



3rd Joint Session of the WMO/ESCAP Panel on Tropical Cyclones and ESCAP/WMO Typhoon Committee (Bangkok, Thailand from 9-13 February, 2015)

Summary of PTC Members' reports (WRD/PTC-TC_3JS/3.2)

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P R of Pakistan with WMO

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Website: <http://www.ptc-wmoescap.org>



WMO/ESCAP Panel on Tropical Cyclones for the Bay of Bengal and Arabian Sea



During the inter-sessional period, the NMHSs of PTC Member Countries as well as their respective DMO's took number of initiatives having considering them as their national responsibilities to provide services in the fields of meteorology, hydrology, Strengthening of Early Warning Systems & promotion of DRR activities.

- **Strengthening of Early Warning System by up-grading and installing new equipments.**
- **Enhanced Cooperation/assistance of international organizations like JICA, ICIMOD, UNESCO, Norwegian Met Institute, World Bank towards improving the services and products of NMHSs.**
- **Capacity building of Met, hydro and DRR personnel**
- **Promotion of research activities**

Country Report - Bangladesh



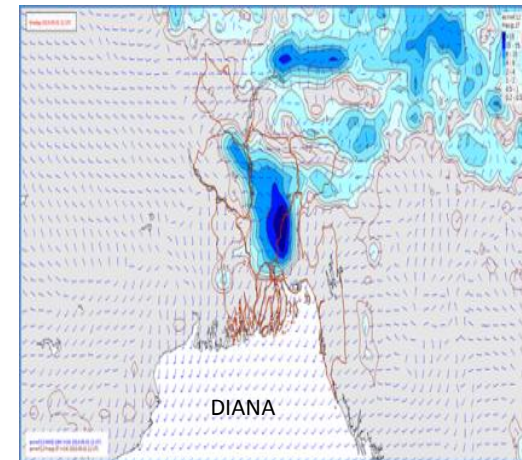
Cyclone Activity

No direct impact of tropical cyclone during 2014. However, under the peripheral effect of VSCS **Hud Hud** moderate to heavy rainfall occurred in many places over Bangladesh. Extreme rainfall June submerged most of the parts of the Chittagong city.

Meteorological Component

DIANA (Digital ANALysis)

BMD implemented DIANA under the project "Institutional support and capacity building for mitigation of weather and climate hazards in Bangladesh" between BMD and Norwegian Meteorological Institute. With the help of this sophisticated software (DIANA) high resolution (15 Km) ECMWF model products can be visualized.





Hydrological Component

In Bangladesh the Flood Forecasting and Warning Centre (FFWC) of Bangladesh Water Development Board (BWDB) is responsible for flood monitoring /forecasting and warning services. **Through the establishment of Radar at the northeastern part of Bangladesh, FFWC is being connected by VSAT link to get all the radar information for flood and flash flood.** Human Capacity Development training will be imparted to FFWC for radar data calibration and its utilization by JICA.

DRR Component

The government intends to implement the provisions of the National plan for disaster Management, 2010 (Section 10: Disaster Management Regulatory Framework, section 11: Disaster Management plans, and standing order Disaster, 2010) in the form of Response Plan for Cyclone Season. **This response plan aims at eliminating or mitigating the cyclone risk by undertaking coordinated activities for the prevention of, preparation for, response to and recoveries from the impact of cyclone.**



Training

- Two (02) BMD officers attended the “WMO International Workshop on Dvorak Technique and Tropical Cyclone Forecasting” at Muscat, Oman.
- Three (03) BMD officers participated in the “Meteorological Data Visualization” in Thailand.
- Two (02) BMD personnel attended the “ICTP-IITM-COLA Targeted Training Activity (TTA): Challenge in Monsoon Prediction” at Trieste-Italy.

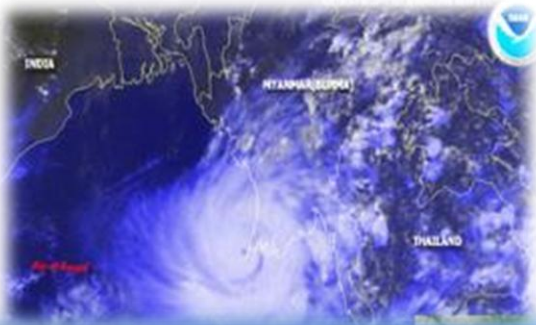
Research

Research/studies have been carried out and published in following journal/newsletters.

