



Department of Meteorology
Sri Lanka



Regional Integrated Multi-
Hazard Early Warning System

Activity Report

6th Monsoon Forum

8 November 2012
Colombo, Sri Lanka

The 6th Monsoon Forum was convened by Sri Lanka's Department of Meteorology (DOM) as part of the initiatives undertaken under the programme *"Reducing risks of tsunamis, storm surges, large waves, and other natural hazards in low- elevation coastal zones"* with support from the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) and the Regional Integrated Multi-Hazard Early Warning System (RIMES).

SECTION 1

INTRODUCTION

1.1 Background

Hazards – both hydro-meteorological and geological - are prevalent in Sri Lanka. Though most hazards can be predicted and forecasts are available from various forecast/warning/information providers in the country, gaps in the application of such information in sectoral decision-making abound.

The Monsoon Forum, geared at promoting the application of forecasts/warning information for enhanced management of risks, is a regular interface between the providers of forecast information and stakeholders from various hazard-sensitive sectors in the country, with the end-in-view of enhanced understanding, by forecast user institutions, of forecast products including their limitations and uncertainties, and better appreciation by technical/warning institutions of users' information needs. This facilitates a cycle of constant refinement of forecast products to suit users needs/requirements and development of more robust information sharing system, hence facilitating better application of forecasts/warning information.

Introduced in Sri Lanka in March 2009, the Monsoon Forum offered an opportunity for dialogue between hydro-meteorological scientists who generate climate forecasts and information, and a range of potential users such as agricultural producers, traders, extension agents, disaster risk managers, government planners and development partners. Built on the monsoon, a regular phenomena in the country, the Monsoon Forum has taken a multi-hazard approach by May 2012, integrating issues on monitoring/warning information and other concerns regarding geological hazards like earthquakes and tsunamis.

In Sri Lanka, the 6th Monsoon Forum was organized by DOM, with support from UNESCAP and RIMES, through the programme “*Reducing risks of tsunamis, storm surges, large waves, and other natural hazards in low elevation coastal zones*”.

1.2 Objectives

The 6th Monsoon Forum, convened on 8 November 2012, from 9:00 AM onwards at the Ministry of Disaster Management, Colombo, Sri Lanka, was with the following objectives:

- a) review the 2012 Southwest Monsoon in terms of patterns of climate and performance of the seasonal climate forecasts
- b) draw feedback from user institutions on the relevance/usability of the seasonal forecast for the Monsoon Season and recommendations for enhancement of forecast products
- c) present the seasonal forecast for the dry season
- d) discuss and present sectoral impacts outlook and response options for potential application
- e) present/discuss recent issues/concerns/developments in earthquake monitoring/tsunami early warning and response
- f) draw recommendations from stakeholder-institutions in improving the conduct of subsequent Monsoon Forums

1.2 Agenda

The 6th Monsoon Forum agenda is presented hereunder.

Agenda		
8.30 – 9.00	Arrival and registration of participants	DOM
Session 1: Opening/Inaugural Session		

SECTION 1

INTRODUCTION

9.00-9.05	National Anthem	
9.05-9.10	Lighting of the Oil Lamp	
9.10-9.25	Welcome/Opening Remarks	Mr. S.H. Kariyawasam Director General Department of Meteorology (DOM)
9.20-9.40	Inaugural Address	Hon. Mahinda Amaraweera Minister, Disaster Management
9.40-9.50	Introduction of participants	To be facilitated by DOM
9.50-10.00	Coffee/Tea Break	
Session 2: Overview of the Monsoon Forum Process		
10.00 – 10.20	Monsoon Forum Overview and Recap on the Summary of Discussions during the 5 th Monsoon Forum	RIMES/DOM
Session 3: Verification of the Southwest Monsoon Season		
10.20-10.40	Verification of Seasonal Forecast for the Southwest Monsoon Season	DOM
10.40-11.50	Feedback from User Institutions on: <ol style="list-style-type: none"> 1) Relevance/Usability of Forecast for the Southwest Monsoon Season 2) Experiences, Management Decisions and Lessons Learnt during the Southwest Monsoon Season 	<ul style="list-style-type: none"> • Agriculture • Energy • Plantation • Disaster Management • Pilot site representatives
Session 4: Seasonal Climate Outlook for the Northeast Monsoon Season		
11.50-12.10	Presentation of Seasonal Climate Outlook for the Northeast Monsoon Season	DOM
12.10-12.20	Discussion	
Session 5: Group Discussion: Sectoral Potential Impacts Outlook and Response Options		
12.20-13.00	Working Group Discussion: Development of Potential Impacts Outlook and Response Options	To be facilitated by DOM/RIMES
13.00-14.00	Lunch	
14.00-14.30	Continuation - Working Group Discussion: Development of Potential Impacts Outlook and Response Options	To be facilitated by DOM/RIMES
14.30-15.20	Presentation of Outputs and Discussion	
Session 6: Issues and Concerns on Tsunami Warning and Response		
15.20-15.35	Lessons Learnt from the 11 April 2012 Tsunami Warning and Response: Outcomes from the Post-Warning Survey conducted by DMC	DMC
15.35-15.50	Discussion	
Session 7: Way Forward and Closing Session		
15.50-16.00	Synthesis	RIMES
16.00-16.10	Vote of Thanks and Closing Remarks	DOM
16.20	Coffee/Tea	

1.3 Participants

The 6th Monsoon Forum was attended by a total of 70 participants coming from government institutions, research centers, mass-based organization, and UN/international development organizations. These include:

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Government Institutions

Airport and Aviation Services (AAS)
Ceylon Electricity Board (CEB)
Central Environment Authority (CEA)
Department of Fisheries and Aquatic Resources (DFAR)
Department of Forest (DOF)
Department of Irrigation (DOI)
Department of Meteorology (DOM)
Disaster Management Center (DMC)
Geological Survey and Mines Bureau (GSMB)
Mahaweli Authority of Sri Lanka (MASL)
Ministry of Disaster Management
National Building and Research Organization (NBRO)
Department of Police (DOP)
Road Development Authority (RDA)
Sri Lanka Navy (SLN)
Urban Development Authority (UDA)
National Water Supply and Drainage Board (NWSDB)

Academe/Research Center

Coconut Research Institute (CRI)
Hector Kobbekaduwa Agrarian Research and Training Institute (HARTI)
Rubber Research Institute of Sri Lanka (RRISL)
Sugarcane Research Institute (SRI)
Tea Research Institute (TRI)

Mass-based organization

Sri Lanka Red Cross Society (SLRCS)

Pilot sites

Pottuvil Divisional Secretariat
Disaster Management Center – Ampara District
Disaster Management Center-Kalutara District

UN/ International Development Organizations

Food and Agriculture Organization of the United Nations (FAO)
Japan International Cooperation Agency (JICA)

SECTION 2

OPENING SESSION

2.1 Welcome/Opening Remarks

Participants to the 6th Monsoon Forum were welcomed by Mr. S.H. Kariyawasam, Director General, DOM. In his welcome and opening remarks, Mr. Kariyawasam highlighted the importance of the Monsoon Forum to facilitate better interaction and coordination between DOM and user institutions. He said that the Monsoon Forum process looks into the integration of user needs into DOM's forecast products. He assured the participants that limitations notwithstanding, DOM will endeavor to improve its forecast products to maximize the benefits of the information to user institutions and communities.

