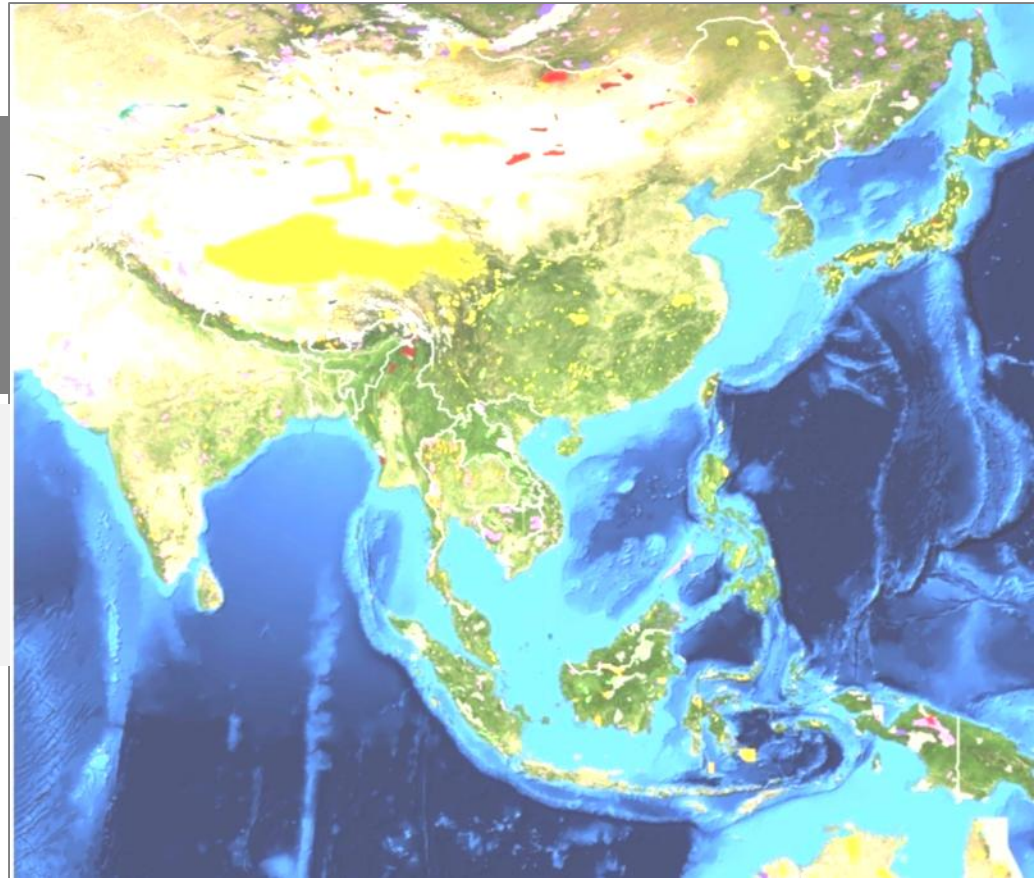


# SAVGIS Applications

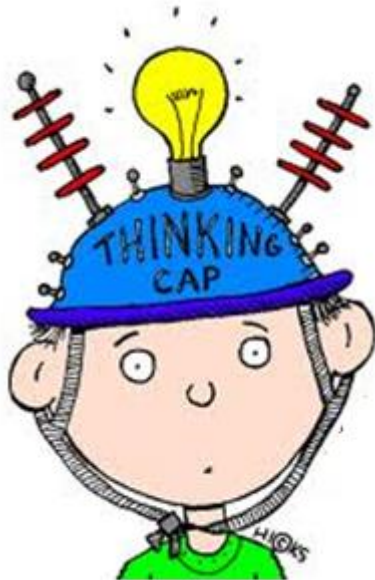
**S. Jothiganesh**

Decision Support Tool Development Specialist,  
Email: [jothiganesh@rimes.int](mailto:jothiganesh@rimes.int)



# Uniqueness of GIS?

**Human Brain**



**IMAGINATION**



**GIS**



**VISUALIZATION**

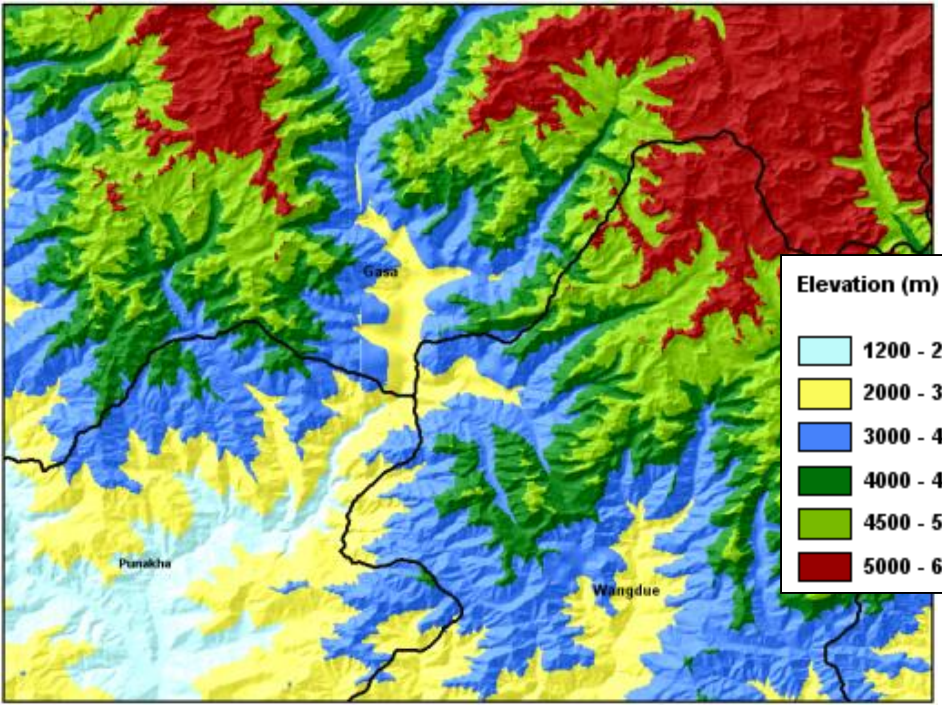
# Can we imagine this?

Complexity in reading and understanding

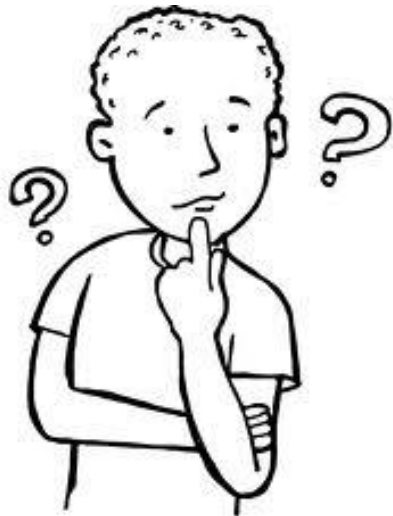


Leave it

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# Why SAVGIS?



Easy?



Efficient?



Economical?



