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**(Session 5: GEOSS Asian Water Cycle Initiative ,
AWCI)**



Flood and Drought Impacts and Climate Change in Lao PDR

by

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Outline

- Overview
- Flood and Drought Impacts
- Climate Change Assessment and Adaptation Study Capacity
- Current Country Activities related to AWCI
- Ideas and Views of possible country involvement in the next stage of AWCI
 - Future approaches for improvement



Overview

Lao PDR is a landlocked country situated in the central of the Indochina peninsula (Southeast Asia). It is bordered by five neighboring countries namely Vietnam, China, Myanmar, Thailand and Cambodia. Lao PDR has a total area of 236,800 square kilometers with the population of around 6,8 millions.

The country has 16 provinces and one capital city.



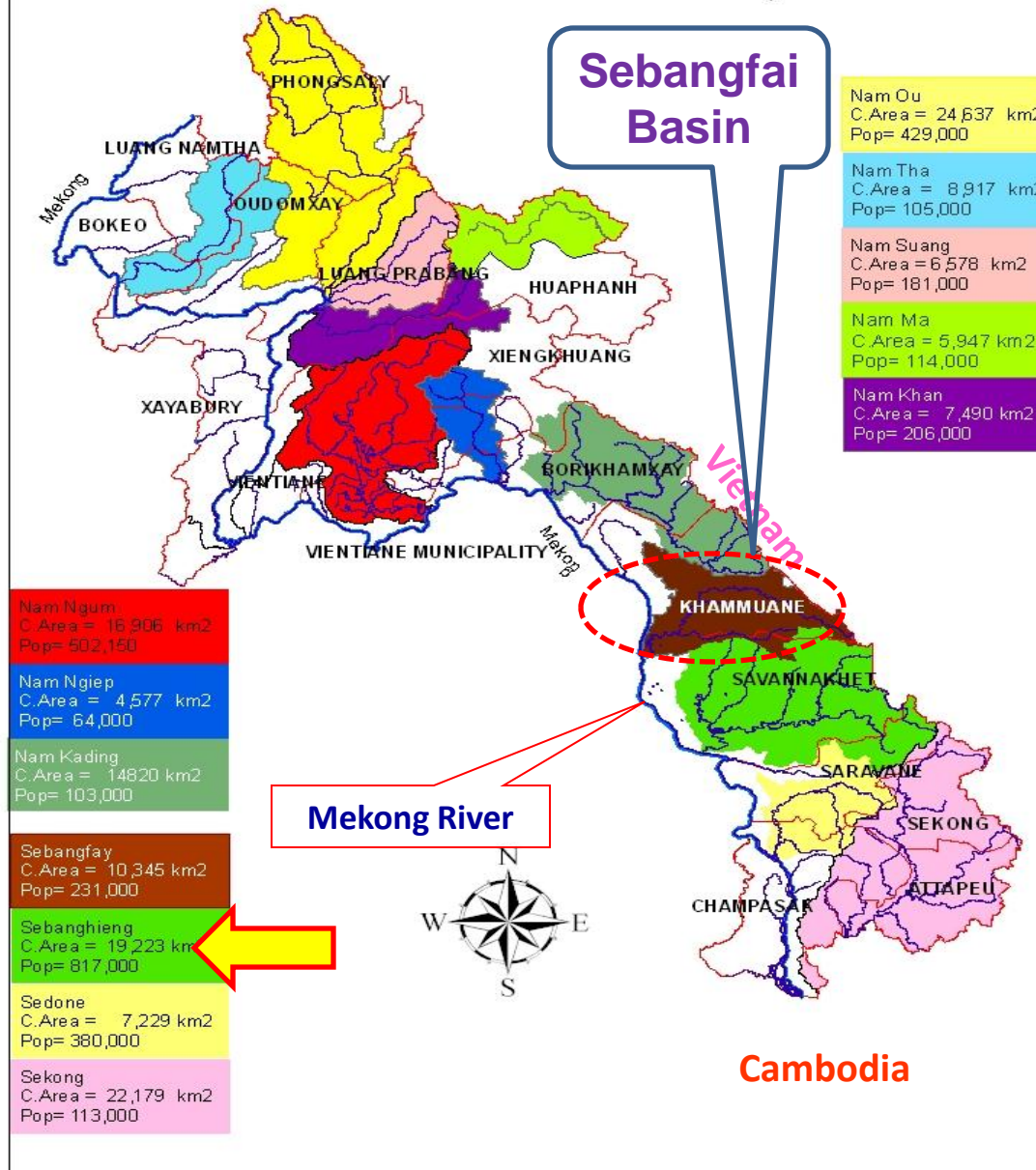
Lao PDR is geographically setting of three ecological zones:

(i). Plains of the Mekong River and its major tributaries (Flood risk prone areas);

(ii). Mountainous areas: The extensive mountain ranges cover 70 percent of the entire territory, stretching from the left bank of the Mekong (Drought prone areas);

(iii). High plateaus.

Major watersheds in Lao PDR with catchment area above 4,500 km²



12 Major Basins:

1. Nam Ou
2. Nam Tha
3. Nam Suang
4. Nam Ma
5. Nam Khan
6. Nam Ngum
7. Nam Ngiep
8. Nam Kading
9. Sebangfai
10. Sebanghieng
11. Sedone
12. Sekong

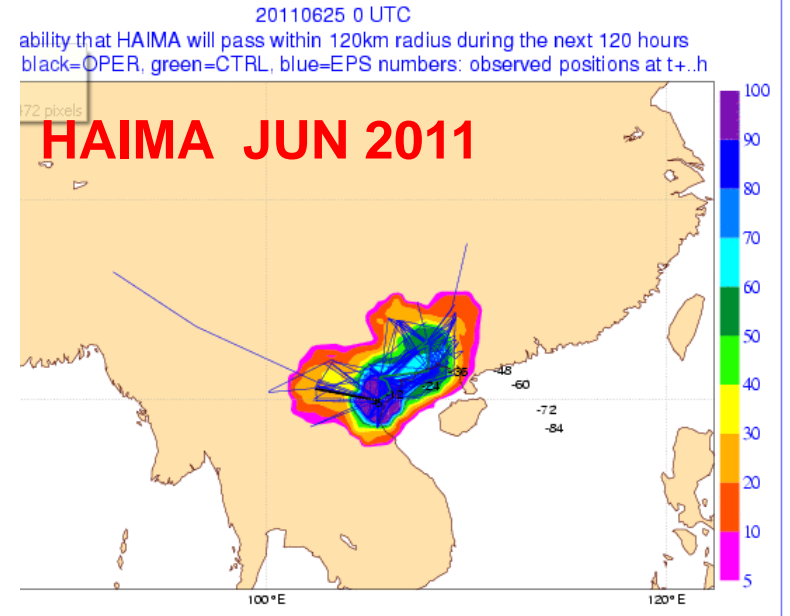
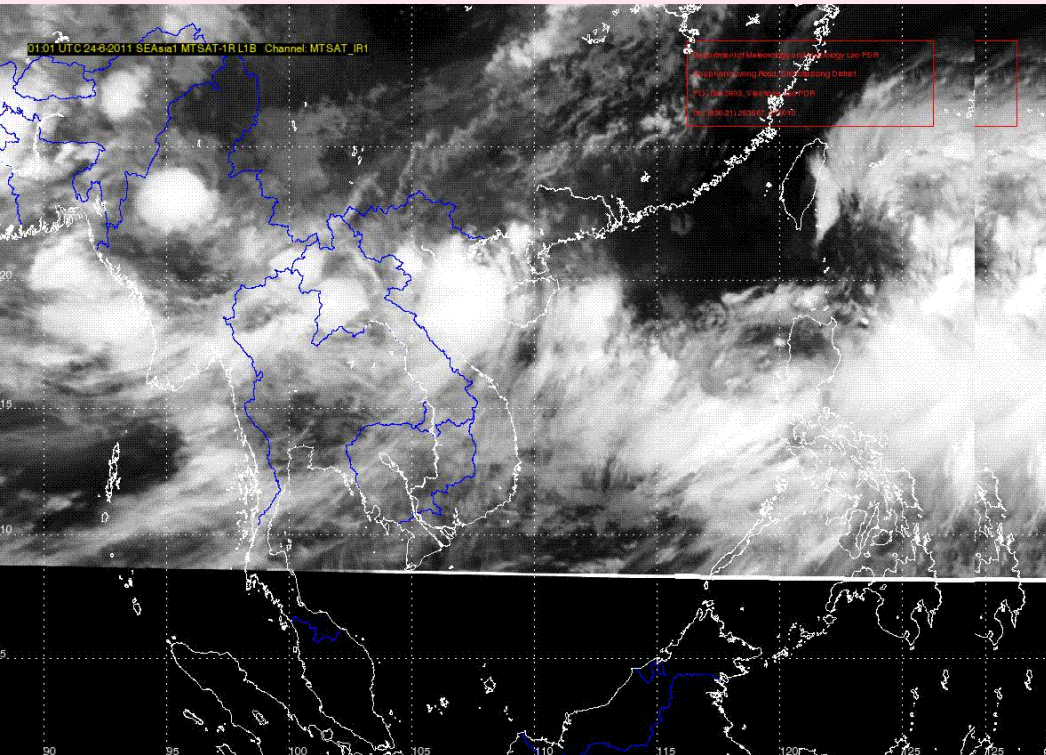
➤ **Flood and Drought Impacts**

Average per year about 3 - 4 Tropical Cyclones of various intensities, after made landfall to Republic of Vietnam, these TCs best tracked through Lao territory where they cause prolonged heavy rainfall and flooding. There are also flash floods and landslides associated with heavy long lasted rainfall in mountainous areas.

Drought spell about 2-3 weeks often occurs in the end of June to July during the crop planting season causing harmful drawbacks to crop yield .

Floods & Flash floods are main drawbacks to national economic development , harmful to people life and damage properties.