2.2 Inaugural Address

Hon. Mahinda Amaraweera, Minister of Disaster Management, delivered the Inaugural Address. At the outset, the Minister recalled his participation in the 5th Monsoon Forum, conducted in May 2012, where DOM released the seasonal forecast indicating the likelihood of below normal rainfall, in the country, during the Southwest Monsoon Season.

The Minister underscored that the very low rainfall during Southwest Monsoon Season resulted to severe drought in many areas in the country, affecting even the drinking water of the affected population. The Minister continued that the water levels in hydro-catchment areas and hydro-power stations went down at a significant rate. He indicated that the agriculture sector was likewise adversely affected.

The Minister espoused that following the drought, Sri Lanka experienced heavy downpour and strong winds due to cyclonic conditions – the most significant being those associated with Cyclone Nilam – resulting to floods and landslides, among others.

According to the Minister, the 6th Monsoon Forum was convened so that participants could evaluate the Southwest Monsoon Season, as well as discuss the forecast for the Northeast Monsoon Season and anticipate the possible conditions in different sectors in the next three (3) months. He opined that the outcome of discussions in the Monsoon Forum would assist DOM in enhancing its services, as well as enhance the capacity of user-institutions in using DOM's products. He said that making Sri Lanka a self-sufficient country and minimizing the sectoral devastations due to adverse climate conditions is a paramount responsibility of the government. He expressed his hope that the Monsoon Forum would be able to contribute to the said goals.

He cited that RIMES have contributed, in a large scale, to promote and create awareness amongst the general public on the products and operations of DOM and DMC. He expressed his gratitude and appreciation to RIMES in undertaking activities that feed into enhanced preparedness, of different sectors in the country, in view of both climate and geological hazards.

2.3 Introduction of Participants

DOM facilitated the introduction of participants.

2.2 Overview of the Monsoon Forum Process

Delivering the presentation, Ms. Ruby Rose Policarpio, Institutional Development Specialist, RIMES, discussed that the Monsoon Forum was introduced in Sri

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Lanka in 2009, as a platform for regular interface between DOM and user institutions targeted at a cyclical process of a) DOM releasing its forecast products; b) obtaining feedback from user institutions on the products' usability/relevance; and c) tailoring the products to better suit user needs.

Ms. Policarpio discussed that since May 2012, the Monsoon Forum in Sri Lanka has taken a multi-hazard approach, integrating issues and concerns on earthquake monitoring and preparedness, and tsunami early warning and response. She explained that the 6th Monsoon Forum is undertaken as part of the program *"Reducing risks of tsunamis, storm surges, large waves, and other natural hazards in low-elevation coastal zones"* supported by UNESCAP.

The objectives of the 6th Monsoon Forum was elaborated by Ms. Policarpio. Target outputs were also presented. These include:

- a) sectoral preparedness plan for the 2012-2013 Northeast Monsoon Season;
- b) short and medium-term recommendations on enhancing inter-agency collaboration for better uptake of forecasts/warning information products for various purposes (e.g. disaster risk reduction, planning, etc.);
- c) recommendations on how to better tailor forecast/warning information products to support decision-making in different sectors.

Subsequently, Ms. Policarpio recapped the proceedings and key discussion points and recommendations during the 5th Monsoon Forum, conducted in May 2012, as follows:

- DOM reviewed the Northeast Monsoon and 1st Inter-Monsoon Seasons
 - Above average rainfall was recorded in 17 principal observations stations in Northern and Northeastern parts of the country from November 2011 to January 2012
 - Observed values at hydro-catchment stations indicate below average rainfall from November 2011 to January 2012
 - Most stations in Southwestern portion of the country received above average rainfall from March to April 2012
- Sectoral feedback on the Northeast and Inter-Monsoon Seasons were provided by:
 - CEB
 - DOI
 - DOA
 - NBRO
 - RRISL
 - DMC
- DOM presented the seasonal outlook for Sri Lanka for the Southwest Monsoon Season
 - Rainfall in Sri Lanka for the 2012 Southwest Monsoon Season is likely going to be below normal
- Experiences and lessons learnt relative to the 11 April 2012 Tsunami Warning were provided by:
 - Department of Meteorology
 - Disaster Management Center
 - Pilot Site representatives
 - Kalutara District
 - Pottuvil Division
- Key discussion points and recommendations:
 - Enhancement of products and services by DOM
 - Spatial and temporal resolutions of forecasts

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- Updating and availability of DOM forecast products and services through various mechanisms to ensure receipt by users
- Robust institutional mechanisms for tsunami warning dissemination and receipt
- Enhancement of collaboration among stakeholders
- Building of stakeholders' capacity in dissemination of and response to forecasts/warning information

It was underscored that based on recommendations from stakeholders during the 5th Monsoon Forum, DOM has introduced some improvements in its seasonal forecast for the Northeast Monsoon Season. In addition, Ms. Policarpio explained that a training on forecast interpretation and translation, involving key sectoral decision makers in pilot areas, was conducted in July 2012 with the lead of DOM and support from other national institutions in the country. Ms. Policarpio espoused that multi-hazard awareness programs were likewise conducted in pilot sites in October 2012. The mentioned activities were all undertaken under the same programme.

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VERIFICATION OF THE SOUTHWEST MONSOON SEASON

3.1 Verification of the Long Range/Seasonal Forecast for the Southwest Monsoon Season

Mr. S.R. Jayasekera, Deputy Director for General and Aviation Weather Forecasting, Disaster Management Activities and Research, and Mr. D.A. Jayasinghearachchi, Meteorologist-In-Charge, National Meteorological Center (NMC), DOM, presented the verification of the seasonal forecast for the Southwest Monsoon Season.

DOM explained that Sri Lanka receives an average of 556mm of rainfall from May to September, ranging between 100mm to 3000mm in different parts of the country, shown in Figure 1.

