

***Generation and Dissemination of Agro-  
Advisories that are based on Multi-  
Timescale Forecast: Myanmar Experience***

***Dr. Kyaw Moe Oo***

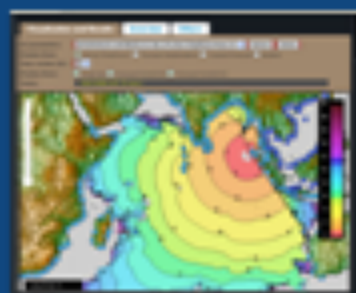
***Acting director General***

***Department of Meteorology and Hydrology***

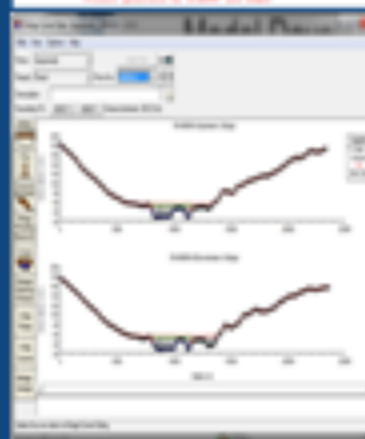
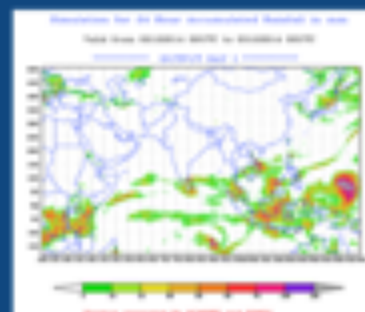


## Earthquake and tsunami services

### Improving data availability



### Weather, climate and hydrological services



### Capacity building



# SESAME: Evolution

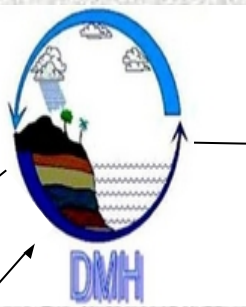
## Monsoon Forum



demand

demand

demand



# SESAME



Empowered Lives  
Resilient Nations

Tool development & further expansion

Customization to select areas

Mobile app

NyaungOo  
Monywa

# Objectives

❖ RIMES shall assist DMH and the Ministry of Agriculture and Irrigation (MOAI) in implementing key recommendations of the 9<sup>th</sup> Monsoon Forum in Nay Pyi Taw in October 2012, in particular the development of tools to support users of weather and climate information:

❖ An updated agro-ecological zone map for Myanmar, crop-weather calendars that take into consideration the climate pattern in the past decades,

❖ Agro-meteorological bulletin that integrates crop development stage,

❖ Expert system for translating weather and climate information into potential impacts and management options,

❖ Pilot Climate Risk Management Field Schools to introduce farmers to the use of science-based information in decision-making.

❖ Upgrade of the country's agro-meteorological network shall support these initiatives.



## **Beneficiaries**

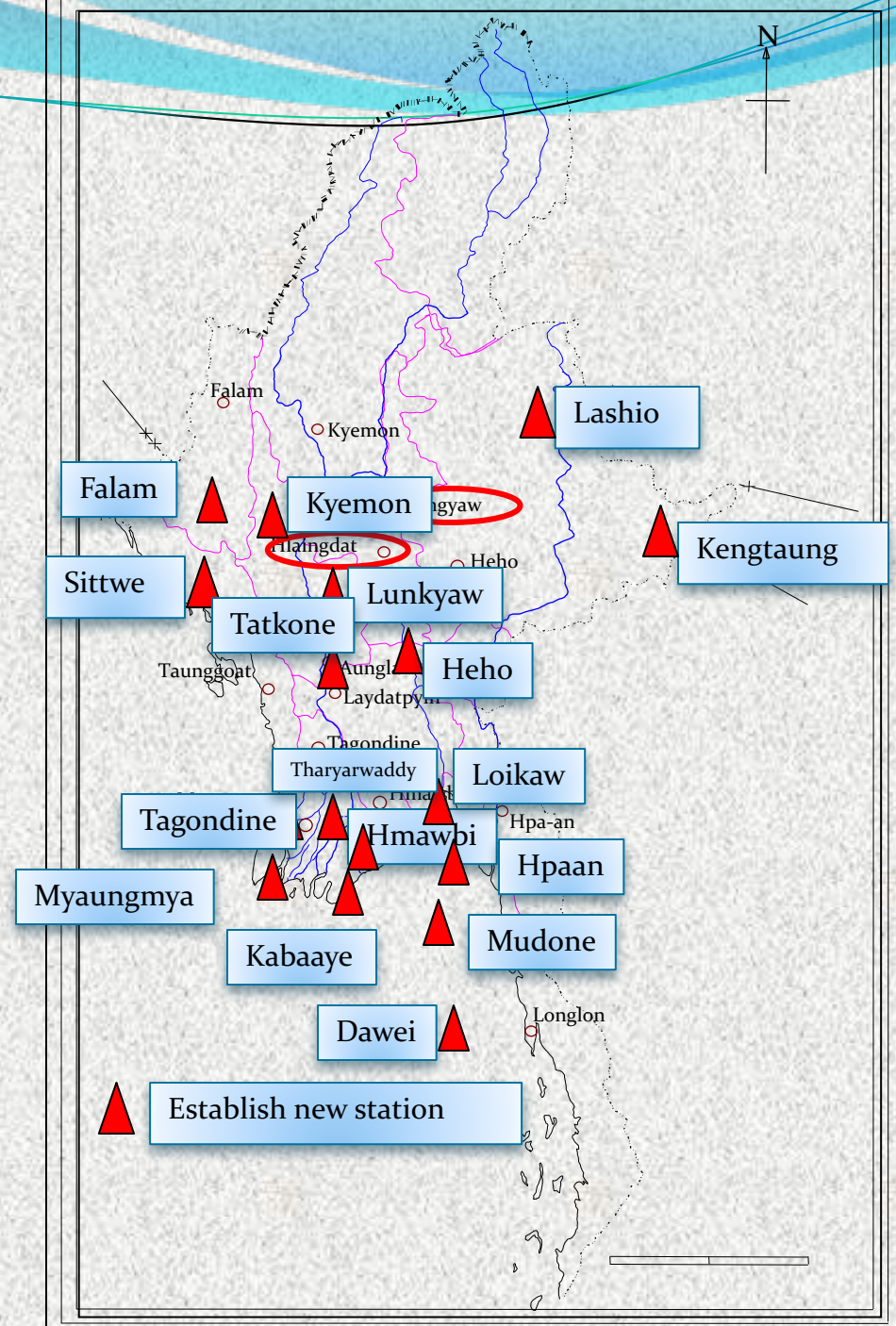
- o Department of Meteorology and Hydrology
- o Ministry of Agriculture and Irrigation
- o Relief and Resettlement Department
- o General Administration Department
- o Farming communities at the pilot sites and other areas

