Translating Climate Information into Climate Services: RIMES initiatives

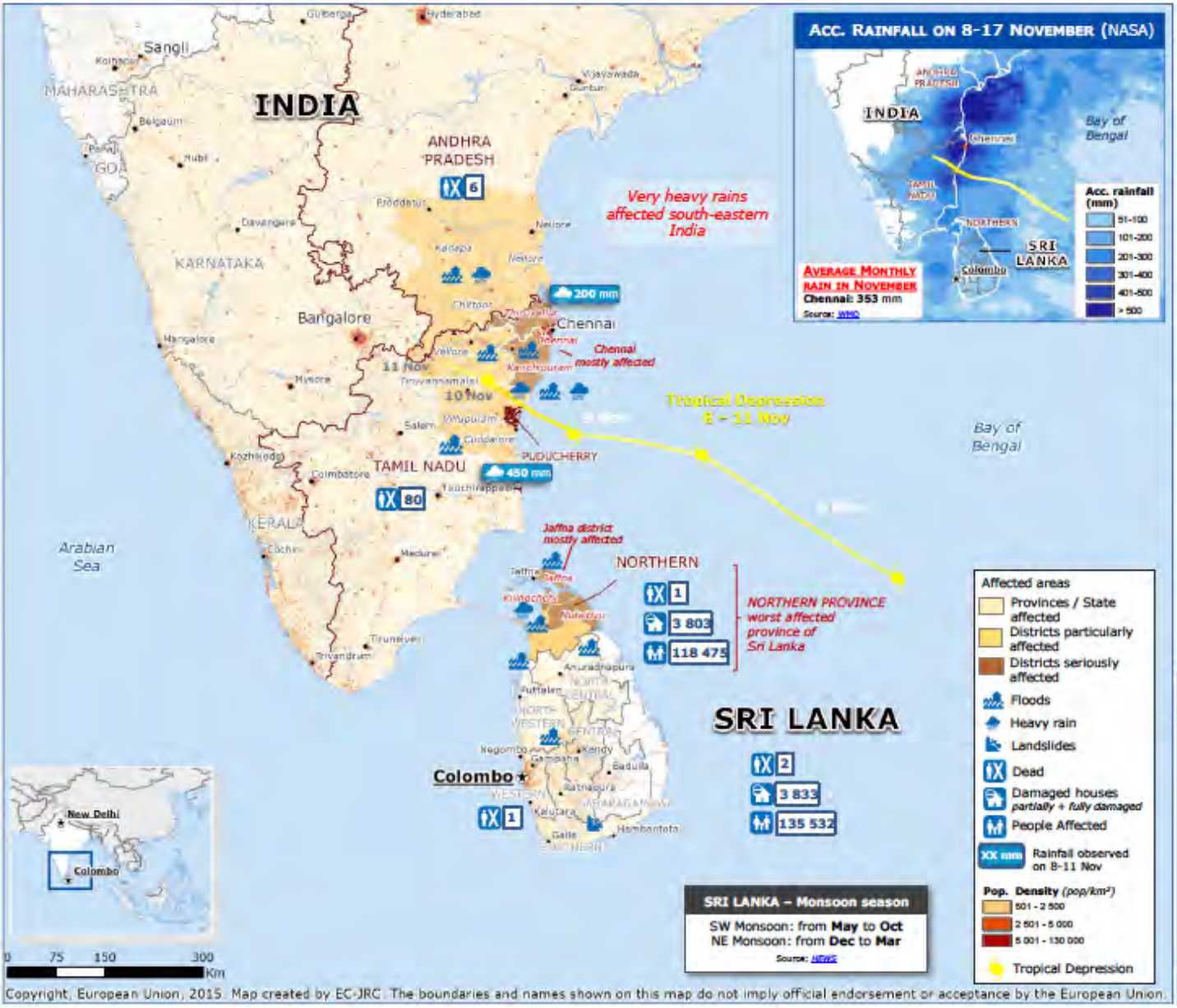
G Srinivasan
RIMES

Regional Stakeholder Consultation on Climate Services for the Third Pole Region
Holiday Inn Jaipur City Centre, Rajasthan, India
9-11 March 2016

Emergency Response Coordination Centre (ERCC) – ECHO Daily Map | 18/11/2015

India, Sri Lanka – Severe Weather

European Commission | Humanitarian Aid and Civil Protection



SRI LANKA – Monsoon season

SW Monsoon: from **May** to **Oct**
NE Monsoon: from **Dec** to **Mar**

Source: NOAA

SITUATION

Over the last 10 days heavy rains and winds affected south-eastern **India** and **Sri Lanka**, causing damage and deaths, especially in **Tamil Nadu** state (India).

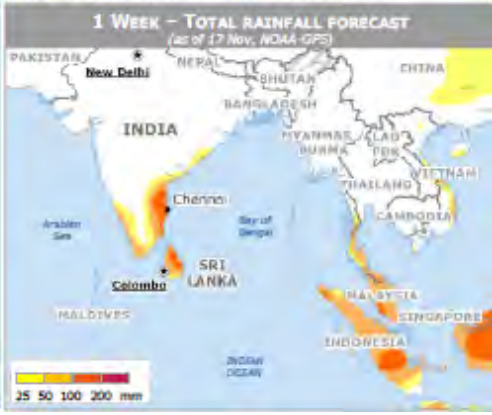
INDIA

- A **Tropical Depression** formed over the Bay of Bengal on 8 November and moved towards the coast of south-eastern India. It reached the coast of **Tamil Nadu** on 9 November, having strengthened into a Deep Depression. Heavy rains and winds affected south-eastern India, especially Tamil Nadu and southern **Andhra Pradesh**, causing floods and damage. Moreover, another low pressure system moved off the coast of these two states over the last few days, causing more rains and floods.
- As of 18 November, media reported over 80 dead (mostly in the area of Chennai) in Tamil Nadu, another eight in Andhra Pradesh and more than 34 000 people displaced in Kanchipuram district (Tamil Nadu).
- Over the next 48 h heavy rains may still affect Tamil Nadu, Puducherry, Andhra Pradesh and Kerala.

SRI LANKA

- Over the last week, heavy rains have also affected Sri Lanka. The latest update of the flood situation indicate that over 135 500 people in 15 districts have been affected by floods, winds and landslides.
- The Northern Province was mostly affected with over 118 000 people affected and 13 500 people displaced. Among the five districts affected in this province, the ones mostly affected are Jaffna (86 210 affected), Kilinochchi (22 890) and Mulaitivu (6 952).
- The Ministry of Disaster Management has requested assistance for relief items from the United Nations.
- Over the next 48 h, more heavy rains, winds and thunderstroms may still affect northern and central Sri Lanka.

Sources: ECHO, IMD, Disaster Management Centre, Media



First Session of

Winter South Asian Climate Outlook Forum

(WinSASCOF-1)

Chennai, India, 14-15 October 2015

Consensus Statement on the Forecast for the 2015 Northeast Monsoon Season (October – December) Rainfall and Temperature over South Asia

Summary

Normal to above normal rainfall is likely during the 2015 Northeast monsoon season (October – December) over southern parts of South Asia including southeast peninsular India, Sri Lanka and Maldives. Above normal rainfall is likely over northern most parts of the region. Other areas of the region that generally receive

Government of India
Earth System Science Organization
Ministry of Earth Sciences
India Meteorological Department

Press Release
Dated: 16 October, 2015

Forecast Outlook for 2015 NE Monsoon Season (October–December)