# Where we can use?

**Earthquake Information System**

**Tsunami Risk Assessment**

**Weather Information System**

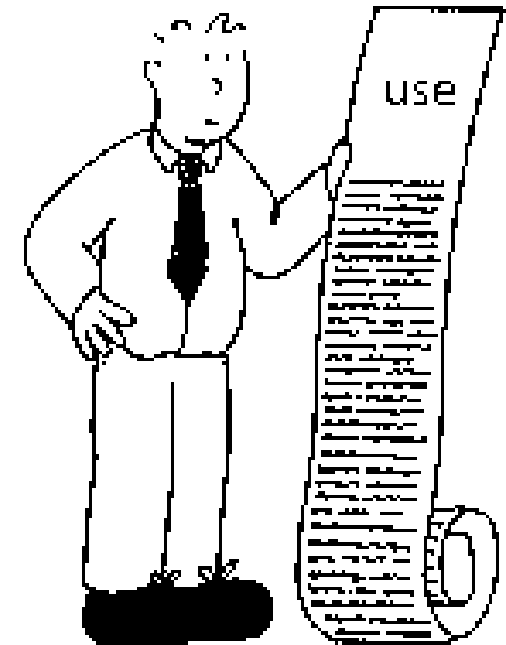
**Geo-climate Information System**

**Disaster Information System**

**Forestry and Biodiversity Assessment**

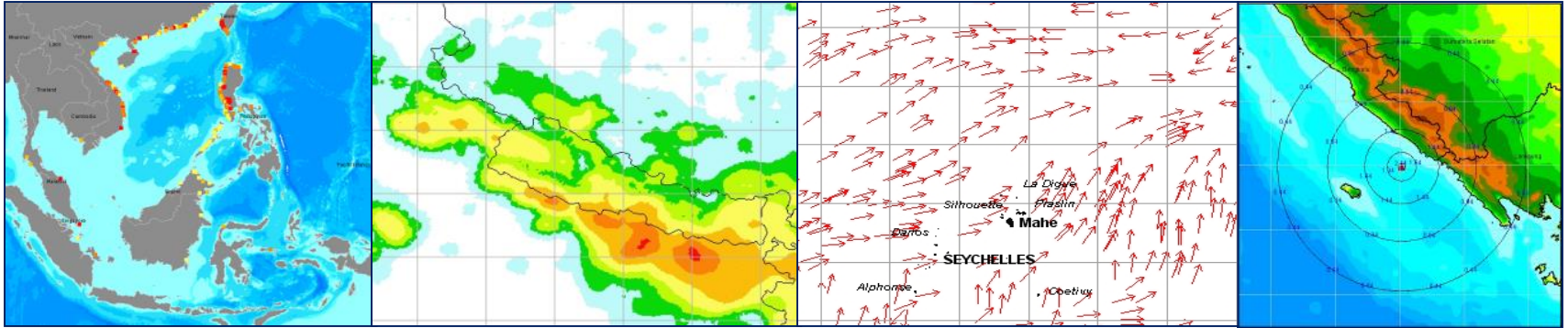
**Integrated Pest management**

**Healthcare Waste Management**



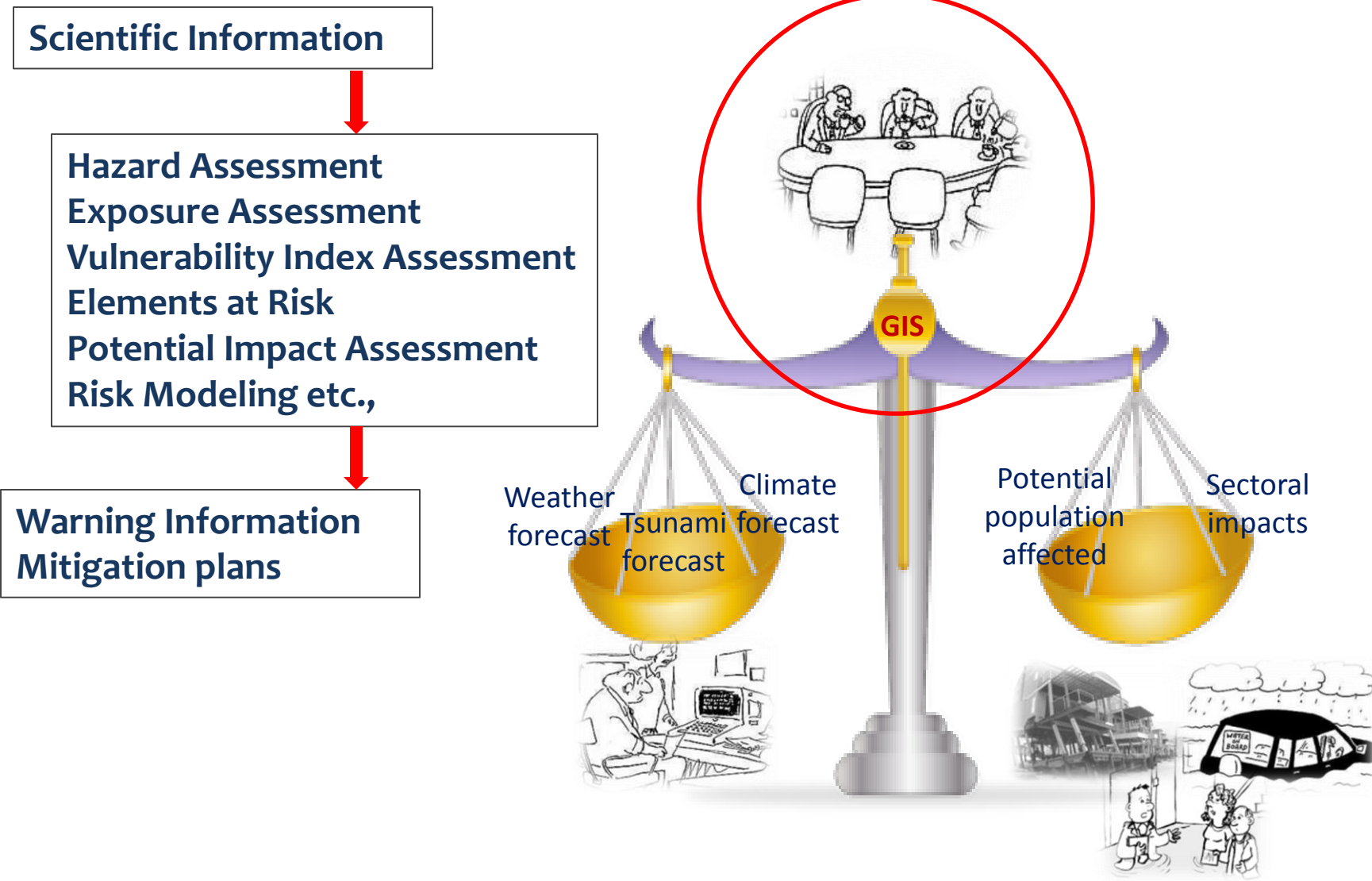


# GIS system in-housed at RIMES

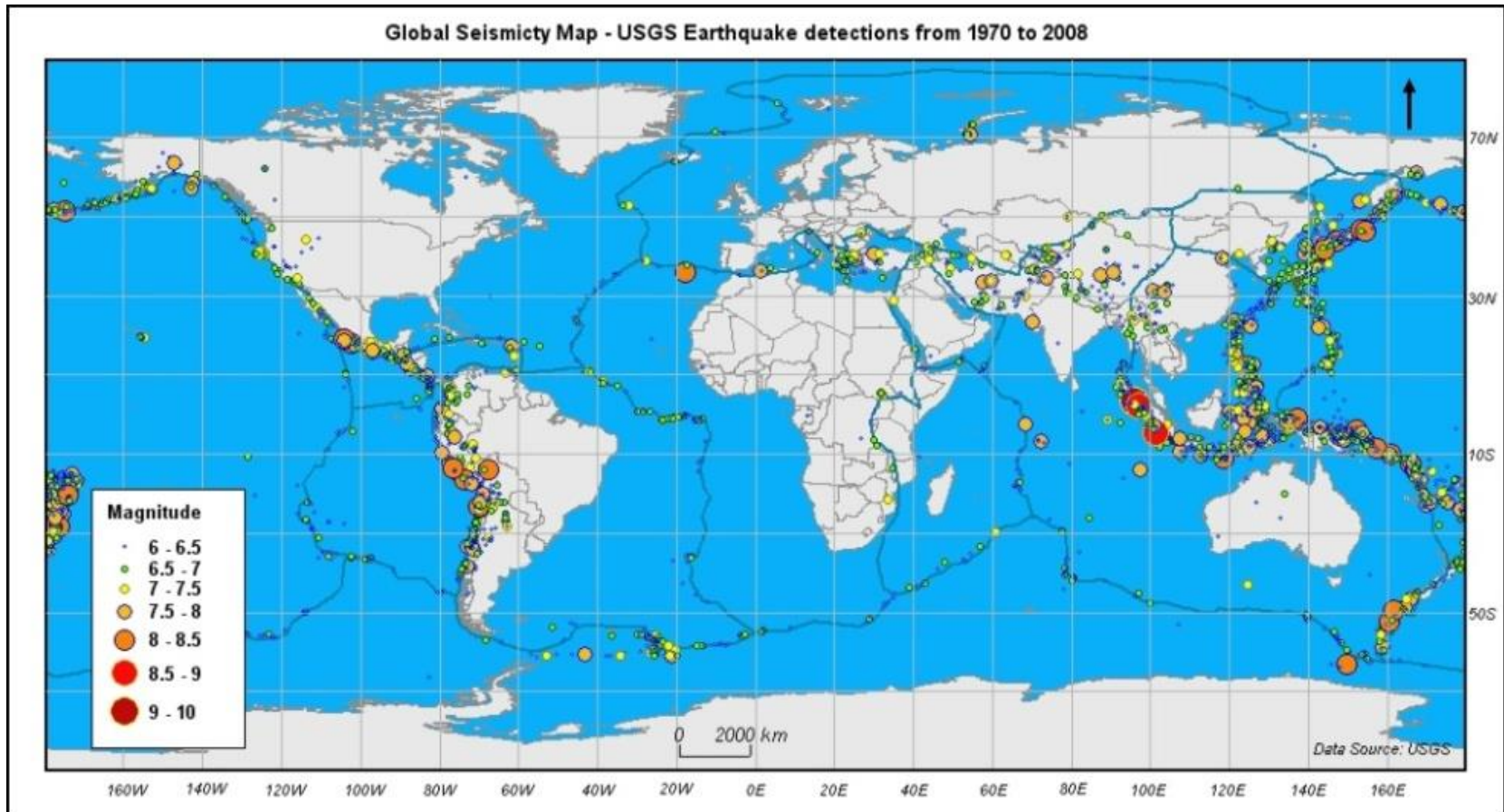


- Earthquake Hazard Information System (Seismology)
- Tsunami Risk Assessment Toolset (Oceanography)
- Weather Information System (Meteorology)
- Geo-Climate Information System (Climatology)
- Disaster Information System

# Bridging Scientists and Disaster Managers



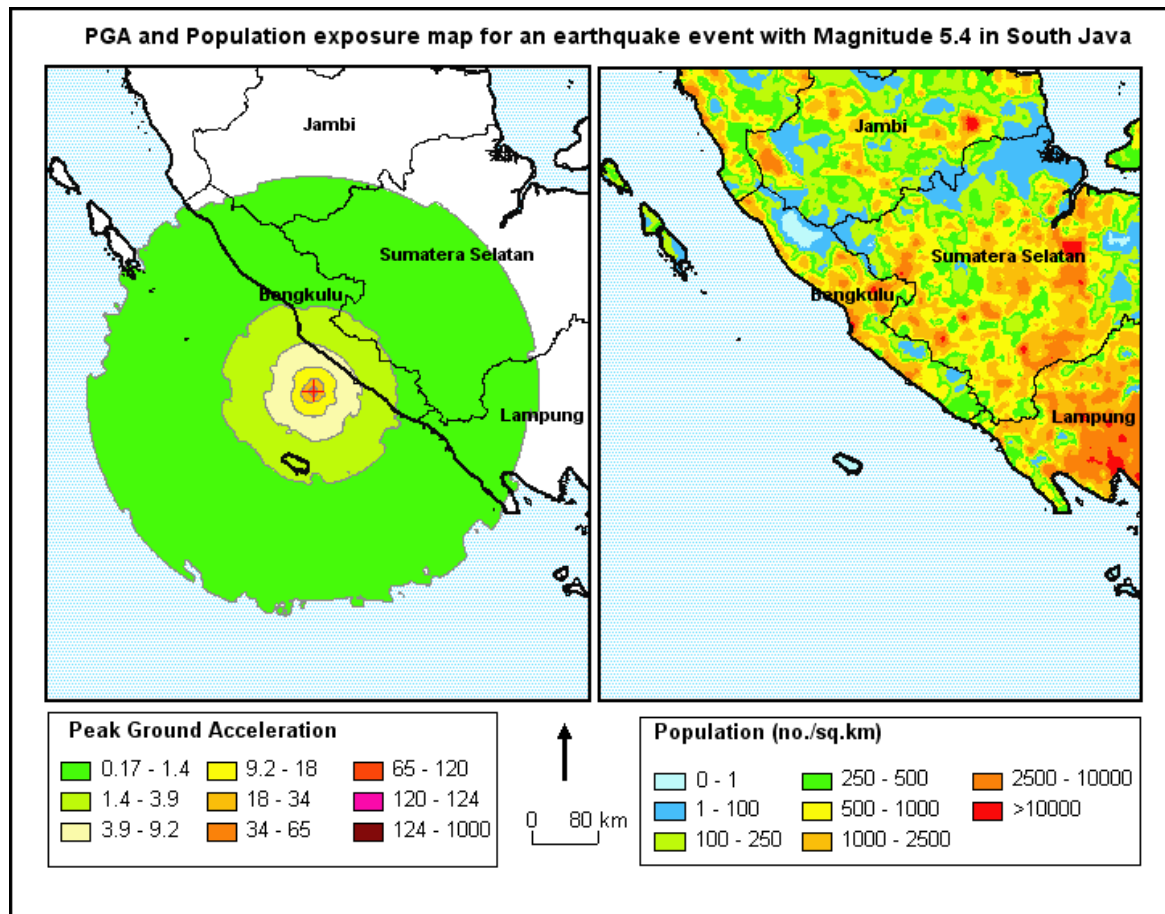
# Earthquake Information System



**Spatial knowledge about occurrence and severity of historical earthquakes**



# Earthquake Hazard Assessment System



Severity of ground shake is key for response options



# Tsunami Risk Assessment Toolset

Digital elevation model

generation, Digitizing contour  
from bathymetry Charts

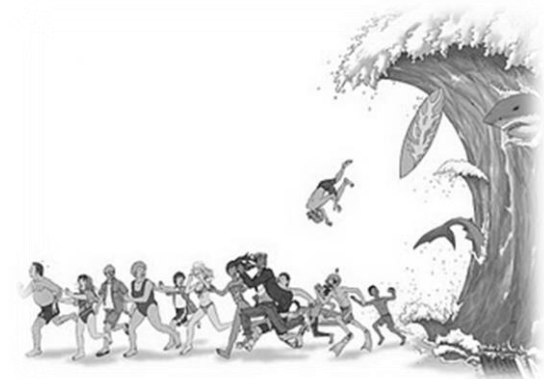
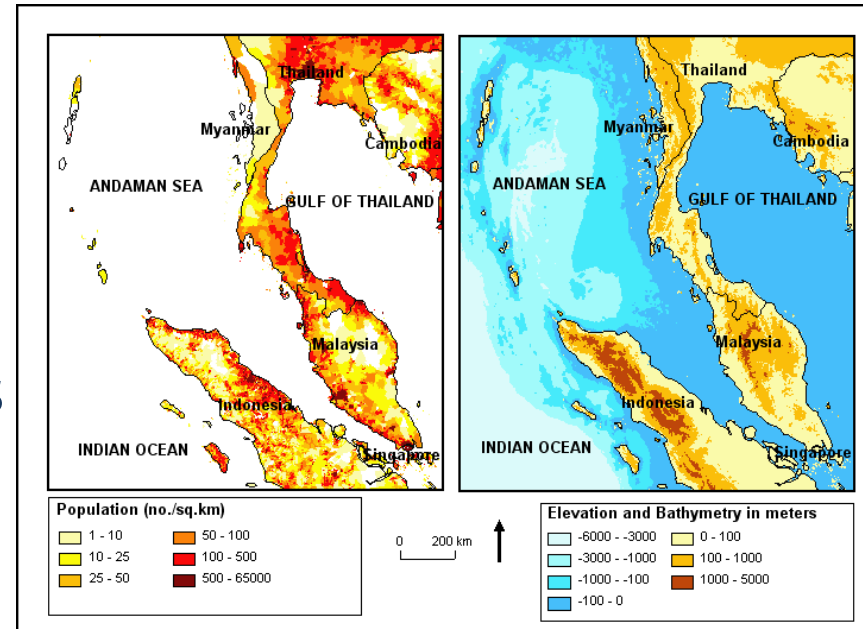
Digitize building foot prints from  
satellite imageries

Plotting global elevation datasets  
SRTM, ASTER, ETOPO and  
GEBCO

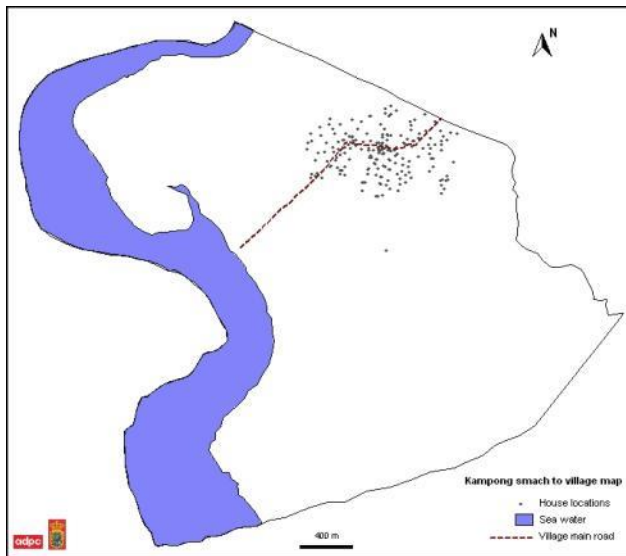
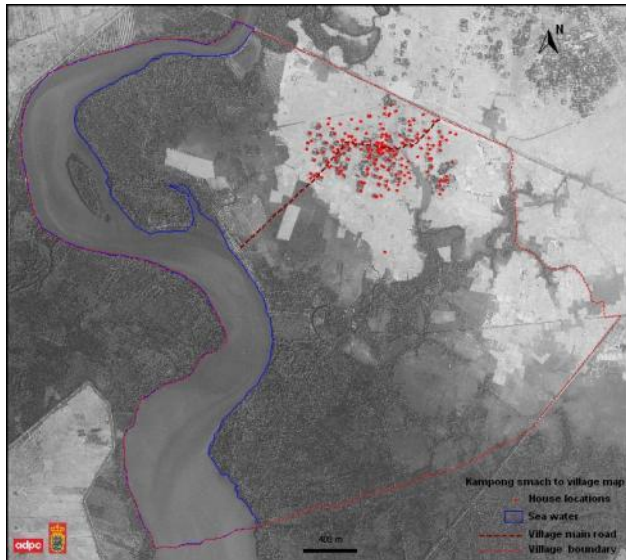
Grid computation, Re-gridding &  
Grid analysis