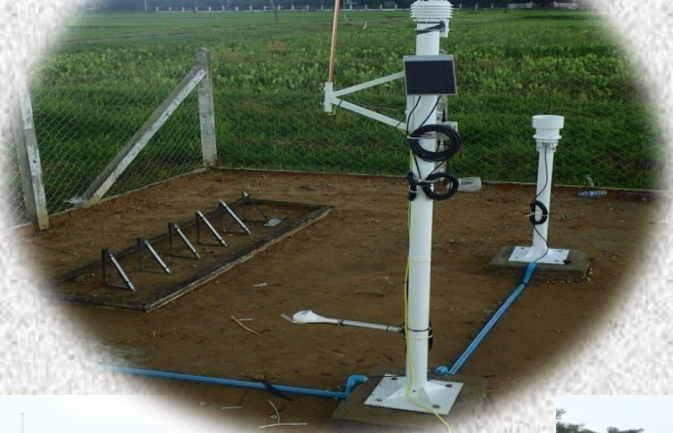
## **Progress points**

- *Availability of geospatial database for multi-hazard risk assessments*
- *Updated agro-ecological zone map for the country*
- *At least 6 updated crop-weather calendars for major crops*
- *DMH agro-meteorological bulletin that integrates crop development stage*
- *At least 17 agro-meteorological stations that automatically transmit data to the data center for forecast generation and verification and to support research*
- *Web-based agro-advisory expert system operationalized and maintained by DMH and linked to MOAI website*
- *At least 20 personnel from MOAI and GAD at pilot sites trained on use of agro-advisory expert system*
- *CRM field schools established in at least 2 pilot sites to introduce farmers to the use of science-based information for decision-making*
- *At least 60 farmers report benefits on the use of forecast-based agro-advisories*

## Upgrading of Agro- met Stations

No	Station
1	Kaba-aye
2	Hmawbi
3	Tagondine
4	Myaungmya
5	Lunkyaw
6	sittwe
7	Tatkone
8	Lasho
9	Kyemon
10	Hpaan
11	Mudon
12	Dawei
13	heho
14	Loikaw
15	Kynetone
16	Tharyarwaddy
17	Falam





***Upgrading of Agro-Met Stations***

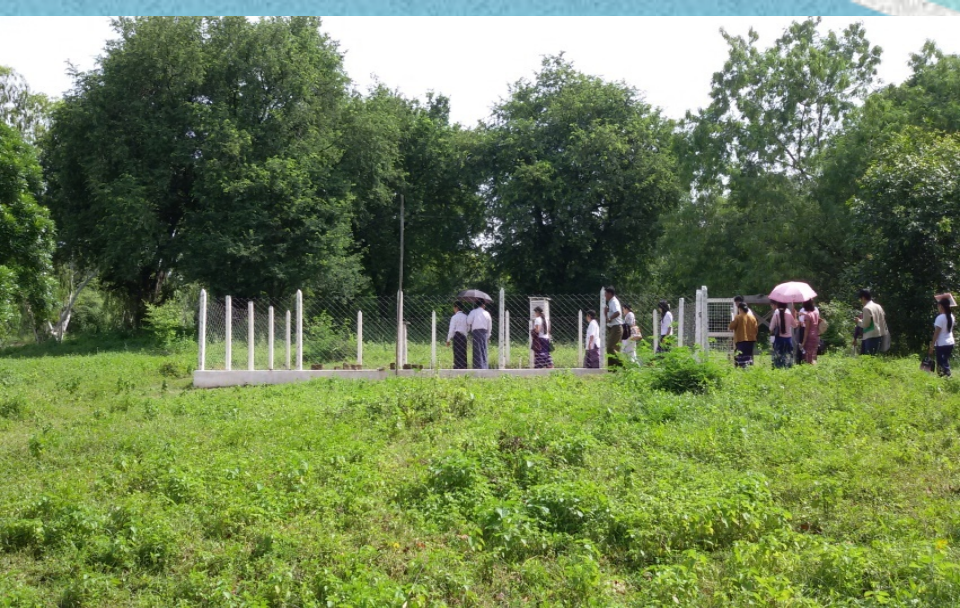


***Opening Ceremony of Forecast Application for Risk Management in Agriculture (FARM) School Curriculum Run Through in Nay Pyi Taw on 23<sup>rd</sup> Sept, 2014***

# ***FARM School Curriculum Wirteshop on 14-15 November, 2013 in Nay Pyi Taw***

Expertise from DMH, DOA, Irrigation Department, Yezin Agriculture University, DAR, and DAP was tapped in developing the draft FARM School Curriculum for testing