TY, TC & TS which best tracked Lao PDR

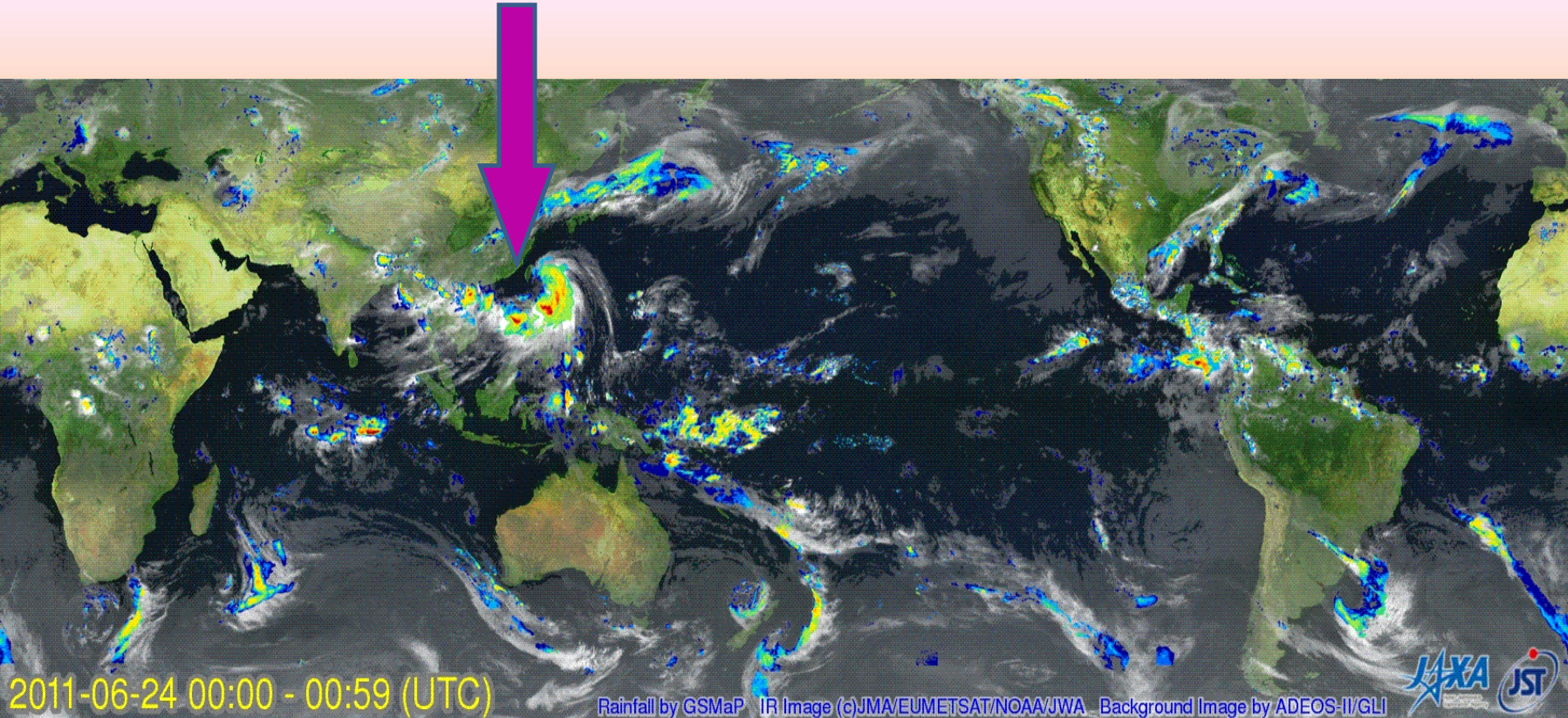


**This TS damaged
agricultural
production and
infrastructures
of 4 provinces**



JAXA's Product on monitoring HAIMA TS

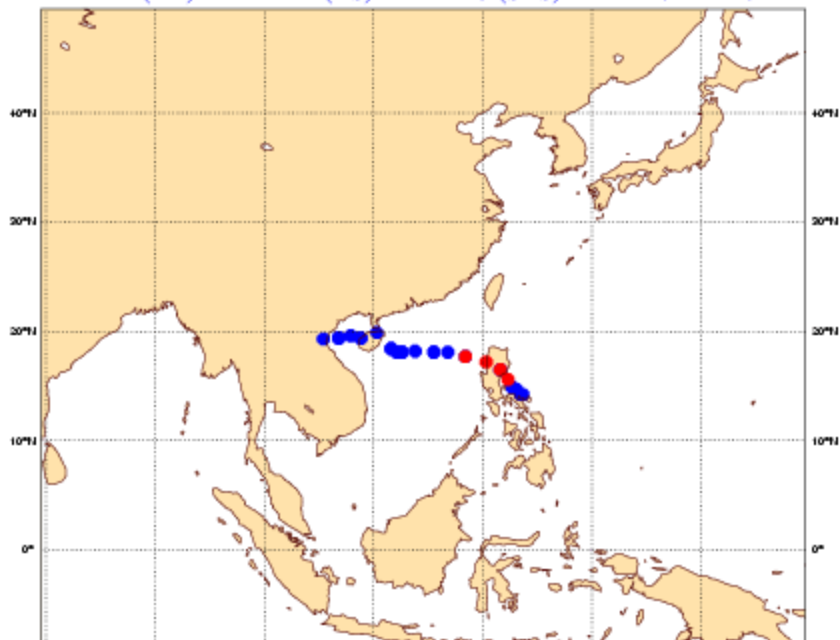
Lao P D R



OBSERVATION TRACKING FOR NOCK-TEN (11W)

CYCLONE LIFETIME : 20110726 TO 20110730

● 1 (TD) ● 2 (TS) ● 3 (STS) ● 4 (TYP/HUR)



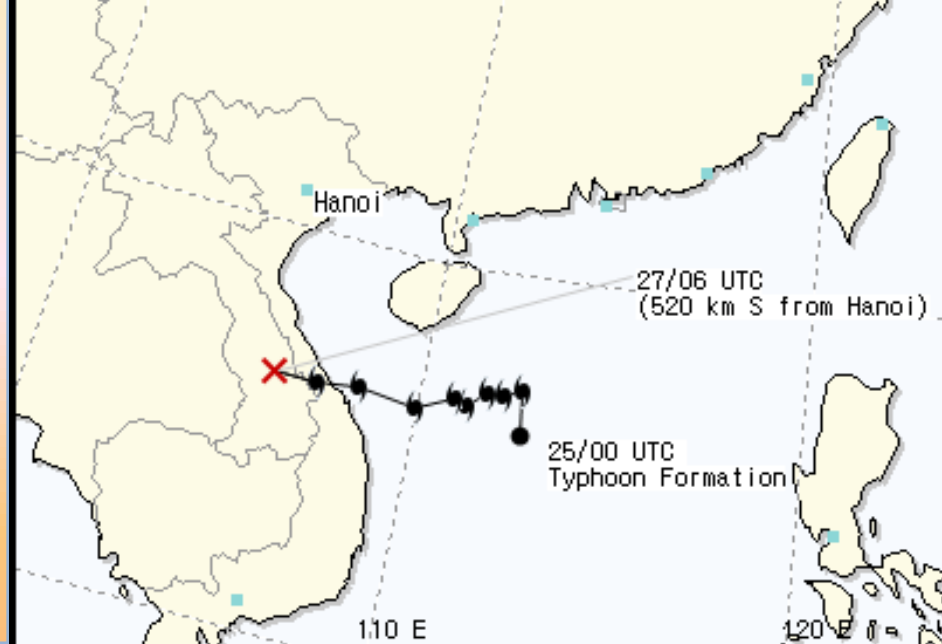
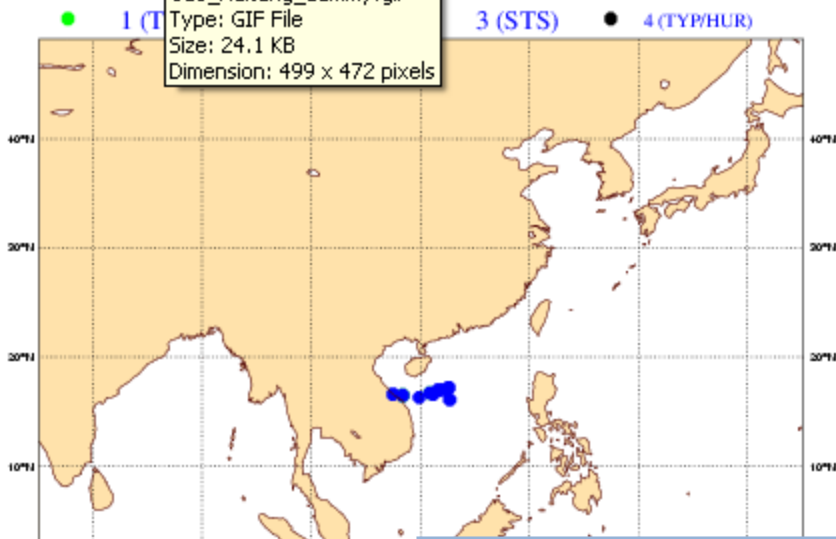
These TCs flooded and destroyed infrastructures of total 11 provinces, affecting huge investment for recovery and renovation



OBSERVATION TRACKING FOR HAITANG (24W)

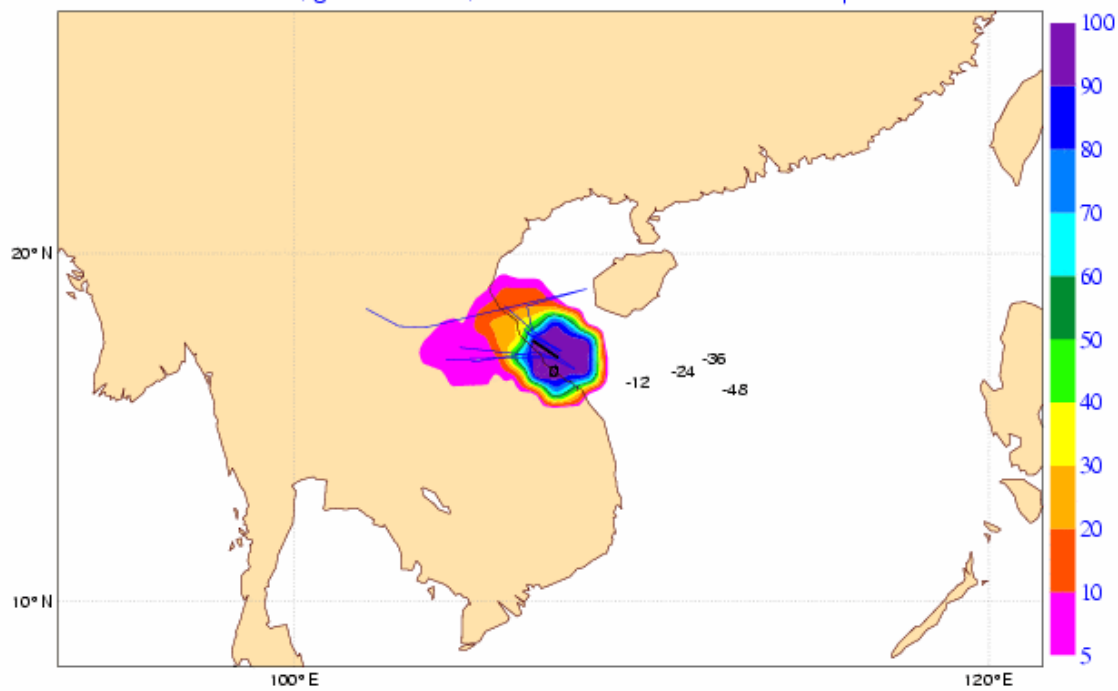
CYCLONE LIFETIME : 20110925 TO 20110927

Obs_Haitang_dummy.gif
Type: GIF File
Size: 24.1 KB
Dimension: 499 x 472 pixels



20110927 0 UTC

Probability that HAITANG will pass within 120km radius during the next 120 hours
tracks: black=OPER, green=CTRL, blue=EPS numbers: observed positions at t+..h