Interpolation, Image mosaicing,  
Inundation mapping

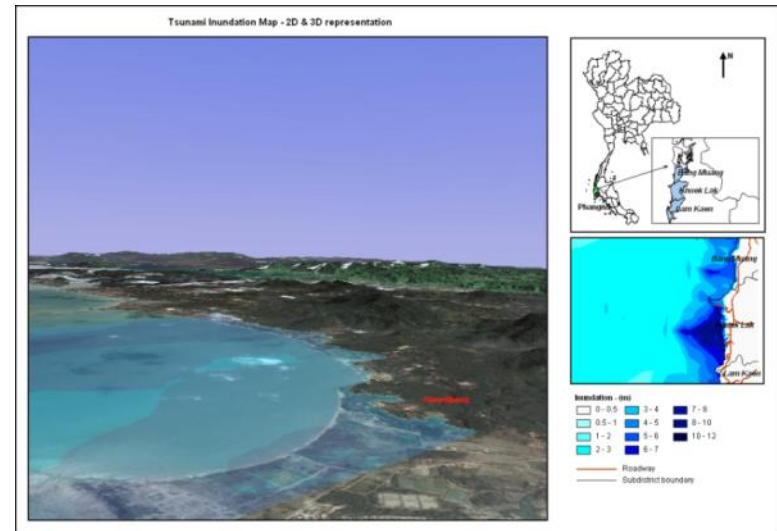
Vulnerability and risk assessment



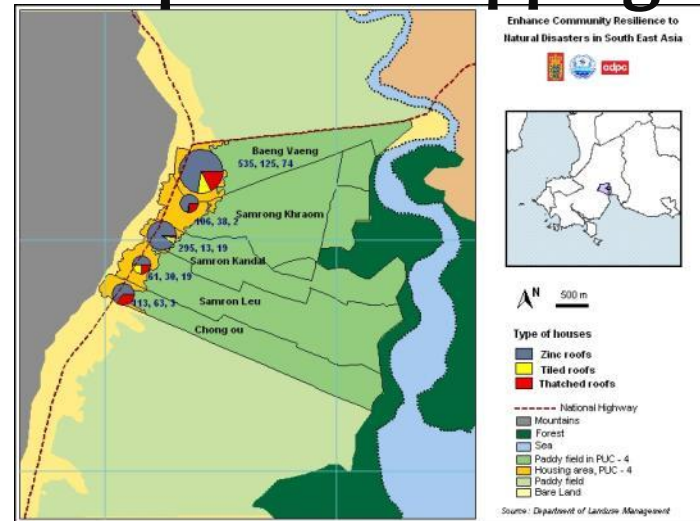
# Digitize house locations



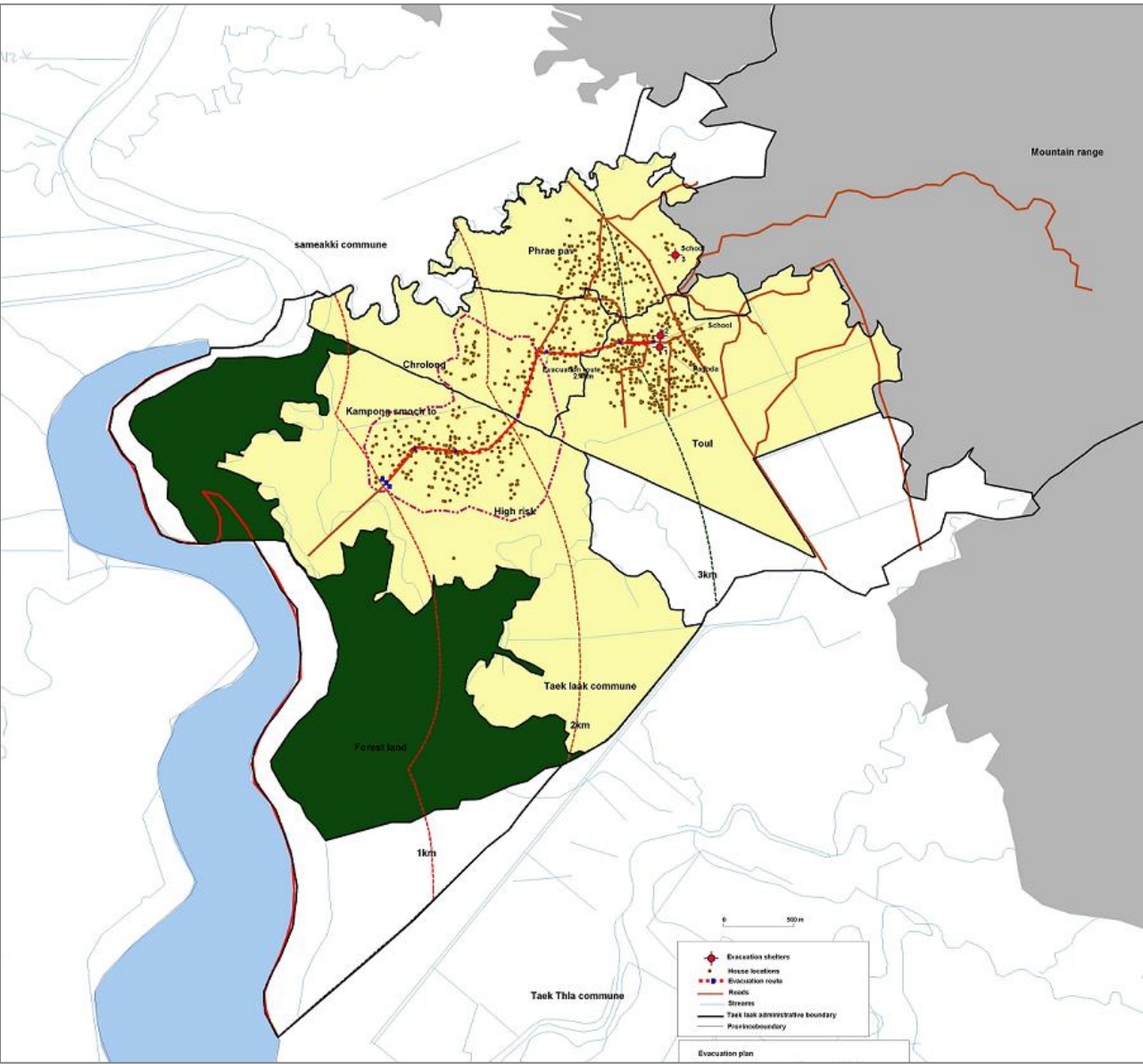
## Inundation



## Exposure Mapping



# Evacuation Mapping



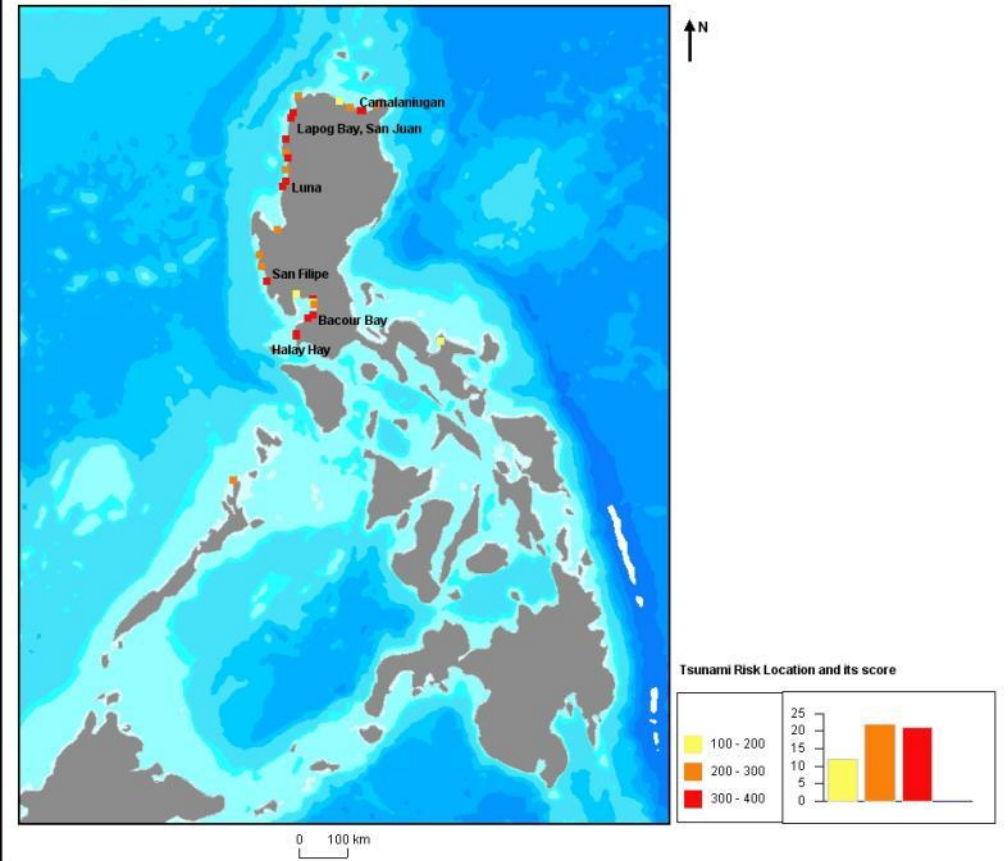
	Evacuation shelters
	House locations
	Evacuation route
	Roads
	Streams
	Taek laak administrative boundary
	Municipal boundary

**Evacuation plan**  
 Houses in Kampong smooth lo village are at high risk  
 In case of strong earthquake people should evacuate  
 through evacuation route to safety shelters 1 & 2 located  
 in Toul village  
 if needed people can be accommodated in Safety shelter 3



# Tsunami Risk Locations in Philippines

Tsunami risk map - Philippines



Luna



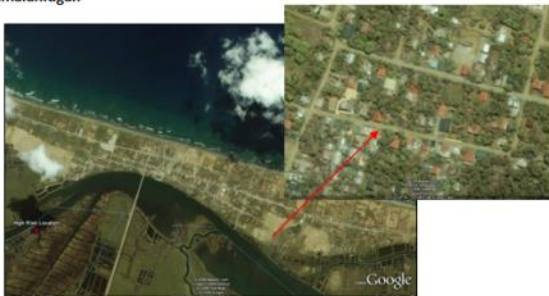
San Felipe



Bacour Bay



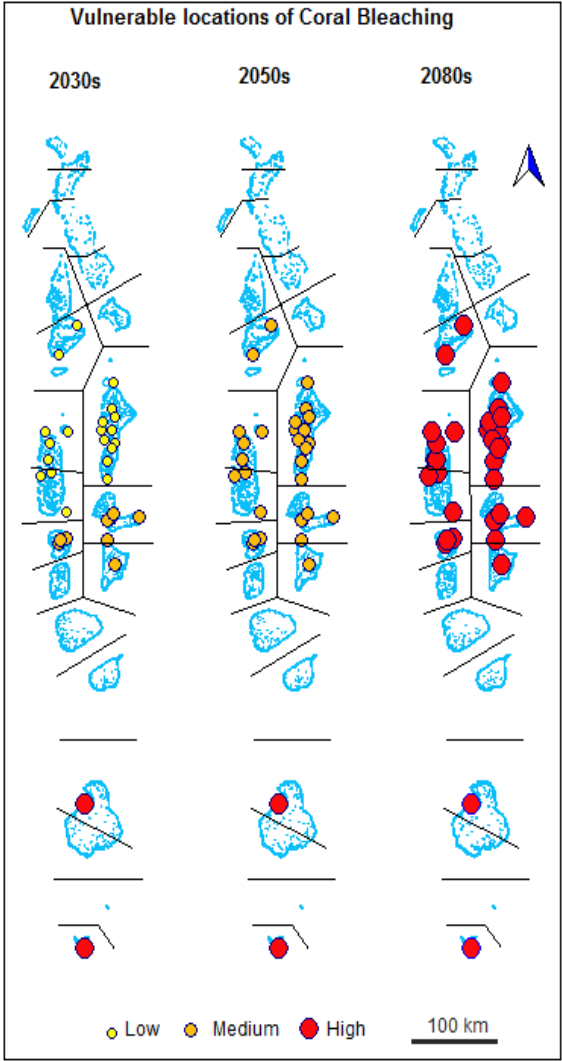
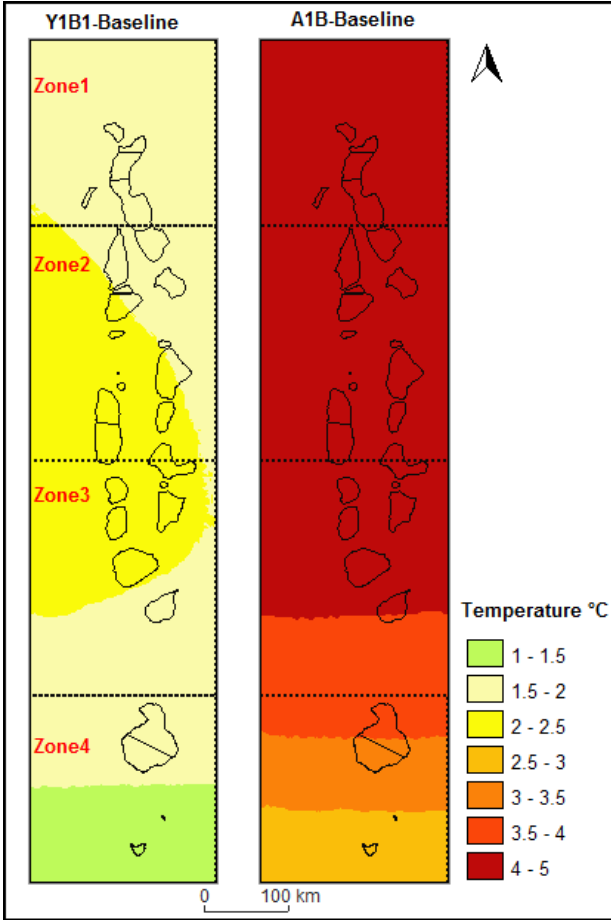
Camalaniugan