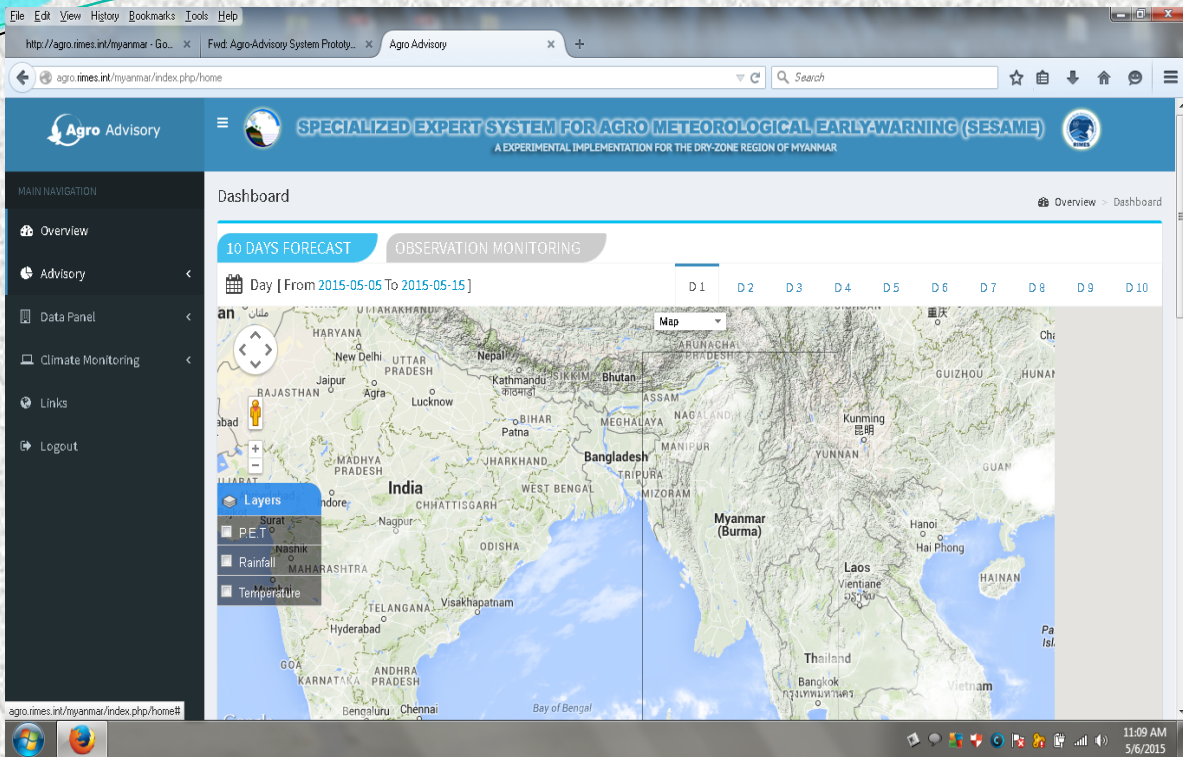




***Visit to the Agro-Met Station (Yezin) & Yezin University on 25<sup>th</sup> Sept, 2014 in Nay Pyi Taw.***



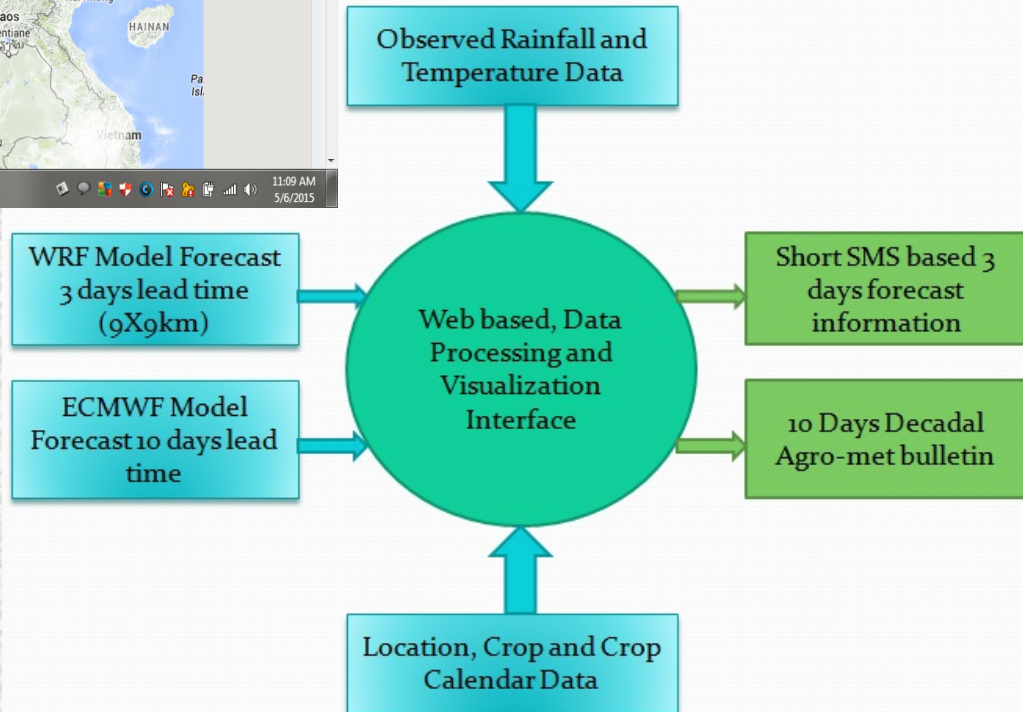
***And then the TOT had gone and applied to the Local Trainers in Nyaung Oo and Monywa within the area of Dry Zone on October, 2014.***



## Specialized Expert System For Agro Meteorological Early-Warning (SESAME)

Web Address; [agro.rimes.int](http://agro.rimes.int)