- THE ATMOSPHERE: A Scientific Journal of Meteorology and Geo-Physics, Bangladesh Metrological Department , July 2014, Volume 4, Number 1, ISSN 2311-468X
- NEWSLETTER VOL.4, ISSUE 1 & 2

Country Report - Myanmar

Disaster Profile of Myanmar



Multiple hazards threaten to Myanmar:

- Fire
- Forest Fire
- Drought
- Cyclone
- Storm surge
- Tsunami
- Flood
- Landslide
- Earthquake





Meteorological Component

Weather Summary

- There were 16 low pressure areas formed over the Bay of Bengal, intensified further into 5 Depressions and one Tropical cyclone given named "Hud Hud".
- **SW Monsoon** established into Southern Myanmar on **17th May** and **retreated from the whole Country on 13th October, 2014**. The monsoon intensity was moderate to strong with regional heavy falls in lower Myanmar areas and isolated heavy falls in Upper Myanmar.
- **In 2014, whole country received about normal rainfall but most parts of the country were above normal in late monsoon period.**
- Heaviest total rainfall was observed (**290.50 inches**) at Launglon station in coastal area of Southern Myanmar
- Highest maximum temperature was (**44.3°C**) at **Mawleik station** (48088) on 25th April 2014.
- Lowest minimum temperature was (**-2 °C**) at **Hakha station** (48030) on 20th December 2014.



Ongoing Activities under Technical / Grant-in-Aid Assistance and Future Plan of Meteorological Division, DMH

- JICA under its technical cooperation project “**Establishment of End-to-End Early Warning System (2013-2017)**” is assisting DMH and Relief and Resettlement Department (RRD) in strengthening its EWS.
- The project for Establishment of Disastrous Weather Monitoring System is another ongoing program being implemented by JICA (2014-2017).
- UN-ESCAP-RIMES project “**Strengthening of Myanmar Multi hazards Early Warning System**” during (June 2013-Nov 2014) and **Strengthening Capacity Development Program** with Norwegian Meteorological Institute and ADPC are also being executed.



Continued.....

- JICA, installed three (03) Storm detecting Radars at Yangon, Mandalay and Kyaukpyu.
- Installation of 30 AWS-Systems.
- Technical Cooperation program for the **development of Forecasting by Numerical Weather Prediction Techniques** with the support of Norwegian Meteorological Services has been carried out since March 2014.
- DMH transmits (13) more SYNOP observation stations to the GTS w.e.f. 1st April, 2014.
- DMH installed Automatic Water Level Monitoring System(Telemetry) at five stations along the five major rivers.



Capacity and Partnership Building at DMH during 2014



13th National Monsoon Forum, Nay Pyi Taw, (18-20, Nov. 2014), RIMES

Capacity and Partnership Building at DMH during 2014



Farm School workshop (23-26 September 2014) (RIMES, DMH & DOA)