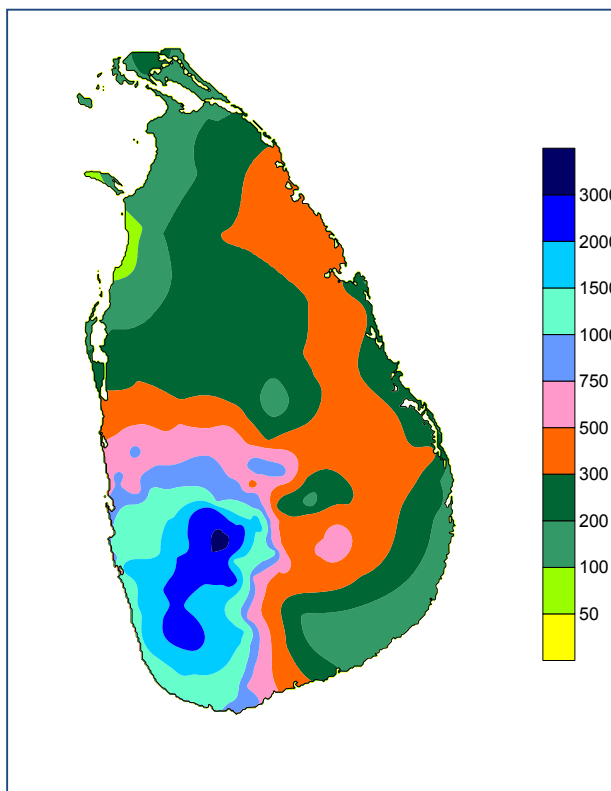


Figure 1. Rainfall distribution in Sri Lanka during the Southwest Monsoon period (DOM)

As forecasted, DOM espoused that most stations recorded below average rainfall from May to September 2012, illustrated in Figures 2 and 3.

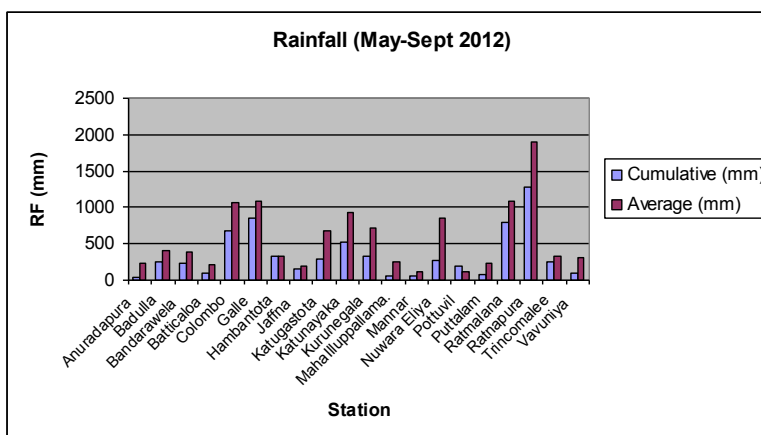


Figure 2. Average rainfall vis-à-vis observed rainfall in different stations in Sri Lanka (DOM, as presented during the 6th Monsoon Forum, 8 November 2012, Colombo, Sri Lanka)

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VERIFICATION OF THE SOUTHWEST MONSOON SEASON

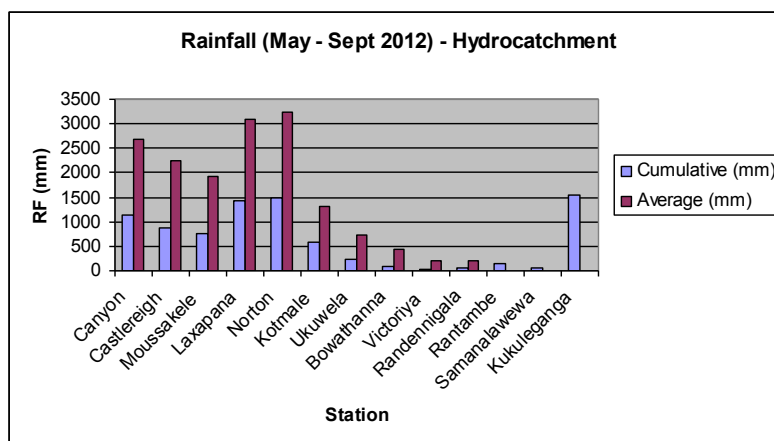


Figure 3. Average rainfall vis-à-vis observed rainfall in different hydro-catchment stations in Sri Lanka (DOM, as presented during the 6th Monsoon Forum, 8 November 2012, Colombo, Sri Lanka)

DOM supplemented that most stations recorded the lowest rainfall, during the season, for the last six (6) years. DOM explained that the very low rainfall, during the Southwest Monsoon Season, could be attributed to the following:

- formation of significantly lesser number of tropical disturbances over the Bay of Bengal
- delayed monsoon onset on 6 June
- Southwest Monsoon was not vigorous but with associated short-duration heavy downpour and winds
- Upper level subsidence

3.2 Feedback from User Institutions on the Relevance/Usability of Seasonal Forecast for the Southwest Monsoon Season and Sharing of Experiences, Management Decisions and Lessons Learnt during the Southwest Monsoon Season

3.2.1 CEB

Mr. Amila Samarakoon, Electrical Engineer, System Control Center, CEB, delivered the presentation. Mr. Amila indicated that in Sri Lanka, the highest demand for power is from around 18.30 to 20.30, the demand peaking at about 2,050MW. This peak demand is attributed to electrical consumption for lighting facilities. He emphasized that per record of CEB, higher temperatures is likely to influence higher power demand, as indicated in Figure 4. On the other hand, rainfall is likely to signal lesser energy consumption as in Figure 5.

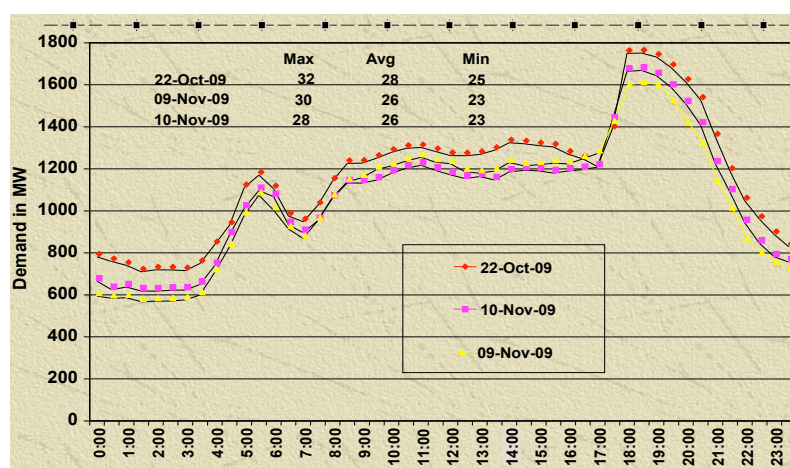


Figure 4. Influence of temperature on power demand: higher temperature entails higher energy consumption (CEB, as presented during the 6th Monsoon Forum, 8 November 2012, Colombo, Sri Lanka)

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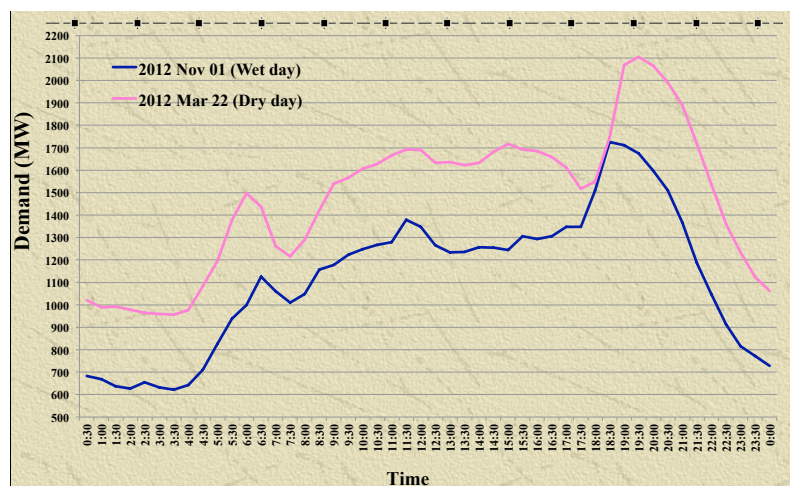


Figure 5. Influence of rainfall on power demand: rainfall is likely to indicate lower energy consumption (CEB, as presented during the 6th Monsoon Forum, 8 November 2012, Colombo, Sri Lanka)

Mr. Samarakoon subsequently explained that annual energy consumption in the country is about 12,000 GWh and that power which could not be supplied by hydro-power plants are supplied by thermal power plants.