### System Overview

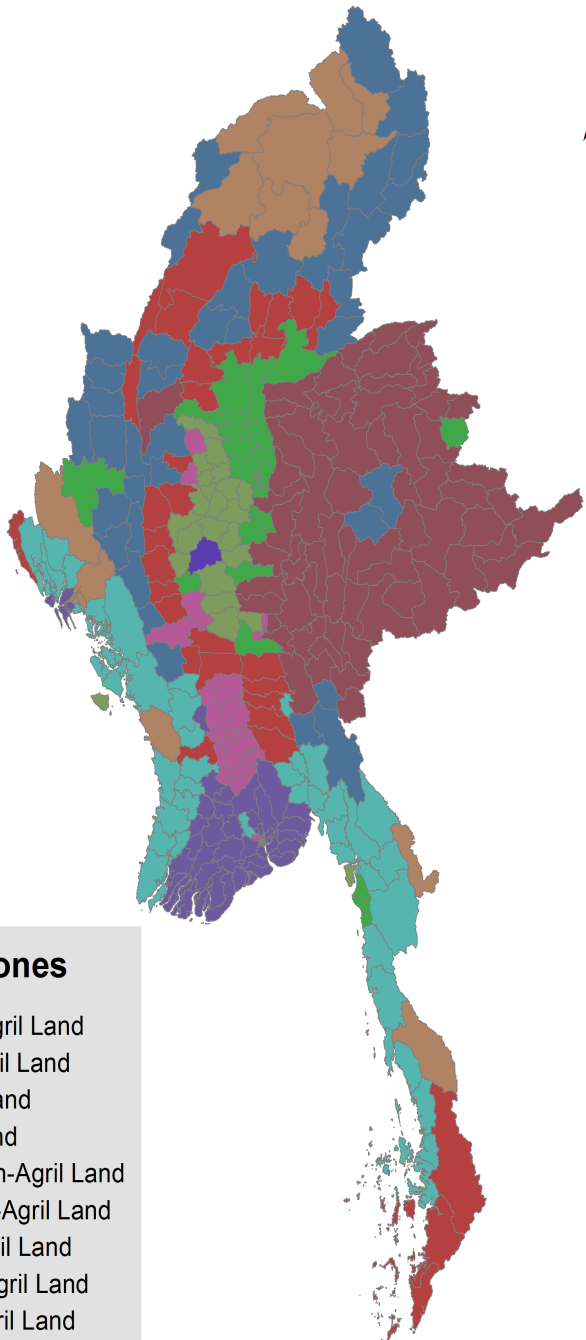














# SESAME: Specialized Expert System for Agro Meteorological Early warning)

A web based online platform to generate and disseminate agro-met bulletins based on short and medium range weather and climatic parameters <http://agro.rimes.int/myanmar>

- Customized for two pilot sites of Dry Zone in Myanmar viz. Nyuang Oo and Monywa.
- Built on two weather model input datasets
  - ECMWF Deterministic Forecast with 10 days lead time
  - WRF Model data from RIMES with 3 days lead time
- Capable of ingesting these two datasets and generate 10 days or decadal Agro-Met bulletins (email and fax) and 3 days short-term forecasts disseminated by SMS messages.



### Agro-Ecological Zones

-  Dry/Lowland/Non-Agril Land
-  Dry/Upland/Non-Agril Land
-  Dry/Lowland/Agril Land
-  Dry/Upland/Agril Land
-  Normal/Lowland/Non-Agril Land
-  Normal/Upland/Non-Agril Land
-  Normal/Lowland/Agril Land
-  Wet/Lowland/Non-Agril Land
-  Wet/Upland/Non-Agril Land
-  Wet/Lowland/Agril Land

190 95 0 190 Kilometers



# Data and Models

## Crop data and Crop weather Calendar

6 crops for both locations is incorporated within the system.

- Paddy
- Sesame
- Pigeon pea
- Cotton
- Chili
- Groundnut

Crop Weather Calendar is also being incorporated within the system to correlate decadal weather parameters with present crop stage.

Decades	Period	Paddy	Sesam	Pegion Pea	Cotton	Chilli	Groundnut
1	1-10 Jan			EH 1 2 4 5		7 1 2	
2	11-20 Jan			1 2 4		1 2	
3	21-31 Jan					LH 1 2 4 7	
4	1-10 Feb	1 2 4				1 2 4 7	
5	11-20 Feb	LH (1, 2, 4)				1 2 4 7	
6	21-28 Feb	1 2 4					
7	1-10 March	1 2 4		LH 1 2 5			
8	11-20 March			1			
9	21-31 March			1			
10	1-10 April		ES 1		1		
11	11-20 April		1 2		1	1	1 2
12	21-30 April		1 2		1	1	1 1 2
13	1-10 May		1	ES 1	ES 1 2		1 ES 1
14	11-20 May		1	1 2	1 2	1 2	1 2
15	21-31 May	1 2			1	1 ES 1 2 4	1 2
16	1-10 June	ES (1)	S 1		1 LS 1 2	1 2	1 2
17	11-20 June	1 2	1 2		1 1 2	1 2	1 2
18	21-30 June	1 2		1 LS 1 2		1 1 2	1 2
19	1-10 July		1 LS 1	1 2		1 1 2	LS 1
20	11-20 July		1 1 2		1	1	1 1 2
21	21-31 July	1 2	1 2	1 2	1 5	1 2	1 2
22	1-10 August	LS (1, 2)	EH 1 2 4		1 EH	LS 1 2 4	1 2
23	11-20 August	1 2	1 2		1 1 5	1 2	1 2
24	21-30 August	1 2	1 2		1 1 5	1 2	1 2
25	1-10 September		1		1 1 5	EH 1 2 4 7	1 2
26	11-20 September		1		1 1 5	1 2 4 7	1 2
27	21-31 September	1 2 4	LH 1 2 4		1 LH	1 2 4 7	EH 1 2
28	1-10 October	EH (1,2,4)	1 2		1	1 2	LH 1 2
29	11-20 October	1 2 4	1 2		1	1 2	
30	21-30 October	1 2 4			1	1 2	
31	1-10 November				1	1 2	
32	11-20 November				1	1 2	
33	21-30 November				1	1 2	
34	1-10 December			1 5		7 1 2	
35	11-20 December			1 5		7 1 2	
36	21-31 December			1 5		7 1 2	

### Code Identification:

- S - Sowing
- ES - Early Sowing
- LS - Late Sowing
- EH - Early Harvesting
- LH - Late Harvesting
- 1 - Rainfall forecast Required
- 2 - Temp Max. Forecast Required
- 3 - Temp.Min.Forecast Required
- 4 - Windspeed Forecast Required
- 5 - Fog Warning
- 6 - Hailstorm Warning
- 7 - Thunderstorm Warning

# Crop Weather Calendar

- Overview
- Advisory
- Data Panel
  - Add Crop
  - Crop List
  - Upload Station Data
  - Upload NDVI
  - View Crop Calendar**
  - Add Crop Calendar
  - Receivers
- Climate Monitoring
- Links
- Logout

