

# Rainfall downscaling, flood modelling and GIS Module

## Example Training Application Workshop on Extreme Floods

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## Initiative on Catastrophic Flood Risk Reduction

at a Regional Workshop "*Ensuring Flood Security for  
Sustainable Urbanization in the Asia Pacific Region*",  
2003

**Bangkok Resolution:**

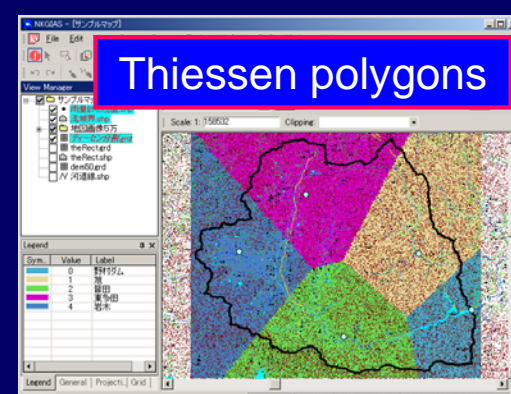
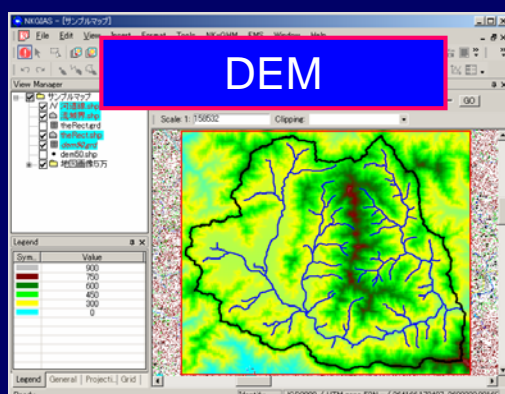
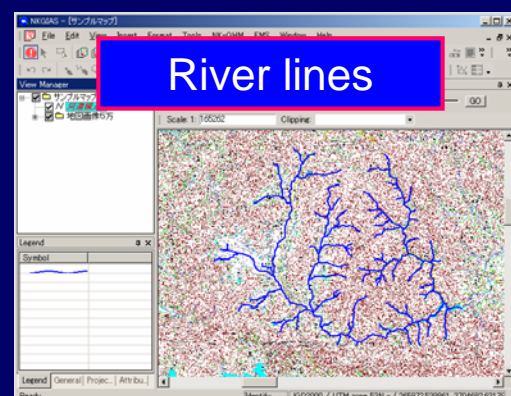
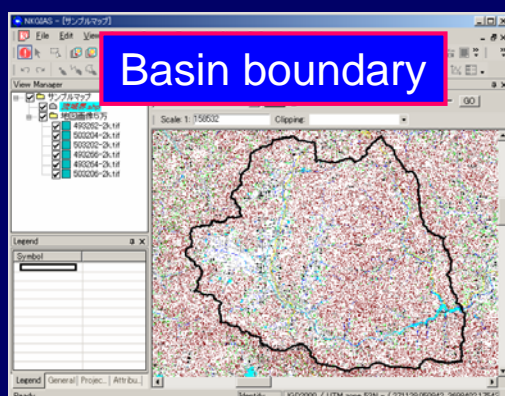
The need for an Asia Pacific Initiative on Catastrophic Flood Risk Reduction, and pledged support for the mission and goals of this initiative by representatives from:

Bangladesh, Cambodia, China, Fiji, India, Indonesia, Lao PDR, Malaysia, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Thailand and Vietnam