According to Mr. Samarakoon, better climate predictions would assist CEB in planning and achieving optimum operation of reservoirs. He indicated that rainfall from the Northeast Monsoon feeds reservoirs in Kothmale, Victoria, Randenigala and Samanalawewa while rainfall from the Southwest Monsoon feeds reservoirs in Castlereigh, Maossakelle, Kothmale and Samanalawewa.

CEB presented Figure 6, registering 2012 (in red) as among the lowest in total storage (in GWh) in the country, from 2006 to 2012.

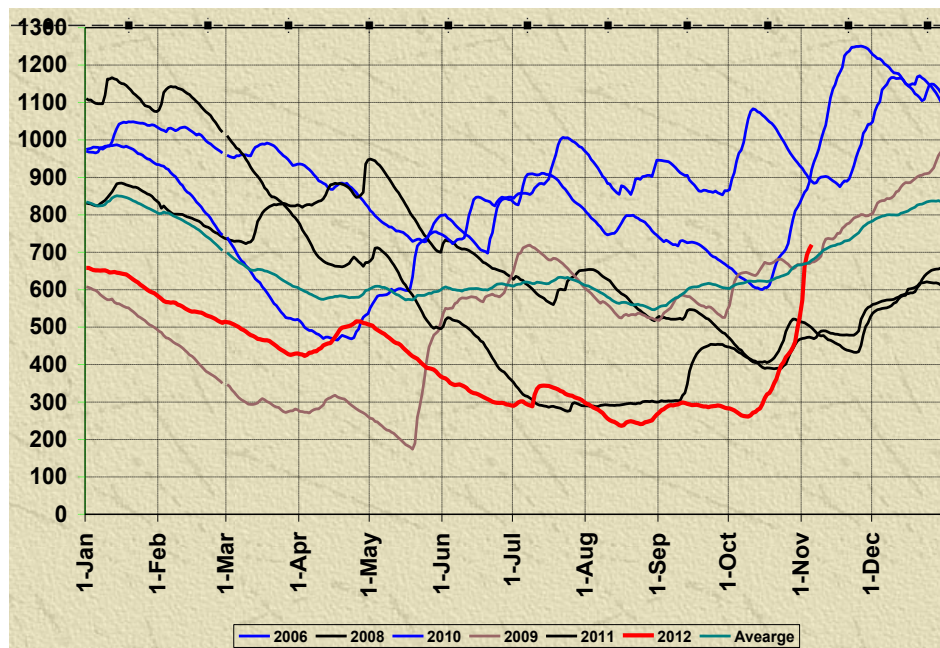


Figure 6. Storage variations (in GWh) from 2006 to 2012 (CEB, as presented during the 6th Monsoon Forum, 8 November 2012, Colombo, Sri Lanka)

As a consequence to deficient rainfall during the Southwest Monsoon Season, Mr. Samarakoon explained that CEB has to implement power cuts. He continued that

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water during the Southwest Monsoon Season was so deficient that even supply for drinking water was insufficient. He expressed that if the 2012-2013 Northeast Monsoon will generate below normal rainfall, the CEB will face very serious problems.

3.2.2 RRISL

Ms. Wasana Wijesuriya, Principal Research Officer, elaborated RRISL's roles in carrying out research and development work and dissemination of outputs to relevant sectors through extension network in order to increase the productivity and income from the rubber industry. She explained that RRISL engages in two (2) major areas of research and development, viz: a) rubber agronomy; and b) technology. She emphasized that many of RRISL's undertakings are closely linked to climate.

She elaborated the rubber plantation in Sri Lanka is concentrated in the wet zone, but expansion to the intermediate zone and other non-traditional rubber growing areas has been undertaken. According to her, the productivity of rubber depends on good management practices and climate. She espoused that for rubber plantation, the most important and climate-critical period is the planting season: May and June in the wet zone and mid-October to November in the Intermediate zone, as shown in Figures 7 and 8.

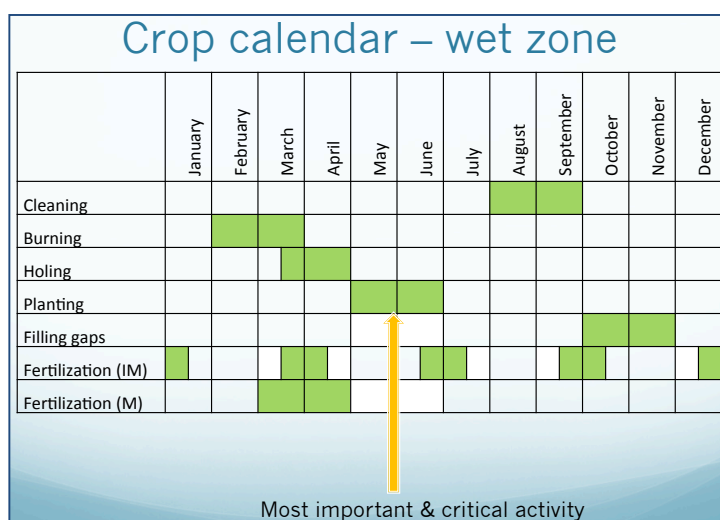


Figure 7. In the wet zone, the most important and climate-critical months for rubber plantation sector are May and June, the planting period (RRISL, presented during the 6th Monsoon Forum, 8 November 2012, Colombo, Sri Lanka)

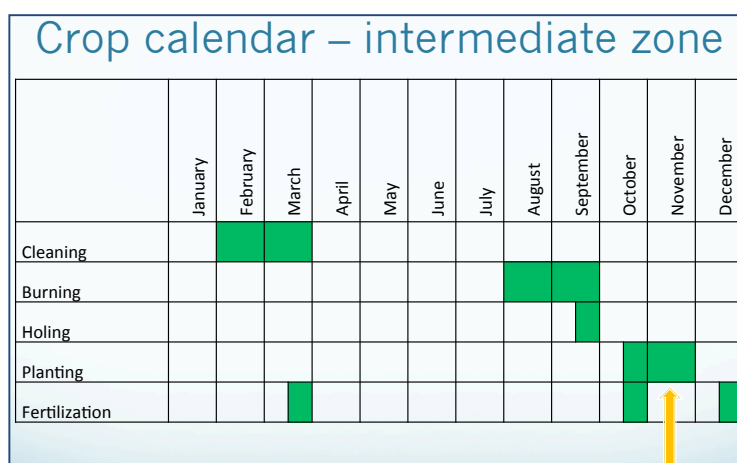


Figure 8. In the intermediate zone, planting period is from mid-October to November and is also regarded as a critical period (RRISL, presented during the 6th Monsoon Forum, 8 November 2012, Colombo, Sri Lanka)

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Ms. Wijesuriya then discussed that she was able to access DOM's forecast for the Southwest Monsoon Season, as she was one of the participants during the 5th Monsoon Forum. She explained that in earlier monsoon seasons, she was able to obtain DOM's seasonal forecast through contacts. She espoused that the forecast was easily understood on her part.