20110930 12 UTC

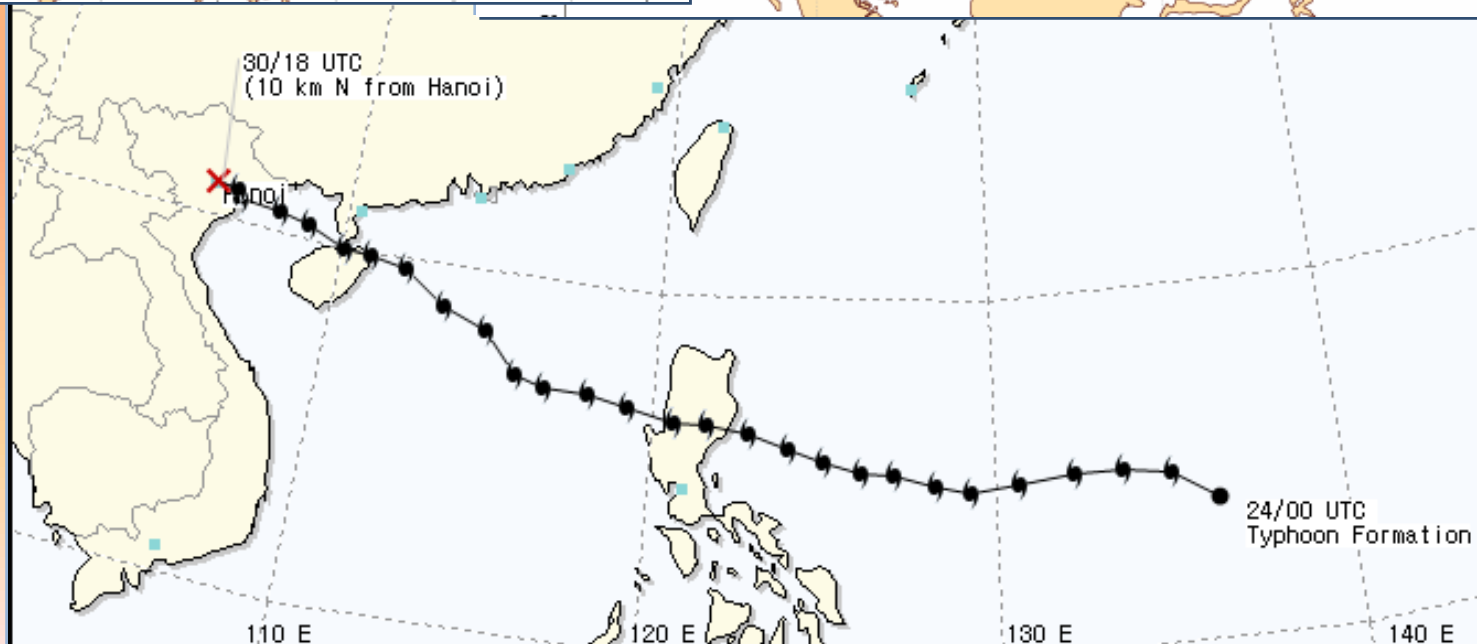
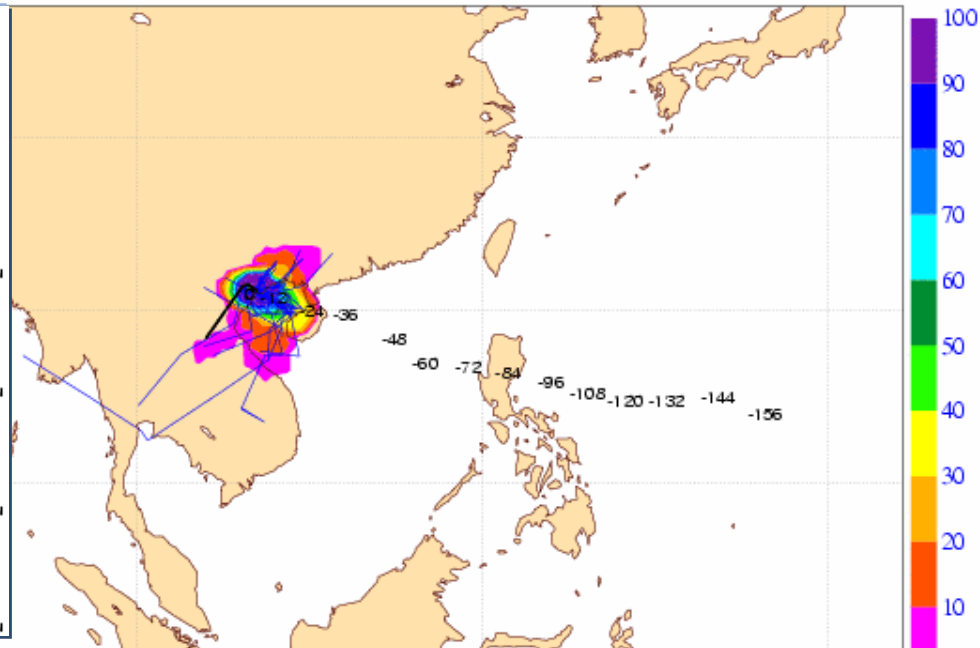
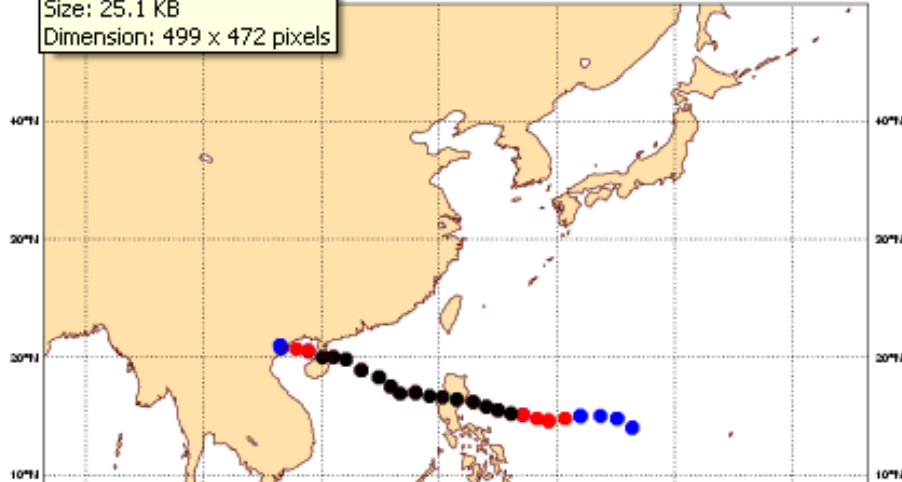
Probability that NESAT will pass within 120km radius during the next 120 hours
tracks: black=OPER, green=CTRL, blue=EPS numbers: observed positions at t+..h

OBSERVATION TRACKING FOR NESAT (23W)

CYCLONE LIFETIME : 20110924 TO 20110930

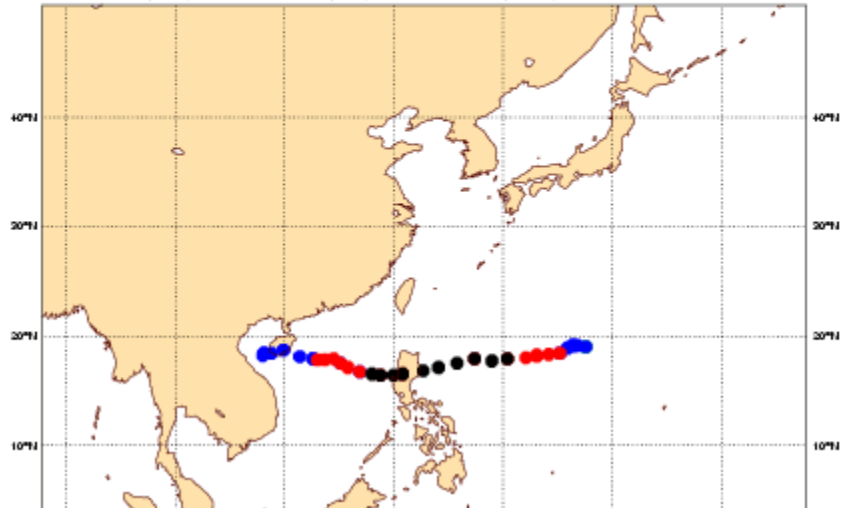
Obs_Nesat_dummy.gif
Type: GIF File
Size: 25.1 KB
Dimension: 499 x 472 pixels

(TS) ● 3 (STS) ● 4 (TYP/HUR)



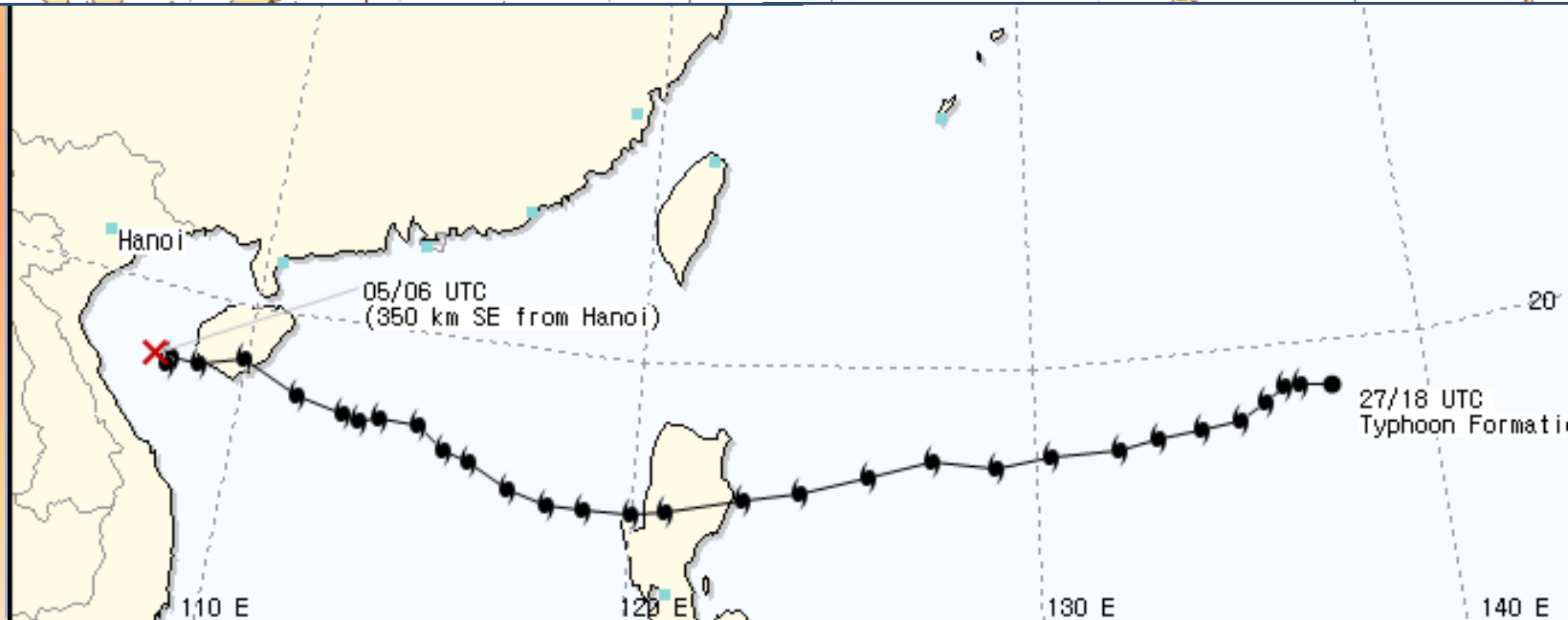
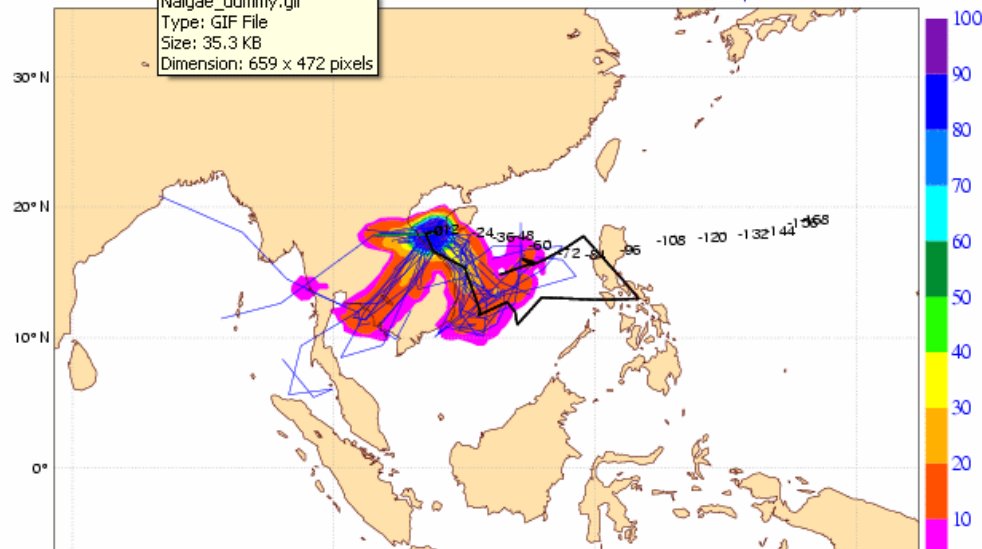
OBSERVATION TRACKING FOR NALGAE (25W) CYCLONE LIFETIME : 20110927 TO 20111005

