



# **Role of Environmental Science and Information in Disaster Reduction**

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# Ecosystem Management in Disaster Preparedness



## Long term preparedness through

- **Spatial Planning**
- **(Socio-) Economic Planning**
- **Environmental Planning (SEA, SDA)**

## Medium term preparedness through

- **EIA**
- **Management Plans**
- **Development Control**

## Short term preparedness through

- **Contingency planning**
- **Recovery management**

**All require science and information on ecosystems and environment to**

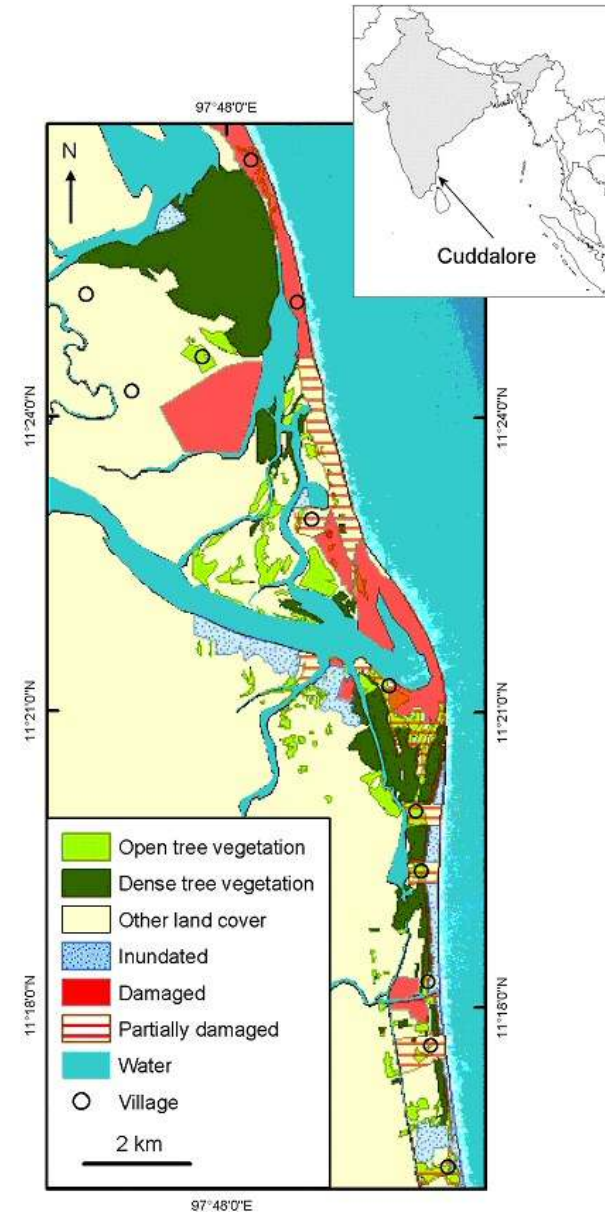
- **Understand the environmental causes and impacts**
- **Develop Decision Support**
  - **Improved information base (mapping- local knowledge)**
  - **Impact projection tools**
  - **Vulnerability assessments**
  - **Development scenario assessments**
- **Develop integrated approached including risk awareness, enforcement**

# Tsunami – A Protective Role for Coastal Vegetation



Examination undertaken by:  
Nordeco  
GRAS  
Wetlands International,  
Indonesia (and others).

Paper in *Science* October 2005 (Vol 310)