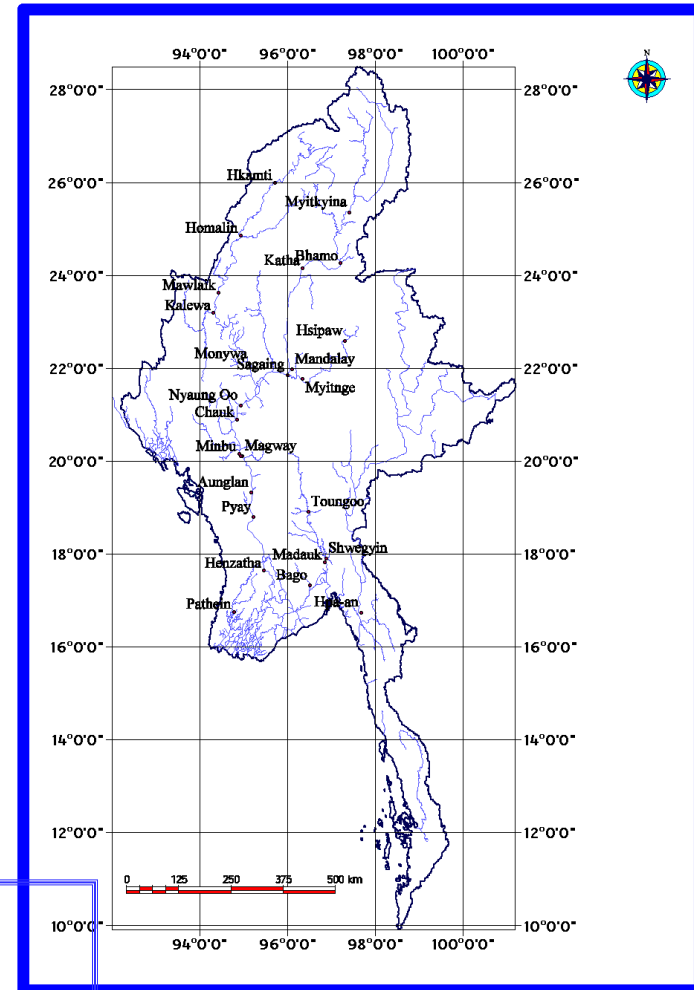
Training on RClimdex, Climsoft supported by Norwegian Meteorological Institute



Hydrological Component

- During the monsoon, flood occurred **one time** at Homalin, Mawlaik and Kalewa on Chindwin river, at Nyung Oo, Hinthada and Zalun on Ayeyarwady River, and at Bago on Bago River and;
- **Two times** at Ngathaing Chaung on Nagwun River ;
- **Four times** at Madauk on Sittoung River and Hpaan on Thanlwin River respectively.

Ayeyarwady	- 15 Stations
Chindwin	- 5 Stations
Sittaung	- 2 Stations
Thanlwin	- 1 Station
Dokethawady	- 2 Stations
Bago	- 2 Stations
Shwegyin	- 1 Station
Ngawun	- 2 Stations



Flood in Myanmar in 2014



Bago Flood in Bago river



Ngathaing Chaung flood in Ngawun river



2014 Flood - Hpaan Flood in Thanlwin River



Country Report – Sri Lanka



Hydrological Component

☐ strengthen 'Hydro-meteorological information System (HMIS)' of the country

During the latter part of the year 2013, the Government of Sri Lanka launched a project 'Hydro-meteorological information System (HMIS)' of the country. The main objectives of the project are :

- 1). Modernization and upgrading of the country's hydro-meteorological data collection and processing system,
- 2). Acquisition of real time data and implementing flood forecasting and early warning system.
3. Implementation of a robust and modern hydrological database of the country,
- 4). Enhancement of capacity of key government agencies to undertake surface water monitoring, analyzing necessary information.

Under this project, 122 hydrometric stations with modern instruments and satellite communication facilities are being established. Central Data Center has been established at the Hydrology Division in Colombo.

☐ One major flood was recorded in a major river basin called 'Kalu Ganga' during June 2014.



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Training

One meteorologist of the department is currently receiving post graduate training at University of Philippines under the fellowship of WMO and one meteorologist has returned after the completion of MS degree in meteorology at the University of Philippines. The representatives of the Sri Lanka Department of Meteorology participated in different meetings/conferences/training workshops which were organized mainly by WMO, UNESCAP, China, Korea, India etc.

In addition, scientific and engineering staff members also participated in short period training programmes organized by JICA, KOICA, RIMES, ADPC, and SMRC. Two training workshops were also conducted for meteorological technicians under Continual Education and Training for newly recruited trainee grade meteorological technicians was started in 2013, and the programme is continued.



Research

Scientists of the Department of Meteorology, Sri Lanka conducted the following research studies during 2014:

- Case Study: Monitoring of Monsoon Flooding in Eastern Sri Lanka Using ALOS PALSAR Data
- A comparative study on cloud radiative forcing over Sri Lanka and Indian monsoon region.
- The Influence of La-Nina on Sri Lankan rainfall.
- Community Base Vulnerability Mapping for Lightning Strikes in Sri Lanka.
- Drought Monitoring in Sri Lanka using Standard Precipitation Index (SPI).
- Develop Climate Scenarios using PRECIS for the period 2000-2030, 2030-2060 and 2060-2090.
- Climate Zonation of Sri Lanka using Rgui Statistical Software.
- Simulation of squall type winds approaching western and southern coasts of Sri Lanka on 8 June 2013 using WRF Model.
- WRF Simulation for Unexpected Heavy Rain and Strong Winds over Sri Lanka on 01st June 2014.