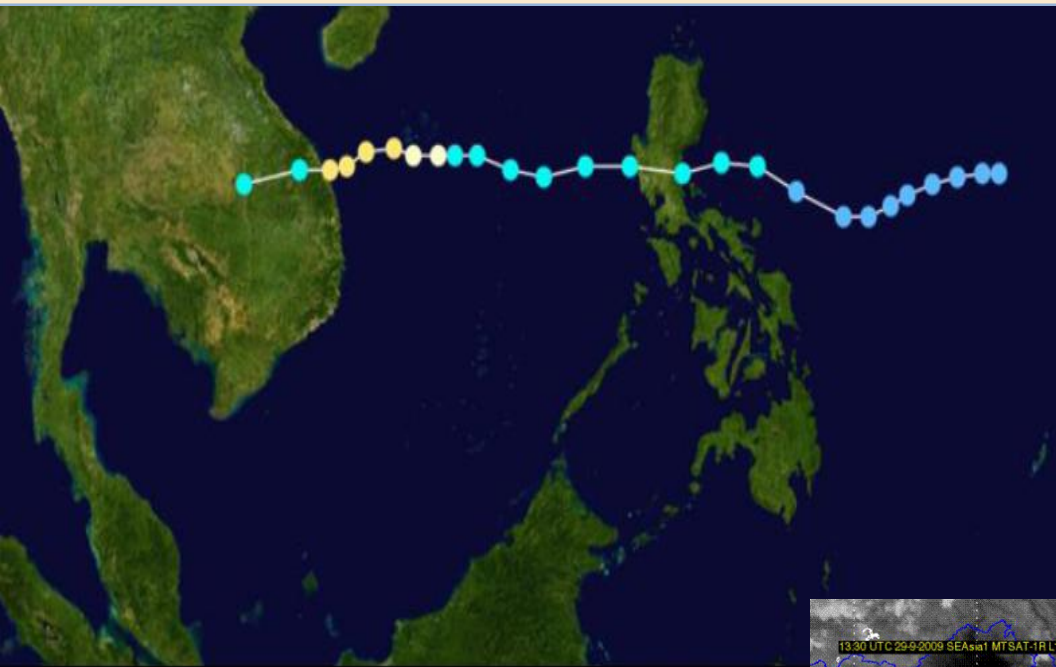
● 1 (TD) ● 2 (TS) ● 3 (STS) ● 4 (TYP/HUR)



20111005 0 UTC
Probability that NALGAE will pass within 120km radius during the next 120 hours
tracks: black=EPSR, green=CTRL, blue=EPS numbers: observed positions at t+..h

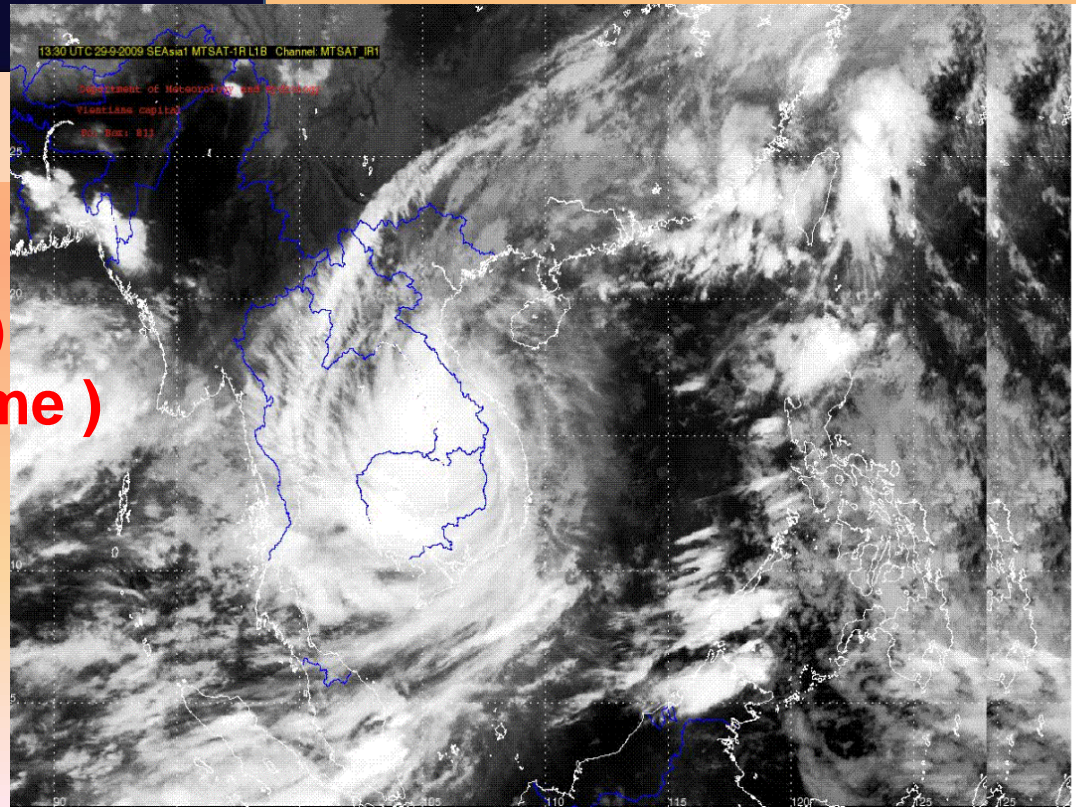
Nalgae_dummy.gif
Type: GIF File
Size: 35.3 KB
Dimension: 659 x 472 pixels





Ketsana 2009
caused historic
devastating floods
over southern
provinces

MTSAT-1R
KETSANA , TY(0916)
05:30 UTC (12:30 local time)
29/9/2009



Impacts by TY KETSANA



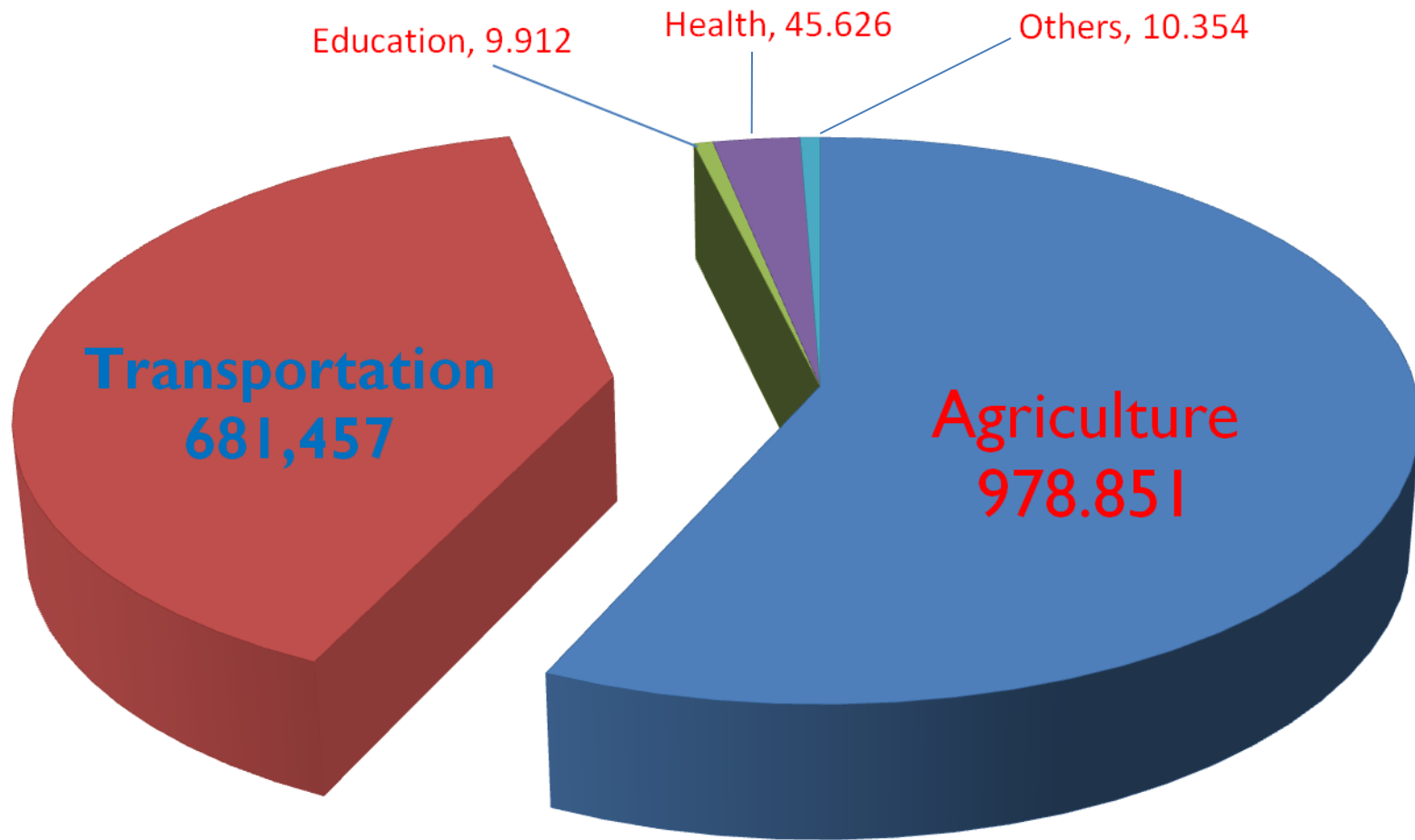
- Province : 5
- District : 43
- Village: 822
- Population : 272.943 people
- Dead : 28
- Missing : 1
- Injured : 94
- Household : 52.547 HHs affected; Displaced Household : 10,670.
- Rice fields : 31,967 hectares of rice and crop fields were damaged
- 3.178 houses affected; 1.194 houses damaged completely.
- Schools: 91. Hospitals: 10. Irrigation: 144. Roads: 47