She indicated that while the forecast for the Southwest Monsoon Season was correct and easily understood, the RRISL was not able to use the same as the 5th Monsoon Forum was conducted only in 22 May, and hence, the information was late. She explained that rubber smallholder sectors received planting materials from the Rubber Development Department in April 2012. According to her, some rubber planters waited for the onset of rain to plant the rubber seedlings but many planted them immediately after the seedlings were received. She said that the 20-day dry spell in May 2012 caused the wilting, and eventually dying, of rubber seedlings. She elaborated that during that period, alternative measures on soil and moisture conservation were not adopted.

She put forward that as planting of rubber seedlings, in wet season, coincides with the Southwest Monsoon and rainfall being very important in the planting stage, the seasonal forecast for the Southwest Monsoon Season be released earlier (mid- to late-April) so that awareness activities can be introduced by the RRISL prior to the planting season. According to her, appropriate measures for soil and moisture conservation/utilization can be enhanced if the seasonal forecast can be received in advance.

She explained that while institutional management decisions were not implemented prior to the season, rubber planters who later requested for assistance were made aware of appropriate recommendations on soil and moisture conservation during the period, based on the below-normal rainfall forecast of DOM for the Southwest Monsoon Season.

She emphasized that planting dates are difficult to change in many sectors except in the estate sector and that proper care and maintenance during the immature phase assures shorter immature period of rubber with minimum casualties.

In closing, she recommended the following:

- Convene the Forum, in preparation for the Southwest Monsoon Season, in mid- to late-April
- Provide forecast updates to stakeholders via email and SMS
- Ensure receipt of forecast by extension personnel in the plantation sector
- DOM, in collaboration with RRISL, to visit rubber planters to explain about forecast products

3.2.3 DOA

Feedback from DOA was rendered by Mr. BVR Punyawardena, Head, Climatology Division.

In the outset, Mr. Punyawardena explained that agriculture contributes to about 11% of Sri Lanka's GDP and supports around 30% of the country's labor force. According to him, Sri Lanka is self-sufficient in terms of production of staple food. Rice plantation, in the country, extends to about 800,000 hectares. He explained that the performance of the agriculture sector depends on the prevailing climate/weather conditions.

According to Mr. Punyawardena, agriculture in Sri Lanka is supported by 80 major dams, the majority of which being in the North-Central Provinces; 11,250 small dams with highest density in North-Western Provinces; and about 12,353 anicuts.

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Though many areas are irrigated, he explained that rainfed agriculture also is practiced in the country, especially for cereals other than rice and for pulses.

He explained that crop production is a function of soil, climate and management (e.g. plant varieties, agronomic practices, fertilizer). He underscored that while soil and management can be manipulated, the same is not possible for climate. Weather changes, according to him, affects crop yield – both in quantity and quality.

He highlighted the following information – and elaborated on their uses – as essential in curbing the damages in the agriculture sector:

- Onset of seasonal rainfall
 - Planning for land preparation (e.g. decision on water consumption for land preparation)
 - Schedule of activities with available machinery and labor
 - Decision on the type of crop and variety
 - Preparation of seeds and other inputs
 - Decision on the extent of areas to be planted
 - Planning for alternative strategies (e.g. Bethma system¹)
- Mid-season dry spells
 - Conservation of water prior to the dry spell
 - Application of mulches
 - Planning of alternative irrigation methods
 - Lift irrigation
- Mid-season above-normal rainfall conditions
 - Provision of extra drainage facilities
 - Refraining from applying agro-chemicals and fertilizers (reduction of production cost)
- Withdrawal of seasonal rainfall
 - Planning of harvest with available machinery and labor
 - Preparation of storing and protective materials
 - Provision of extra care for seed production
- Above normal ambient temperature
 - Conservation of water in advance (nullifying the effect with more water)
 - Application of mulches
 - Planning of alternative irrigation methods

Mr. Punyawardena said that over-all good weather conditions throughout the season is likely to result to high yield which will positively impact on the national economy.

He continued to explain that he was aware of DOM's forecast for the Southwest Monsoon Season and the information was easily understood.

He expressed that DOM's forecast would be really valuable if:

- it is provided with at least two (2) months lead time
- it is area-specific (at least region-wise)

¹ A traditional practice, in Sri Lanka, during drought periods. Under the bethma system, lands around the reservoir areas are redistributed to farmers, as water is insufficient to cultivate the entire agriculture area in the community.

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According to him, in Sri Lanka, agriculture is the biggest stakeholder of climate information. Less focus, however, has been provided to the sector. He indicated that over-all, Sri Lanka is expecting a production loss of about 23% due to insufficient rainfall during the Southwest Monsoon Season as shown in Figure 9.

District	Expected Production Loss - %
Kurunegala	50%
Puttlam	58%
Monaragala	28%
Mannar	55%
Anuradhapura	21%
Polonnaruwa	22%
Trincomallee	23%
Batticaloa	22%
Ampara	20%
System H	78%
Sri Lanka	23%

Figure 9. Projected production loss (paddy) due to insufficient rainfall during the Southwest Monsoon Season (DOA, presented during the 6th Monsoon Forum, 8 November 2012, Colombo, Sri Lanka)

Mr. Punyawardena said that in case of minimal rainfall during the Northeast Monsoon Season, the rice available for the country's consumption would only last until January 2013.

To strengthen the agriculture sector, he recommended the following:

- An Agro-meteorological Advisory Service (AAS) should be established through the collaboration of DOM and DOA. Based on forecast information issued by DOM, DOA would provide value addition by providing information “digestible” to farmers. He espoused that this would also enhance the credibility of forecasts. Information, then, could be disseminated through farm broadcasting services. The AAS Cell should be established, composed of a team of scientists and extension agronomists, within the DOA. The AAS should be directly linked to the National Meteorological Center (NMC) of DOM. The AAS process is outlines, as follows:
 - Short and medium-range forecasts issued by the NMC should be directly provided to AAS. This information should be area-specific.
 - Preparation of value-added agro-advisories by the AAS Cell
 - Dissemination of agro-advisories to farmers through a) farm broadcasting service; b) online agricultural extension service; c) cyber extension service; d) printed and electronic media; e) sms alert system

He subsequently discussed the increased rainfall variability within the seasons. He further espoused that long-term rainfall trend in the country, is by far, not established – it is neither increasing nor decreasing.