Rainfall over South Peninsula

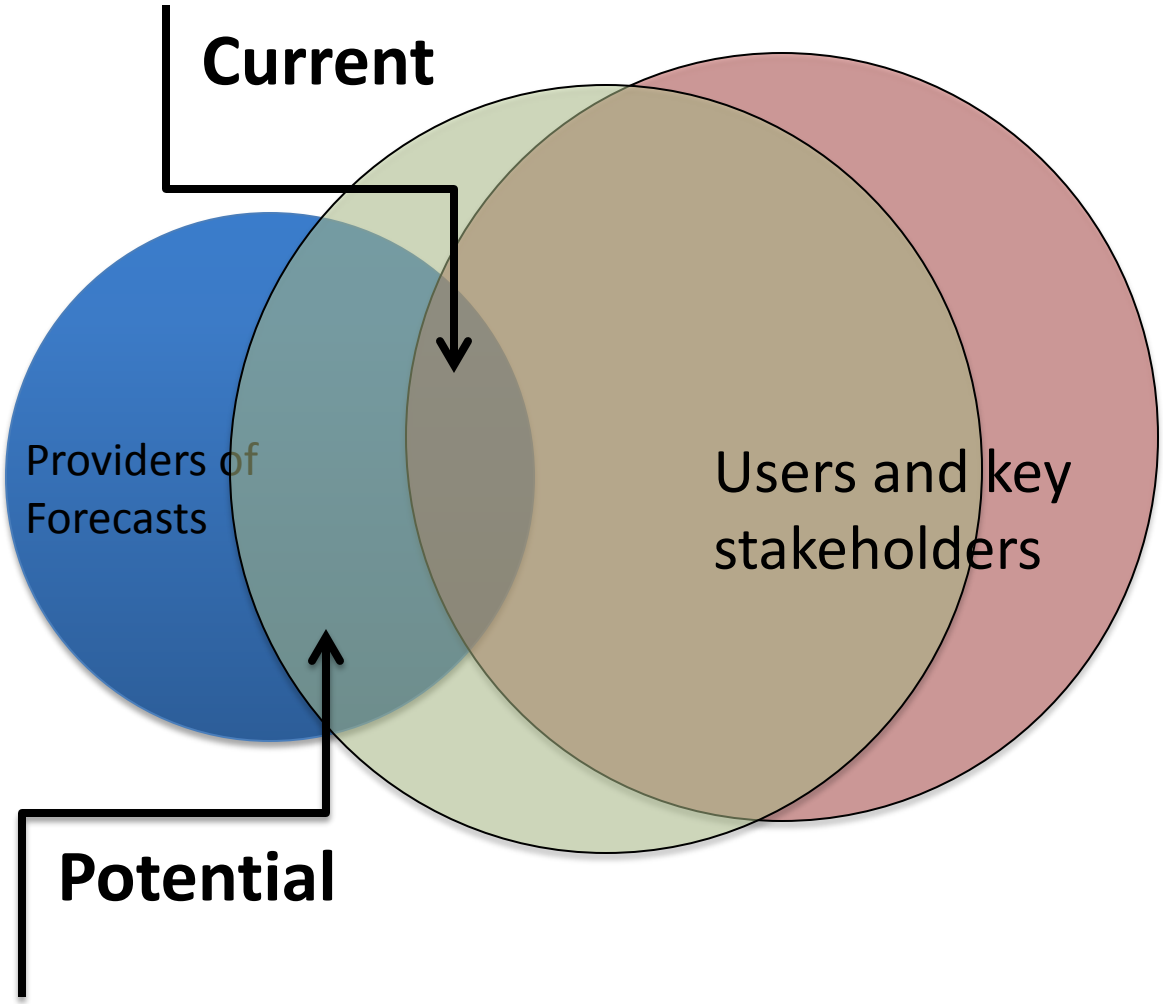
The summary of forecasts for 2015 North-East monsoon season's Rainfall is given below:

1. **Season's rainfall for South Peninsula (Tamil Nadu, Coastal Andhra Pradesh, Rayalaseema, Kerala and south interior Karnataka), is most likely to be above normal (>111% of Long Period Average). The Long Period Average (LPA) of the North-East monsoon season rainfall for the south Peninsula for the base period 1951-2000 is 332.1mm.**

2. **Season's rainfall for Tamil Nadu is most likely to be above normal (>112% of LPA). The LPA of the North-East monsoon season rainfall for the Tamil Nadu for the base period 1951-2000 is 438.2mm.**

Regional Stakeholder Consultation on Climate Services for the Third Pole Region,
Jaipur, Rajasthan, India, 9-11 March, 2016

Interaction of forecast providers and users



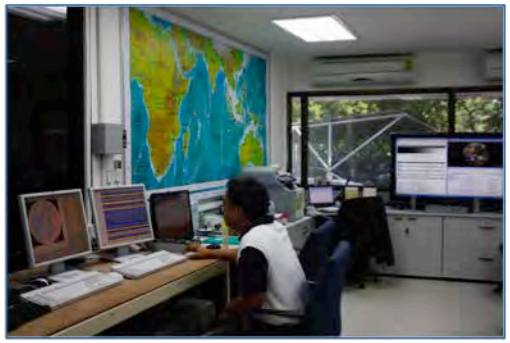
The Regional Integrated Multi-Hazard Early Warning System for Africa and Asia

(RIMES)

Enhance the use of Climate Information for Risk Management

About RIMES

- Established on 30 April 2009
- **Intergovernmental**, owned and managed by Member States
- Registered with the United Nations under Article 102 of UN Charter
- UN ESCAP support for RIMES institutional development


About RIMES

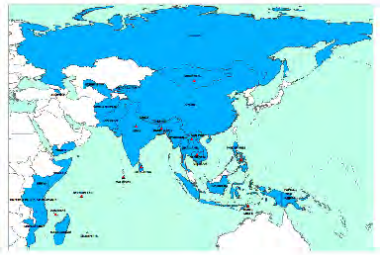
Regional: 32 Member and Collaborating States in Asia and Africa

Integrated: links science with generators and users of early warning information

Multi-hazard: started with tsunami and earthquake, and expanded to include hydro-meteorological hazards

Regional Integrated Multi-Hazard Early Warning System

RIMES



Early warning: with mandate to provide early warning services for enhanced preparedness for, responses to, and mitigation of natural hazards

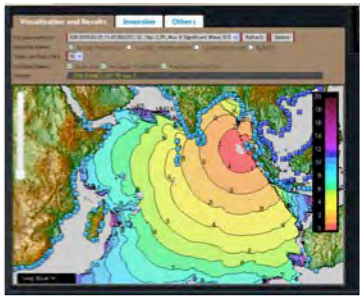
System: consists of regional technical support unit, connected to national and local systems

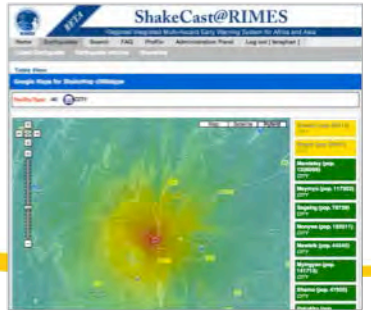
Key Support to Members – risk management