COUNTRY REPORT – PAKISTAN



Review of Cyclone Activity

During 2014, two cyclonic disturbance occurred in the Arabian Sea. However, Pakistan was not directly effected by these TCs.

1. Tropical Cyclone NANAUK that originated in the eastern central Arabian sea during 2nd Week of June 2014. PMD closely monitored the track of the TC and issued 3 weather advisories.
2. Very Severe Tropical Cyclone “Nilofar” that originated in the south-east Arabian Sea. PMD closely monitored the track of the cyclone and issued 11 Weather advisories.

Meteorological Component

❑ **Signing of Letter of Agreement between PMD and UNDP**

A Letter of Agreement (LoA) was signed between the UNDP and Pakistan Meteorological Department (PMD) for strengthening the “Early Warnings Dissemination during Upcoming Monsoon Season” under the Supporting Community Resilience (SCORE) Project”.

❑ **“Establishment of Specialized Medium Range Weather Forecasting Centre (SMRFC) and Strengthening of Weather Forecasting System in the Islamic Republic of Pakistan”.**

Government of Pakistan has recently approved the project SMRFC worth **about Rs. 2.5 billion under Japanese grant-in-aid assistance**. Out of the total project cost, the share of **Government of Japan is around 97.5 %**.



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Implementation of Quality Management System for Provision of Meteorological Service for Air-Navigation (ISO 9001: 2008 Certification)

As per WMO and ICAO requirements, PMD started implementing QMS at its Meteorological Offices in the country. Up to 2013, only 2 Met Offices at Karachi and Lahore Airports got ISO 9001:2008 Certification. However, during 2014, fifteen (15) more Met Offices at different airports have got this certification, making the total 17.

Numerical Weather Prediction at PMD

PMD has been running COSMO (Consortium for Small-scale Modeling) a Non-hydrostatic model as an operational tool for Numerical Weather Prediction since 2013. COSMO operates daily for 3day at (00UTC) and 2day at (06UTC).

- Driven with initial conditions from GME (Global Model of DWD, Germany)
- Model horizontal resolution : 14 Km
- Using high performance computing cluster system of 184 cores.