## View Crop Calendar

Data Panel > View Crop Calendar

### Calendar

< > today

## June 2016

Sun	Mon	Tue	Wed	Thu	Fri	Sat
29	30	31	1	2	3	4
Chilli : Nyuang Oo [Early Sowing] [ Forecast Needed :: Rainfall   Temp Max.]			12a Chilli : Nyuang Oo [Intermediate] [ Forecast Needed :: Rainfall   Temp Max. ]			
Cotton : Nyuang Oo [Intermediate] [ Forecast Needed :: Rainfall ]			12a Cotton : Nyuang Oo [Late Sowing] [ Forecast Needed :: Rainfall   Temp Max. ]			
GroundNut : Nyuang Oo [Intermediate] [ Forecast Needed :: Rainfall   Temp Max.]			12a GroundNut : Nyuang Oo [Intermediate] [ Forecast Needed :: Rainfall   Temp Max. ]			
Paddy : Nyuang Oo [Intermediate] [ Forecast Needed :: Rainfall   Temp Max.]			12a Paddy : Nyuang Oo [Early Sowing] [ Forecast Needed :: Rainfall ]			
Pegion Pea : Nyuang Oo [Intermediate] [ Forecast Needed :: Rainfall ]			12a Pegion Pea : Nyuang Oo [Intermediate] [ Forecast Needed :: Rainfall ]			
Sesam : Nyuang Oo [Early Sowing] [ Forecast Needed :: Rainfall   Temp Max.]			12a Sesam : Nyuang Oo [Sowing] [ Forecast Needed :: Rainfall ]			
5	6	7	8	9	10	11
Chilli : Nyuang Oo [Intermediate] [ Forecast Needed :: Rainfall   Temp Max. ]						12a Chilli : Nyuang Oo [Intermediate] [ Forecast Needed :: Rainfall   Temp Max. ]
Cotton : Nyuang Oo [Late Sowing] [ Forecast Needed :: Rainfall   Temp Max. ]						12a Cotton : Nyuang Oo [Late Sowing] [ Forecast Needed :: Rainfall   Temp Max. ]
GroundNut : Nyuang Oo [Intermediate] [ Forecast Needed :: Rainfall   Temp Max. ]						12a GroundNut : Nyuang Oo [Intermediate] [ Forecast Needed :: Rainfall   Temp Max. ]
Paddy : Nyuang Oo [Early Sowing] [ Forecast Needed :: Rainfall ]						12a Paddy : Nyuang Oo [Early Sowing] [ Forecast Needed :: Rainfall ]
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Sesam : Nyuang Oo [Sowing] [ Forecast Needed :: Rainfall ]						12a Sesam : Nyuang Oo [Sowing] [ Forecast Needed :: Rainfall ]
12	13	14	15	16	17	18
Chilli : Nyuang Oo [Intermediate] [ Forecast Needed :: Rainfall   Temp Max. ]						
Cotton : Nyuang Oo [Intermediate] [ Forecast Needed :: Rainfall   Temp Max. ]						
GroundNut : Nyuang Oo [Intermediate] [ Forecast Needed :: Rainfall   Temp Max. ]						
Paddy : Nyuang Oo [Intermediate] [ Forecast Needed :: Rainfall   Temp Max. ]						
Pegion Pea : Nyuang Oo [Intermediate] [ Forecast Needed :: Rainfall ]						
Sesam : Nyuang Oo [Intermediate] [ Forecast Needed :: Rainfall   Temp Max. ]						

# 10 Days Forecast

File Edit View History Bookmarks Tools Help

Agro Advisory

agro.rimes.int/index.php/home

Your Download is Avail... Getting Started Most Visited NPE Latest Headlines

MAIN NAVIGATION

- Overview
- Advisory
- Data Panel
- Climate Monitoring
- Links
- Logout

Dashboard

Overview > Dashboard

10 DAYS FORECAST OBSERVATION MONITORING

Day [ From 2016-06-19 To 2016-06-29 ]

D1 D2 D3 D4 D5 D6 D7 D8 D9 D10

Map

Layers

- P.E.T
- Rainfall
- Temperature

Color Bar

RAIN (mm)

270  
240  
210  
180  
150  
120  
90  
60  
30  
0  
-30

Most Recent Advisories

Windows Taskbar: In preparation to th... Agro Advisory - Mo... 2016 WMO Day RIMES\_DMH\_CapB... WMOmore.ppt [Co... 3:52 PM

# Forecast Advisory

## Date Forecast Advisory

<b>Jun</b> 11-20	<b>Location Name</b>	<b>Monywa</b>
	<b>Accumulated Rainfall</b>	Expected accumulated rainfall for dekad 11-20 Jun 2016 is 3.35 in . The spell is expected to be mostly Very Wet
	<b>Temperature Forecast</b>	Expected variation in this dekad 11-20 Jun 2016 is likely to from maximum temperature of 31 deg.C to minimum temperature 24 deg.C
	<b>Wind Forecast</b>	Expected Wind for 11-20 Jun 2016 is likely to to be of Average wind speed of 22 km/h

<b>Jun</b> 11-20	<b>Location Name</b>	<b>Nyung Oo</b>
	<b>Accumulated Rainfall</b>	Expected accumulated rainfall for dekad 11-20 Jun 2016 is 4.7 in . The spell is expected to be mostly Very Wet
	<b>Temperature Forecast</b>	Expected variation in this dekad 11-20 Jun 2016 is likely to from maximum temperature of 32 deg.C to minimum temperature 25 deg.C
	<b>Wind Forecast</b>	Expected Wind for 11-20 Jun 2016 is likely to to be of Average wind speed of 13 km/h

<b>Jun</b> 1-10	<b>Location Name</b>	<b>Monywa</b>
	<b>Accumulated Rainfall</b>	Expected accumulated rainfall for dekad 1-10 Jun 2016 is 1.99 in . The spell is expected to be mostly Very Wet
	<b>Temperature Forecast</b>	Expected variation in this dekad 1-10 Jun 2016 is likely to from maximum temperature of 32 deg.C to minimum temperature 24 deg.C
	<b>Wind Forecast</b>	Expected Wind for 1-10 Jun 2016 is likely to to be of Average wind speed of 16 km/h