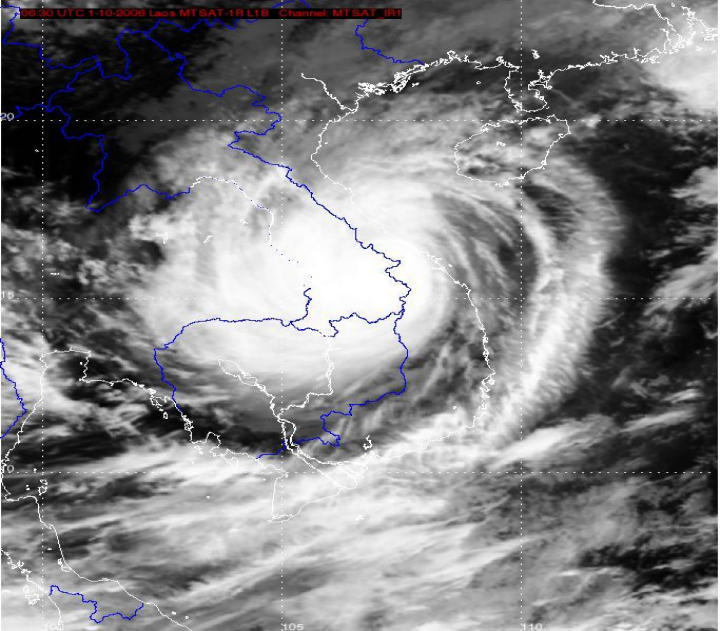
Total damage 58 million USD (Data source: NDMO , MLSW)

Total damages by floods in 2011 (Billion kip)

Provinces	Agriculture	Transportation	Education	Health	Others	Total
Phongsaly	5.726	10.455			9.329	25.510
Huaphanh	3.273	16.356				19.629
Xiengkhuang	29.730	119.018	5.693	7.748		162.189
Sayabouly	25.380	63.690	0.590	0.348	0.125	90.133
Vientiane Cap	64.900	30.830	0.380	0.230		96.340
Vientiane	145.500	131.500	1.100	2.700		280.800
Bolikhamxay	158.810	30.914	0.123	1.400		191.247
Khammouan	298.168	62.822	0.841	0.500		362.331
Savannakhet	65.164	111.134	0.673			176.971
Champasack	182.200	104.738	0.512	32.700	0.900	321.050
Saravanh						7.440
Total	978.85	681.457	9.912	45.626	10.354	1,733.64 0

Damages by Floods in 2011 (Billion kip)





Properties damaged by flash floods





Impacts of Flash floods



Drought records in Lao PDR

Annual Flow Change
(Below normal)

Tributary of Mekong,
Xechamphon

26 Feb 1999



ມີຄວາມຕ້ອງການພັດທະນາຢ່າງຍືນຍົງໃນ
ອ່າງ...

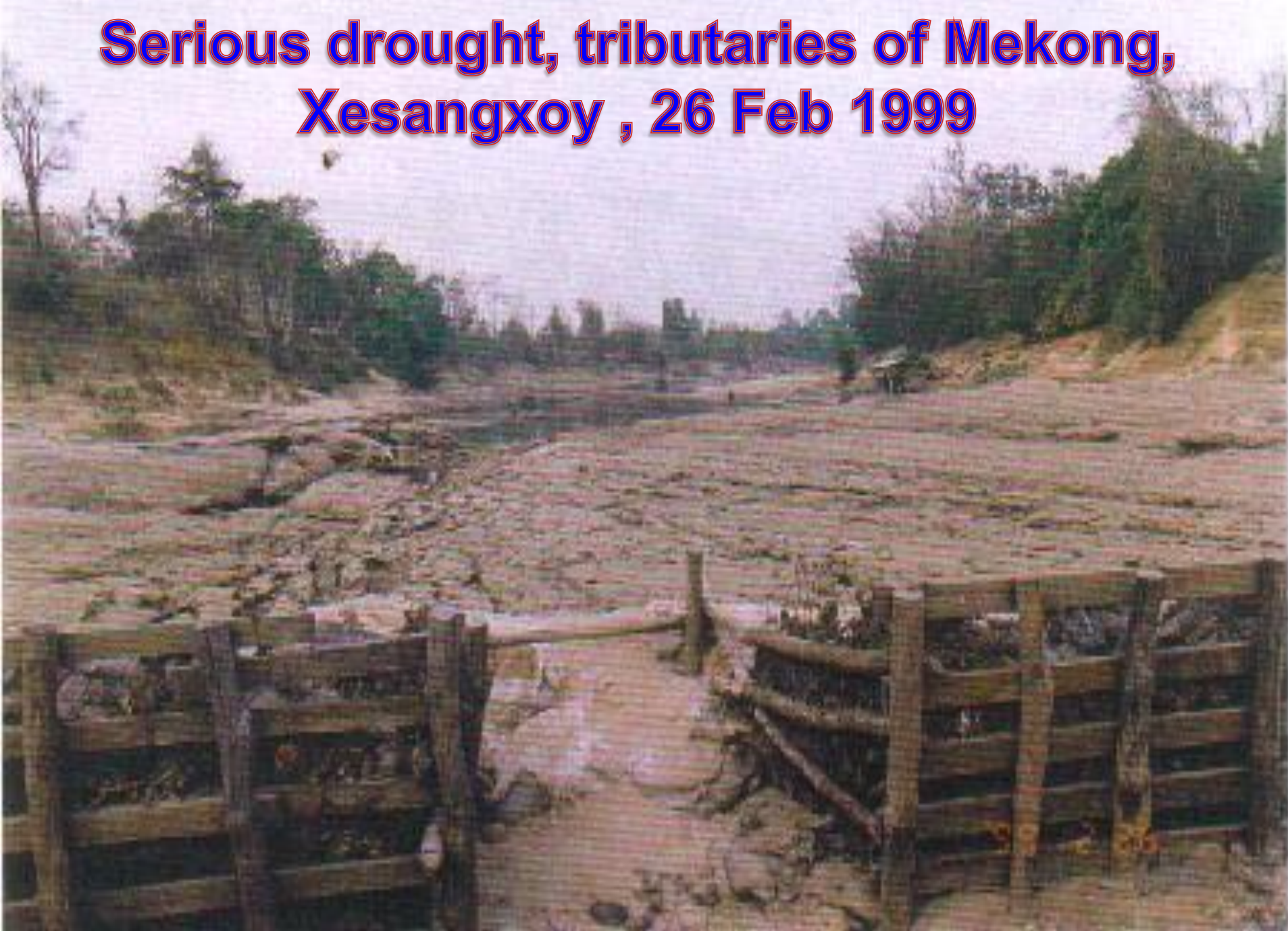
Need Sustainable Development in the Basin

Serious drought , tributaries of Mekong,
impacted agricultural production , resulting
in key constraints of food security issues.



ເຊຊຳຊອຍ ແຫ້ງແລ້ງຂາດຄອນ ສະຫວັນນະເຂດ ປີ 1998

Serious drought, tributaries of Mekong, Xesangxoy , 26 Feb 1999



✓ **Climate Change Assessment and Adaptation Study Capacity**

Climate change and variability is a key issue in Lao PDR. It is a real threat, concern and challenge for the whole country. The Government of Lao PDR has clearly recognized the issue. As a LDC, Lao PDR is one of most vulnerable countries suffering from destructive impacts of climate change. In recent years, Lao PDR has been affected by severe floods and droughts in the central to southern parts which resulted in huge damages and loses.

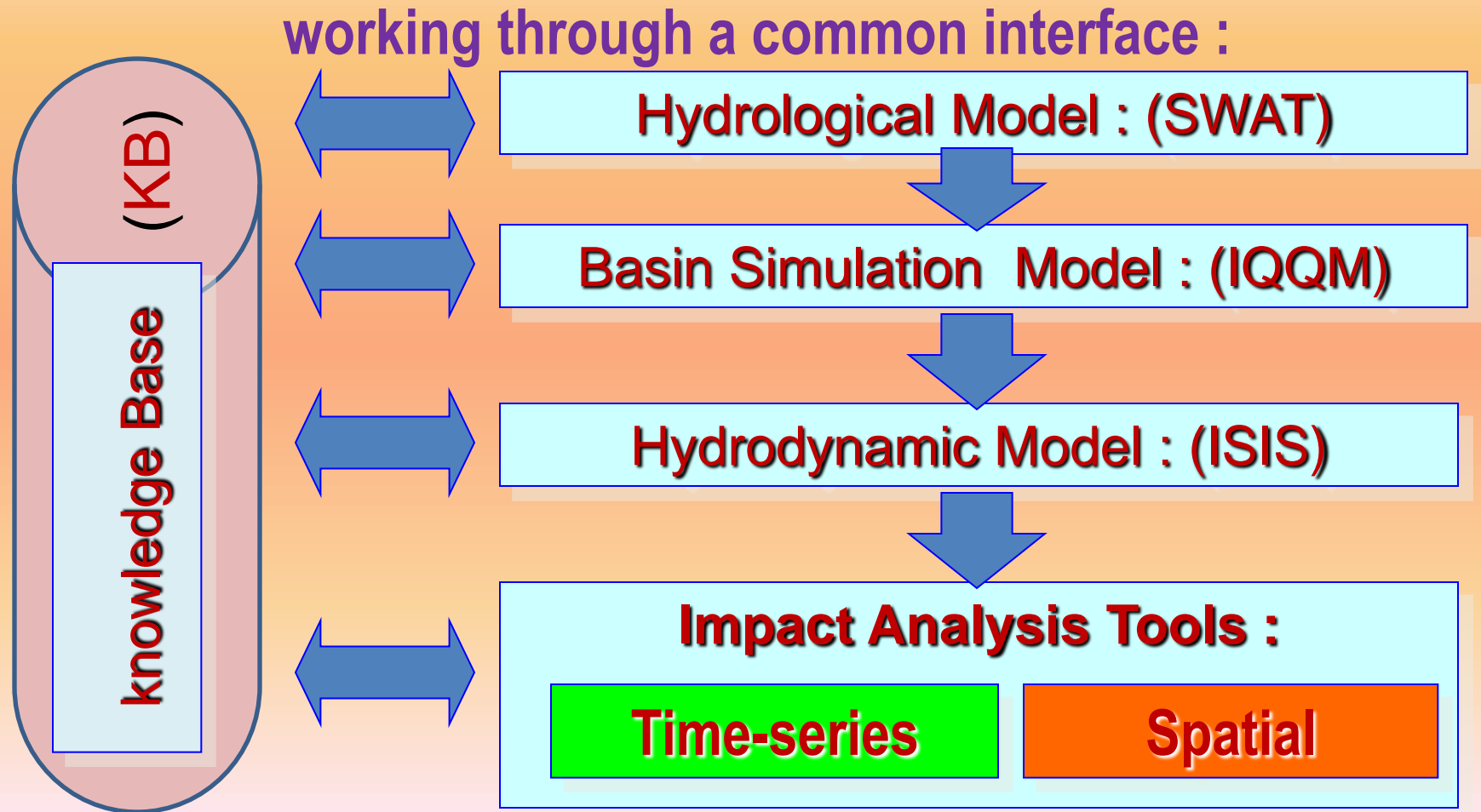
❖ Commitments of Lao Government :

- ✓ Ratified the UNFCCC in 1995 and the Kyoto Protocol in 2003;
- ✓ Established the National Steering Committee on Climate Change (NSCCC) May 2008;
- ✓ Established Climate Change Office Sept. 2009;