# Program

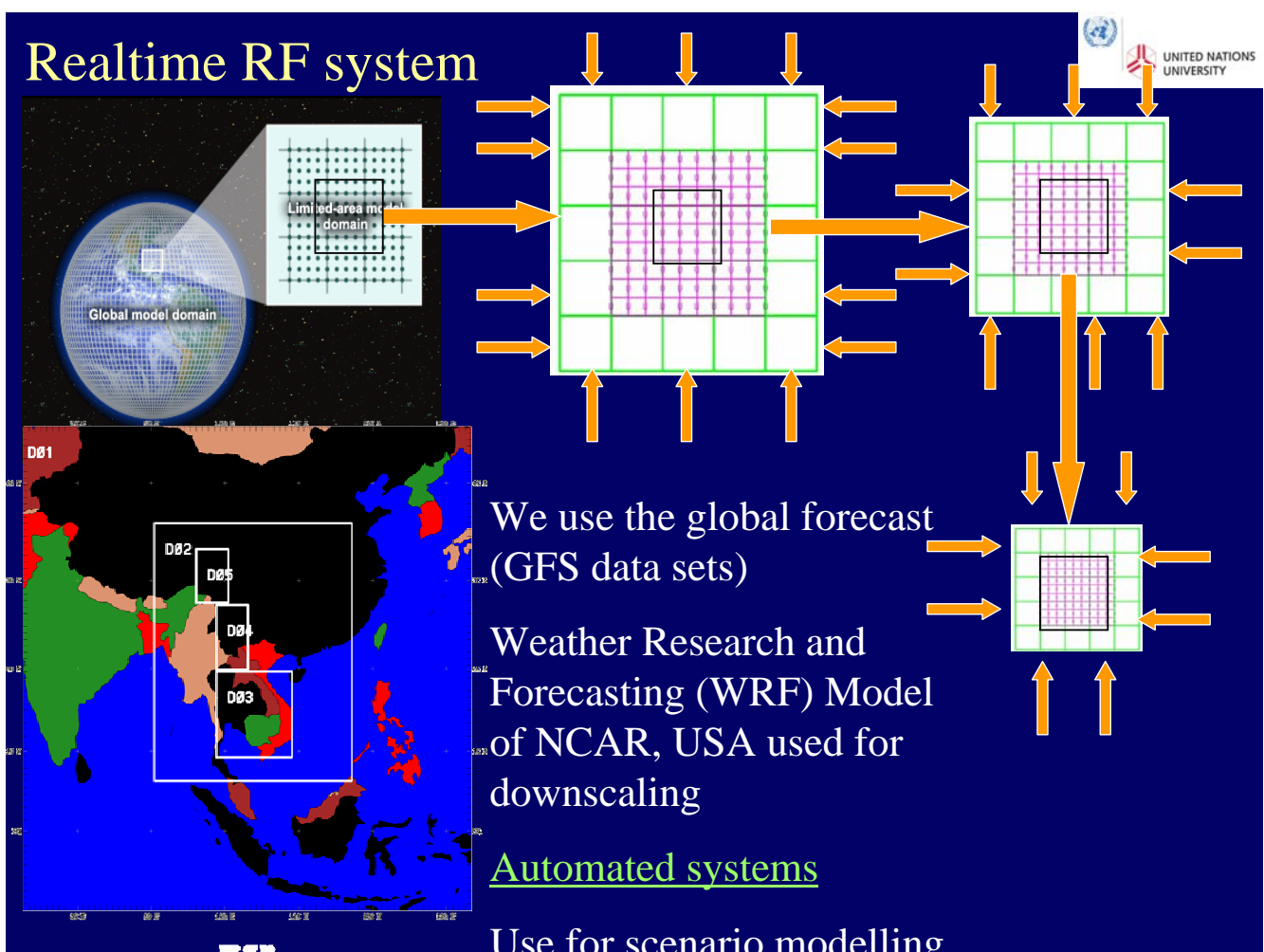
- **Phase I (Hands on – 3 weeks)**
  - Training on GIS
    - ❖ GIS system freely distributed
  - Setting up and application of Rainfall Downscaling and forecasting system (DRF)
  - Setting up Flood inundation modelling and Application (FMS)
- **Phase II (Home country 3 months)**
  - Transfer to others
  - Model application and verification with historical floods
  - Field survey for data collection
- **Phase III (Hands on – 3 weeks)**
  - Risk Assessment: Economic losses and people at risk

## Various data sets from NK-GIAS



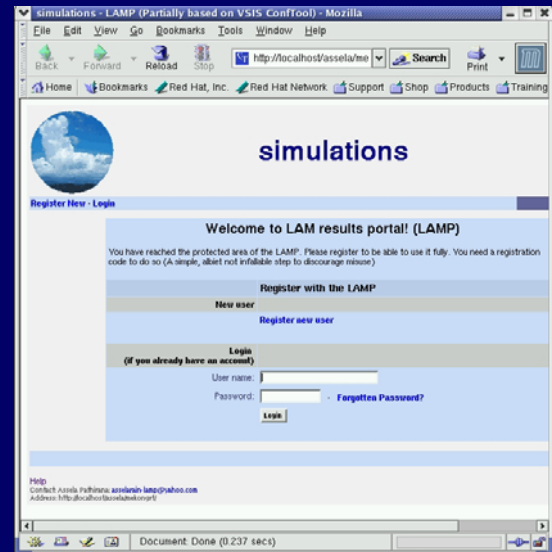
# Model set up and results from GIS Links

- ❑ The GIS system provides all the functionality required for hydrological modelling
- ❑ A special feature of the GIS system is the ability to handle time series data.
- ❑ Provisions to link static vocational data to time series GIS data.