Earthquake and tsunami services

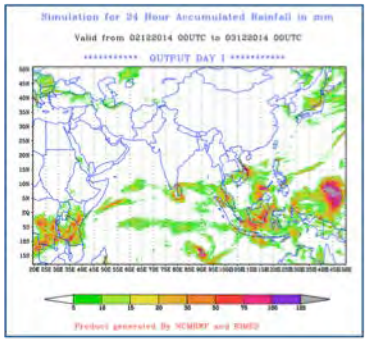
Capacity building

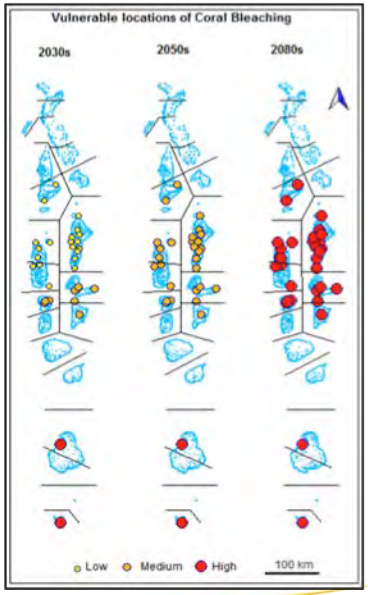
Improving data availability

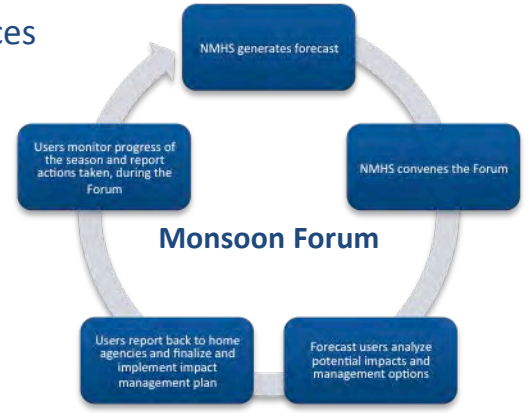




Weather and climate services

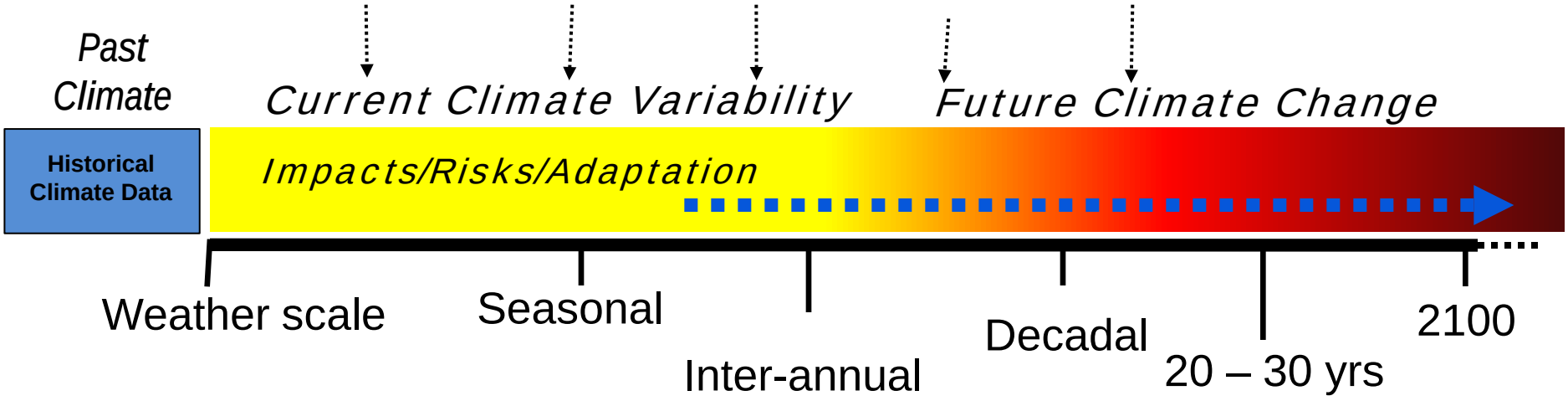




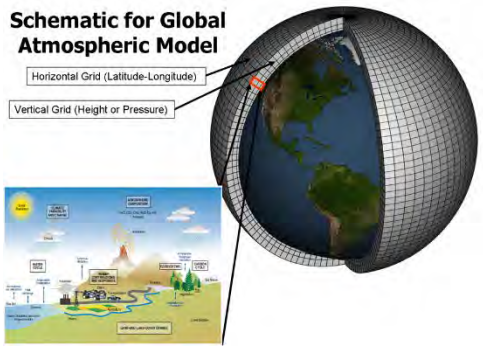


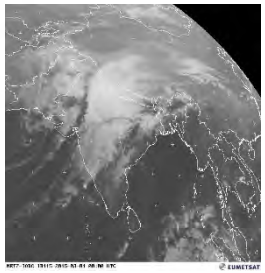
Provide Climate information and Services on a continuum of time-scales

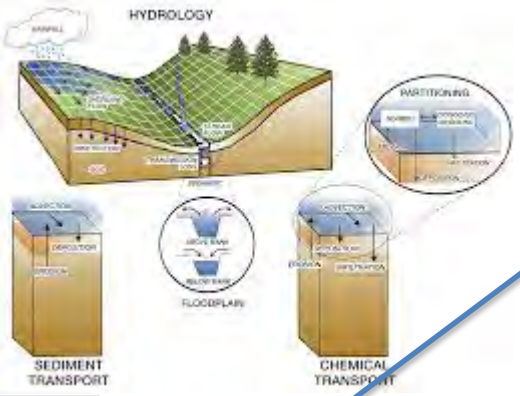
Iterative Climate risk management and adaptation actions