He elaborated that as of that moment, 12,000 water tanks (reservoirs) are not operational, thus efforts to operationalize these should be in place in order for the DOA to harness conserved water during dry periods.

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3.2.4 DMC

DMC's feedback was delivered by Mr. Pradeep Kodippili, Assistant Director, Early Warning Division.

In his presentation, Mr. Kodippili discussed that DMC was established in 2005, following the 2004 Indian Ocean Tsunami. According to him, DMC is under the National Council for Disaster Management chaired by the President. He discussed the disaster management structure in the country, from the national to community levels, as follows:

- National Disaster Management Coordinating Committee
- Emergency Response Committee
- District Disaster Management Committees
- Division Disaster Management Committees
- Community Disaster Management Committees
- Sub-Committees at Grama Niladhari (GN)² Levels

Mr. Kodippili highlighted that Sri Lanka is prone to climate hazards, per its 34-year (1974-2008) data on hazards/disasters occurring in the country. This is indicated in Figure 10.

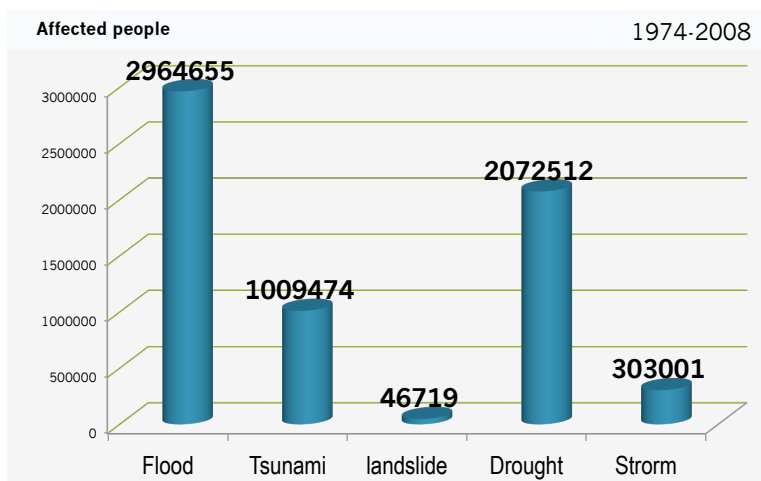


Figure 10. Floods and droughts register highest impact, in terms of number of people affected, among the natural hazards occurring in Sri Lanka from 1974-2008 (DMC, as presented during the 6th Monsoon Forum, 8 November 2012, Colombo, Sri Lanka)

According to Mr. Kodippili, DMC was aware of DOM's forecast for the 2012 Southwest Monsoon Season, DMC being represented during the 5th Monsoon Forum. He espoused that the forecast was easily understood by DMC.

Based on DOM's seasonal forecast, Mr. Kodippili said that DMC conducted mitigation initiatives and awareness programs for the 2012 Southwest Monsoon Season. Monitoring of ground water availability and coordination with relevant stakeholders for response was likewise undertaken.

DMC, per presentation of Mr. Kodippili, allocated around Rupees 10 Million (approximately USD 78,125) for emergency water supply for the affected population. Water tanks were located in areas where drought was confirmed.

² GNs are the smallest administrative units in Sri Lanka.

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Figure 11 indicates the total number of DMC-recorded drought-affected population during the Southwest Monsoon Season.

	District	Affected Population
1	Kurunegala	286,556
2	Pollonnaruwa	143,870
3	Batticaloa	119,595
4	Vavuniya	104,961
5	Trincomalee	94,983
6	Anuradhapura	93,705
7	Kandy	67,439
8	Ampara	64,357
9	Puttalam	54,200
10	Killinochchi	48,801
11	Monaragala	48,486
12	Hambantota	47,244
13	Matale	35,699
14	Mannar	31,918
15	Jaffna	29,556
16	Mullaitive	23,210
17	Badulla	18,038
18	Rathnapura	16,597
19	Nuwaraeliya	9,690
	Grand Total	1,338,905

Figure 11. Drought-affected population during the Southwest Monsoon Season (reported by DMC during the 6th Monsoon Forum, 8 November 2012, Colombo, Sri Lanka)

Mr. Kodippili mentioned that DMC also recorded numerous forest fire incidents due to the dry and hot climate condition during the period.

SECTION 4

SEASONAL CLIMATE OUTLOOK FOR THE NORTHEAST MONSOON SEASON

4.1 Presentation of the Seasonal Climate Outlook for the Northeast Monsoon Season

The seasonal outlook for the Northeast Monsoon season was presented by Ms. Shiromani Jayawardena, Meteorologist, DOM.

At the outset, Ms. Jayawardena explained that the outlook was based on the following:

- forecasts from different empirical and dynamical climate models
- probabilistic forecast generated by the Climate Predictability Tool (CPT)
- various prevailing global climate conditions

She elaborated that outlook for November 2012 to January 2013 were generated by various regional/global climate centers using different models:

- World Meteorological Organization's designated Global Producing Center's Long Range Forecast and Multi-Model Ensemble Forecast
- CFS model by the National Center for Environmental Prediction (NCEP), USA
- EUROSIP model by the Meteo-France (France)
- ECMWF
- UK Meteorological Office
- JMA

Ms. Jayawardena then elaborated on the different models and the outlooks generated by the centers from November 2012 to January 2013.

Based on the analysis of various available model outputs, probabilistic forecast generated by the CPT, and prevailing global and regional climate conditions, DOM indicated that rainfall, from November 2012 to January 2013, is likely going to be normal in the different parts of the country, as indicated in Figure 12. DOM elaborated that in case of deviation, rainfall is likely going to be above normal for the mentioned period and that chances for below normal rainfall, within the period, is very slim.