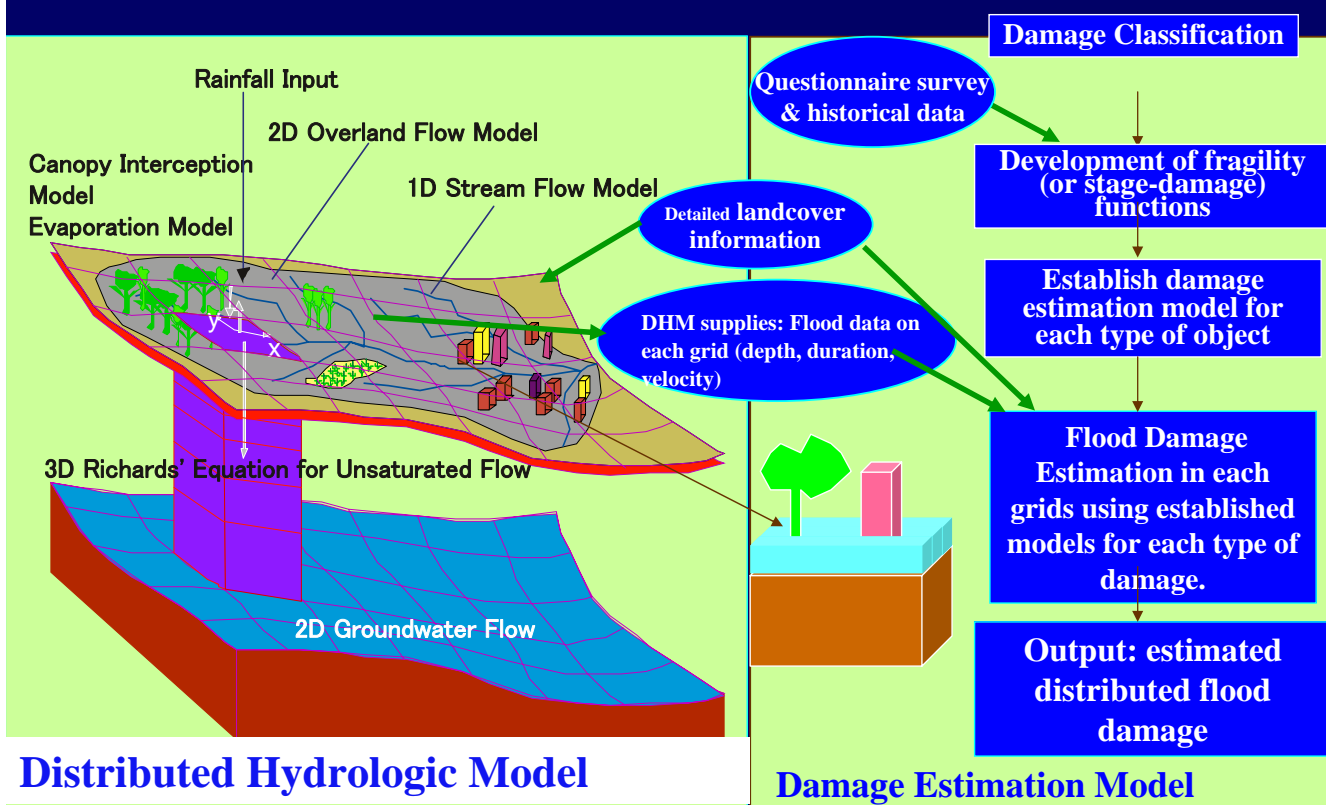


# Real-time Rainfall Forecasting and Hydrological Modeling platform at UNU

- ❑ Rainfall in selected regions are forecasted, 48h into the future.
- ❑ Rainfall products are made available on the web, in a real-time basis.
- ❑ Works unattended every day. Results ready around 17:00H JST (10:00H UT)



# Inundation Modeling: Damage Assessment and Evacuation



# Organizations

- ❑ **Organized by UNU**
  - Resources from: UNESCO-IHE, Monash University, Australia, Nippon Koei Co., Ltd., AIT, Thailand
- ❑ **Participants –Professionals from a University and the organization responsible for flood control - trainers**
  - China: Tsinghua University, Beijing Municipality
  - Nepal: Institute of Engineering, Department of Hydrology and Meteorology
  - Philippines: University of Philippines, PAGASA (Hydro meteorological Agency)
  - Sri Lanka: University of Peradeniya, Irrigation Department
  - Viet Nam: Institute of Hydrology and Meteorology, Department of Storm Control and Dyke Managemet

# Outcomes

- ❑ **Phase I – Training of trainers on GIS, Rainfall forecasting and Flood modeling**
  - A training text book with examples and step-by-step manuals to set up and run models
- ❑ **Phase II – Develop extreme flood scenarios for each country.**
- ❑ **Phase III – A book on case studies and recommendations**
- ❑ **A Community of researchers and practitioners working on Extreme Floods**

# China: Beijing

- For example, on Aug 1<sup>st</sup>, 2007, the precipitation was about 80mm/h at Anhua bridge . After five days, the another rainfall of 82 mm/h occurred at the same place. Rainfall resulted in inundation of 3m on the road.