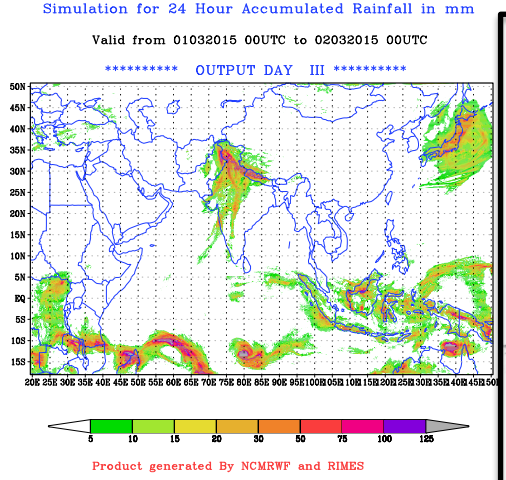


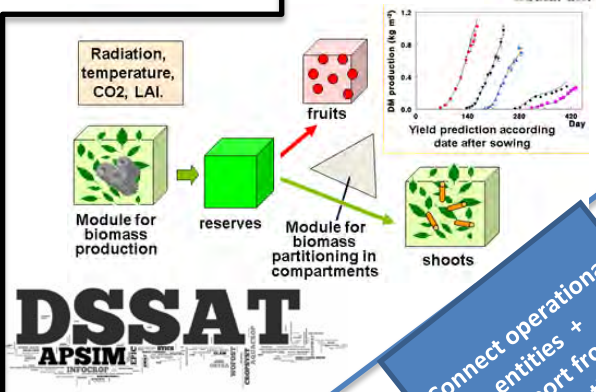
Source: Andy Robertson, IRI

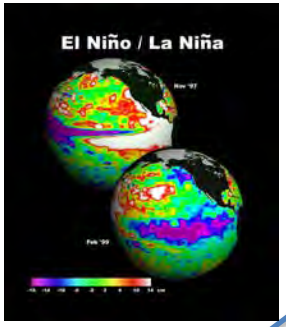












Connect operational entities + Support from research institutions

Sector Departments that use climate information

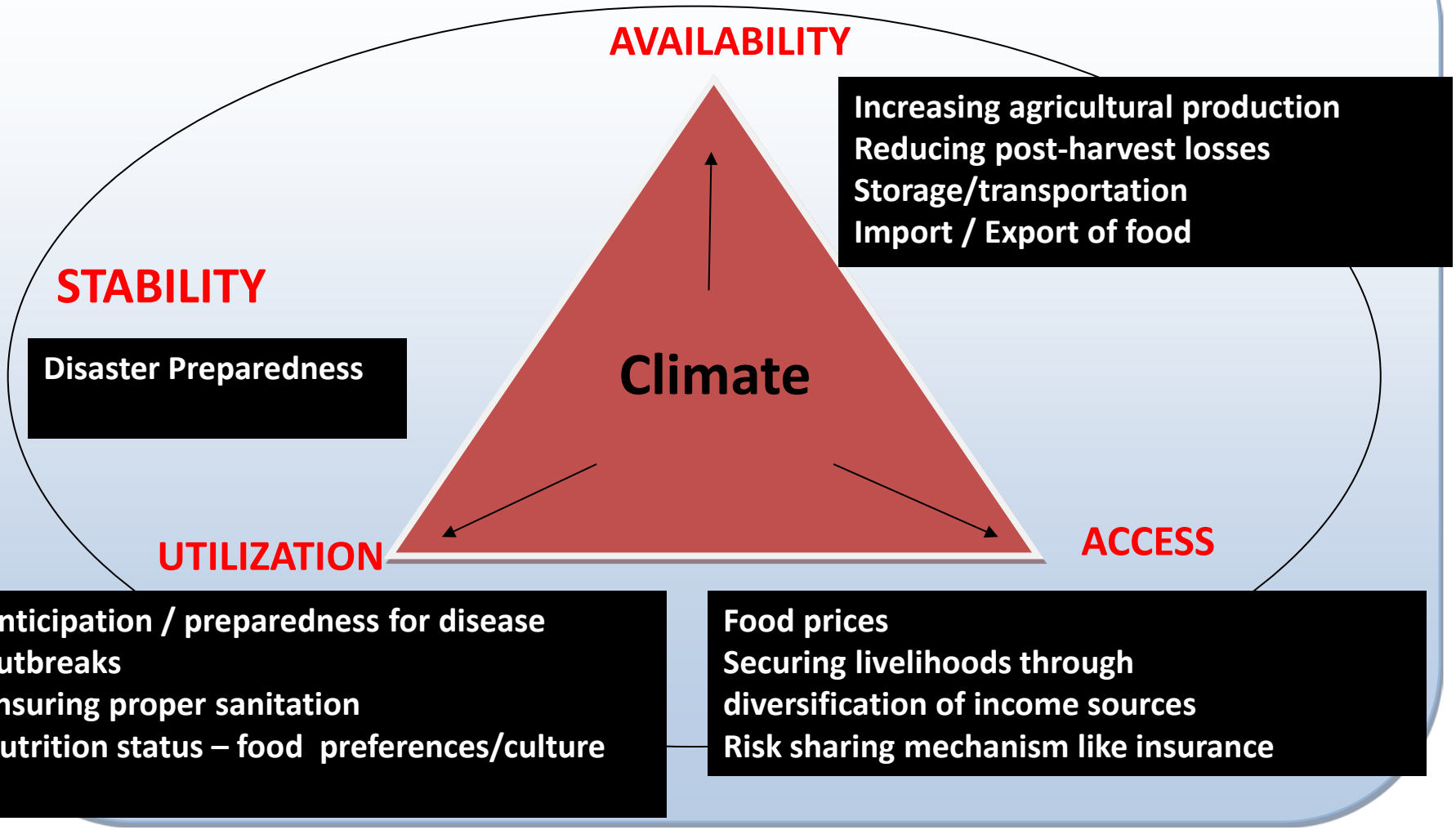
End users

In selected countries of the Greater Mekong Sub-region – Cambodia, Lao PDR and Myanmar
FAO-RAP, Bangkok/RIMES implemented the Climate Component
–"Enhancing Utility of Seasonal Climate Forecasts and Managing Climate Change Risks"

***Activity 1*: Monsoon Forum: enhancing the utility of seasonal climate forecasts**
Activity 2: Managing climate change risks

Phase I: Started August 2010 to September 2011
Final evaluation completed by September 2012

Food Security



Monsoon Forum Countries in South Asia

Bangladesh

Maldives

Myanmar

Nepal

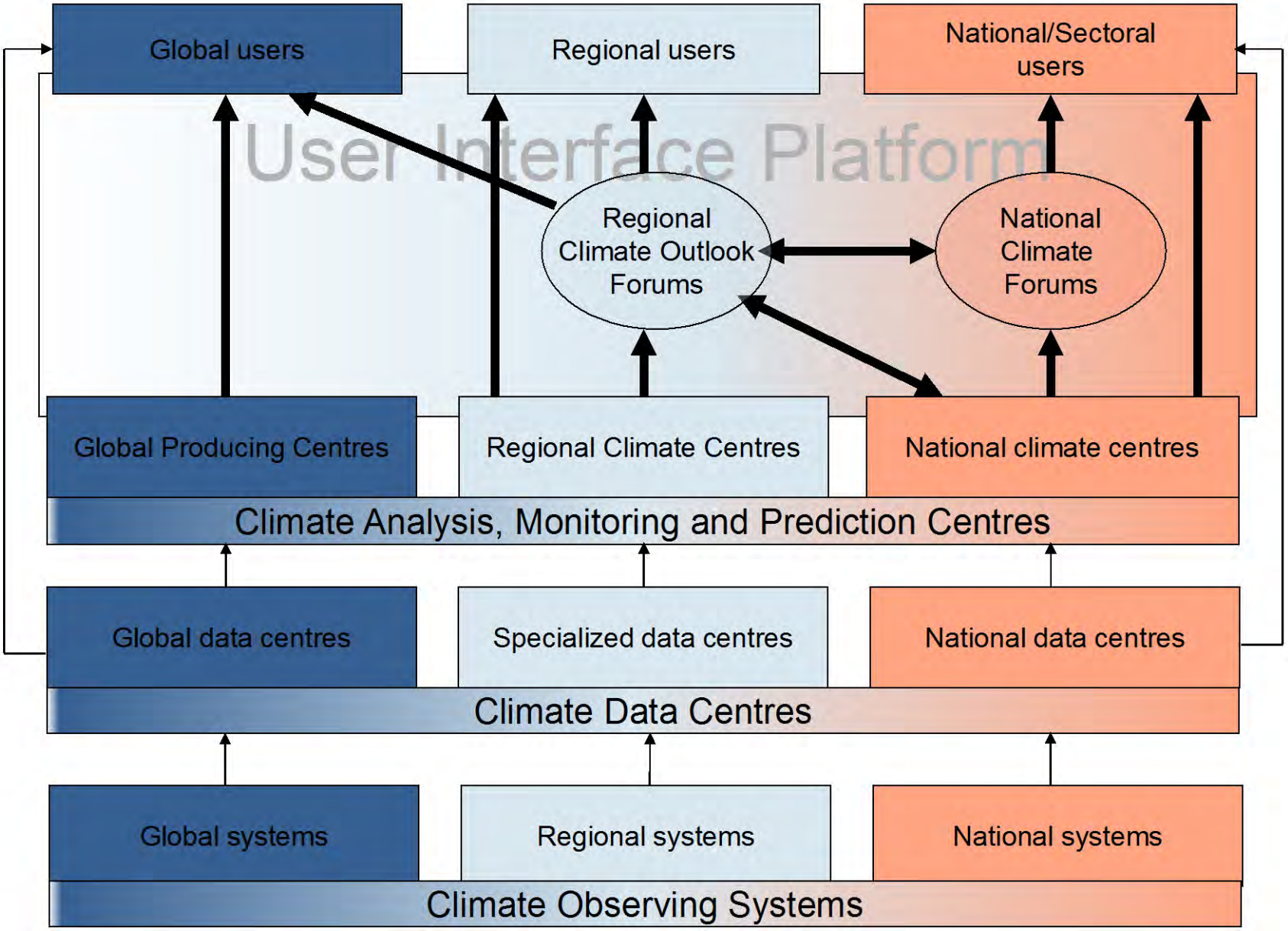
Pakistan

Sri Lanka

Slides contributed by Ms. Ruby Rose, RIMES

Features of the Monsoon Forum meetings

- Articulation of community concerns and demands by government and non-government organization
- Collective effort for understanding and using climate information for applications
- Identify opportunities for anticipatory actions
- Acceptance of probabilistic information for utilization in decision-making



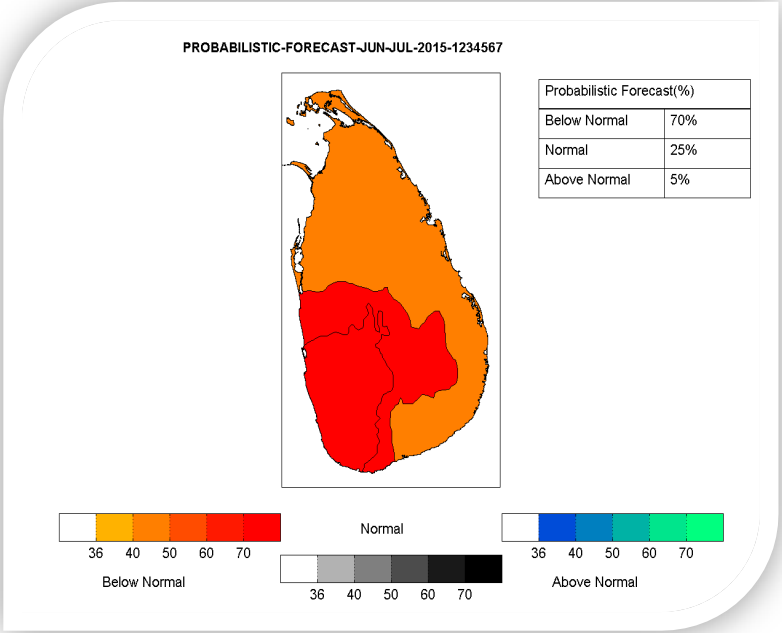
WMO-RIMES GFCS project "Capacities and mechanisms for climate services production and delivery are in place in South Asia" – recently formalized under the Canadian Government