<b>Jun</b> 1-10	<b>Location Name</b>	<b>Nyung Oo</b>
	<b>Accumulated Rainfall</b>	Expected accumulated rainfall for dekad 1-10 Jun 2016 is 3.19 in . The spell is expected to be mostly Wet
	<b>Temperature Forecast</b>	Expected variation in this dekad 1-10 Jun 2016 is likely to from maximum temperature of 34 deg.C to minimum temperature 25 deg.C
	<b>Wind Forecast</b>	Expected Wind for 1-10 Jun 2016 is likely to to be of Average wind speed of 7 km/h

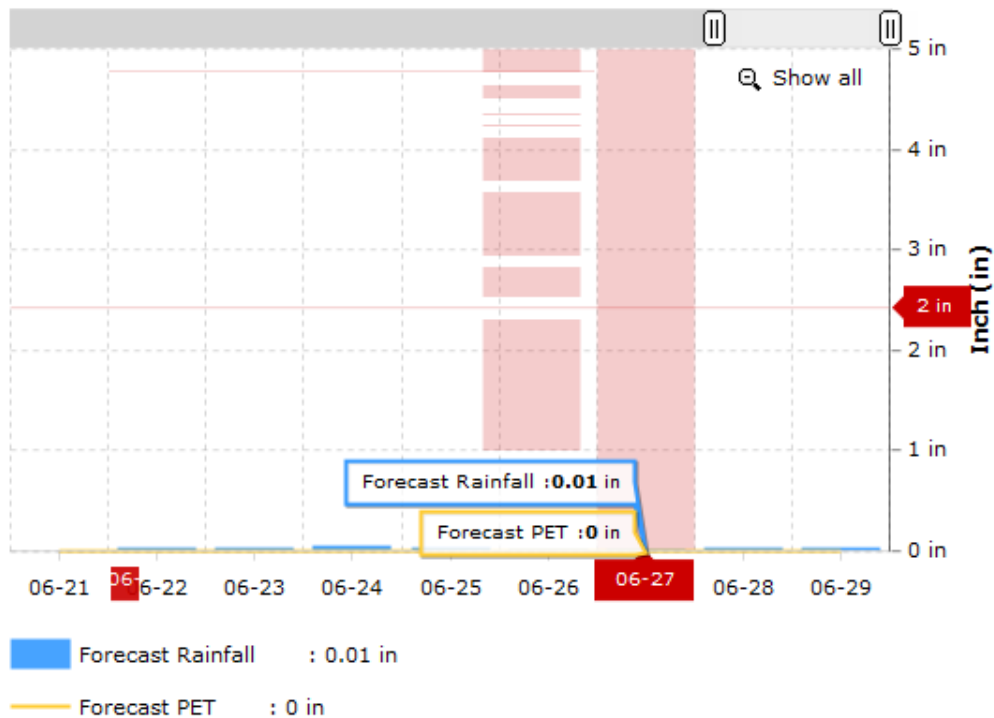
<b>May</b> 21-31	<b>Location Name</b>	<b>Monywa</b>
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# Forecast Advisory

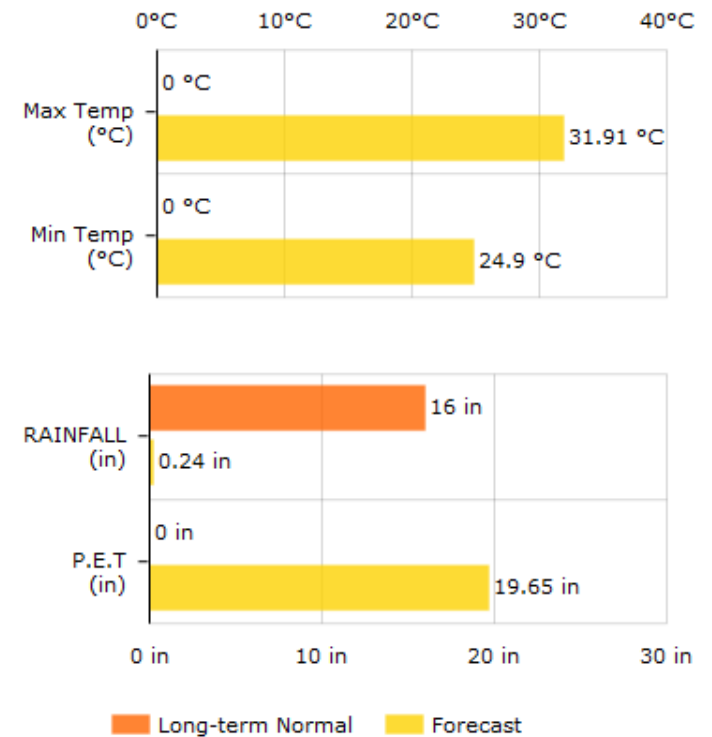
## Advisory

Location Name	<b>Monywa</b>
Accumulated Rainfall	Expected accumulated rainfall for dekad 11-20 Jun 2016 is 0.24 in . The spell is expected to be mostly Dry
Temperature Forecast	Expected variation in this dekad 11-20 Jun 2016 is likely to from maximum temperature of 32 deg.C to minimum temperature 25 deg.C
Wind Forecast	Expected Wind for 11-20 Jun 2016 is likely to to be of Average wind speed of 17 km/h