## China

- Location: north of Beijing
- The main branch of Wenyuhe basin
- River length: 23.7 km
- Catchment Area: 210 km<sup>2</sup>
- Beijing Olympic park is located in this basin
- Designed standard: 20-years

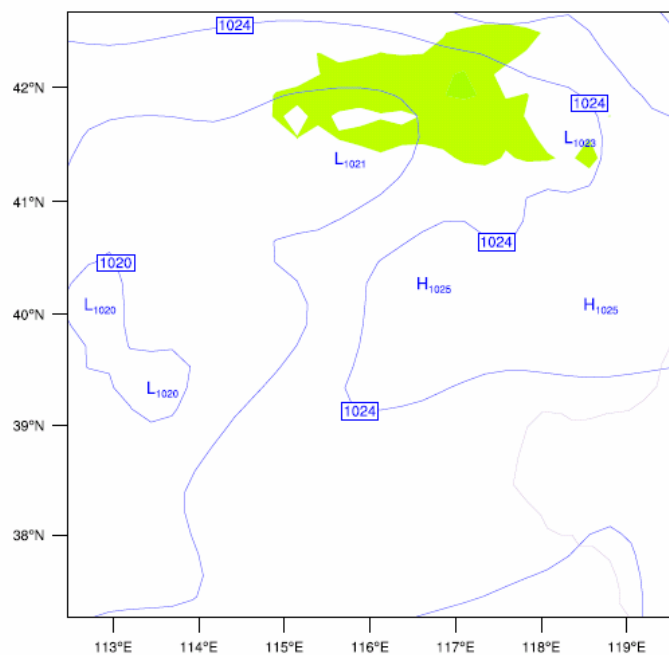
### Output:

Precipitation  
Wind  
Temperature

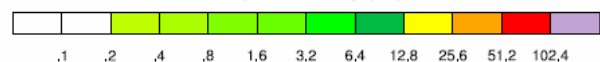
### REAL-TIME WRF

Init: 2007-11-14\_00:00:00  
Valid: 2007-11-14\_00:30:00

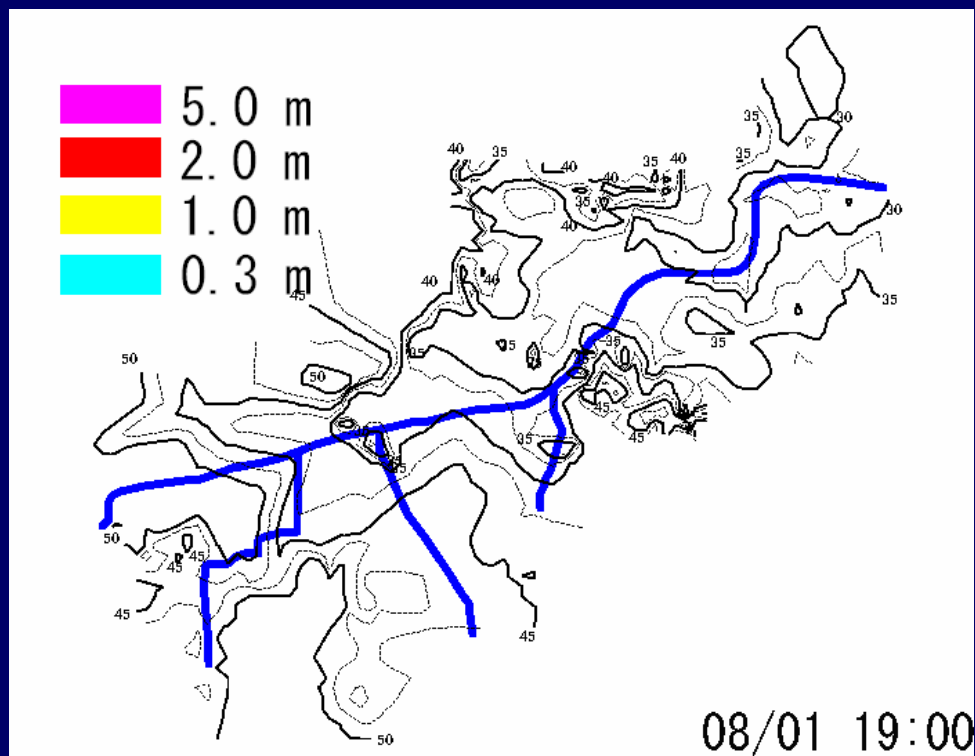
Precipitation Tendency from 2007-11-14\_00:00:00 to 2007-11-14\_00:30:00 (mm)  
Sea Level Pressure (hPa)



Precipitation Tendency (mm)



## Simulation results: Surface Inundation



## Observations

- ❑ Many participants were interested in operational forecasting.
- ❑ Pairing of educational and responsible agency participants proved to be very effective
- ❑ The module can be divided in to 3 sub modules and delivered according to the needs of each country.







**Thank you**