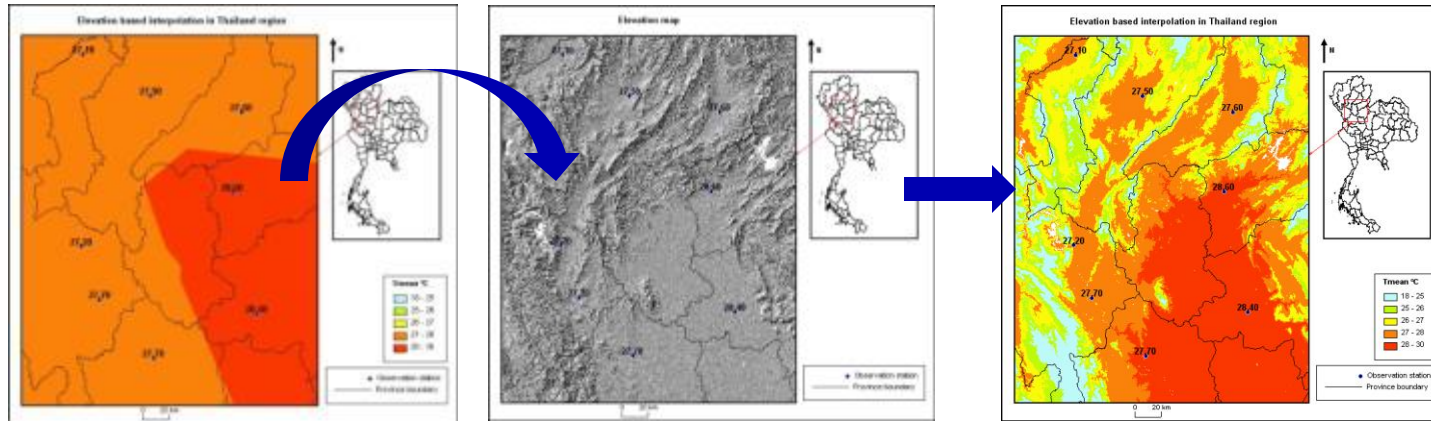
# GCIS for Maldives

- MaldivesGCIS
- 1. Atoll Boundary
  - 2. Atoll Areas
  - 3. Island boundary
  - 4. Cities
  - 5. Coastline
  - 6. Highways
  - 7. Reefs
  - 8. Waterbodies
  - 9. Wetlands
  - 10. Landuse
  - 11. Locations
  - 12. Met.Station\_Main
  - 13. Met.Station\_AWS
  - 14. TRMM\_Ob\_19982007
  - 15. GEBCO\_30sec
  - 16. ETOPO\_2mn
  - 17. SSH\_GFDL\_A1B80sG
  - 18. SSH\_GFDL\_A1B80s
  - 19. GCM\_PR
  - 20. GCM\_SST
  - 21. GCM\_Tas
  - 22. GCM\_PR\_Change
  - 23. GCM\_SST\_Change
  - 24. GCM\_TAS\_Change
  - 25. RCM\_RF\_1981\_2000
  - 26. RCM\_RF\_2021\_2040
  - 27. RCM\_RF\_2041\_2050
  - 28. RCM\_RF\_2082\_2100
  - 29. RCM\_T\_1981\_2000
  - 30. RCM\_T\_2021\_2040
  - 31. RCM\_T\_2041\_2050
  - 32. RCM\_T\_2082\_2100
  - 33. CL\_ERA1989\_2008

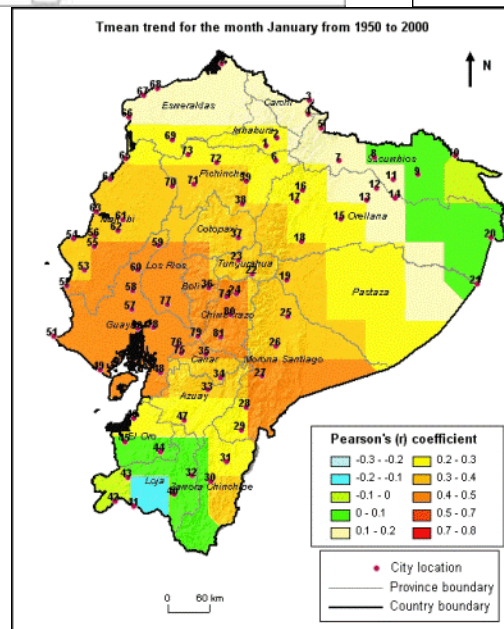


# Climate Analysis

## Climate surface construction



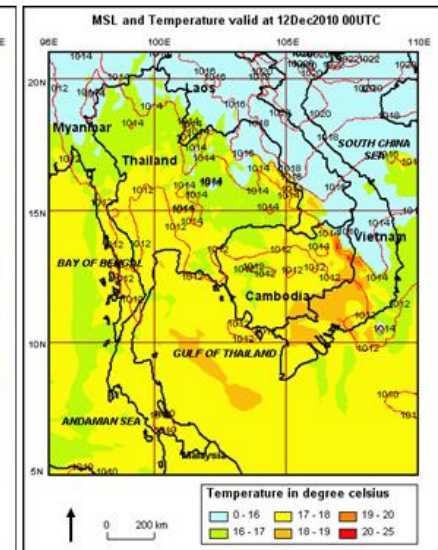
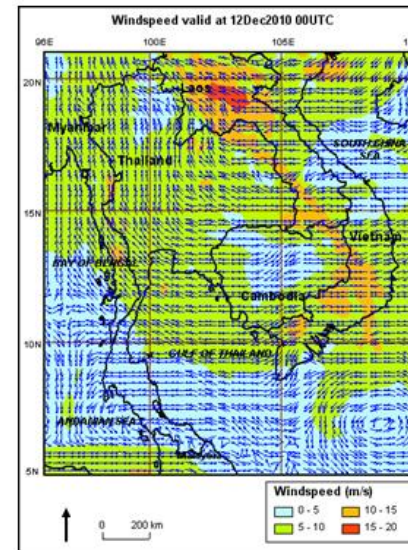
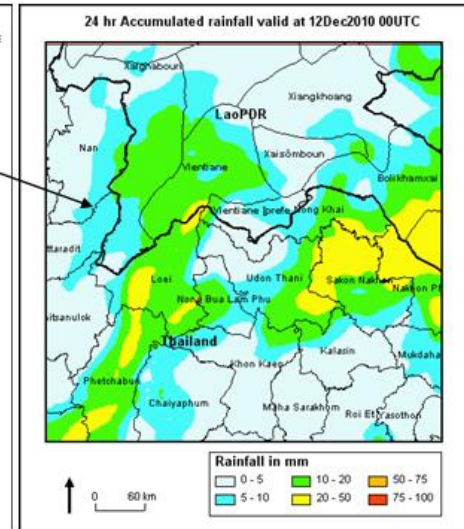
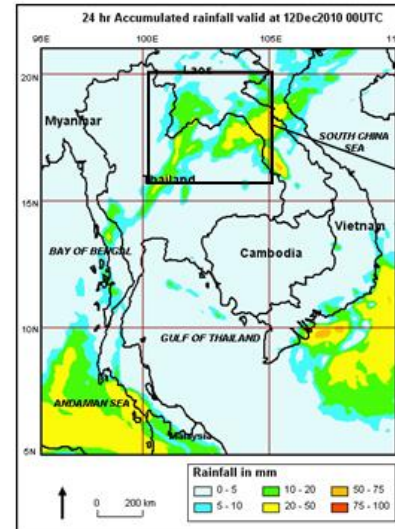
Monthly trend analysis from 1950 to 2000





# Weather Information System

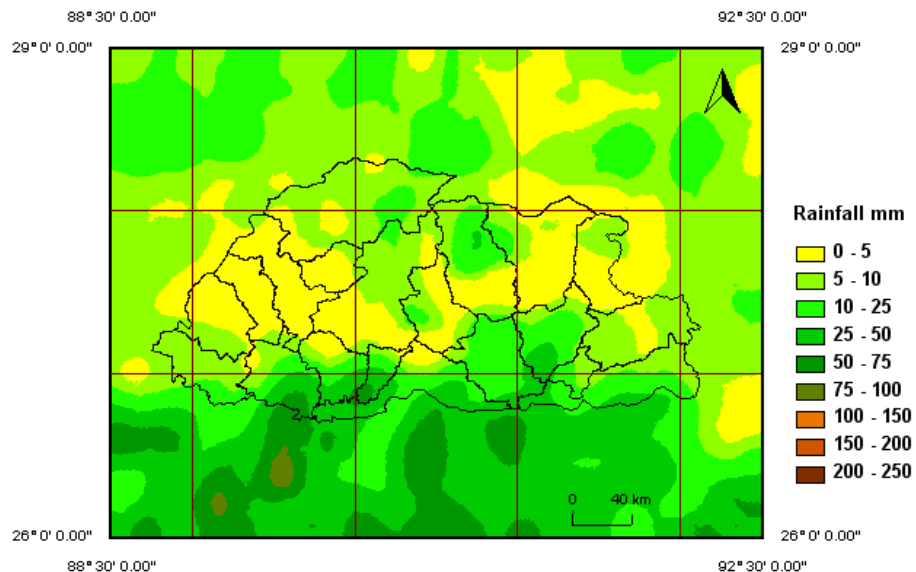
- Better understanding about the weather patterns in a geographic region.
- Serves as a database management system for storing observed weather parameters, forecast information's and other spatial datasets.



# Spatial Analysis - Bhutan

Analysis which allows the user to study the relationship between location and its characteristics geographic feature.

It is very useful for analyzing meteorological or hydrologic data in terms of geographic distribution, and for verification analyses of forecasts and warnings.

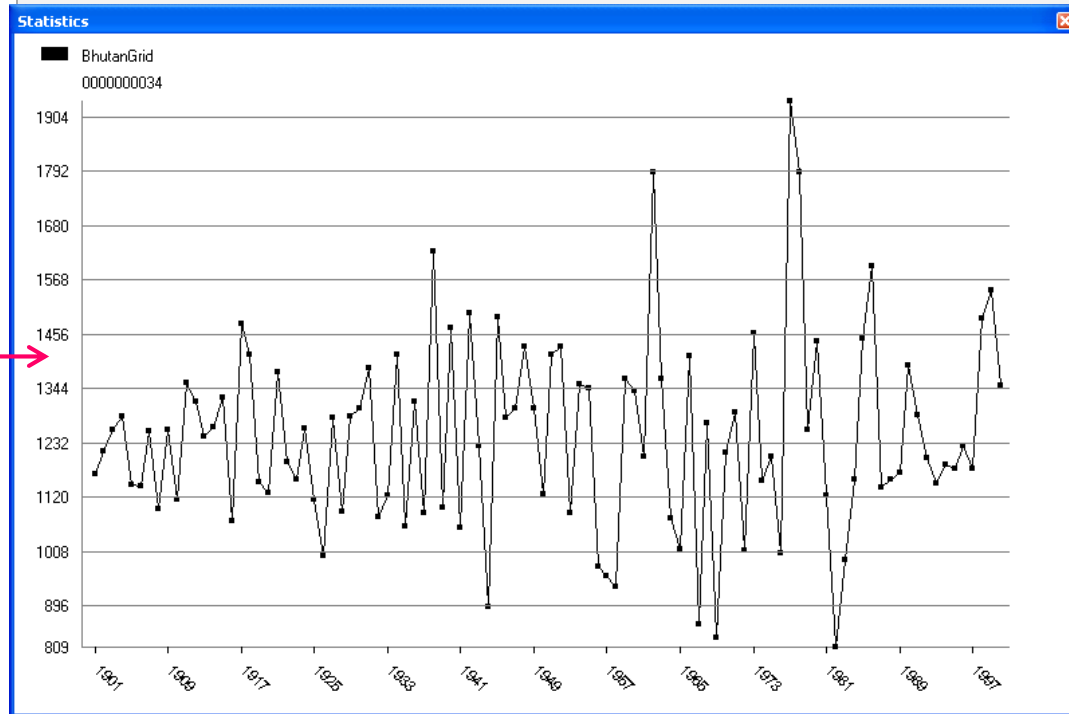
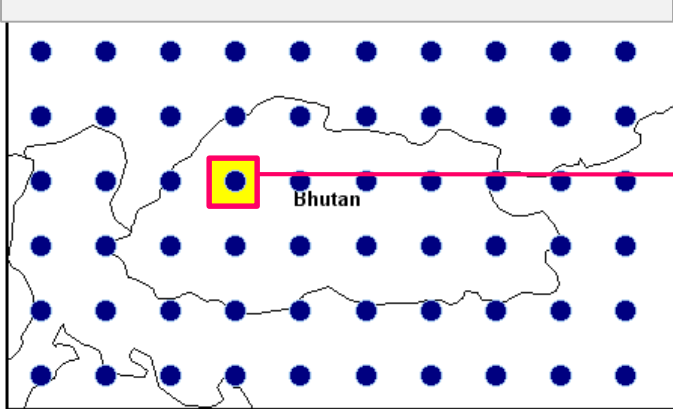


# Temporal Analysis - Bhutan

Analysis which allows the user to study the variations of a parameter or phenomenon of a object over a location or geographic region.