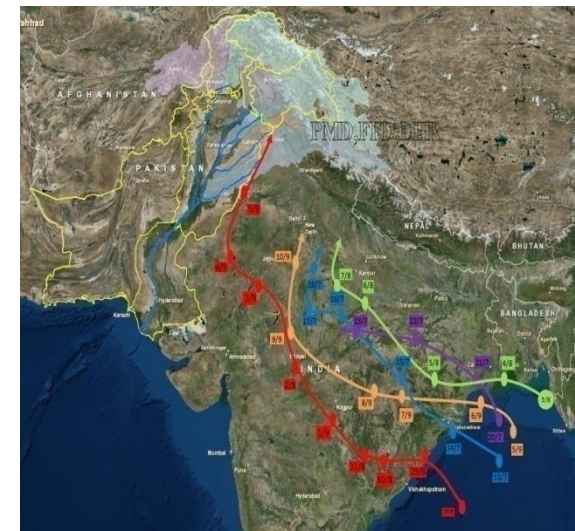


Hydrological Component

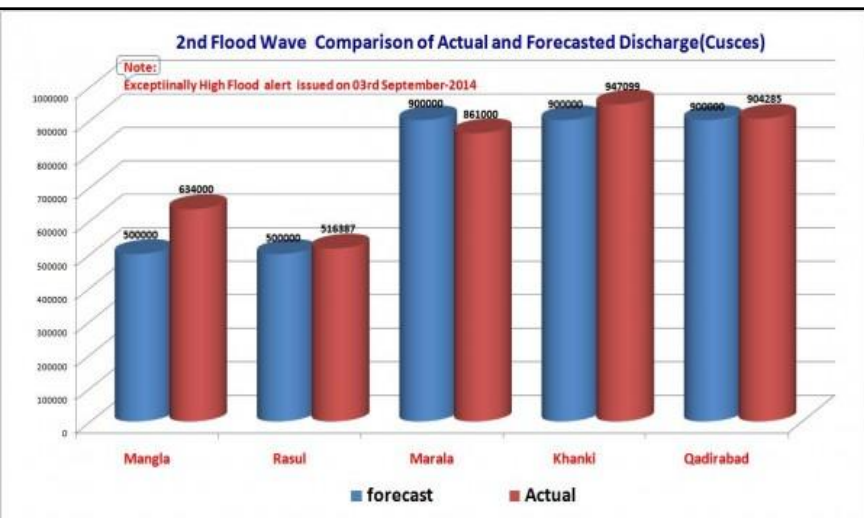
☐ September 2014 Flood in Pakistan

During the first week of September, 2014, the monsoon provided torrential rainfall over Northeast Punjab, Kashmir & Catchments of Jhelum, Chenab and eastern rivers which caused exceptionally high flooding in river Chenab and Jhelum alongwith Nullahs of river Ravi and Chenab. The severe flooding effected many parts of the country.

The monsoon rainfall / flood generating system was very well predicted by PMD in advance and the disaster management agencies were well prepared and responded appropriately.



September 2014 Flood in Pakistan



Province	Location	Total Rainfall (mm) September 2014	Normal Monthly Rainfall (mm)
Punjab	Islamabad A/P	416.3	110.7
	Islamabad ZP	438.3	123.3
	Jhelum	239.1	65.4
	Lahore A/P	564	74.6
	Lahore PBO	451.1	60.4
	Murree	302	130.9
	Sialkot Cantt.	551.2	---
	Sialkot A/P	472.1	89
	Toba Tagh Singh	113	---
AJK	Astore	102.1	20.9
	Kotli	487.1	84.3
	Muzaffarabad	172.1	109.6
	Rawalakot	547.2	---

Province	Deaths	Injured	Houses Damaged	Villages Affected	Population Affected	Persons Evacuated
Khyber Pakhtunkhwa	12	15	42	0	0	0
Punjab	286	512	100000 approx.	3484	2470000	618347
Azad Kashmir	56	111	5768	187	46979	0
Gilgit-Baltistan	13	35	1292	127	13266	0
Sindh	0	0	0	267	0	65583
Total	367	673	107102	4065	2530245	683930

Detail of damages and life losses



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❑ UNESCO Project “Strategic Strengthening of Flood Warning and Management Capacity of Pakistan”

The UNESCO in collaboration with JICA started implementation of the project **“Strategic Strengthening of Flood Warning and Management Capacity of Pakistan”** in January 2012 in order to strengthen the flood early warning capability and management capacity of relevant organizations in Pakistan to effectively cope with such hydrometeorological disaster risk reduction challenges in the country in future. The project concluded in June, 2014 and the main components of the project were:

- Strategic Augmenting of Flood Forecasting and Hazard Mapping
 - Knowledge Platform for sharing Transboundary and Community data
 - Capacity Development for Flood Forecasting and Hazard Mapping
- Two international workshops were held in Lahore in July 2012 and December 2013 in which more than 70 international and local scientists participated.
- The Indus-IFAS was got developed by ICHARM and JAXA Japan and in collaboration with PMD. This model alongwith RRI (Rainfall Runoff Inundation) model was handed over to PMD’s Flood Forecasting Division (FFD) based at Lahore.



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Continued.....

- Two Media Centres were established at FFD-Lahore and Met Headquarters, Islamabad.
- Four (04) PMD personnel completed their MS degree at ICHARM, Japan while 3 personnel did their Masters in GIS and Remote Sensing.
- ❑ **Establishment of Regional Flood information System in the Hindu Kush Himalayan Region (HKH-HYCOS)**

The ICIMOD has been implementing this project “Establishment of Regional Flood Information System in the Hindu Kush Himalayan Region (HKH-HYCOS)” in order to promote regional cooperation in flood risk reduction and to cope with flood related disasters in future.