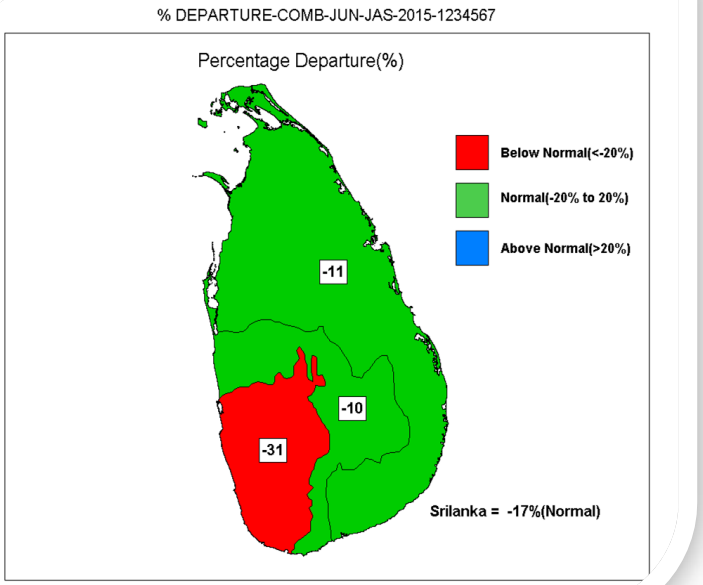
Enhancing Capacities at community level

- *CRM field schools*
- *At pilot sites to introduce farmers to the use of science-based information for decision-making – Myanmar, India :Tamil Nadu*
- *Partnering with local NGOs and township level agriculture extension workers*

Seasonal Forecasts – capacity building

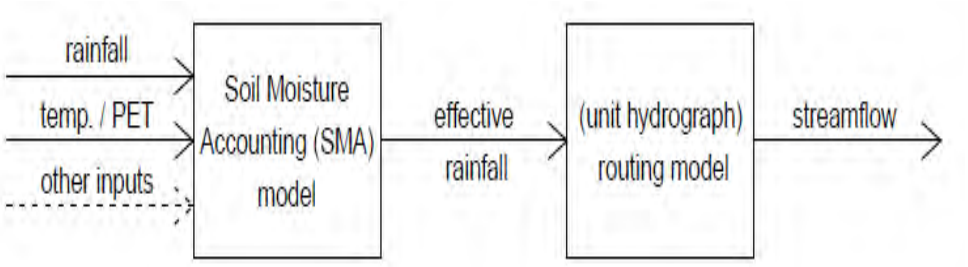
- ECMWF primary data source (1.5 x 1.5, 41 members, seven monthly)
- Monthly and Seasonal Forecast tool (ensemble) climate zone wise
- Other GCMs are include for multi model ensemble forecast (NCEP, GFDL)
- Updated monthly





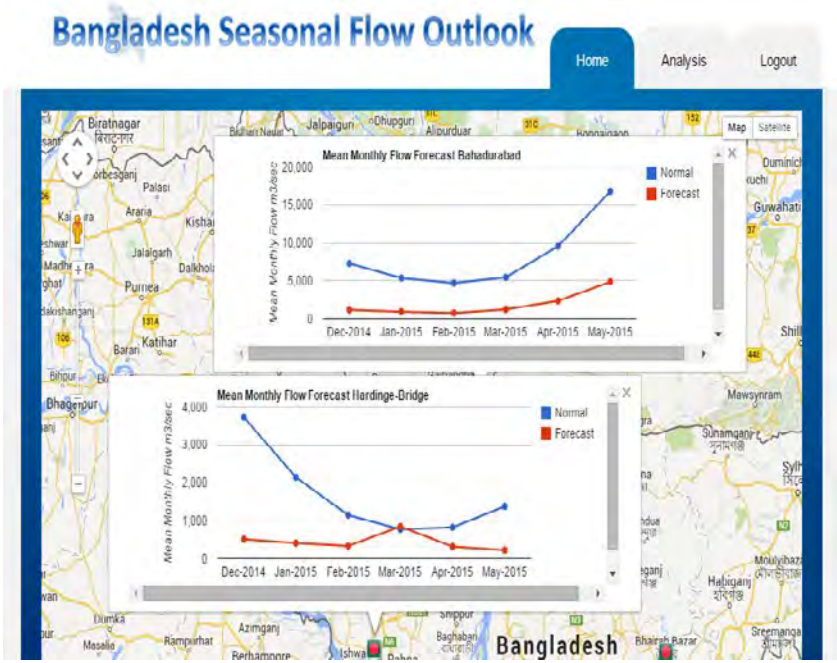
Seasonal climate information into hydrological models

- Seasonal flow outlooks were derived from ECMWF's 7 months forecasts of 41 ensemble members.
- The seasonal ensemble forecasts of precipitation and temperature were extracted for Ganges and Brahmaputra basins.
- At each grid point, mean ensemble precipitation and temperature values were computed. Then mean basin precipitation and temperature values were computed taking the grid average covering the Ganges and Brahmaputra basins.
- This basin average precipitation and temperature forecasts were then used in the hydrological model to generate seasonal flow outlook for Ganges and Brahmaputra Rivers for three month lead time



Monthly and Seasonal Flow Outlook [Aug 2015 - Oct 2015]

Station	Latitude	Longitude	Mean Monthly Flow (m3/s)						Mean Seasonal Flow (m3/s)	
			Aug 2015		Sep 2015		Oct 2015			
			Normal	Forecast	Normal	Forecast	Normal	Forecast	Normal	Forecast
Bahadurabad	25.1655	89.7330	45,409	22,016	39,362	19,805	26,517	12,080	37,096	17,967
Hardinge Bridge	24.0658	89.0264	36,219	25,124	36,634	32,025	14,962	16,104	29,272	24,418



Seasonal Forecasts – capacity building

- Working mainly in Sri Lanka.
- 2 weeks training on the components at RIMES – Sri Lanka, Myanmar, Bangladesh
- Customized tools have been transferred to DoM and back up support is being provided regularly.
- Detailed operational manual for the tool is developed for ease-of-use

Strengthening Capacities for Risk Information Application to Reduce Disaster Risks Project funded by UN ESCAP