## Forecast of Monywa



## Forecast and Climatology During Crop Season





Forecast

Advisory

Forecast

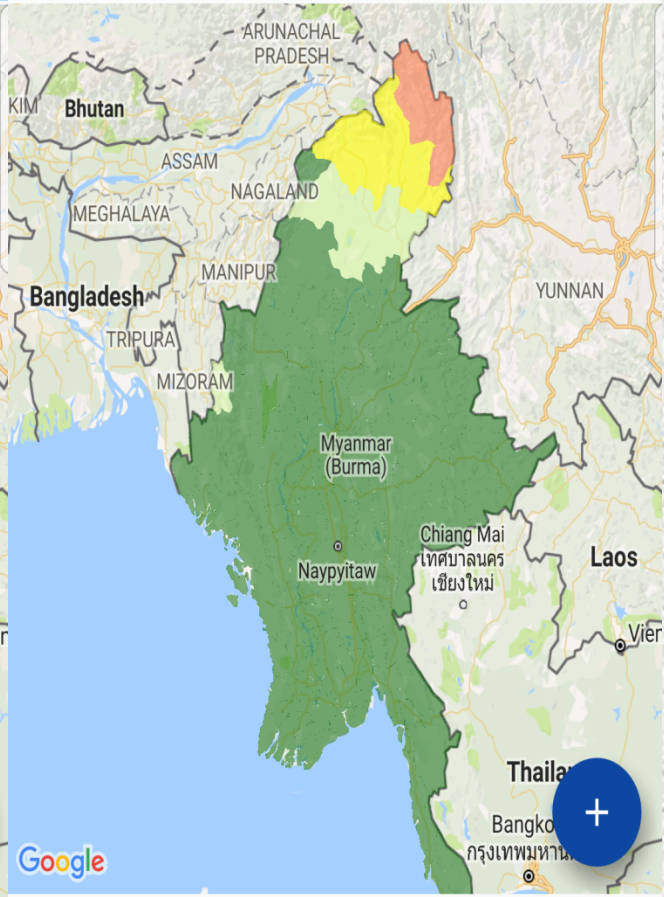
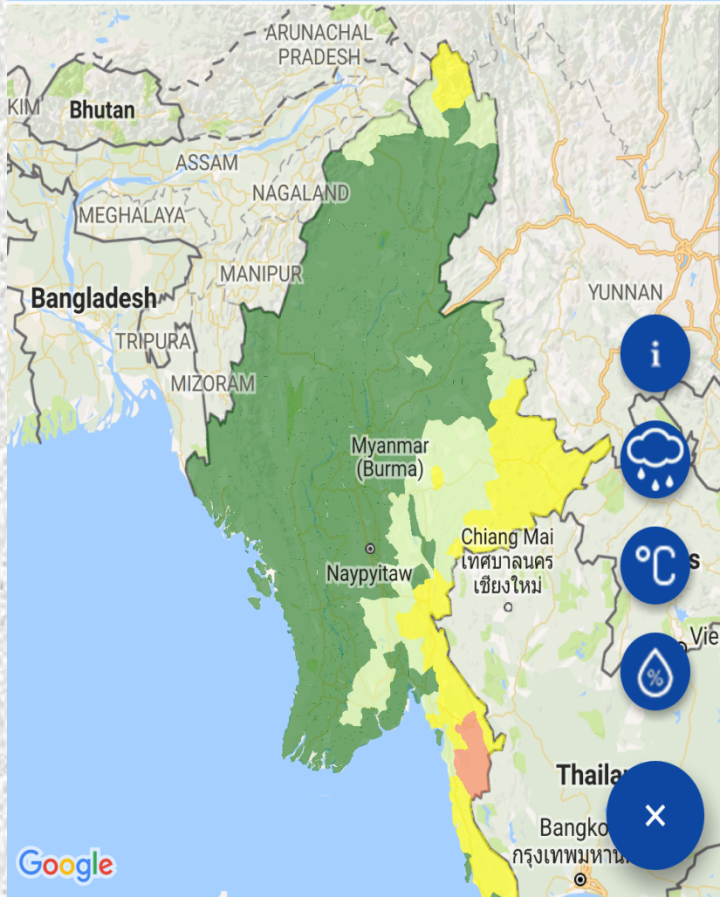
Advisory



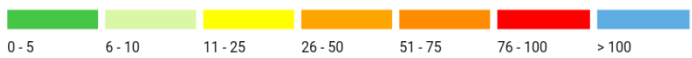
RAIN : 2017-04-29



RAIN : 2017-04-26



Rainfall (mm)



3 DAYS

10 DAYS

MONTH

SEASON

Rainfall (mm)



3 DAYS

10 DAYS

MONTH

SEASON

# SESAME: Features

Labutta  
Loi-Kaw  
Kawkareik  
Hpa-An  
Hpapun  
Chauk  
Minbu  
Meiktila  
Myingyan  
Nyaungu  
Mawlamyine  
Kyaukpyu  
Taungup  
**Monywa**  
Shwebo  
Keng Tung  
Pekon  
Taunggyi

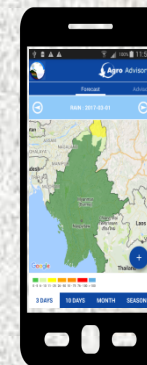
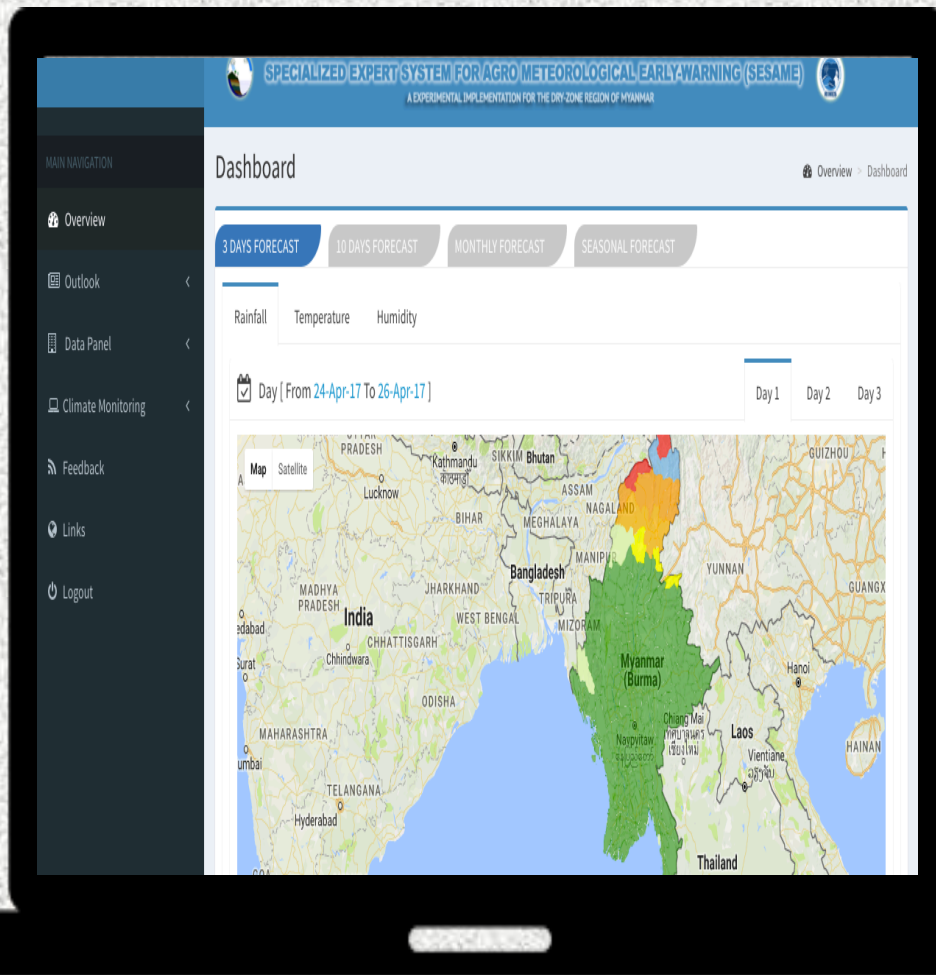
- SESAME
  - A decision support system
  - An scalable system
    - Currently 18 townships included
    - can be scaled to include all townships in Myanmar\*
  - Two weather forecast model data
    - WRF, ECMWF
    - 3 days, 5 days, 10 days, monthly and seasonal forecasts
  - Generate agro climatic bulletin