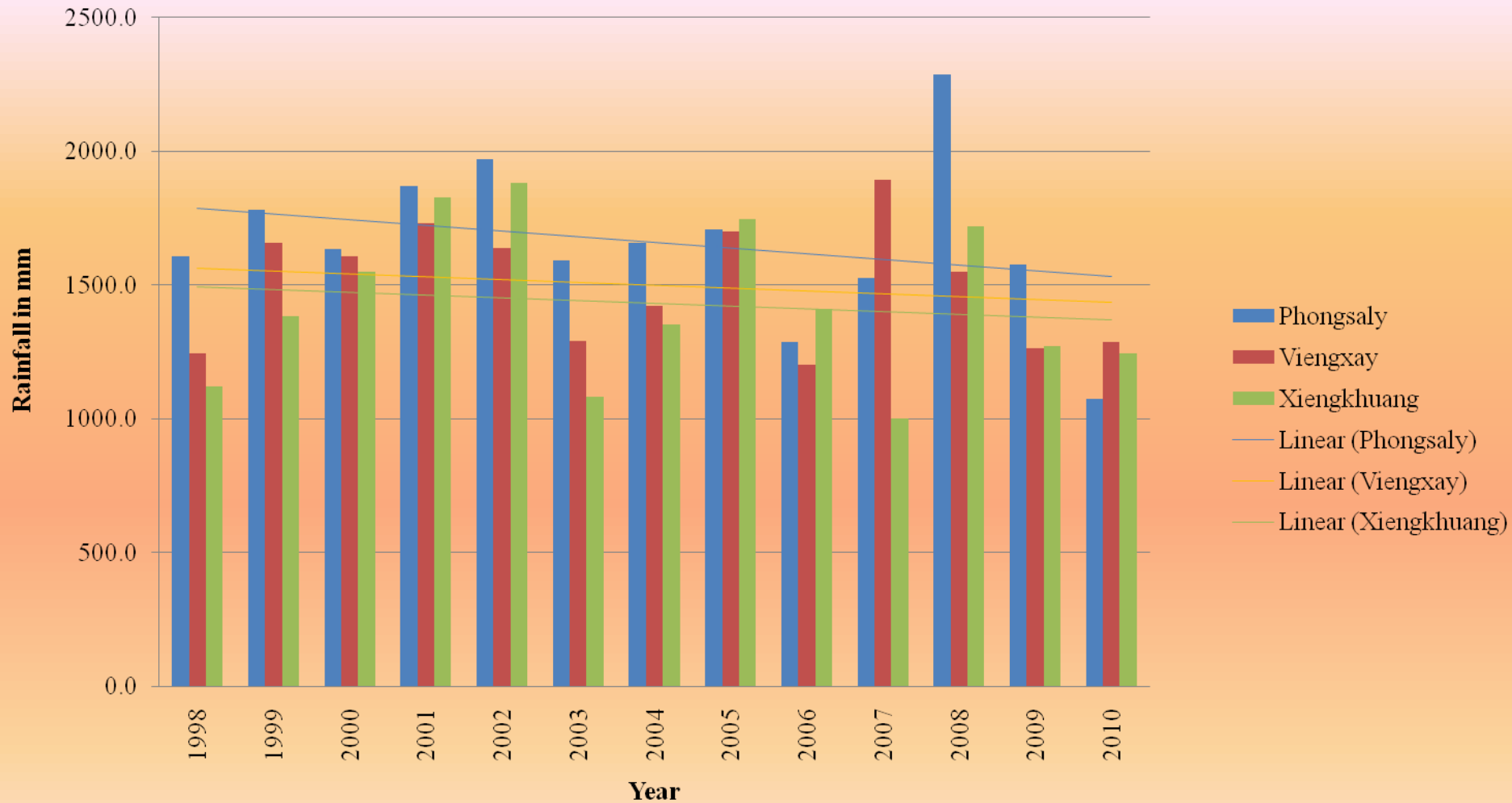
- ✓ Collaborative CCAA activities conducted, learning by doing, over a selected pilot river basin, by concerned Departments under MoNRE in collaborating with and implementing the MRC's Programme with line ministries;
- ✓ Lessons learnt and best practices are to be extended and applied on other prioritized basins, such as Xebangfai etc...;

❖ Tools and Models in Applications

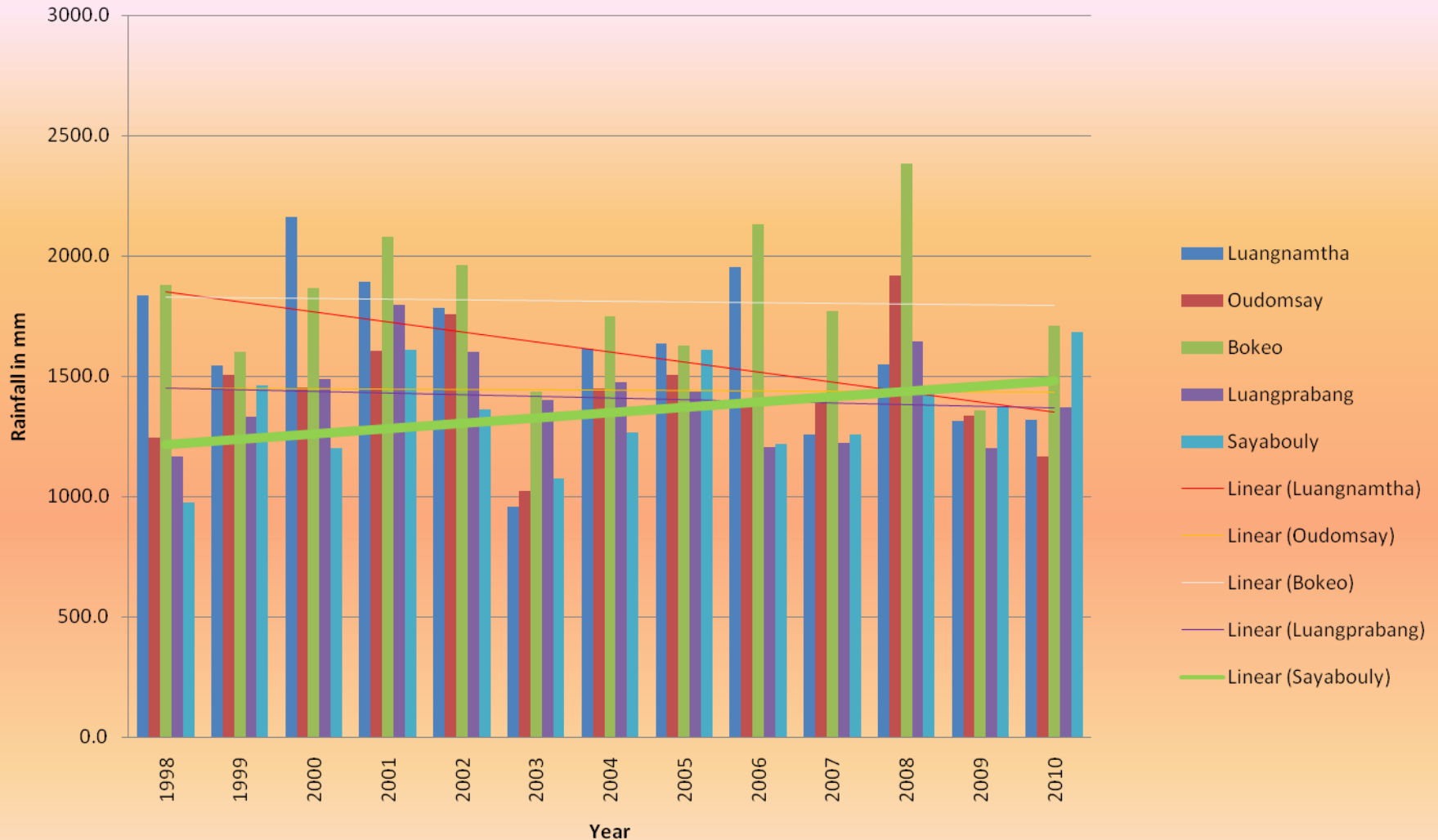
- The MRC developed Tool Box : termed as Decision Support Framework (DSF) encompassing of Database or Knowledge Base (KB), Models and Analysis Tools



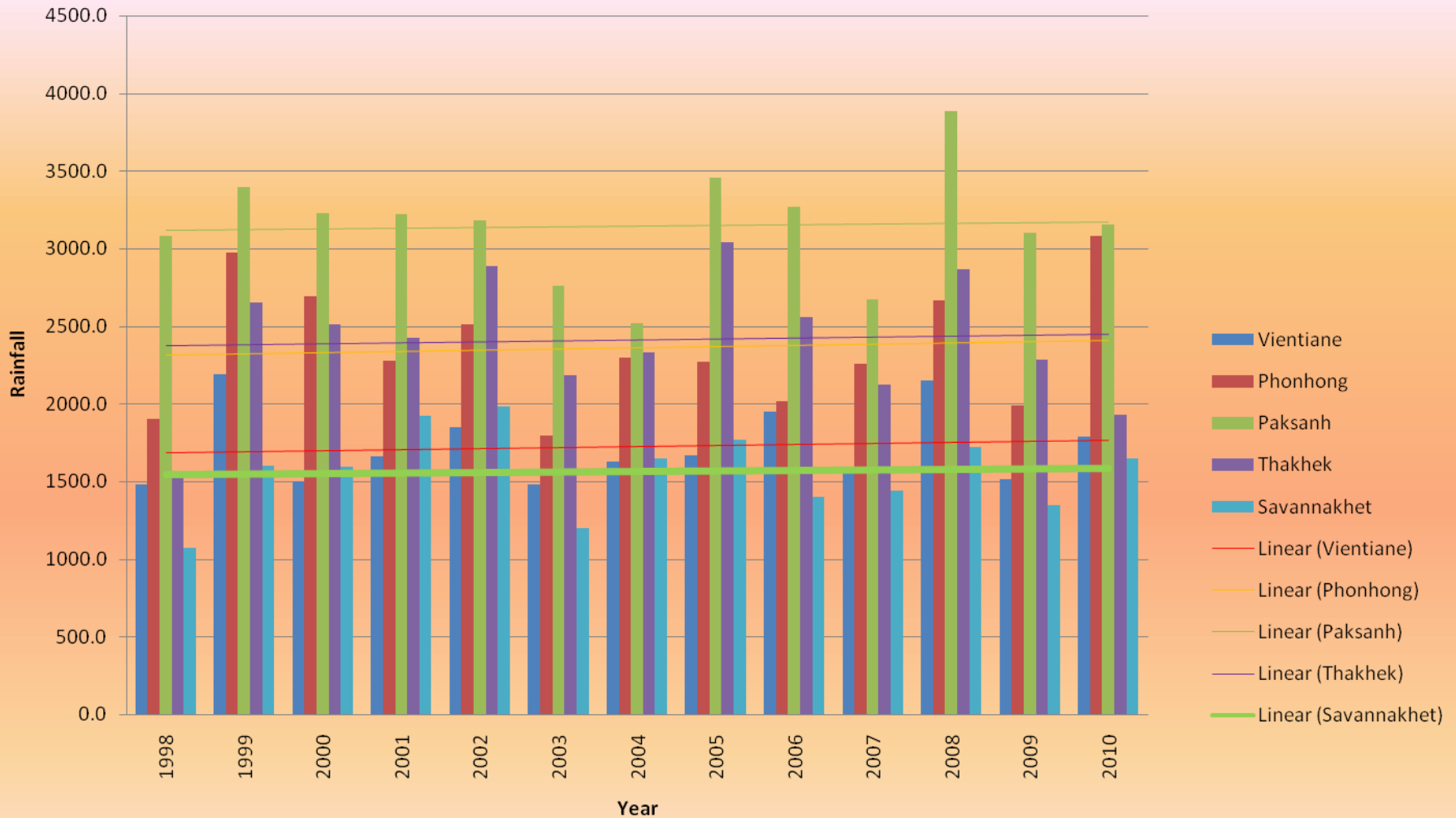
Annual rainfall (in mm) in Northeastern part