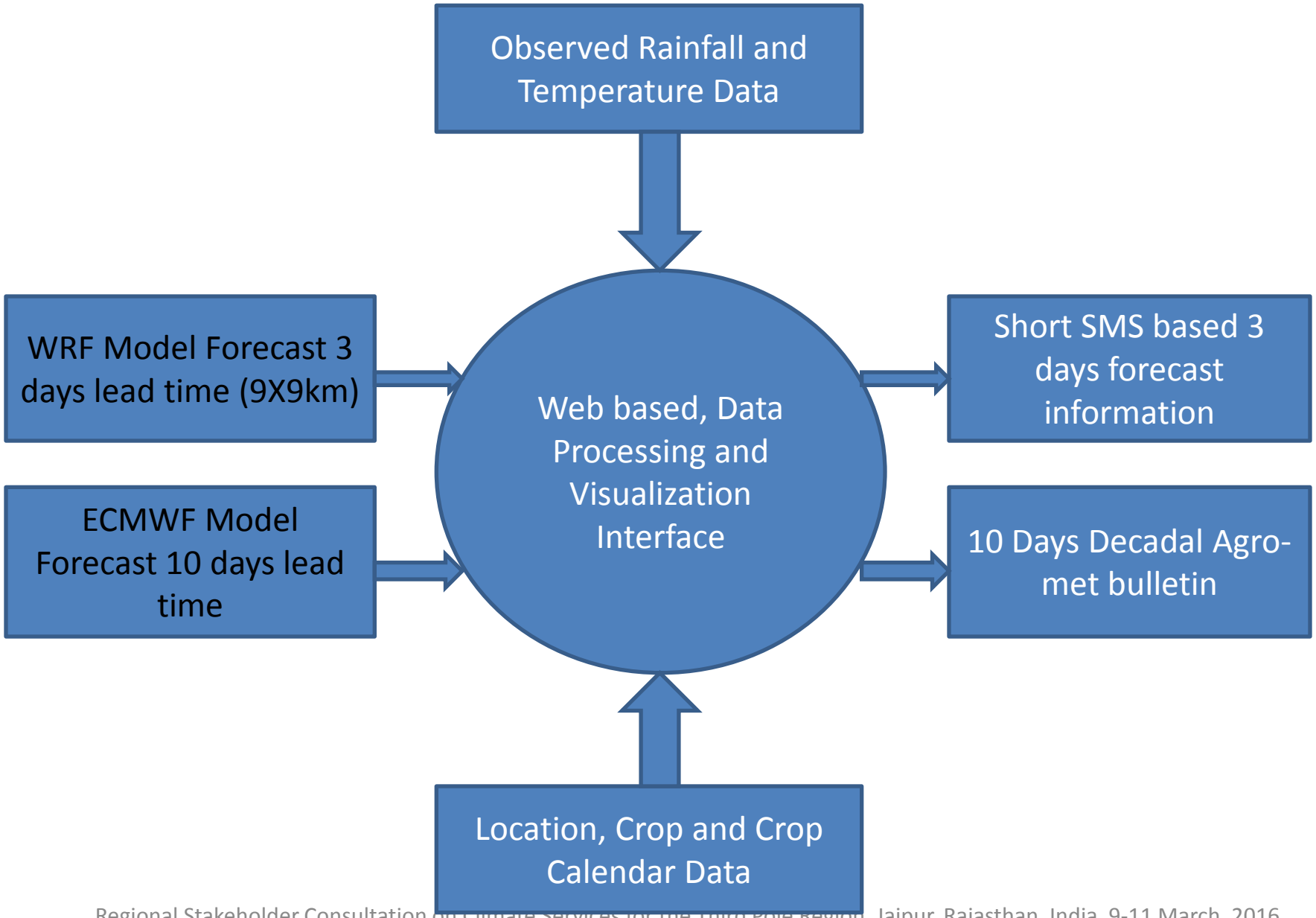
a) Support National meteorological and hydrological services (NMHSs) in customizing regional climate projections;
b) Assist Sectoral users on interpretation and application of customized climate projections for risk analysis;

Our experience: user agencies need support with interpretations of scenarios; guidance and help in relating such information (along with its uncertainties/confidence levels) to their specific decision making contexts

Clarify limitations and encourage "best use"

- Involve planning departments for integrating risk-informed adaptation into the development planning process,
- pilots in Myanmar, Pakistan, and Sri Lanka, countries with robust Monsoon Forums;
- where users have demanded for these products and capacity building services and where NMHSs have requested RIMES to assist in responding to these demands.

- Work on collaborative project in countries and the region to bring in the best science knowledge for climate risk management
- Help transform regionally down scaled CC projects into more user friendly products and encourage proper use and interpretation of CORDEX data in the region
- R2O (Research to Operations)


Observed Rainfall and Temperature Data
WRF Model Forecast 3 days lead time (9X9km)
ECMWF Model Forecast 10 days lead time
Web based, Data Processing and Visualization Interface
Short SMS based 3 days forecast information
10 Days Decadal Agro-met bulletin
Location, Crop and Crop Calendar Data