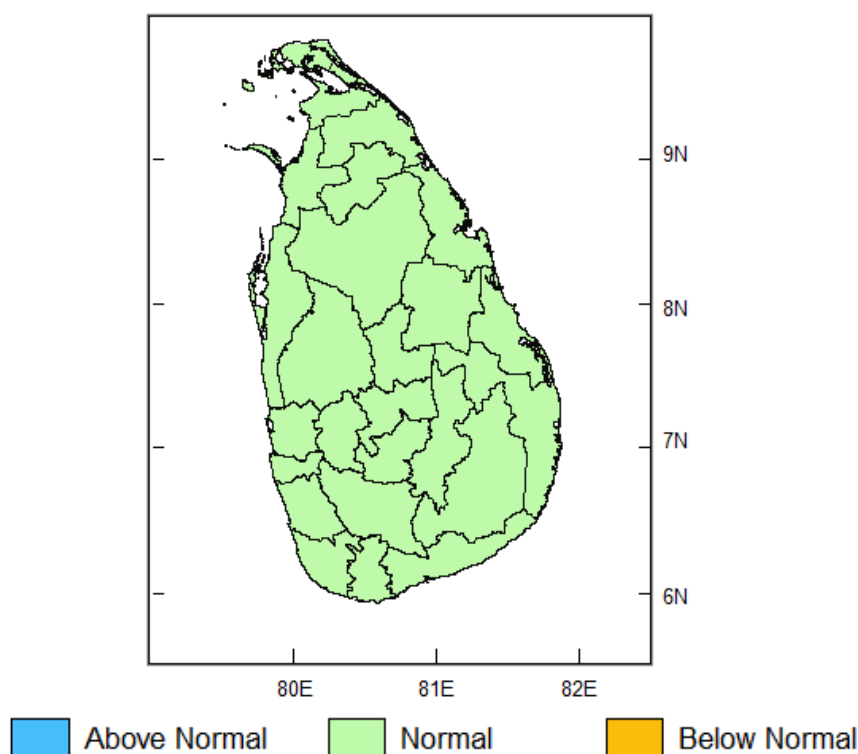


Figure 12. DOM's Seasonal outlook, for November 2012 to January 2013, shows that normal rainfall is likely in all areas in the country.

SECTION 4

SEASONAL CLIMATE OUTLOOK FOR THE NORTHEAST MONSOON SEASON

Figure 12 also shows that in response to recommendations of stakeholder institutions from previous Monsoon Forums, DOM has generated seasonal forecast for the different districts in the country.

Ms. Jayawardena further discussed rainfall drivers in Sri Lanka: El Nino Southern Oscillation (ENSO) and Indian Ocean Dipole (IOD). She proceeded to explain that majority of the dynamical models indicate ENSO- and IOD-neutral conditions for November 2012 to January 2013, hence probability for normal to above normal rainfall is high.

4.2 Discussion

Discussion, following the presentation of the seasonal outlook for November 2012 to January 2013, was anchored on the following key points:

- **Enhancement of the forecast localization**

Seasonal forecast, released by DOM for the 2012 Southwest Monsoon Season, was appreciated by the participants. The seasonal forecast for the Northeast Monsoon Season was also appreciated, with the participants noting improvement in forecast resolution, the latter indicating district-wise information. It was further suggested that the forecast resolution be adapted to agro-climatic zones.

- **Provision of updated seasonal forecast to stakeholders**

DOM and stakeholder institutions agreed that in case of shifts in the seasonal trend in the region, updates should be sent to stakeholder-institutions by email and other mechanisms. DOM was also encouraged to provide forecast updates for subsequent months.

DOM is also looking into publishing the seasonal forecast in its website.

- **Comments on the Monsoon Forum Process**

Participants indicated that the Monsoon Forum is a very good platform for exchanging ideas between climate-relevant sectors and DOM. It is very useful as during the Forum, DOM provides information which is very useful to stakeholders. Participants also appreciated DOM in providing forecast with lead time of up to (two) 2 months.

A unanimous recommendation from the stakeholders, to hold the Monsoon Forum for the next Northeast Monsoon Season by mid or late October was put forward. Convening the Monsoon Forum on an earlier time would be very useful for the agriculture, plantation and other sectors. The CEB indicated that if the next Forum for the Northeast Monsoon Forum could be held in mid- or late October, the seasonal forecast can be fed into the panel meeting of decision makers of the institution, conducted to project water inflows to reservoirs and estimate power generation outputs.

SECTION 5

POTENTIAL IMPACTS OUTLOOK AND RESPONSE OPTIONS

5.1 Group Discussion: Development of Potential Impacts Outlook and Response Options

The participants, tasked to deliberate and project potential impacts and responses in their sectors for the season, were divided into two (2) groups:

- Agriculture, Plantation, Water Resources, Irrigation and Energy
- Disaster Risk Management

The groups' discussion was anchored on the following questions:

- What would be the likely impacts on your sector from November 2012 to January 2013 based on DOM's seasonal forecast?
- What can be done to address/mitigate the possible impacts?
- What can be done to take advantage of the potential climate from November 2012 to January 2013

5.2 Presentation of Potential Impacts Outlook and Response Options

Outputs, from group discussions, are presented below.

5.2.1 Agriculture, Plantation, Water Resources, Irrigation and Energy

Potential Impacts	Response Options
Agriculture and Plantation	
<ul style="list-style-type: none"> ○ Land preparation for paddy can be done in November ○ Cultivation can start in December ○ Harvesting can be carried out in February ○ No significant impact in inland fisheries sector (breeding and harvest) ○ No significant impact on the sugarcane plantation sector ○ Withdrawal of the Northeast Monsoon Season is critical for the agriculture and plantation sectors 	<ul style="list-style-type: none"> ○ Disseminate information to officers ○ Farmers should optimize use of available rainfall ○ Control the sluice during land preparation ○ Reduce the land preparation period to two (2) to three (3) weeks to take advantage of available rainfall for the season ○ Use short-term paddy varieties (3 to 3.5 months) to ensure water availability during the paddy growing period ○ Surplus water, if available, can be stored in preparation for the next season and for other purposes ○ Extra care for tea planting should be undertaken ○ Those engaged in inland fisheries should take advantage of the possible normal rainfall to maximize productivity ○ Normal sugarcane cultivation practices/procedures can be undertaken ○ Monitoring forecast updates from DOM
Water Resources and Irrigation	
<ul style="list-style-type: none"> ○ Reservoirs can be supplied with water after lengthy period of deficient rainfall 	<ul style="list-style-type: none"> ○ Conserve water to be used for the next season ○ Ensure safety of dams and other related infrastructures
Energy	
<ul style="list-style-type: none"> ○ Good water inflow to hydro-power generating reservoirs/catchment ponds 	<ul style="list-style-type: none"> ○ Increase hydro-power generation and reduce generation of thermal power ○ Since hydro-power generation is likely going to be high, the subsequent months can be utilized for maintenance work of thermal power plants

5.2.2 Disaster Risk Management

Potential Impacts	Response Options
Disaster Risk Management	
<ul style="list-style-type: none"> ○ Flood in urban areas and other flood-prone areas during heavy rain ○ Landslide, cutting failure ○ Epidemics ○ Effect to livelihoods ○ Road blocks due to structure failure/falling of trees in some areas 	<ul style="list-style-type: none"> ○ Local governments to do awareness activities to the general public ○ Review of preparedness, evacuation and response plans ○ Strengthening of infrastructures like small dams/tanks in different areas ○ Cleaning of canals, drainage systems

SECTION 5

POTENTIAL IMPACTS OUTLOOK AND RESPONSE OPTIONS

- Lightning occurrences
- Dam/tank structural failure
- Availability of rainwater for conservation
- Minimized energy consumption due to AC and fan usage reduction
- Minimized dust accumulation
- Enhancement of capacities of response teams in flood- and landslide-prone areas
- Enhancement of facilities in evacuation areas in flood- and landslide-prone areas
- Preparedness of medical teams for health and sanitation issues
- Allocation of funds to District Secretaries and other local governments for preparedness and response activities vis-à-vis floods and landslides

SECTION 6

ISSUES AND CONCERNS ON EARTHQUAKE MONITORING AND PREPAREDNESS AND TSUNAMI WARNING AND RESPONSE

6.1 Lessons Learnt from the 11 April 2012 Tsunami Warning and Response: Outcomes from the Post-Warning Survey Conducted by DMC

Mr. J.M.A.R Jayarathne, Acting Director, Emergency Operations Center, DMC, discussed the outcomes of the survey conducted by DMC in the wake of the 11 April 2012 tsunami warning. According to Mr. Jayarathne, the survey looked into the responses of the constituents in different coastal areas in the country in order to develop more efficient and effective evacuation mechanisms in view of possible subsequent tsunami warnings. He explained that the survey involved 300 respondents from three (3) districts, six (6) divisions and 15 GNs.