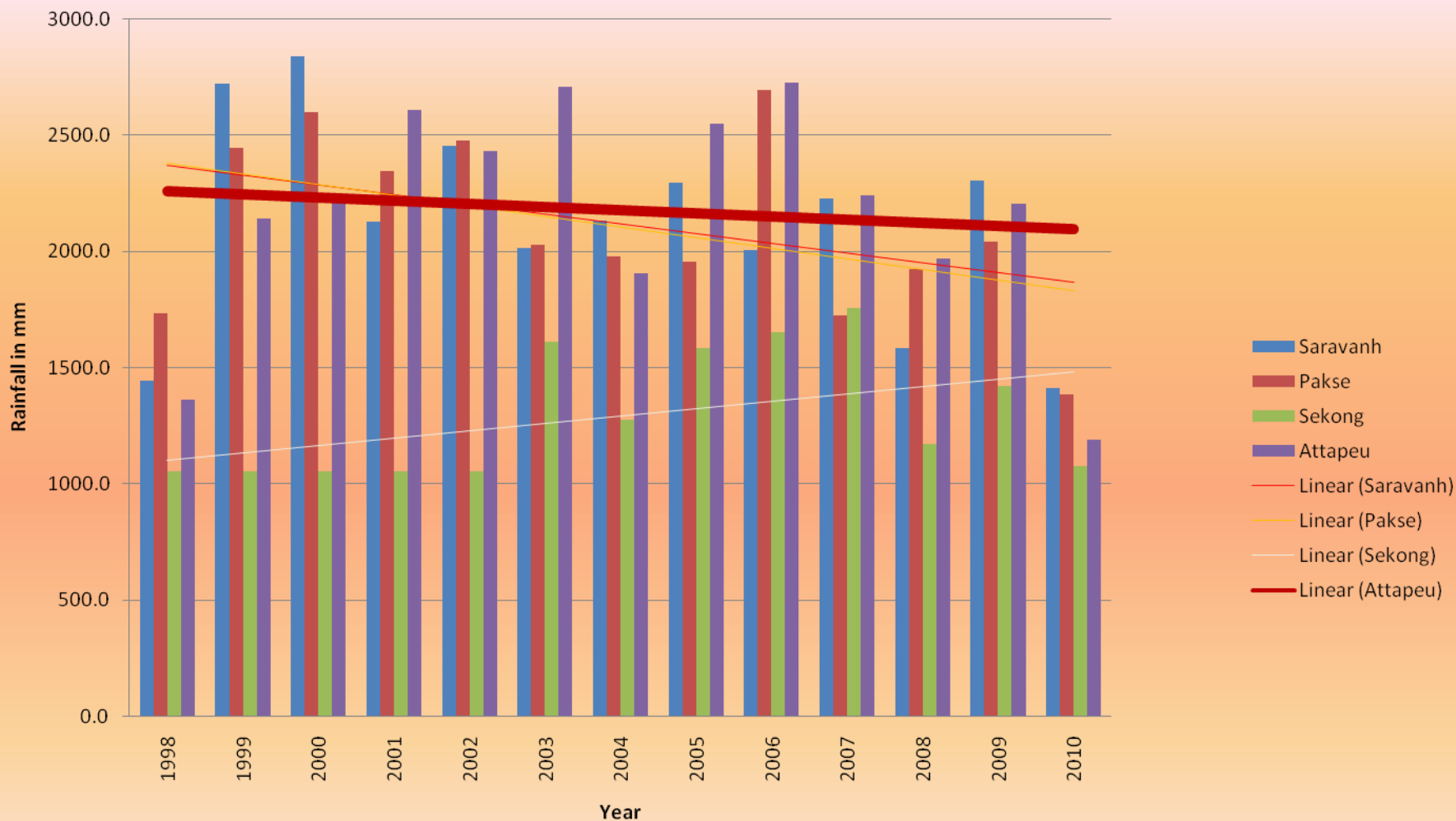
Annual rainfall (in mm) in Northwestern part



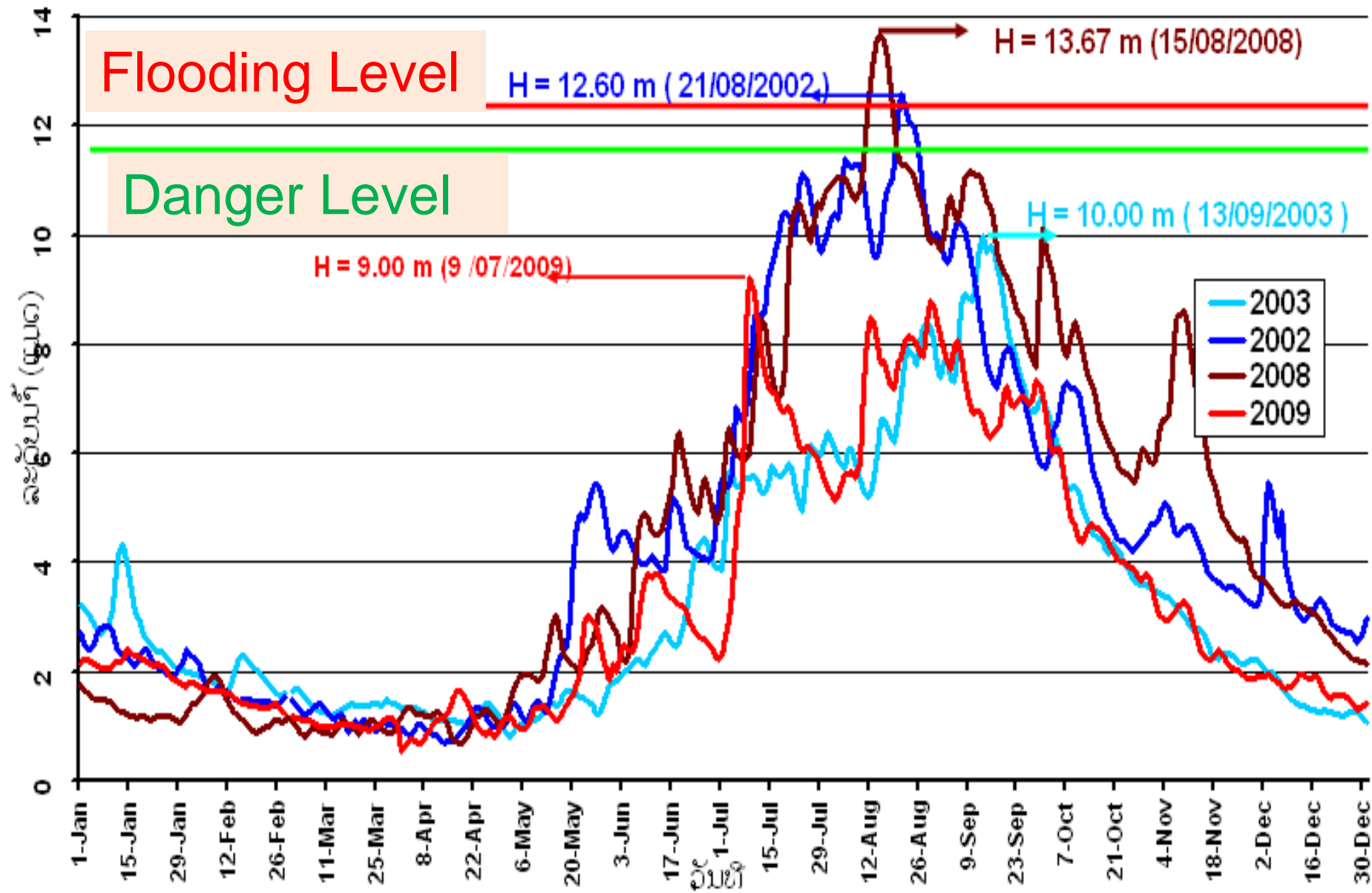
Annual rainfall (in mm) in Central part



Annual rainfall (in mm) in Southern part



Trends of Water level in main River of Lao PDR

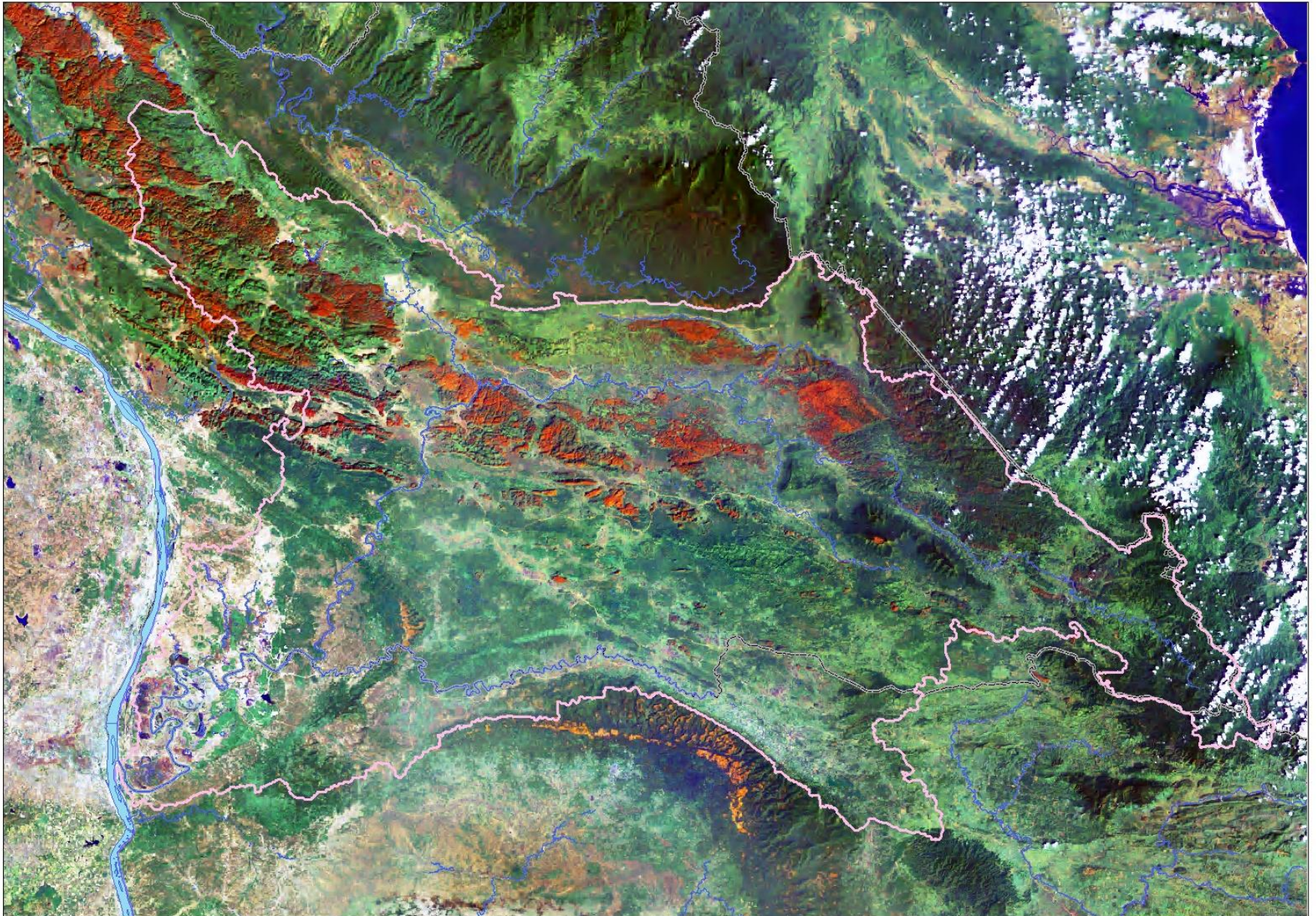


- **Techniques and Tools for Operational Monitoring, Forecasting and Warning :**
- ✓ Data collection, measurement at all sites are manually carried out by observers ;
- ✓ Linear Regression and Empirical techniques are being utilized for national forecasting practices ;
- ✓ The MRC developed URBS Model has been used for flood forecasting over Xebangfai Basin ;
- ✓ Also utilized the Outputs/products of the Flash Flood Guidance System (FFGS) of MRC's FMMC as advisory for issuing warning of Flash Flood.
- ✓ NWP products of advanced centers are downloaded for utilization & local applications.