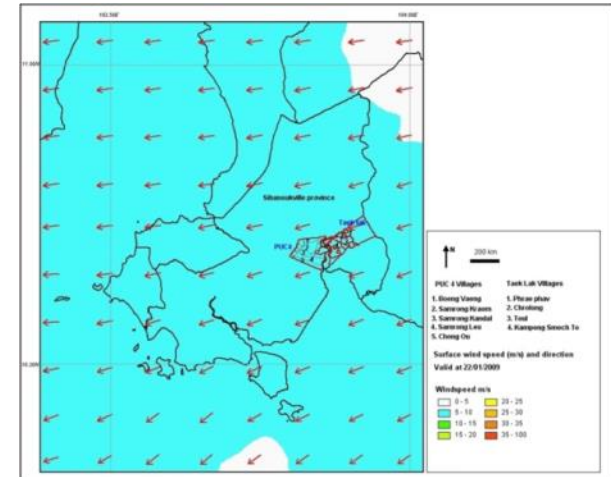
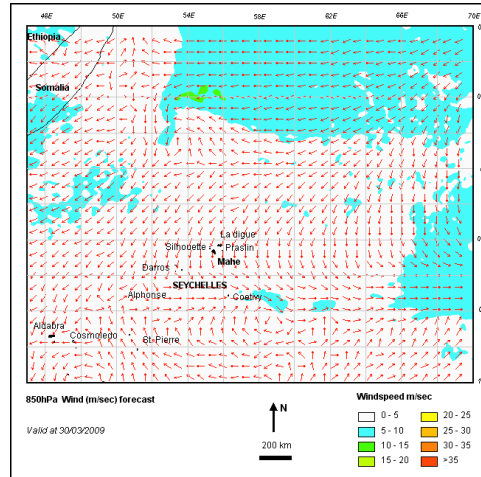
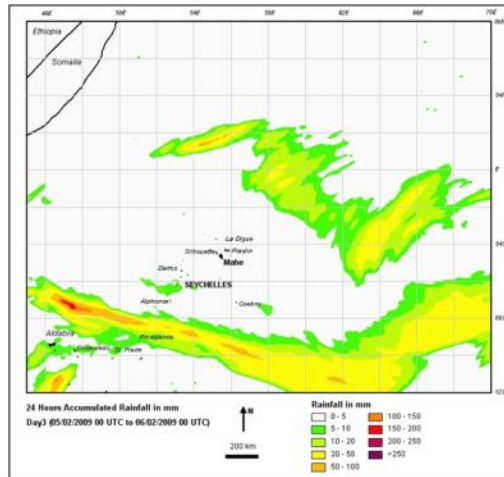
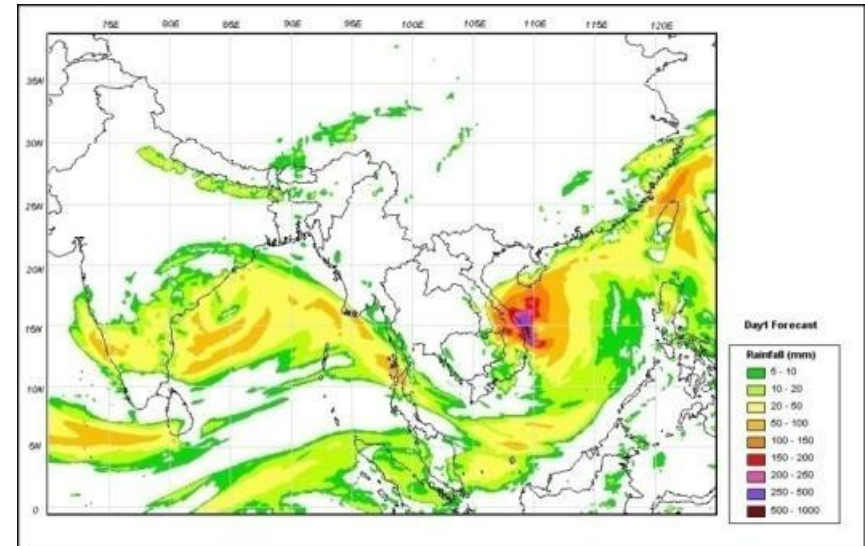
- Analyze patterns and behaviors
- Identify anomalies

## Temporal analysis of grid location in Bhutan



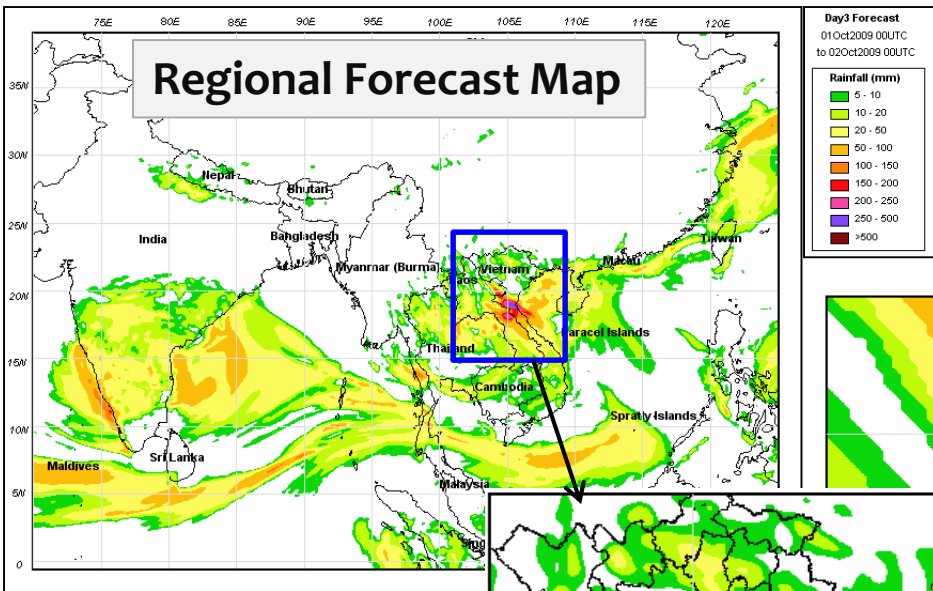
# Weather Plots @ RIMES

- Rainfall
- Temperature
- Wind speed
- Mean Sea Level
- Wind Direction
- Ground Potential Height

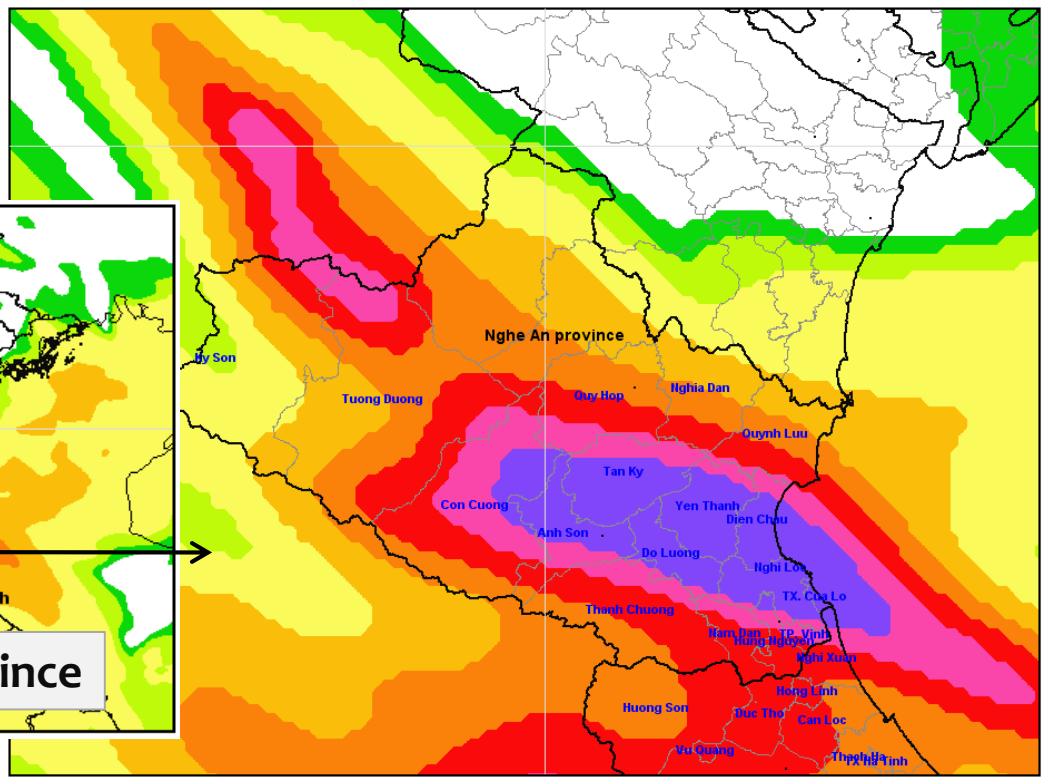




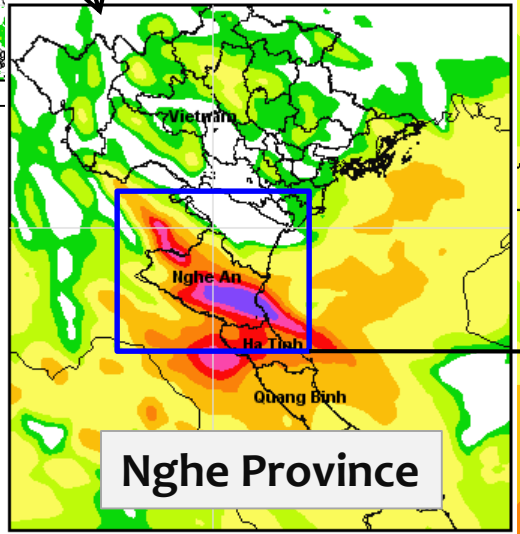
# Better visualization for understanding Hazards



**Disticts: Tan Ky, Yen Ti, Yen Thanh, Dien Chau, Do Luong, Ahn Son**



**GIS Generates Value Added Information**



# Hazard Thresholds

What is the threshold value of rainfall in a geographic area to trigger an impact (hazard)?

◆ Heavy Rainfall? → **What is threshold?**

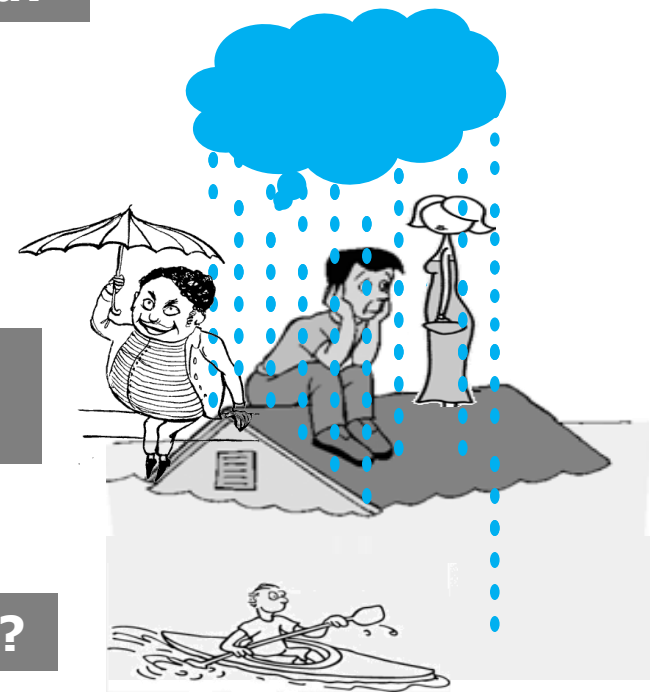
Rainfall amount which can cause impacts for society  
(Ex: 300mm/day or 200mm.hr)

◆ Heavy Rainfall can cause? → **What it cause and Where?**

Flood..

◆ Flood can affect? → **What is Impact?**

Livelihood..  
Infrastructure...  
Agriculture...  
Etc.,



# Paddy field Case

<b>What?</b>	200mm rainfall
<b>Where?</b>	Sukothai and Nakhon Ratchasima Province
<b>When?</b>	25 November 2009

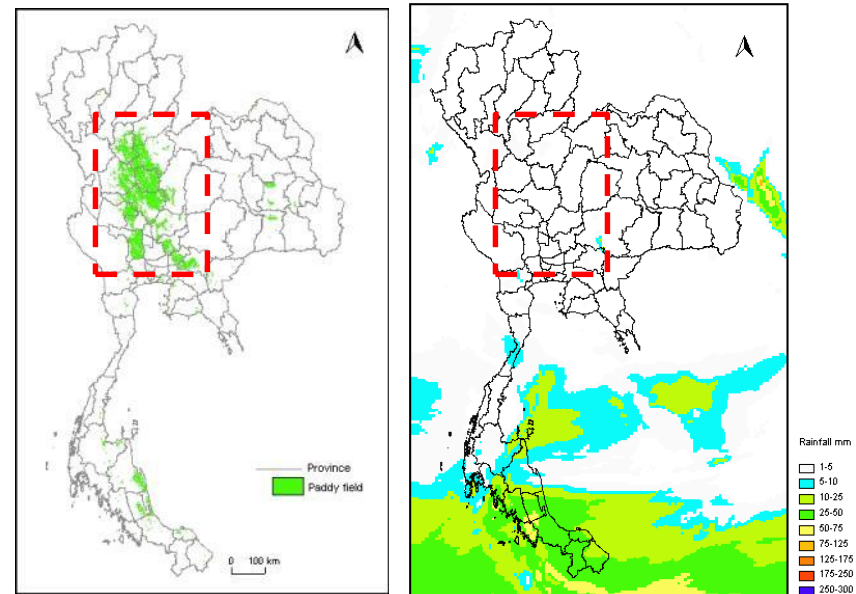
## Hazard functions

More than 150mm in 24 hours in November month on a paddy field creates flooding in the field and huge crop damage.

## Impacts

1. Flooding in paddy field
2. Crop damage
3. Economic loss High (because it is at harvesting stage)

## Hypothetical Scenario



# Uttaradit Landslide Case

## Hazard functions

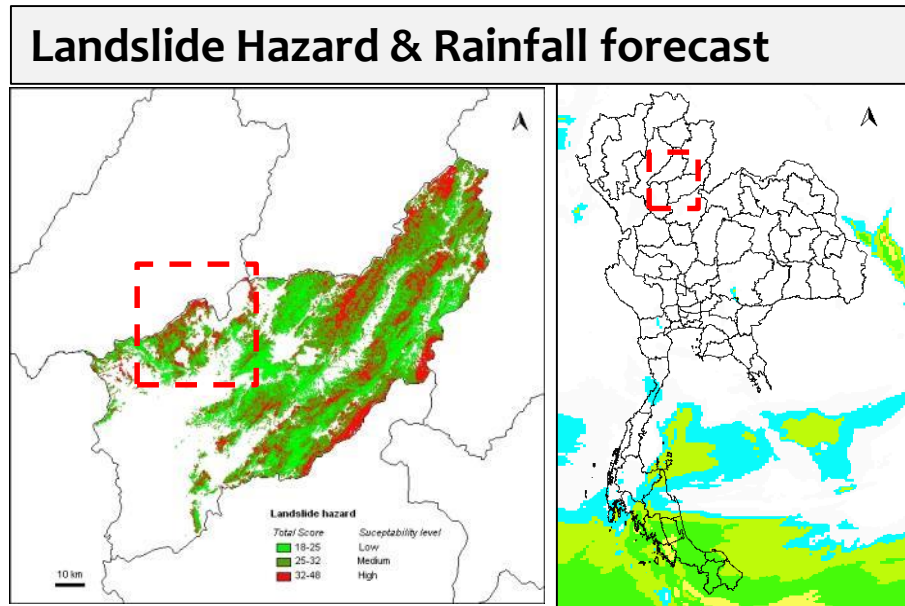
More than 150mm rainfall may trigger Landslides in the Hazard Zones.