\*depending on availability of data

## List of Priority Townships -

- 1. Chin State - Matupi
- 2. Bago West and North - Pyi, Shwe Taung, Moenyo, Tharyar Waddy, Pan Taung, Paung Tei, Taung Ngu
- 3. Ayeyarwaddy - Inngapu, Myaung Mya, Hinthada, Myan Aung
- 4. Sagaing Region - Wun Tho, Htilin, Hti Kyike, Kathar, Kaw Lin, Pin Lei Hoo, Kant Balu
- 5. Magway Region - Magway Township
- 6. Shan State – loisho

# SESAME: Features



# SESAME: Features

SESAME advisory says that in the next 5 days, there's going to be heavy rain !!

In that case, let's not add fertilizer in our farm today. Let's wait for the next 5 days.



# Access

## News / Activities / Updates

- ▶ Department of Meteorology & Hydrology (DMH), Myanmar convenes, the 9<sup>th</sup> edition of [SASCOF](#) & 2<sup>nd</sup> edition of CSUF with support from WMO and technical assistance from RIMES.
- ▶ Bhutan's Department of Hydro-Met Services convenes its 2<sup>nd</sup> National Climate outlook Forum with support from WMO GFCS and technical assistance from RIMES. ▶ [Read More](#)
- ▶ Nepal's Department of Mines and Geology firms up cooperation with

## Weather & Flood Outlooks



▶ [El Niño 2015/2016 Impact Outlook and Policy Implications](#)

## Recent Earthquakes



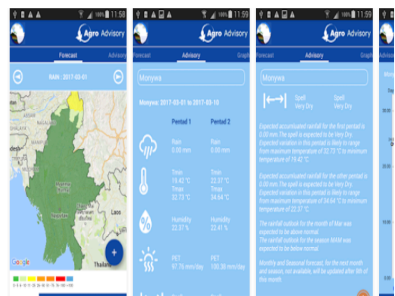
- 03:02:22 Apr 25, 2017 UTC  
Off Coast of Central Chile  
Mag:4.8 Depth:10km
- 01:43:05 Apr 25, 2017 UTC  
Near Coast of Central Chile  
Mag:5.1 Depth:27km
- 23:25:50 Apr 24, 2017 UTC  
Fiji Islands Region Mag:4.9  
Depth:9km
- 22:19:56 Apr 24, 2017 UTC  
South of Mariana Islands Mag:4.8  
Depth:10km

ShakeCast@RIMES BETA



**DMH Sesame**  
RIMES Weather

★★★★★



SESAME is an agricultural advisory system built to provide early warning and advisory to farmers for making their day-to-day crop management. The system uses numerical weather prediction outputs from the European Center for medium range weather forecast (ECMWF) with 10 days lead time, and from the Weather Research and Forecast (WRF) with 3 days lead time. Forecasts for precipitation, temperature, humidity, potential evapotranspiration parameters that are essential for agriculture are shown.

REVIEWS

5.0

★★★★★

1

4

3

2

1

More from developer

**DOM RIMES**  
RIMES  
Weather Forecast  
FREE

**RimesForecast**  
RIMES  
Gives the weather forecasts (precipitation, temperature)  
FREE

first Climate Service User Forum in India ▶ [Read More](#)

quake & Tsunami	Weather and Extreme Event	Water Related Hazards	Seasonal Climate	Climate Change
Monitor Alerts	▶ Realtime NWP Outputs	▶ Flood Forecasting	▶ Climate Outlook	▶ Model Products
sk		▶ Tidal Surge Forecasts		▶ Climate Change Analysis
Tool		▶ Hydrological Modeling		
Education		Tools		
ool		▶ Drought Forecast		

▶ Get SESAME

**GET SESAME ON Google Play**

Multi-Hazard Early Warning System for Africa and Asia



This section will be updated soon.

- crop data collected from agriculture offices
- major crops grown, cropping pattern, seasonality of crops, crop calendar
- agricultural land use population data at village level from GAD for three townships (Shwebo, Myingyan, Chauk)
- currently the information is being translated from Burmese to English by DMH staff

# **Information Communication and Application in Institutions and Communities**

- **Institutional mechanisms, within each sector, for ensuring receipt and application of warning/information up to community levels**
  - **Capacity building in translation of warning into impacts/risk information and management options**
  - **Enabling and customizing capacities for inter- and intra-sectoral communication**
  - **Ensuring receipt of information up to community level**
  - **Capacity building for national, sub-seasonal, and community stakeholders for responding to information, for preparedness**
  - **Sustaining awareness and capacity building initiatives in communities**

# User Feedback

- **Densifying observation stations, particularly in water shed areas**
- **Forecast development for Districts and Townships**
- **Generation of more easy to understand information**
- **Enhancing communication of information**
- **Delivery of information to various sectors and stakeholders, on regular basis, through various channels**
- **Feedback mechanism for ensuring warning receipt by various institutions**
- **Firming up DMH role as the mandated source of hydro-meteorological and geological information**



Thanks