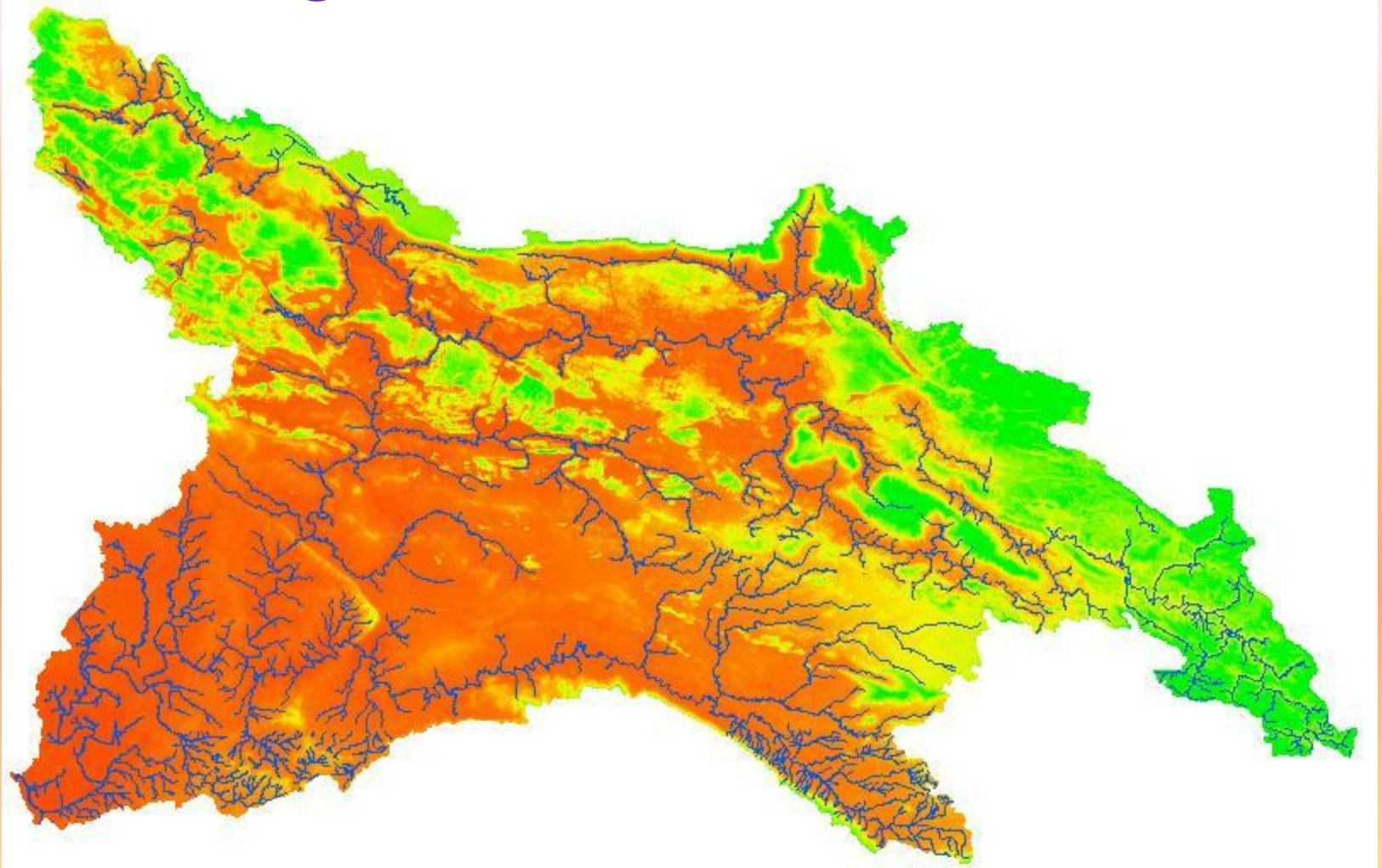
➤ **Current Country Activities related to AWCI**

- **Selected Pilot Area Basin and data collection sites;**
- **Uploaded Hydro-meteorological data to the template database;**
- **Proceeded Data Quality Control by using AWCI QC Interface, developed by AWCI data center ;**
- **In-situ field observation, monitoring , forecasting and warning for national practices and service delivery to decision makers and risk communities.**

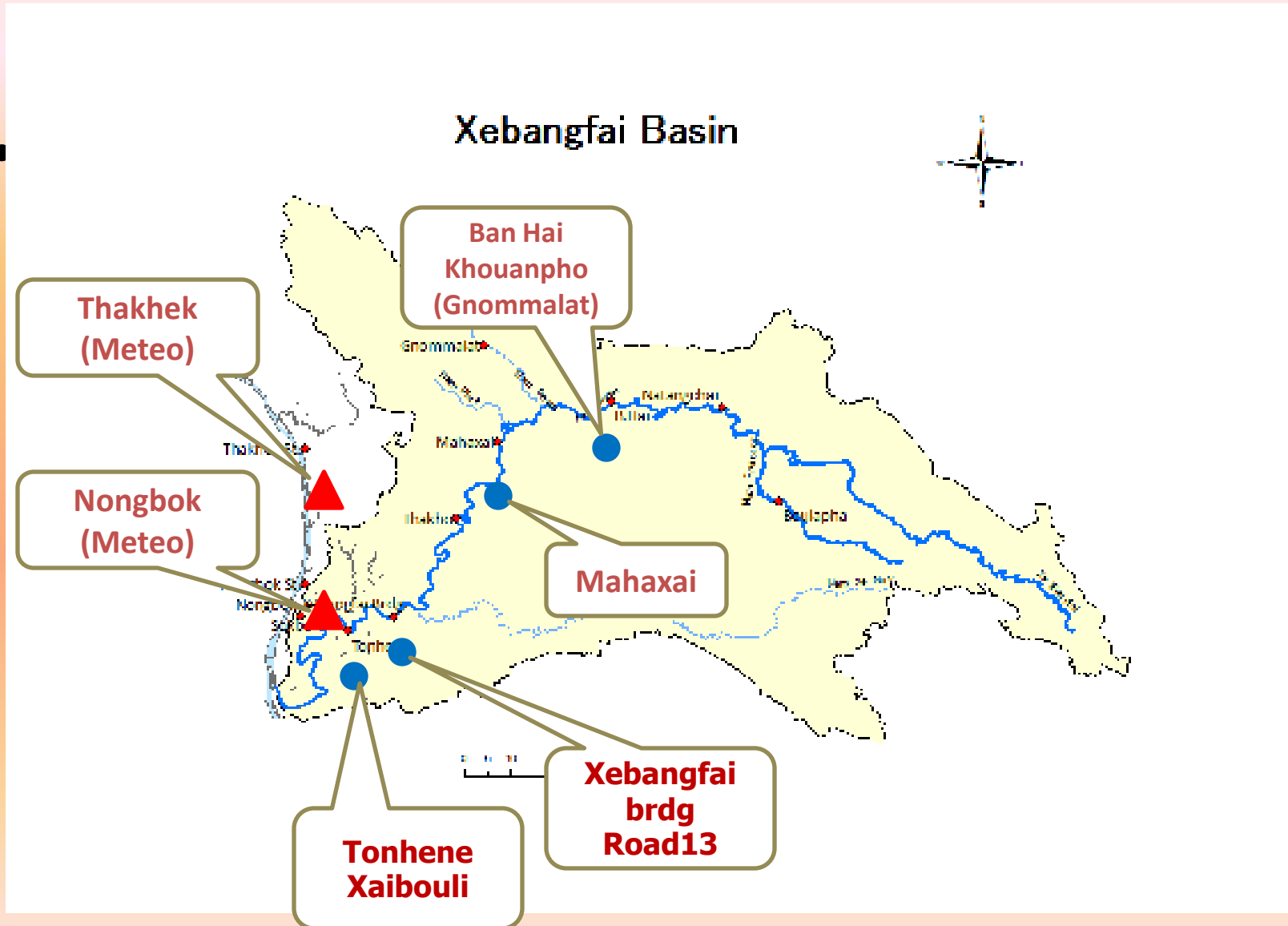
Selected pilot Basin, Xebangfai in Khammouane province



Xebangfai main stream and tributaries



Data collection sites over the selected basin



Locations of sites for data contribution

Name	District	Village	River	Latitude N	Longitude E	Altitude
Thakhek (Meteo)	Thakhek	Chompheth		17° 23′	104° 49′	151
Nongbok (Meteo)	Nongbok	Song Muang Tai		17° 09′	104° 49′	147
Xebangfai brdg Road13	Xebangfai		Xe Bangfai	17° 04′38″	104° 59′06″	140
Tonhen	Xaibouli		Xe Bangfai	17° 03′02″	104° 53′39″	
Mahaxai	Mahaxai		Xe Bangfai	17° 24′48″	105° 11′59″	155
Ban Hai Khouanpho	Gnommalat	Hai	Xe Bangfai	17° 29′43″	105° 25′30″	

➤ Ideas and Views of possible country involvement in the next stage of AWCI

- ✓ So far Lao PDR has not yet much involvement, due to short of capacity on both scientific know-how and national budget constraints ;
- ✓ Lao PDR is ready to involve and contribute to the next stage of AWCI, in this context we are expecting of capacity building, beneficial from the concept design in setting up GEOSW/WCI “**Work Benches**”. In regard the actual implementation, Lao government assigned appropriate agencies, Departments for collaborative actions.

■ **Future approaches for improvement**

- ✓ Set up mechanism for National Integrated Water Resources Management (N-IWRM) and individual River Basin Organization or Committee (RBO/RBC) ;
- ✓ In deep scientific Capacity building of national Modeling Unit/Team for CCAA and Water Resources and Environment Researches. This has to be in line with the Implement Design of GEOSW/SCI Work Benches ;
- ✓ In deep scientific capacity building of national hydro-meteorological integrated and coordinated observation, quality control, data and information sharing, forecasting, and early warning dissemination systems. This to be under the guidance and assistance of AWCI and strictly harmonized with the Implement Design of GEOSW/SCI Work Benches.



Thank You
for kind attention !