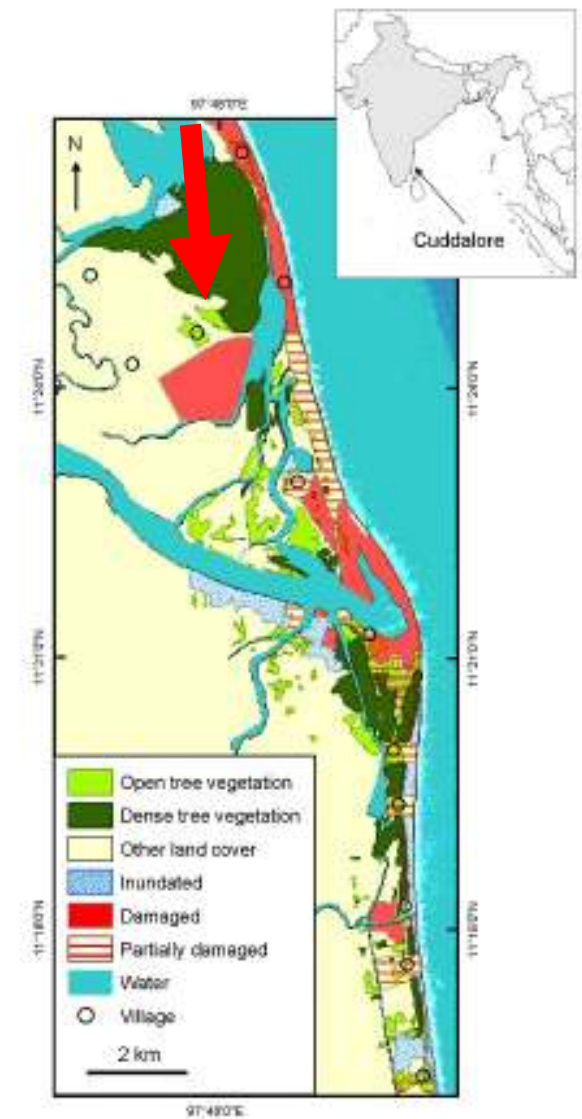
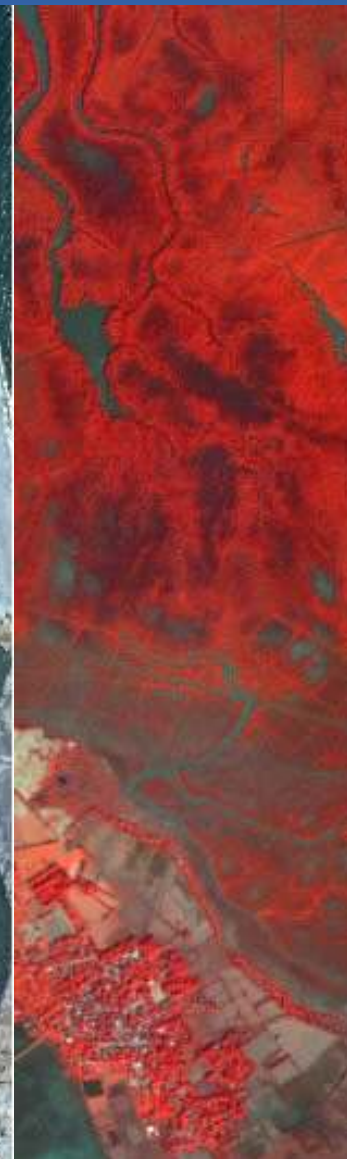