Under this project, three (03) AWS (Automatic Weather Station) have been installed for sharing of Meteorological parameters among “ICIMOD” Member countries via a website <http://hkhhycos.pmd.gov.pk>



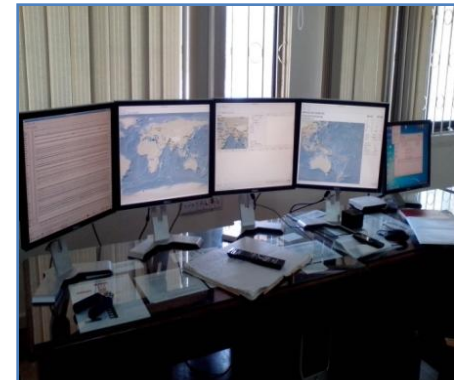
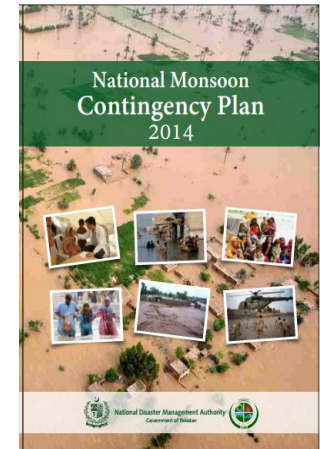
DRR Component

National Monsoon Contingency Plan 2014

National Disaster Management Authority (NDMA) of Pakistan prepared National Monsoon Contingency Plan July-September 2014.

Post-exercise Report on “IOWave14”

An Indian ocean-wide exercise was organized by IOC/UNESCO held on 10th September, 2014. 24 countries including Pakistan which are all part of Indian Ocean Tsunami Warning System (IOTWS) were invited to take part in the exercise.





Training and Research

- During 2014, 3 PMD scientists were proceeded abroad for undertaking Ph.D in Meteorology at King Abdulaziz University, Saudi Arabia, while 2 for undertaking MS in Hydrology and Water related Disasters at ICHARM, Japan.
- whereas 12 PMD scientists are already doing their Ph.D in Meteorology in different countries such as Germany, USA, China, Hong Kong, Korea under fellowship opportunities offered by these countries.

During 2014, around 64 fellowships were availed by PMD scientists for attending short-term trainings/ workshops/ seminars abroad. These fellowships were offered mainly by WMO, ICIMOD, ICTP, IOC-UNESCO, CMA, JICA, JAXA, NARBO, UNESCO, UN-ESCAP, SMRC, APCC Korea etc.

- ❑ **AWCI Training Workshop on Assessment of Climate Change Impact on a Watershed Hydrology including Hydrological Modeling in Cold Region Basins**

The University of Tokyo, Japan in collaboration with PMD under the kind support of Asia-Pacific Network for Global Change Research (APN) organized the Asian Water Cycle Initiative (AWCI) Workshop on "Assessment of Climate Change Impact on Watershed Hydrology including Hydrological Modeling in Cold Region Basins".



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The workshop aimed at enhancing the capacity of young professionals on improved techniques for climate change assessment.

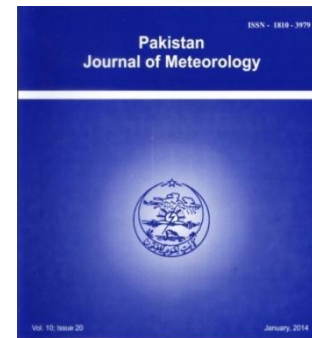
More than 45 participants/trainees from various national organizations, academia, and participating Asian Nations representing Bangladesh, Bhutan, Indonesia, Korea, Malaysia, Myanmar, Nepal, Philippines, Sri Lanka, Thailand and Vietnam, attended the training workshop.



Research/Publication

A number of Research work/small projects related to forecasting techniques, climate change, climate modeling, downscaling for seasonal and monthly prediction, NWP modelling, were also carried out.

PMD published two issues (No. 19 and 20) of “Pakistan Journal of Meteorology”. These issues contain 15 research papers.



Country Report - Thailand



Review of Tropical Cyclone

During 2014, Thailand was **not directly affected by tropical cyclones**. However, there were some tropical cyclones originated in the Western North Pacific Ocean and South China Sea namely: **typhoon “RAMMASUN (1409)”**, typhoon **“KALMAEGI (1415)”** and **tropical storm “SINLAKU(1421)”** indirect influenced on the weather in Thailand.