The survey revealed that of the 300 survey respondents, 70 did not evacuate upon the receipt of evacuation order accompanying the tsunami warning. Of the 70 respondents who did not evacuate, 31% expressed that their reason for not evacuating was because the tsunami warning indicated for the population to wait for the next information; another 31% believed that tsunami would not come; 14% said that they were worried about their household possessions; 3% conveyed that they did not know where to evacuate; 7% espoused that they did not know what to do; 9% said that their houses were located in hilly areas hence, they were safe; and according to 4%, they were not able to evacuate because there was no transportation mechanism that can be used for evacuation.

Referring to the first 31%, DMC discussed that some people have misunderstood the contents of the tsunami warning, as evacuation was ordered during that time. Analysis, by DMC of the survey result, attributed the assumption – that tsunami would not occur – of the next 31% of those who did not evacuate to what is called “normalcy bias” or the tendency of people to underestimate the possibility of occurrence and impacts of a hazard/disaster.

Recommendations, drawn from the survey, include the following:

- Ensure information transfer in the case of tsunami warning and evacuation, from DMC to the coastal community levels, within 45 minutes from earthquake occurrence
- Build capacities of concerned institutions in transferring/communicating information to ensure integrity of the warning information
- Encourage people in coastal areas to participate in tsunami drills so that they are properly informed of evacuation routes and areas
- Dissemination of hazard maps and capacity building on the conduct of tsunami drills
- Conduct of tsunami drills during the night
- Awareness activities on the necessity and importance of people’s participation in tsunami drills and the importance of early warning messages from DMC to communities

6.2 Early Warning and Disaster Risk Management in Pottuvil Division, Ampara District

This was delivered by Mr. A.M. Thameem, Assistant Director for Planning, Divisional Secretariat, Pottuvil Division, Ampara District.

According to Mr. Thameem, awareness of hazards – especially those with short lead-time like tsunami – among the officials and constituents of Pottuvil has significantly improved after RIMES, in collaboration with DMC, DOM, GSMB and other national institutions, conducted a series of activities under the programme “Reducing risks of tsunamis, storm surges, large waves, and other natural hazards in low-elevation coastal zones”.

Mr. Thameem indicated that most of the constituents in Pottuvil responded well to the 11 April 2012 tsunami warning

SECTION 7

RECOMMENDATIONS AND AGREEMENTS

7.1 Synthesis of Recommendations and Agreements

Recommendations and agreements, synthesized from discussions during the different sessions in the 6th Monsoon Forum, are presented in this section.

- **Enhanced spatial and temporal resolution of forecasts**
The seasonal forecast for the Northeast Monsoon Season, indicated by DOM district-wise, was appreciated by the stakeholders. It was recommended though to adapt the agro-climatic zones in localizing forecasts.
- **Provision of seasonal forecast updates to stakeholders**
DOM and stakeholder institutions agreed that in case of changes in the climate trends for the season in the region, updates should be sent the institutions by email, SMS and other mechanisms. DOM was also encouraged to provide forecast updates for subsequent months.

Updates and/or forecasts for the subsequent season could include the following information, among others, to maximize usefulness:

- onset of seasonal rainfall
- mid-season dry spell
- mid-season above normal rainfall
- withdrawal of seasonal rainfall
- above-normal ambient temperature

DOM is also looking into publishing the seasonal forecast into its website.

- **Enhanced delivery of forecast products**
A mechanism to ensure receipt of forecasts by extension personnel in the plantation and other sectors should be put in place.
- **Enhanced awareness and uptake of forecast information**
It was suggested that DOM, in collaboration with RRISL, visit rubber planters to explain about forecast products.

DOA recommended that an Agro-meteorological Advisory Service (AAS) should be established through the collaboration of DOM and DOA. Agricultural advisories, in farmers' language, could be generated and disseminated by DOA based on forecasts issued by DOM.

The AAS Cell should be established, composed of a team of scientists and extension agronomists, within DOA. The AAS should be directly linked to NMC of the DOM.

The process of forecast receipt, and development and dissemination of agro-advisories by DOA is detailed below:

- Short and medium-range forecasts issued by the NMC should be directly provided to AAS; forecasts should be area-specific.
 - Preparation of agricultural advisories by the AAS Cell
 - Dissemination of agro-advisories to farmers through a) farm broadcasting service; b) online agricultural extension service; c) cyber extension service; d) printed and electronic media; e) SMS alert system
- **Enhanced conduct of the Monsoon Forum**
While highly appreciated as very useful to stakeholder sectors, it was recommended that the subsequent monsoon forums be conducted in:

SECTION 7

RECOMMENDATIONS AND AGREEMENTS

- mid- to late-April in anticipation of the Southwest Monsoon Season
- mid-to late October in anticipation of the Northeast Monsoon Season

- **Enhanced awareness on disaster risk reduction/management**

It was recommended that disaster risk reduction/management should be introduced as part of the school curriculum, so that awareness transcends all levels and sectors in communities.

- **Enhanced understanding of people's responses to tsunami warning information**

Stakeholders recommended that more surveys assessing people's responses to tsunami warning should be conducted in order to obtain a representative population of the country's coastal community residents. Responses, or the differences thereof, among men and women should also be assessed.

SECTION 8

WAY FORWARD AND CLOSING SESSION

8.1 Synthesis of Discussions

Ms. Ruby Rose Policarpio highlighted the key points discussed and the agreements between DOM and stakeholder-institutions during the 6th Monsoon Forum. She then indicated that RIMES will continue to work with DOM and other partner institutions in responding to the information needs of hazard-sensitive sectors as well as in building capacities of institutions and communities in end-to-end warning.

8.2 Vote of Thanks and Closing Remarks

Mr. S. H. Kariyawasam conveyed his thanks to the Ministry of Disaster Management for the support extended to DOM; the participants for their valuable presence and enriching inputs in the discussions as well as in providing recommendations to enhance DOM's forecast products and the conduct of subsequent Monsoon Forums; and RIMES for the assistance provided to DOM in convening the Monsoon Forum and other undertakings.

He continued that DOM will do its best to cater to the needs of the different information user sectors in the country. He expressed that the 6th Monsoon Forum has been very successful and expressed his hope for equally successful Monsoon Forums in the future.