# Tsunami – A Protective Role for Coastal Vegetation



Pre Tsunami – QuickBird 0.6 m

Post Tsunami – Ikonos 4 m



# Cyclones and Coastal Flooding



**Shelters save lives**  
**mangroves can reduce impacts**



*Coastal flooding, Vietnam*



*1991 Cyclone, Bangladesh*



# Cyclones and Coastal Flooding

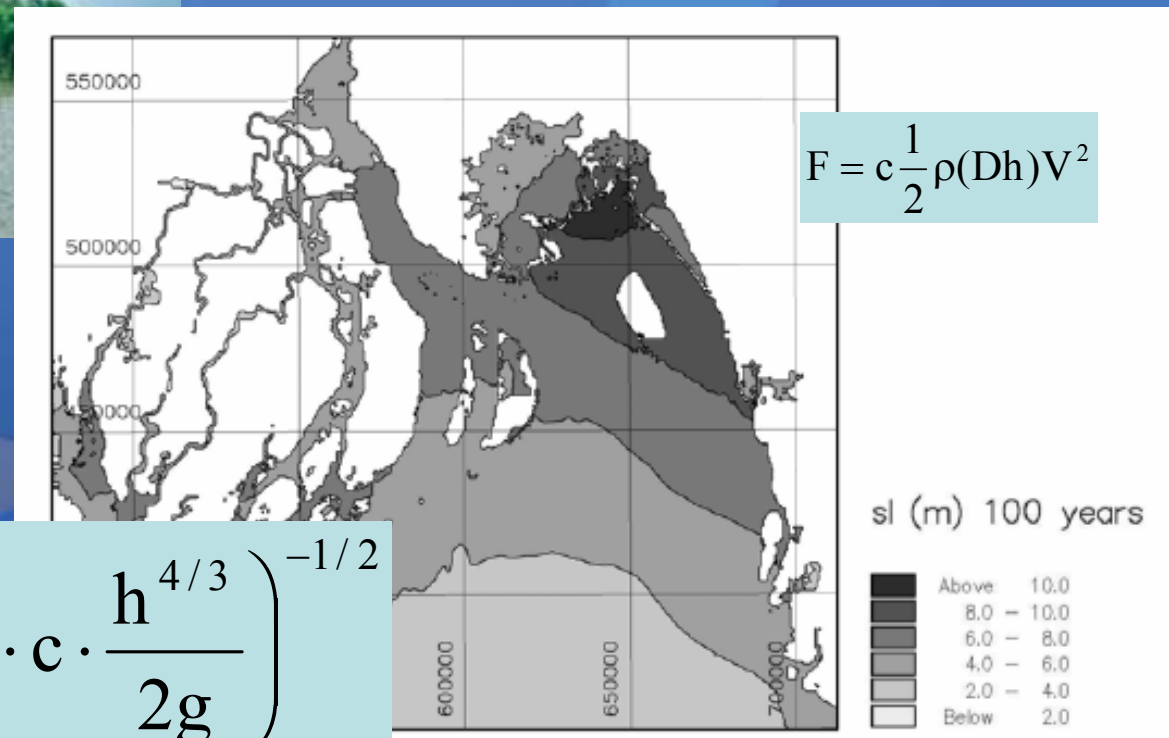


**Mangroves provide protection  
against the surge waves  
generated by cyclones**

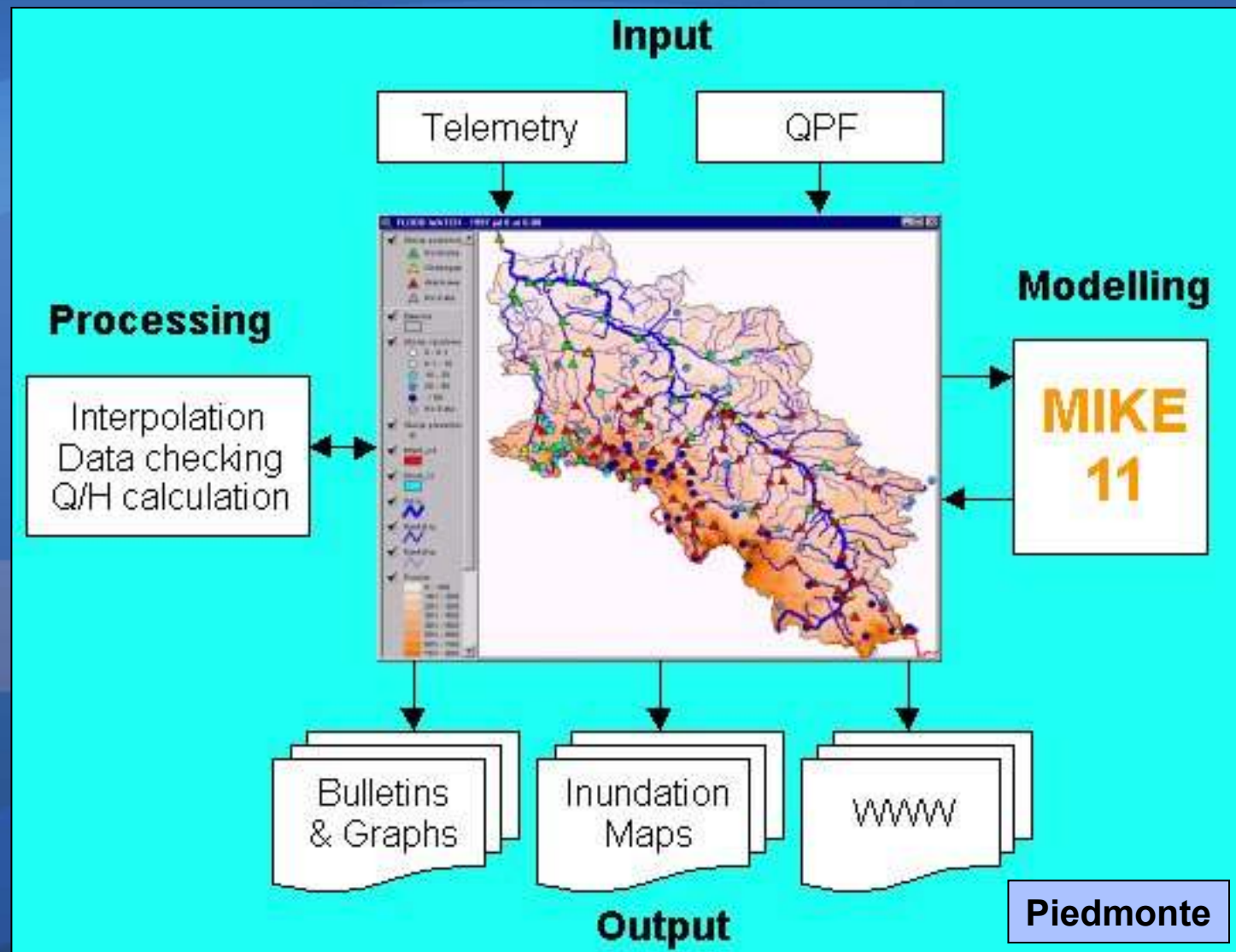




The protective effect of mangroves is easily included in model forecasts of cyclones



$$M_M = \left( \frac{1}{M^2} + \frac{n}{A} \cdot D \cdot c \cdot \frac{h^{4/3}}{2g} \right)^{-1/2}$$