Rainfall	Alert level
0-50	No risk
50-100	Ready
100-150	Alert
150-300	Evacuate

## Impacts

1. Building collapse
2. Human Casualties
3. Affects vegetation pattern

## Hypothetical Scenario

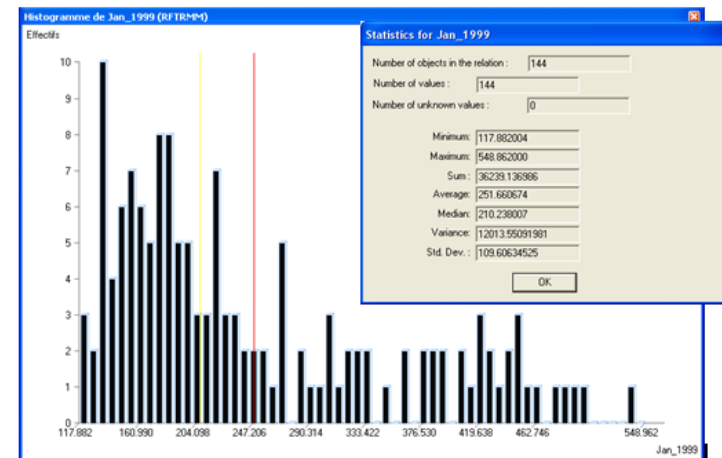
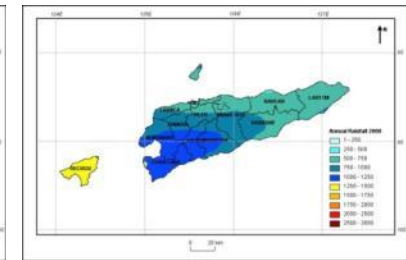
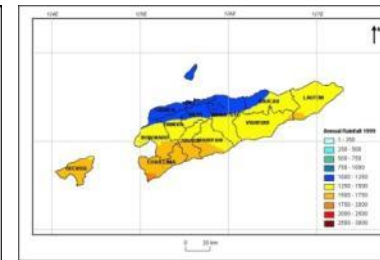
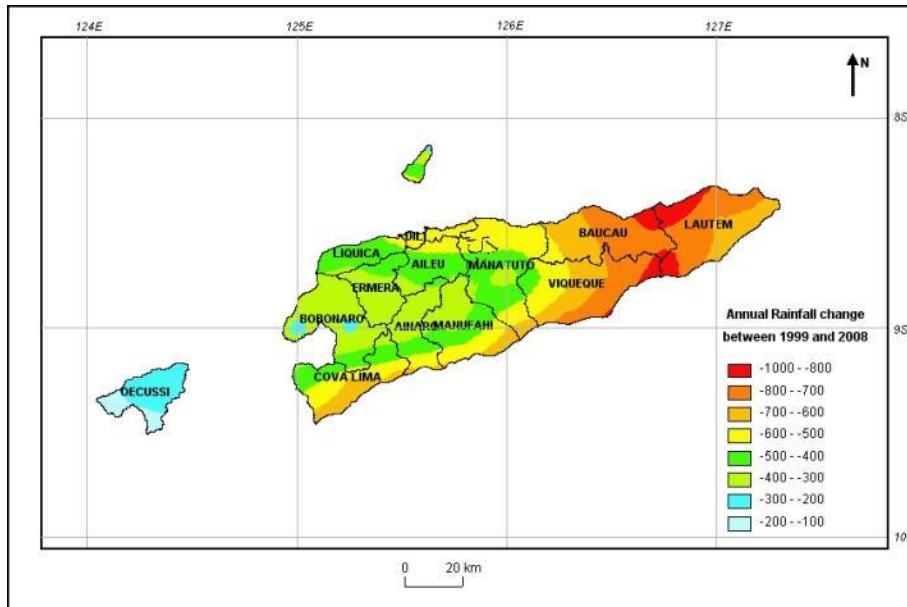


<b>What?</b>	200mm rainfall
<b>Where?</b>	Uttaradit Province
<b>When?</b>	25 November 2009



# TRMM Rainfall Database – East Timor

## TRMM Database Development from 1999 to 2009 for East Timor



**Weather Database Management : Spatial and Temporal datasets of surface observatory and Forecast products**

**Generate Value added products by adding Geographical Information to forecast.**

**Serves to interpret and analyze scientific products**

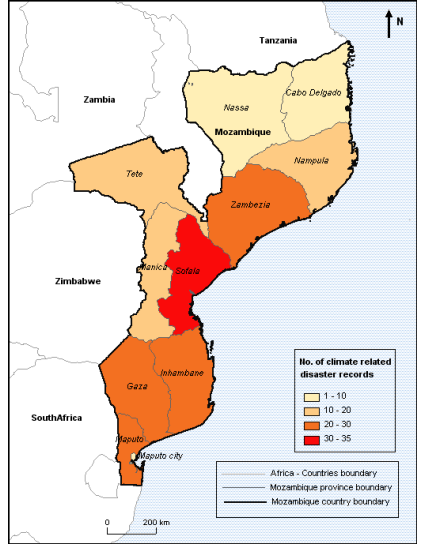
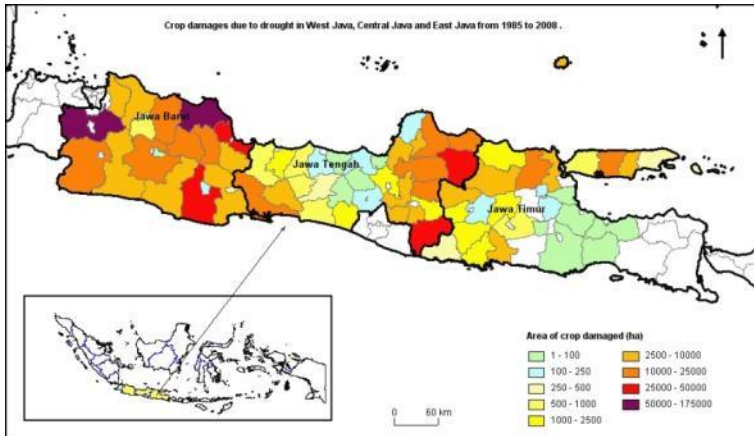
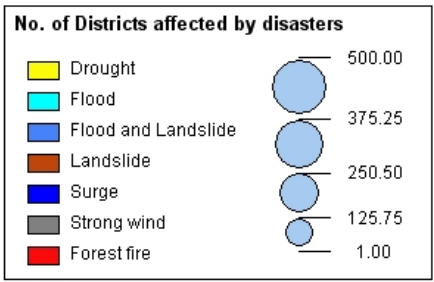
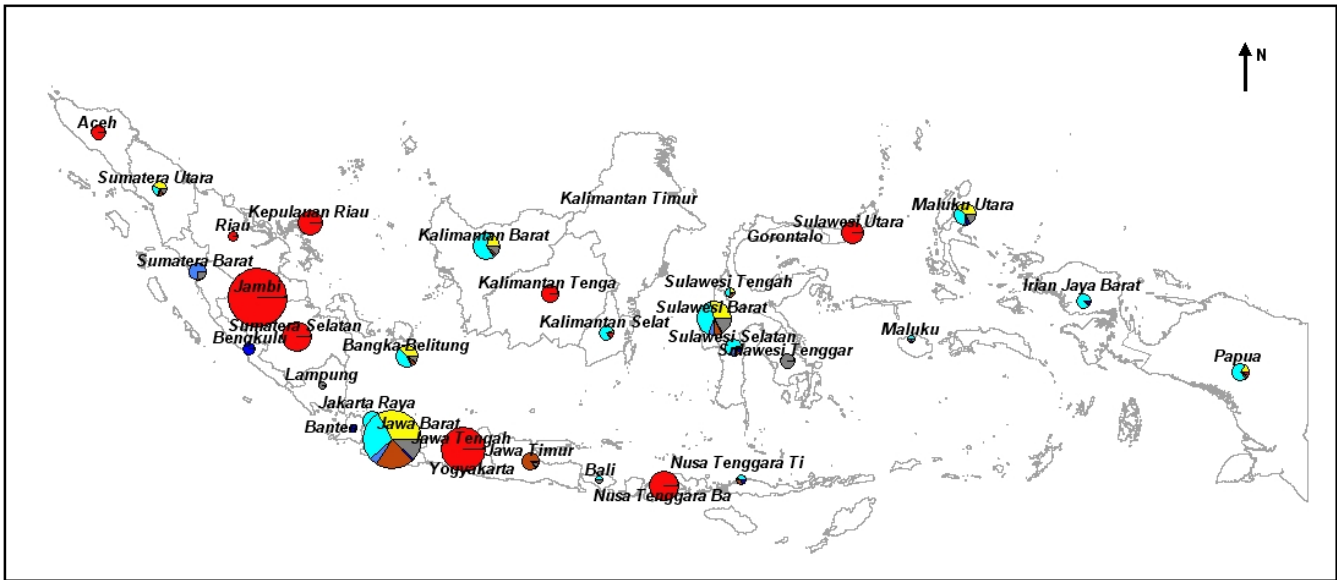
**Helps in Decision making purposes for issuance of warnings and verification.**

**Exposure assessment with help of demography, environmental and socio-economic data**

**Historical impacts analysis for deriving thresholds by case analysis.**

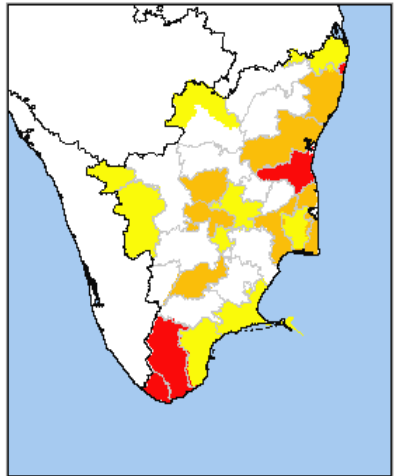
**Evolving the process of generating pre-impact scenarios**