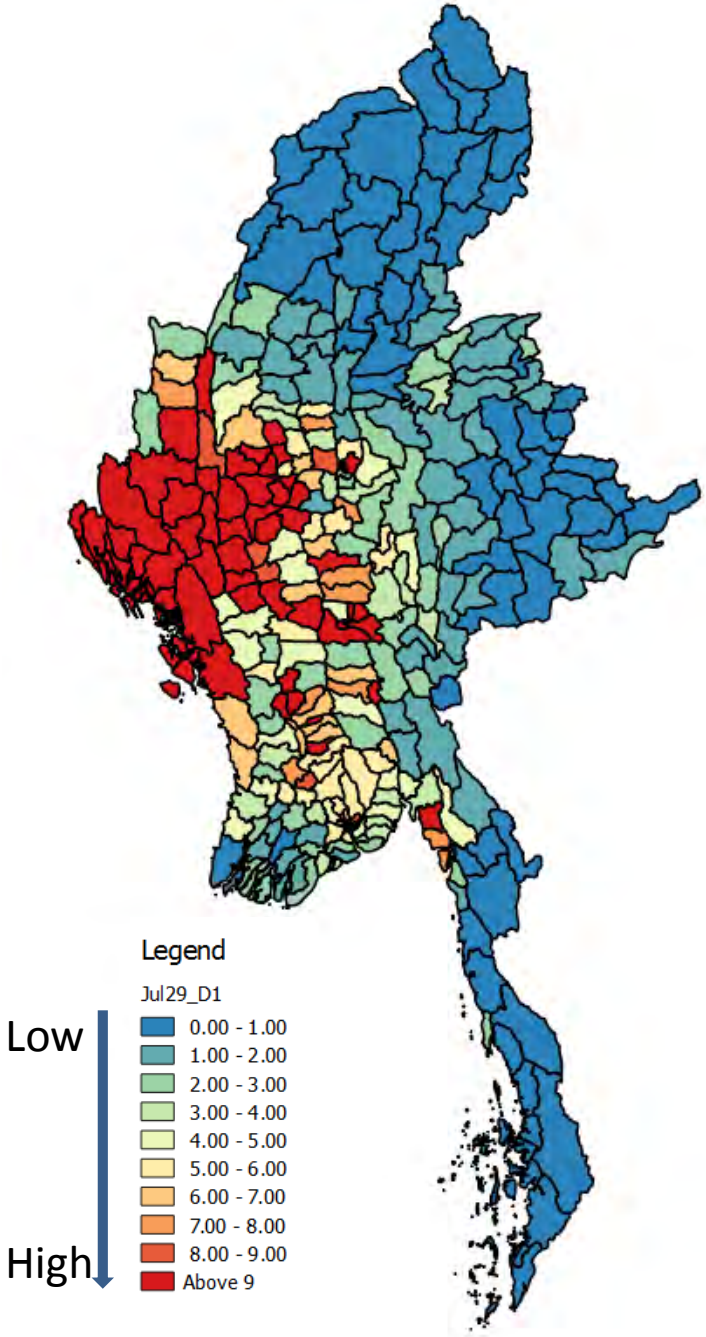


Figure 1: Risk Map based on Day 1 WRF forecast data of 29th July 2015

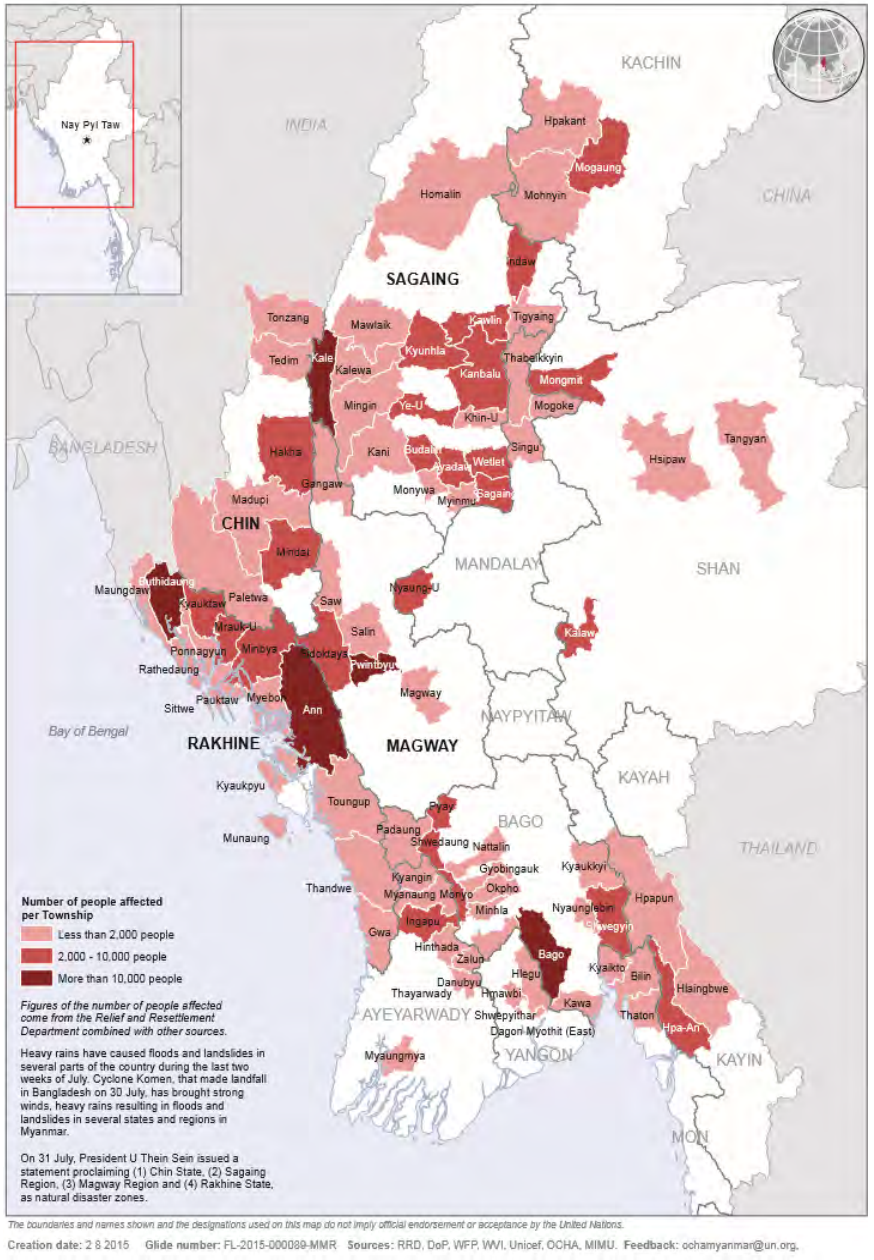


Figure 2: Map of flood affected areas of Myanmar during Komen cyclone, Map: OCHA

- **CC impact & vulnerable sectors** are
  - Water resources
  - Forests
  - Health
  - Agriculture & livelihood

Government of Manipur
Directorate of Environment

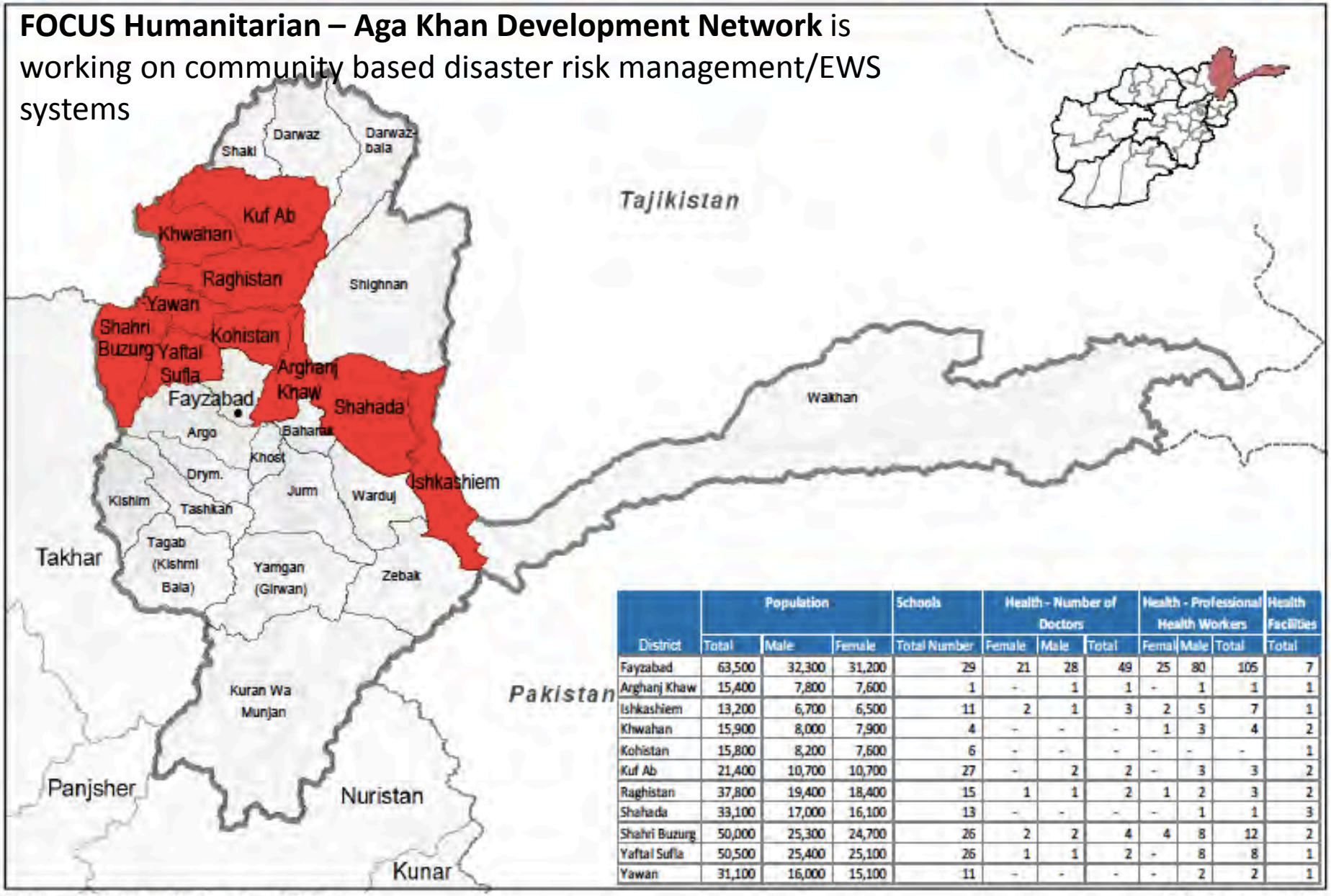
Problem Statement

- **vulnerable** Himalayan **Ecosystem**
- high **natural resource** dependency
- unique ecology and **rich biodiversity**
- **Deficit** in (reported by DoNER)
  - Infrastructure
  - Basic needs
  - Resources
  - Governance

Districts Affected by Avalanches - Badakhshan Province 19 Jan. 2012

OCHA

FOCUS Humanitarian – Aga Khan Development Network is working on community based disaster risk management/EWS systems



District	Population			Schools	Health - Number of Doctors			Health - Professional Health Workers			Health Facilities
	Total	Male	Female	Total Number	Female	Male	Total	Femal	Male	Total	Total
Fayzabad	63,500	32,300	31,200	29	21	28	49	25	80	105	7
Arghanj Khaw	15,400	7,800	7,600	1	-	1	1	-	1	1	1
Ishkashiem	13,200	6,700	6,500	11	2	1	3	2	5	7	1
Khwahan	15,900	8,000	7,900	4	-	-	-	1	3	4	2
Kohistan	15,800	8,200	7,600	6	-	-	-	-	-	-	1
Kuf Ab	21,400	10,700	10,700	27	-	2	2	-	3	3	2
Raghistan	37,800	19,400	18,400	15	1	1	2	1	2	3	2
Shahada	33,100	17,000	16,100	13	-	-	-	-	1	1	3
Shahri Buzurg	50,000	25,300	24,700	26	2	2	4	4	8	12	2
Yaftal Sufla	50,500	25,400	25,100	26	1	1	2	-	8	8	1
Yawan	31,100	16,000	15,100	11	-	-	-	-	2	2	1

