained that DMC was able to receive information from DOM. DMC then made the participants listen to the automated warning used in early warning towers when there are tsunami warnings. DMC espoused that it will do its best in addressing the gaps revealed during 11 April 2012 tsunami warning event.

***Kalutara District***

According to the District Disaster Management Committee (DDMC) Chief of Kalutara District, they were able receive the warning from DMC and disseminate the same to their constituents. He explained that people living in tsunami danger zones were evacuated. He cited the programme's contribution in keeping preparedness in the mind of the key district and community officials.

The presenter explained that though they were able to successfully disseminate the information, there were difficulties encountered during that time. He said that telephone and mobile phone connections failed, and they have to use alternative ways of communicating the information to stakeholders. He also espoused that training curricula, on the proper communication and dissemination of warning information, should be designed.

***Pottuvil Division***

Representatives from Pottuvil Division highlighted the gaps in the receipt of warning information from DMC, on 11 April 2012. They underscored on the failure of some towers to operate, hence not everyone were able to receive warning information. They advocated that communication mechanism, for tsunami warning, should be very robust and efficient to ensure the safety of those living in tsunami high risk areas. DMC assured stakeholders that it will do its best to address the gaps in tsunami warning dissemination.

**Wrap up and closing program**

The synthesis of the 5th Monsoon Forum and way forward was delivered by RIMES. This was followed by the vote of thanks and closing remarks which were rendered by DOM.

**Summary of feedback and recommendations**

- Enhancement of products and services by DOM

  Consensus from the participants' comments and opinions point to recommendations for DOM to enhance the spatial and temporal resolution of its forecasts. Participants highlighted the level of reliability of DOM forecast products, and stressed that in order for the forecast products to be applied, they have to be improved.

  To provide clarification on the uncertainties of forecast products, RIMES explained that uncertainties are always attached to forecasts because of the limitations of science, and the complexity of systems that affect weather/climate. RIMES

elaborated that seasonal forecasts should be supported by shorter-tem forecasts, as shorter-term forecasts have lower uncertainties compared to longer-term forecasts. RIMES emphasized the seamless integration of forecast products. RIMES continued that there are indeed rooms for improvement in terms of the products and services provided by DOM, and that it will work with DOM to address such issues.

DOM elaborated that it continues to do its best to enhance its products and services for the benefit of the stakeholders. DOM also pointed out that comments and suggestions from stakeholders will assist the institution in addressing the gaps.

- Updating and availability of DOM forecast products and services
  Stakeholders indicate that the seasonal forecast was not available in DOM's website. It was recommended by stakeholders that the seasonal outlook should be updated every month, and posted in DOM's website, so that the same can be accessed easily by stakeholders.

- Robust institutional mechanisms for tsunami warning dissemination and reception
  Some institutions, like the Airport and Aviation Services, were not able to receive the tsunami warning from DOM last 11 April 2012. Some tsunami towers, operated by DMC, were not able to function. Consensus from the participants pointed to establishment of robust information dissemination and receipt mechanisms to ensure the receipt of warning by all stakeholders, so that necessary action can be initiated by all concerned.

- Enhanced collaboration among stakeholders
  Collaboration, among stakeholders in tsunami early warning, should be enhanced so that consensual decisions can be derived. For example, DMC, CEB and other stakeholders have to have consensus on when to cut off electrical power in the event of tsunami warning.

- Building of capacity of stakeholders in dissemination of tsunami warning/advisory
  Capacity of stakeholders, especially in the sub-national and local levels, in disseminating warning information should be enhanced. It should be emphasized that multiple mechanisms for receipt and dissemination of warning should be in place, so that even if one (1) mechanism fails, other mechanisms will still allow authorities to receive warning from national institutions, and disseminate the warning/advisories to communities.