Meteorological Component

1. Two new Dual Polarization Doppler weather Radar systems were completely installed at **Sakon-nakhon** and **Narathiwat stations**. Doppler Weather Radar systems is in progress at **Donmoung airport** in Bangkok and in **Khonkean province** and expected to be completed in 2015.
2. **TMD in cooperation with Japan organized Regional Training Workshop on Weather Radar Basis and Routine Maintenance and real-time Radar Rainfall Estimation and Forecasting in Bangkok** in which 20 participants from 7 ASEAN countries attended the workshop. One expert each from JMA, Japan Radio, WMO were also invited to impart training.
3. The **South East Asia Meteorological Telecommunication Center, RTH Bangkok**, at TMD, has been upgraded to support both new format, TDCF (Table Driven Code Form), and old format, TAC (Traditional Alphanumeric Code) to be exchanged in GTS network.
4. HF Radars were installed at 6 sites to **measure wave and current in the Gulf of Thailand**. **Long-range HF Radars** were also installed in Andaman Sea in order to detect tsunami .



Meteorological Component.....

5. **New meteorological broadcast for shipping system was installed for dissemination of sea-area warnings, forecasts and coastal reports.**
6. The progress of WIS implementation for Bangkok DCPC is in process of being an official WIS Center. All necessary documents were submitted WMO for evaluation. The expected full operation of Bangkok DCPC will be started during some time in 2015.
7. Ocean meteorological disaster warning system was created by the Marine Meteorological Center (MMC) of TMD to increase more efficiency of wind-wave prediction and the ocean current prediction in the Gulf of Thailand and Andaman Sea.
8. 14 AWS stations were installed by MMC along the coastline.
9. The GTS is being used for international exchange among meteorological/hydrological organizations, satellite data centers and numerical weather prediction centers is implemented essentially through dedicated telecommunication means.



Meteorological Component.....

11). Aeronautical meteorological systems were installed in many airports. Some other installations had been implementing during 2014-2015 for aviation service as the following.

- Four new Automated Weather Observing Systems (AWAS) were completely installed.
- One upgraded Automated Weather Observing System (AWAS) to Low Level Wind Shear Alert System (LLWAS).
- Low Level Wind Shear Alert System (LLWAS) were installed at two airports. Installation of LLWAS at two more airports is in progress and expected to be completed in 2015.