Data Source: AIMS, CSO, OCHA Northern Region Field Office

Disclaimer: *The designations employed and the presentation of material on this map do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area or of its authorities or concerning the delimitation of its frontiers or boundaries.*

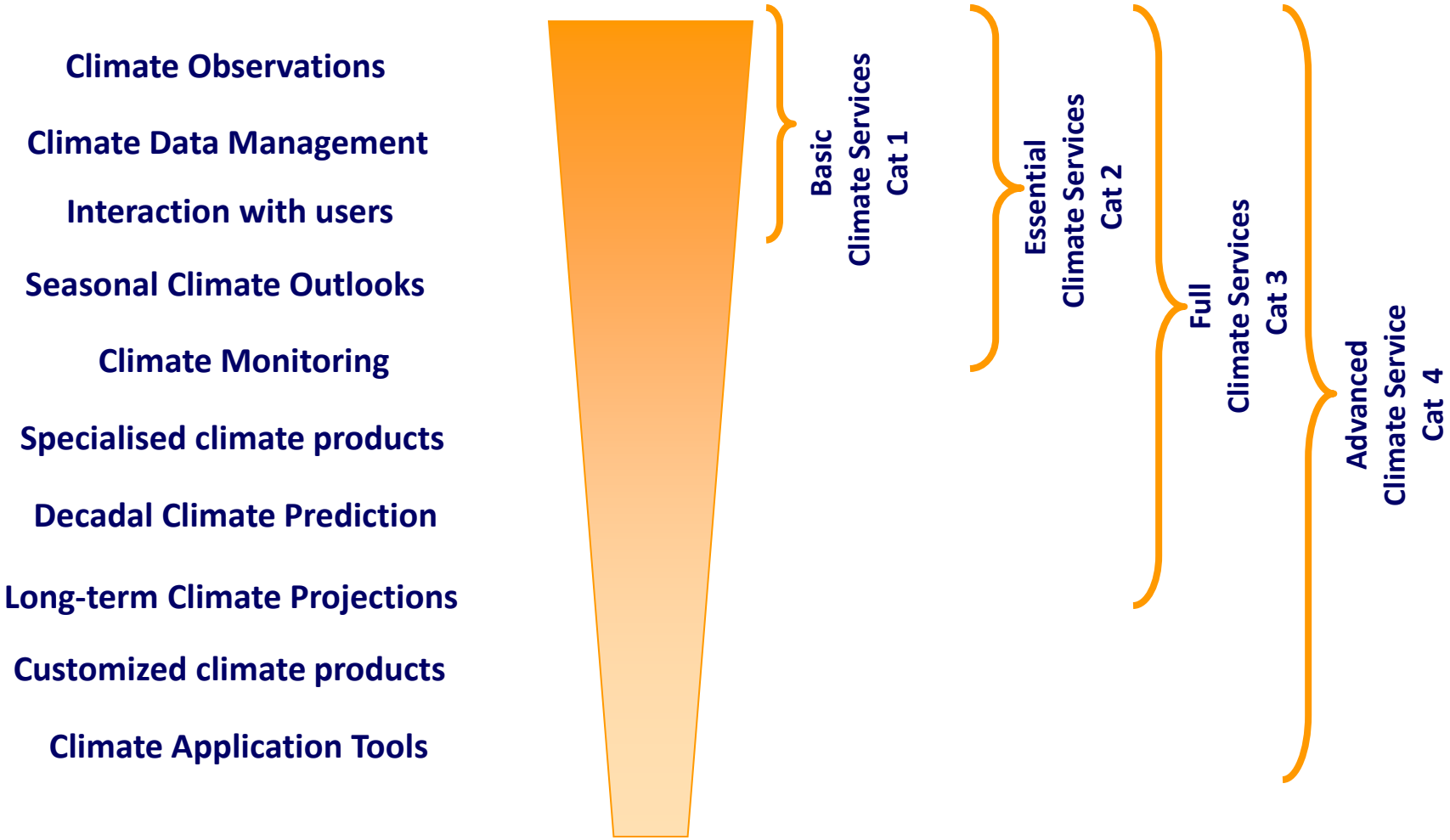
Date: 19 Jan 2012, 21:00 hrs
Author: OCHA IMU
Office: Kabul

In Conclusion

- *Identify distinctive aspects of climate services requirements of the Third Pole Region (3PR) – Agriculture, biodiversity, ecosystem services ..*
- *Disaster risks – focus*
- *Network of institutions that can support context specific interventions to enhance climate services in the 3PR*
- *Supporting observations, monitoring, science to enhance relevance and quality for iterative Climate risk management to enable sustainable progress*
- *RIMES: willingness to collaborate and support – already started working on a WMO GFCS project for South Asia*

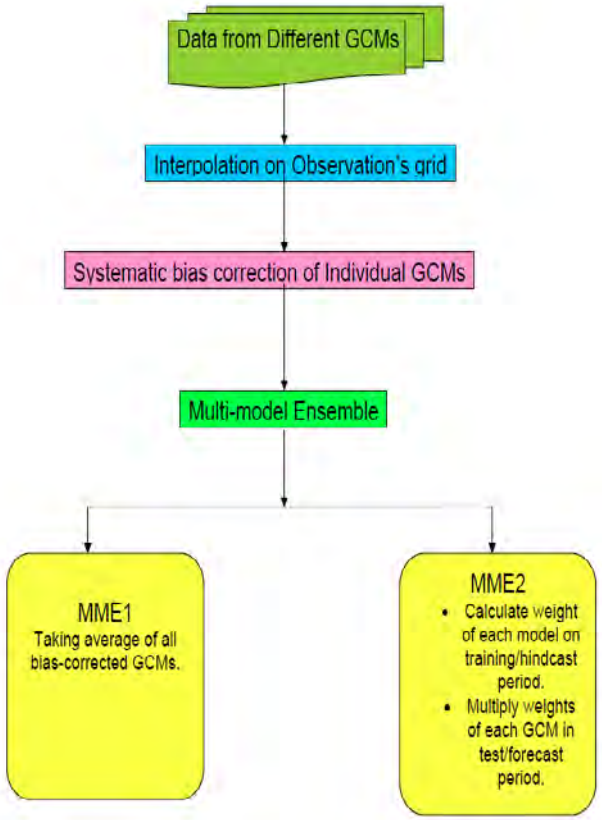
…thank you

Categories of Infrastructural Capacities



Model Setup

- **Multi model Ensemble forecasting**
- The MME forecasting consists of four modules in which various techniques are used to generate the monthly/seasonal forecast.
  - MME1 (Simple mean forecast)
  - MME2 (Weighted average Forecast)
  - PCR (Principal Component Regression Analysis)
- Final Probabilistic Forecast for each zones
- A “predictand” and “Predictor” based model



SELCTED GCMS

Model	Resolution	Ensemble Members	Extent/Lead	Reference
CCM3.6	2.8125°x2.7893 27°	**24**	**Regional/Six month**	**Van den Dool, H.M., 1994**
COLA	1.875°x1.86467 8°	**10**	**Regional / Six month**	**Schneider, E. K., 2002**
GFDL	2.5°x2.0°	**10**	**Regional / Six month**	**Anderson, J. L., et.al, 2005:**
ECHAM5	2.8125°x2.7893 28°	**24**	**Regional / Six month**	**Roeckner, E., et.al, 2006**
ECMWF	1.5° x 1.5°	**41**	**Regional / Seven month**	**Gregory et al. (2000), Wolff et al. (1997)**
CFSv2	1.0° x 1.0°	**24**	**Regional / Nine month**	**Saha et.al, 2010**