# Disaster Information System

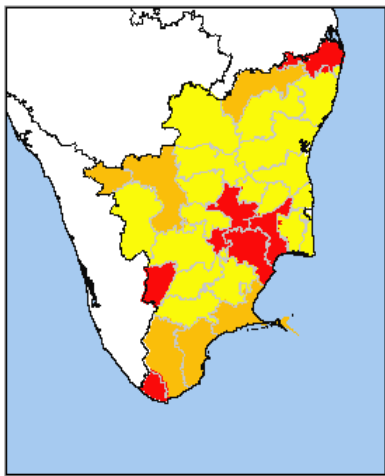


# Disaster Frequency and Impacts Mapping

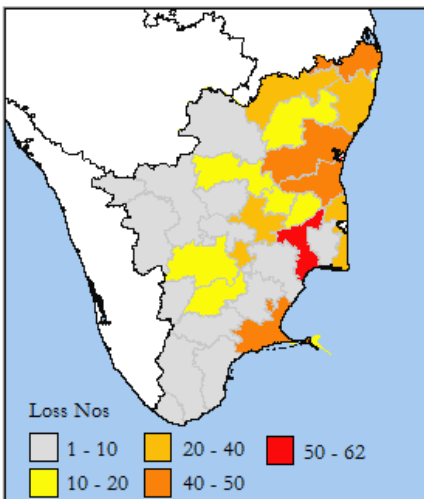
Cyclone/Strongwind/Hailstorm



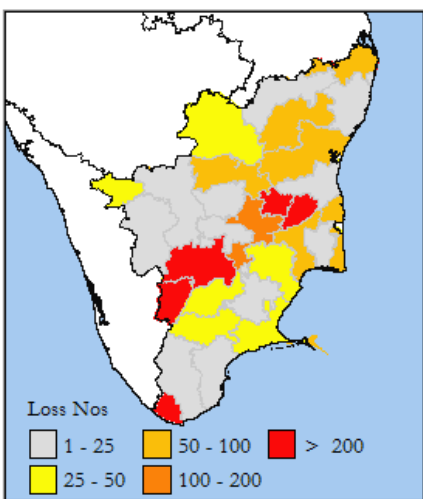
Heavy Rainfall



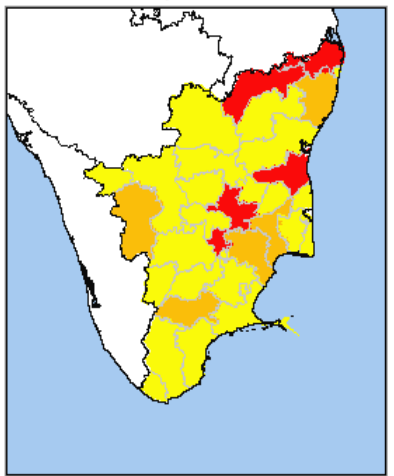
Human loss



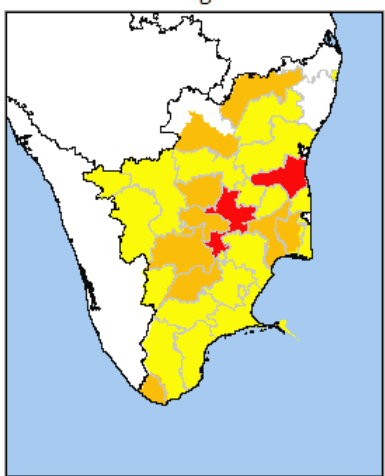
Cattle loss



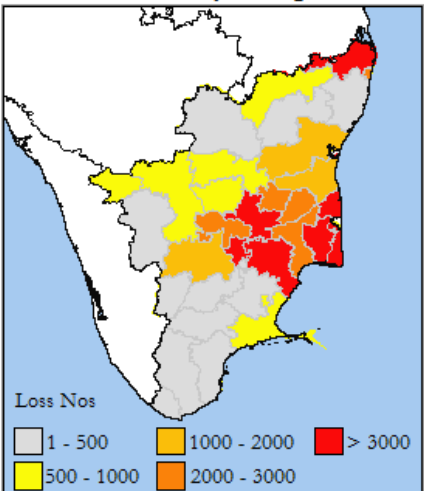
Flood/FlashFlood



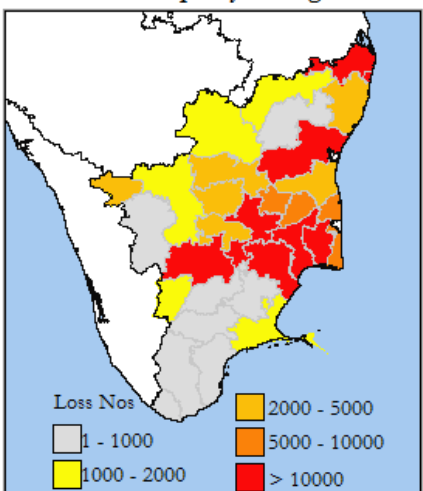
Drought



Houses fully damaged



Houses partly damaged



Low Medium High





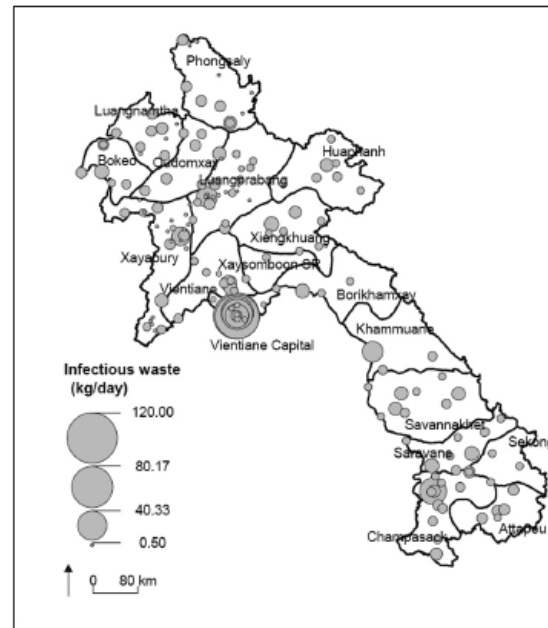
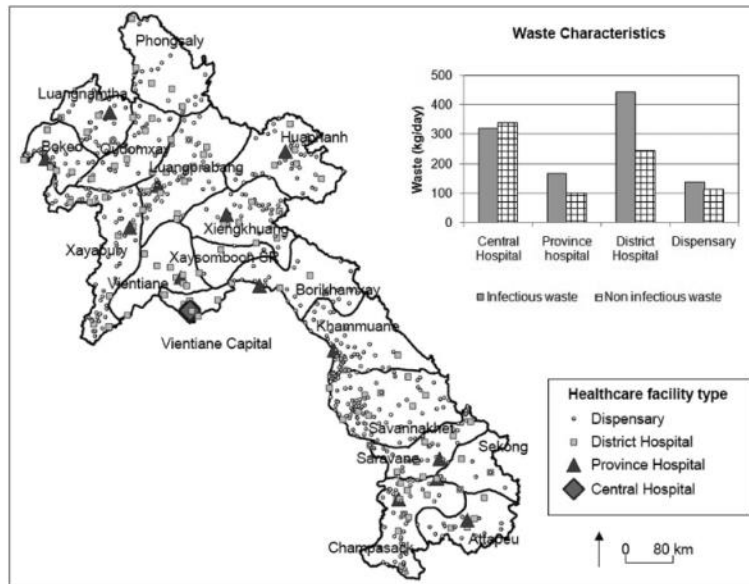


# Healthcare Waste Management

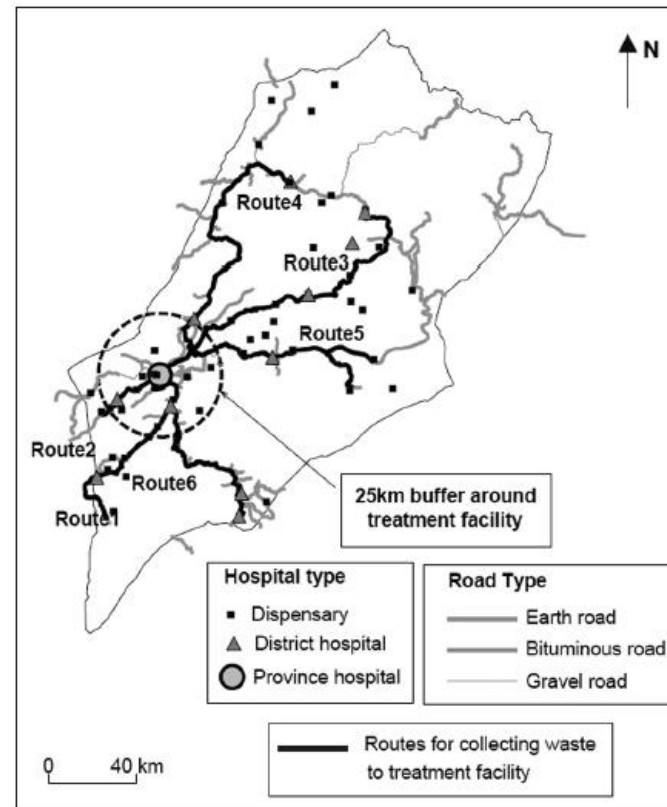
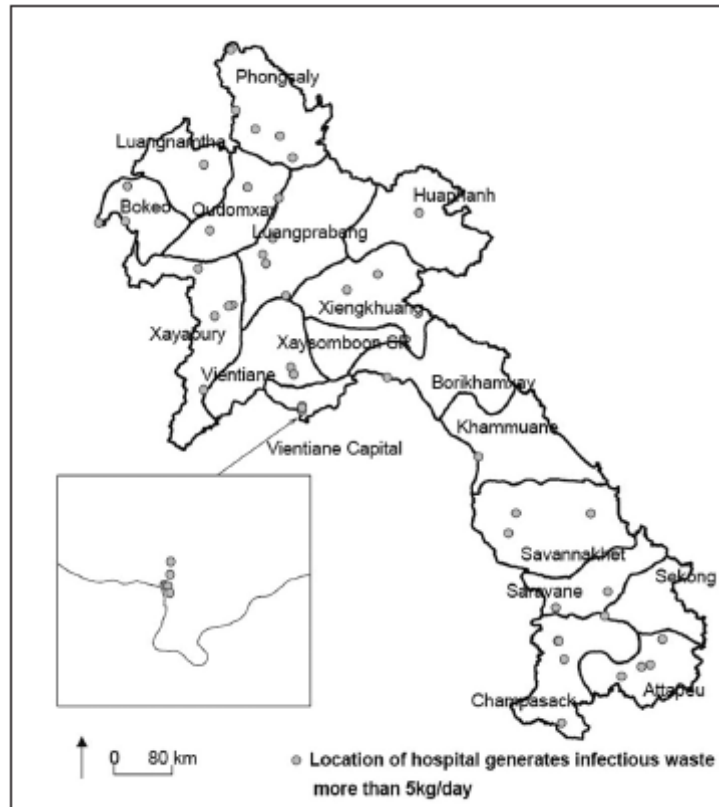
Spatial distribution of healthcare systems  
and healthcare waste

Waste concentration

Optimum routing analysis



# Healthcare Waste Management



Route	Distance (km)	No. of district hospitals	No. of dispensary	Infectious waste (kg day <sup>-1</sup> )	Non-infectious waste (kg day <sup>-1</sup> )	Total (kg day <sup>-1</sup> )
1	110.65	2	9	11.658	5.58	17.238
2	48.57	1	4	5.618	2.62	8.238
3	172.43	1	6	6.462	3.3	9.762
4	146.8	2	1	8.282	2.86	11.142
5	148.57	2	1	8.282	2.86	11.142
6	76.48	1	3	5.196	2.28	7.476

# Forestry and Biodiversity

**Forest, biodiversity and freshwater resource mapping**

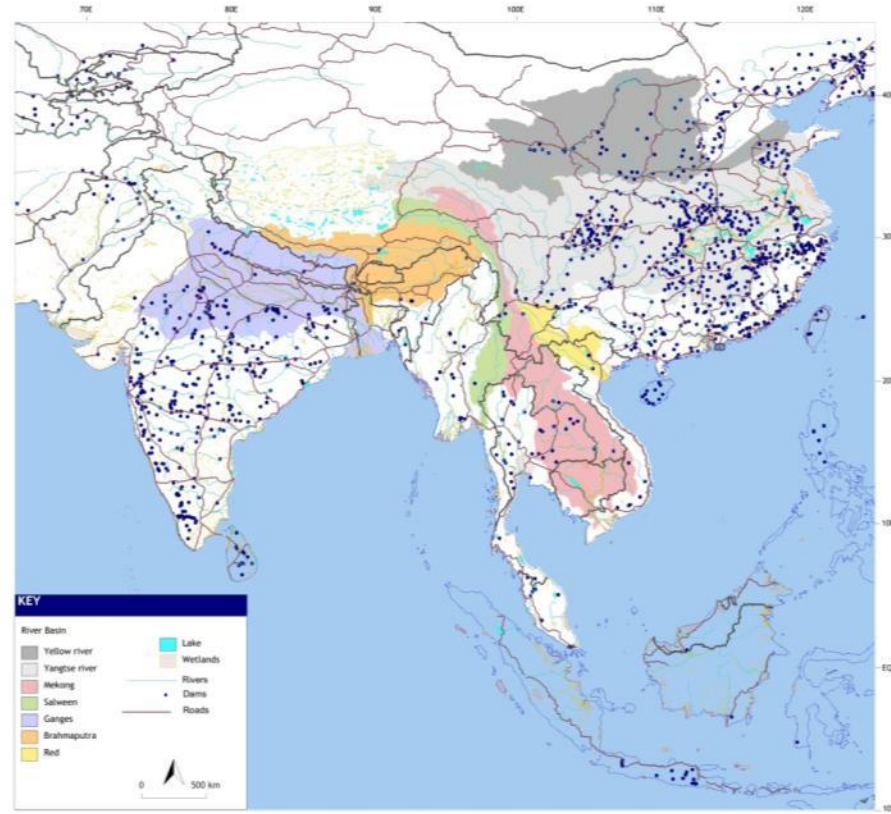
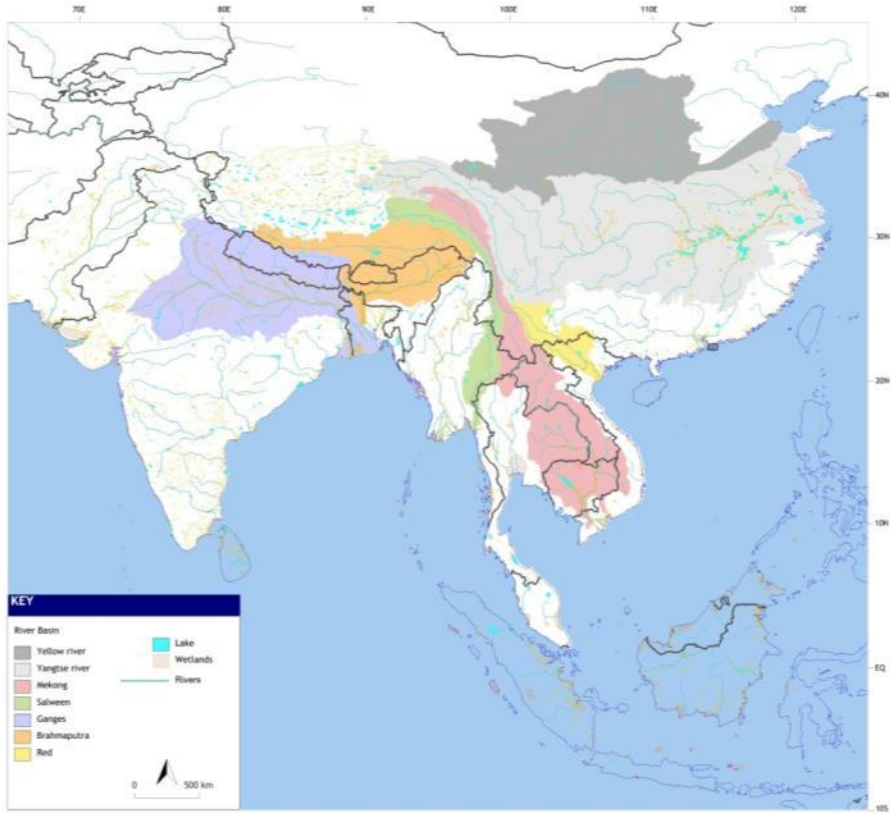
**Mapping Threats for these resources.**