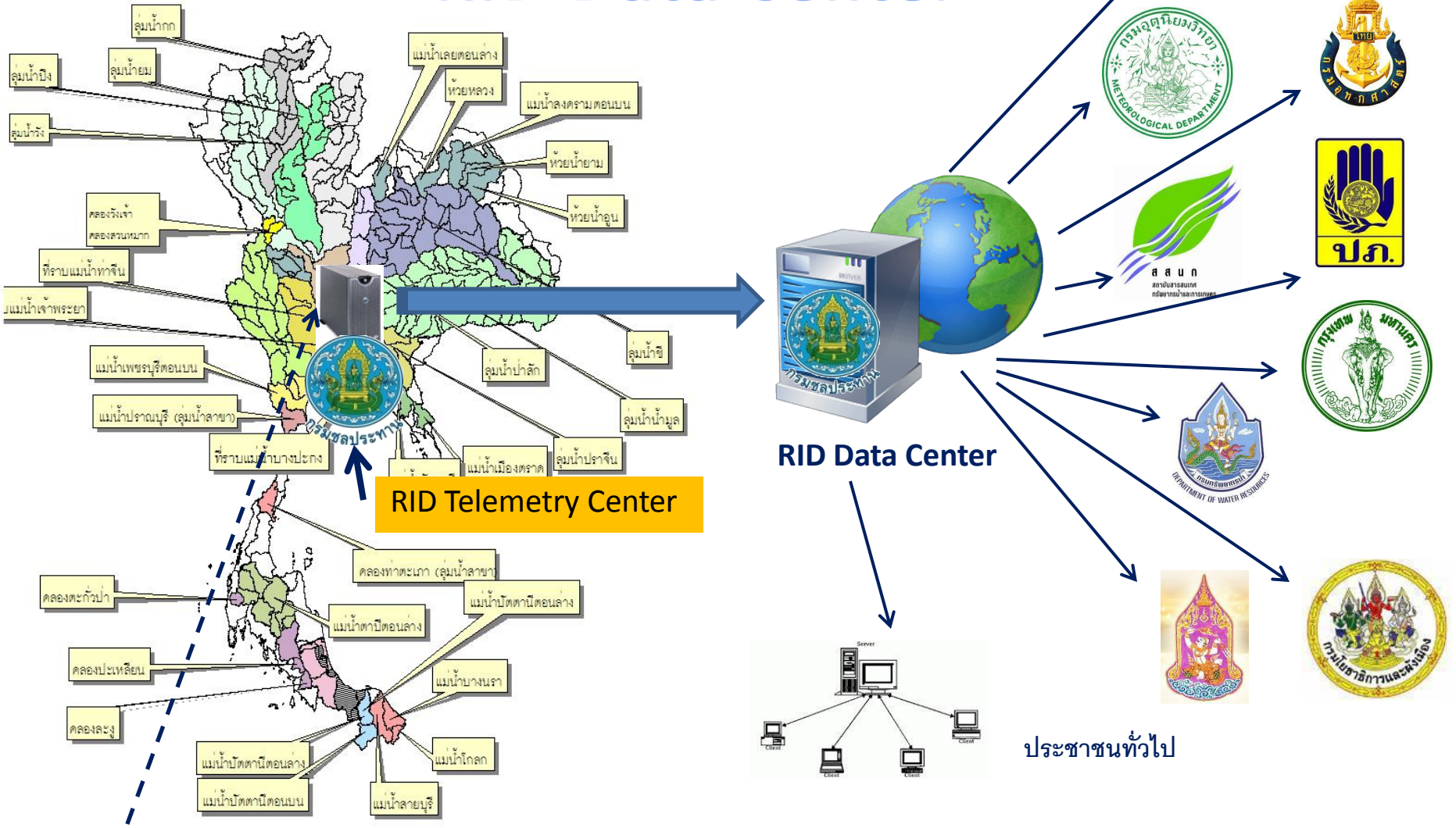
Hydrological Component

The Royal Irrigation Department (RID):

- There are 25 main River Basins in Thailand and RID has established monitoring system on 23 river basins out of 25. For flood forecasting and real-time hydrological data acquisition, RID network across the country is supported by:

- 517 manual river gauges
- 2,294 manual rain gauges
- 710 telemetric stations
- 430 telemetric micro stations

RID Data Center



Water Data (Water level, Rainfall, Flow) are Sending every 15 minute with Automatic Real Time from the 23 river basin of telemetry systems (Thailand has 25 river basin)

The committee for monitoring and analysis of water situation



Duties :

- 1) to coordinate and exchange information of climate, rainfall, runoff and water operation
- 2) to analyze and forecast future situation for water management





DRR Component

Department of Disaster Prevention and Mitigation (DDPM) is the main focal national agency of Thailand responsible for disaster management.

Disaster Risk Reduction Achievements / Results

- Strategic plan to prepare for entry into ASEAN's Department of Disaster Prevention and Mitigation
- Signed MoU with UNDP for the implementation of 3-year project on Disaster Risk Reduction.
- Hosted the 6th Asian Ministerial Conference on Disaster Risk Reduction. The forum brought 19 government ministers, high-level officials from 19 countries .



Training Component

TMD sent officials to attend meeting/training conducted under WMO/PTC frameworks as below :

- 1 participant in Training on Operational Tropical Cyclone Forecasting, India.
 - 1 participant in 6th International Workshop on Verification Methods, India.
 - 1 participant in Training Workshop on Severe Weather Forecasting (GDPFS) and Public Weather Service (PWS), Philippines.
 - 1 participant in Training Workshop Public Weather Service (PWS) , Philippines.
 - 3 participants in Training Workshop on Synergized Standard Operating Procedures for Coastal Multi-hazards Early Warning System, Nanjing, China.
- TMD in cooperation with the Sultanate of Oman (DGMAN) conducted the familiarization on-the-job Training (OJT) on Aeronautical Meteorological Observations for seven (7) observers.



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THANK YOU