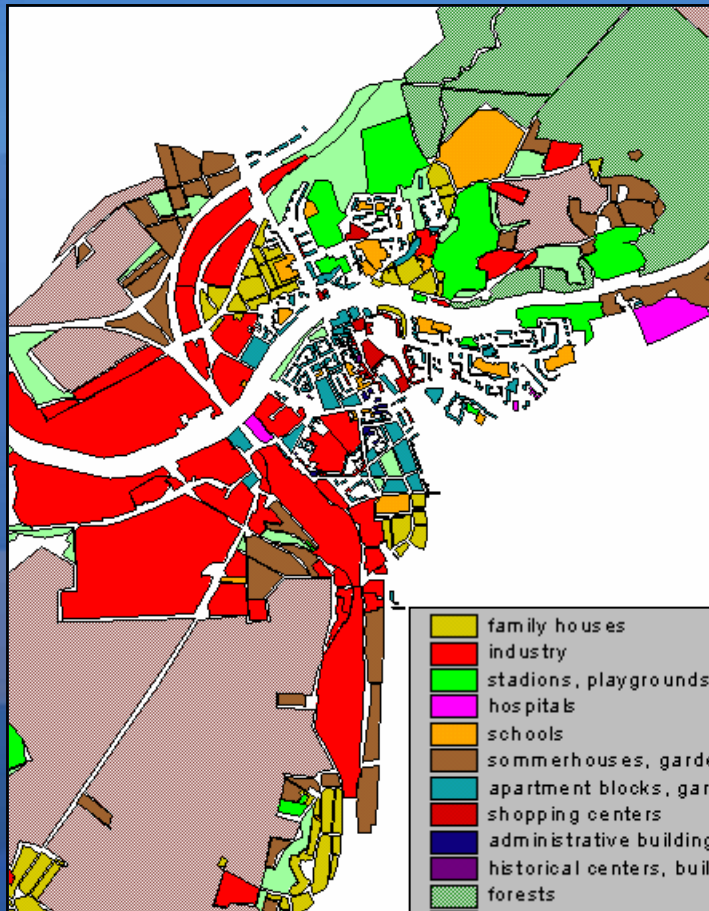




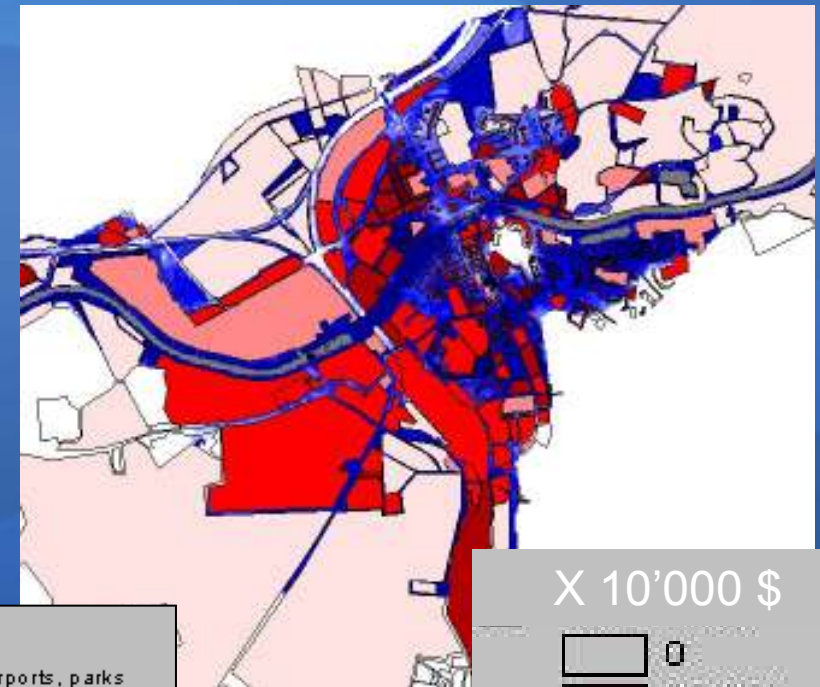
# Damage assessment



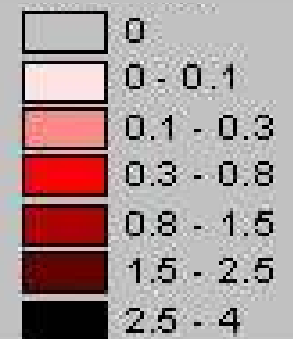
## Property database



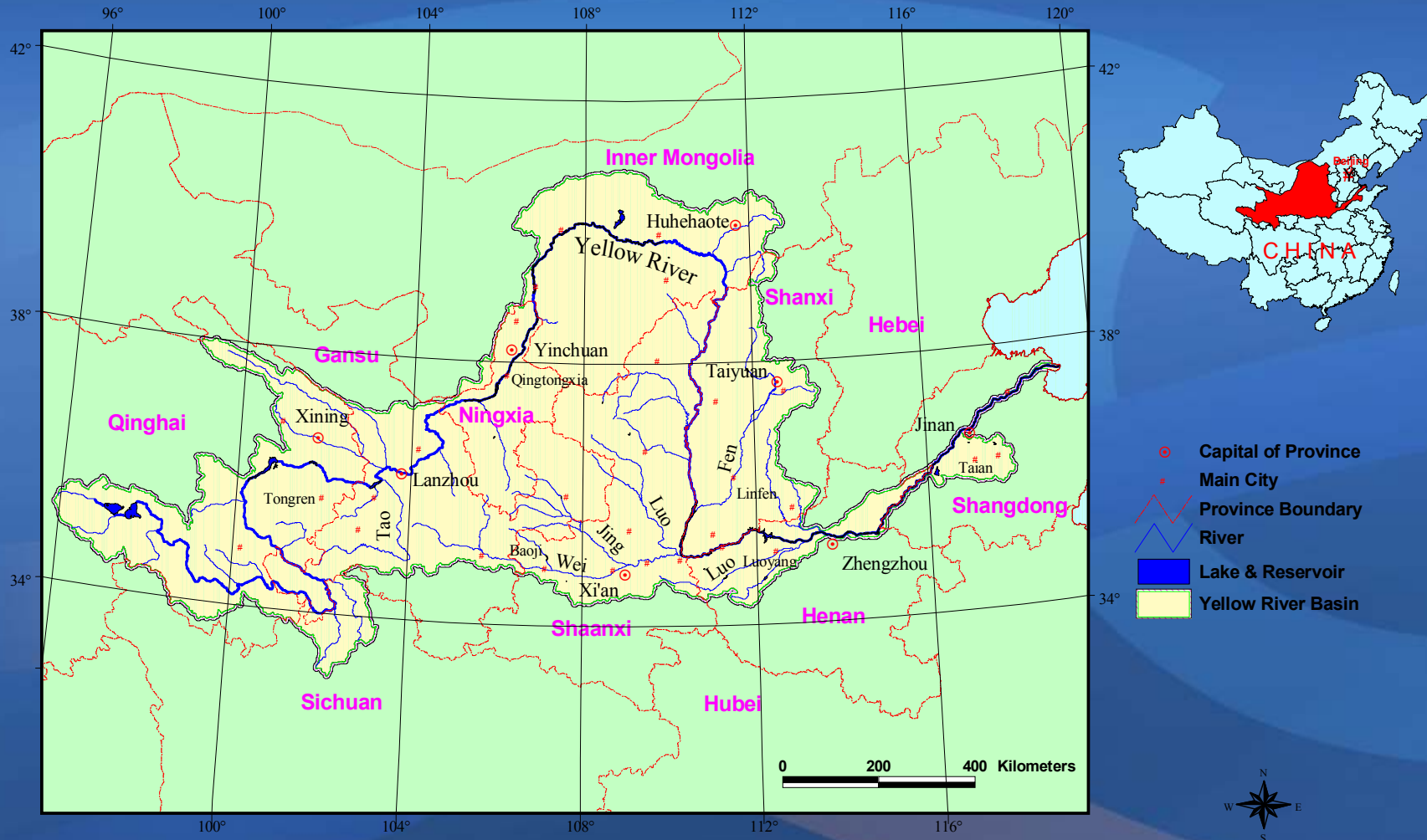
## Calculated damage distribution



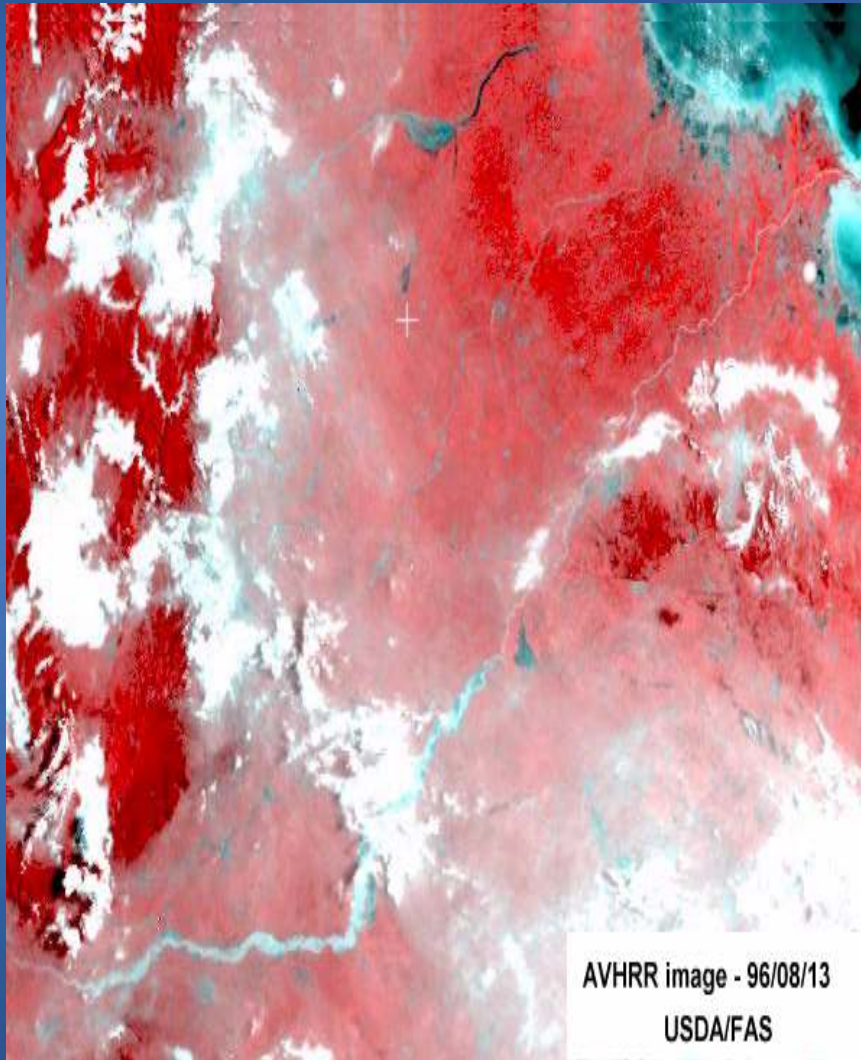
X 10'000 \$



# Yellow River Basin



# Flood Embankments – natural and built



AVHRR image - 96/08/13  
USDA/FAS





# Retention Basins- strengthening natural storages



# Options for disaster reduction



Understanding the river flows and floods enables use of natural and man-made reservoirs in disaster reduction



- **Big potential- solid scientific understanding and information needed**
- **Risk reduction for water related disasters to be integrated into water and coastal resources management and with climate adaptation**
- **Remote sensing, GIS and modelling are tools which can improve infrastructure developments and disaster preparedness.**
- **Build national capacity**