**Hot spot identification by overlaying resources and threats to prioritize the areas**

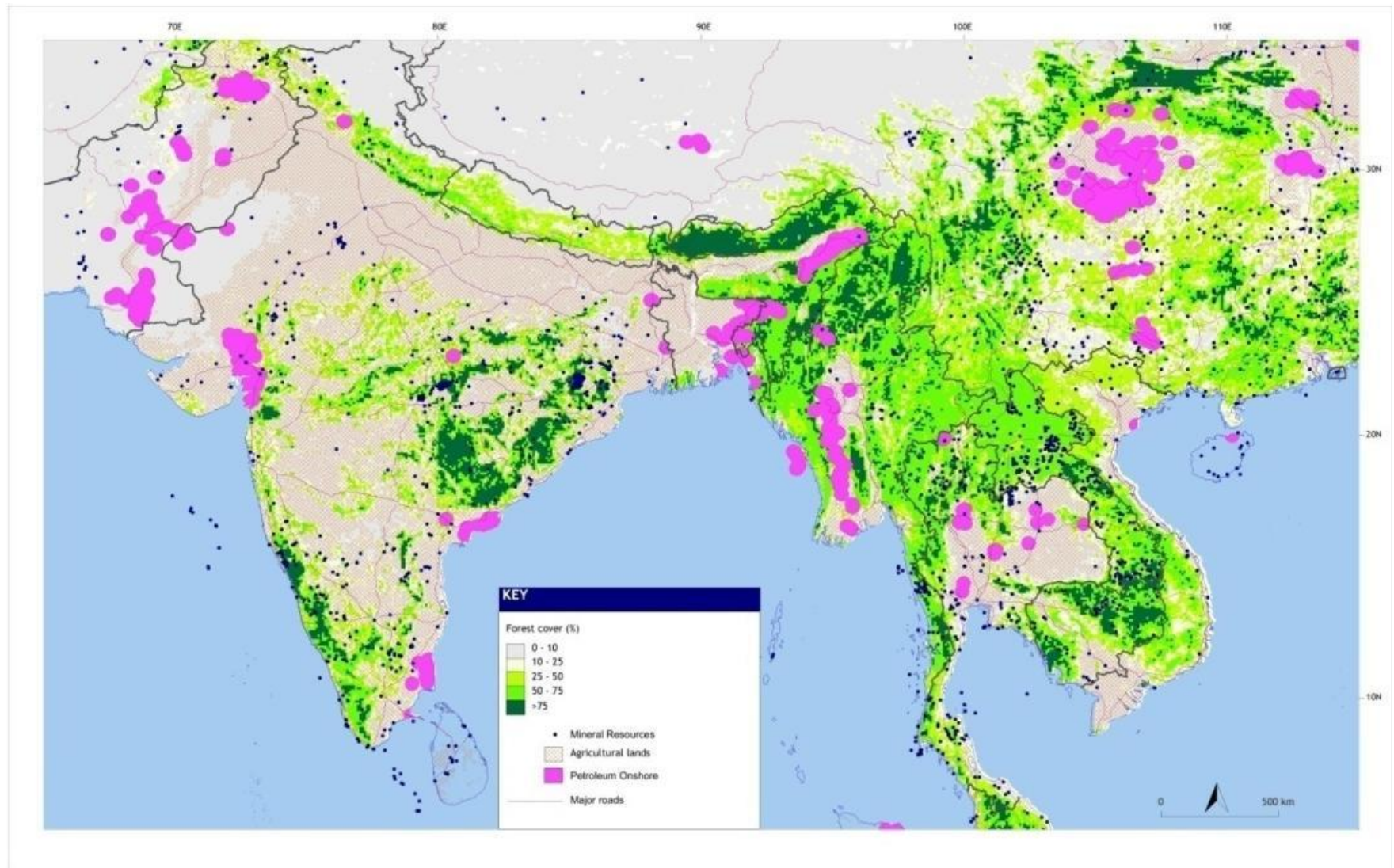
Policy makers/donor agencies use these information for preparing strategies and future projects.



# Freshwater resources and its threats

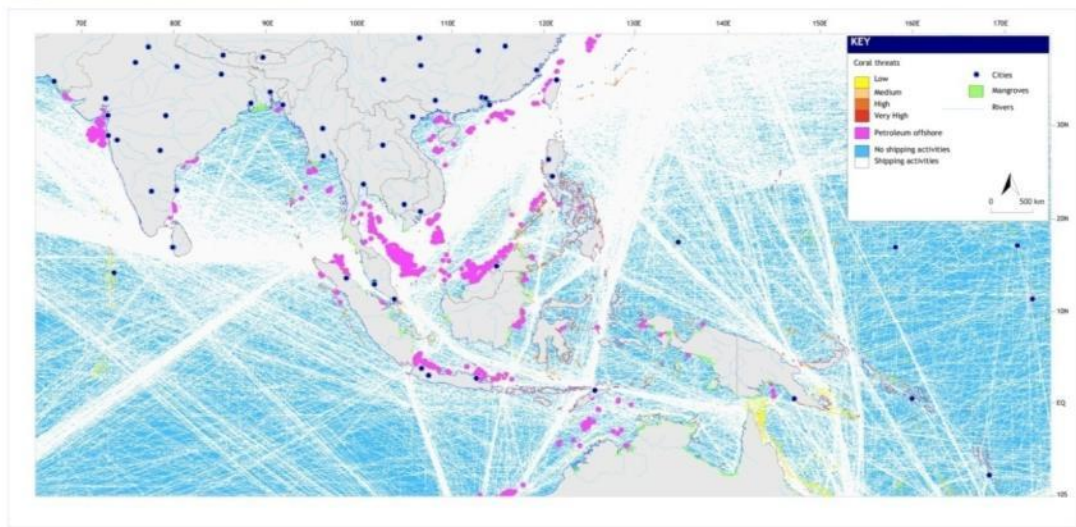
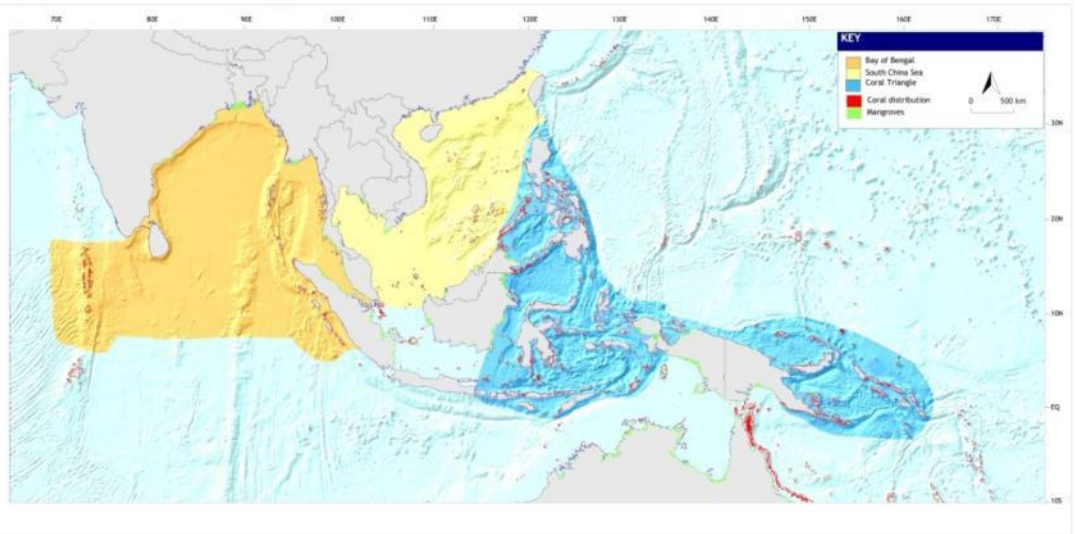


# Forest resources and its threats

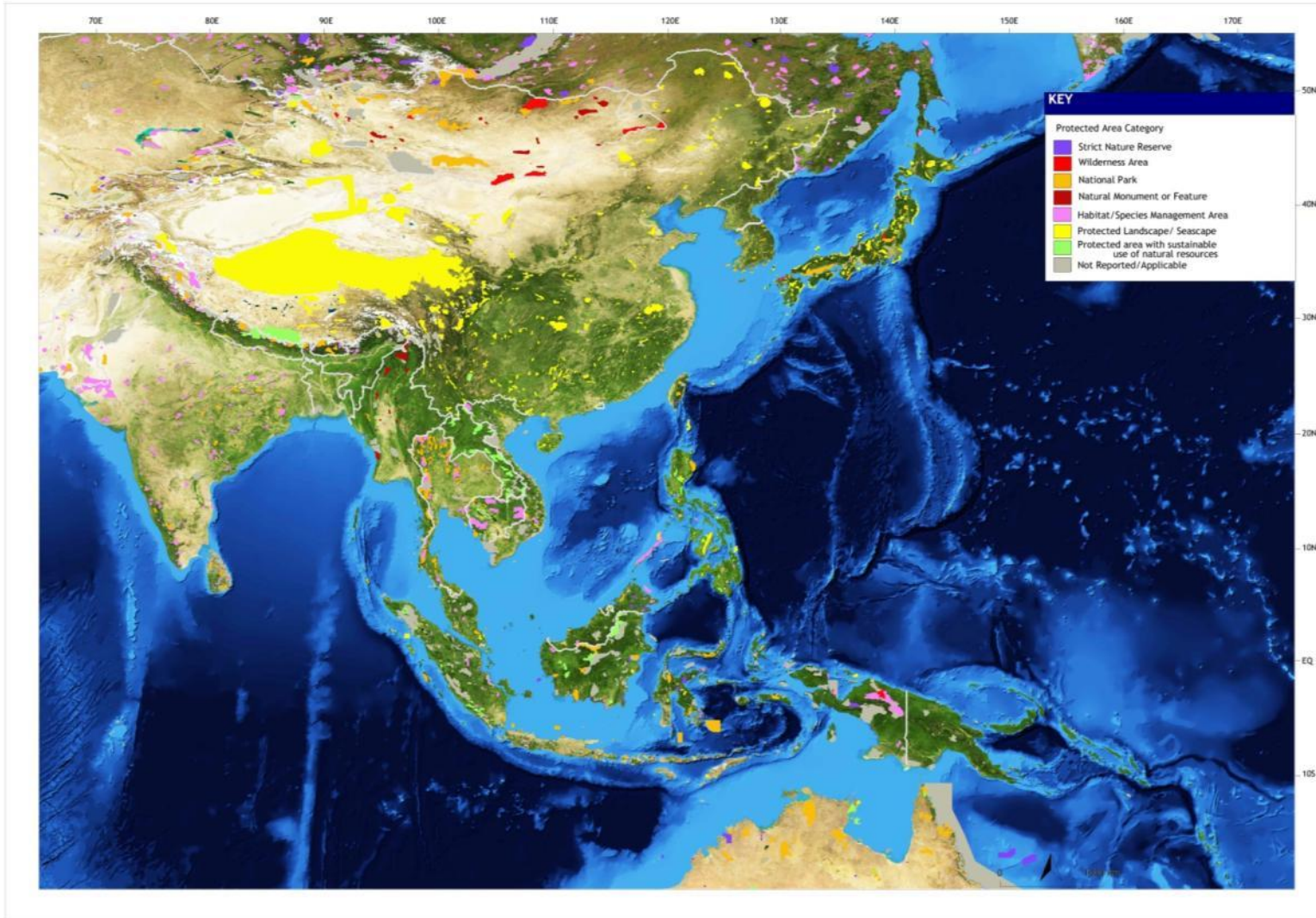




# Marine resources and its threats

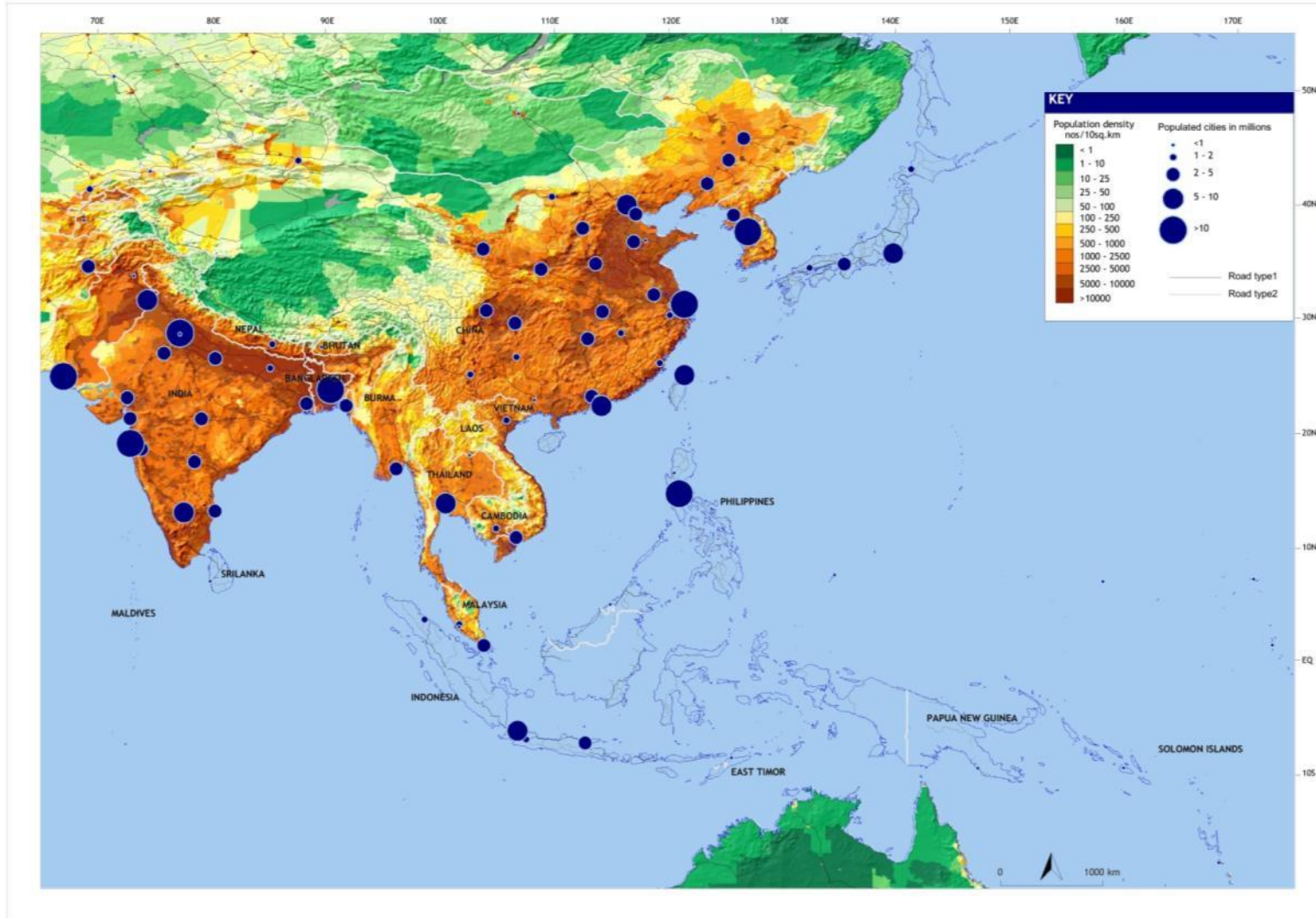


# Protected areas





# Spatial datasets importance



**Everything is possible with a freeware  
SAVGIS..... So why not we use this...**

**Any questions.....**



**Thank you**