Climate Change: Impacts and Opportunities for the Red River Basin and Delta, Vietnam

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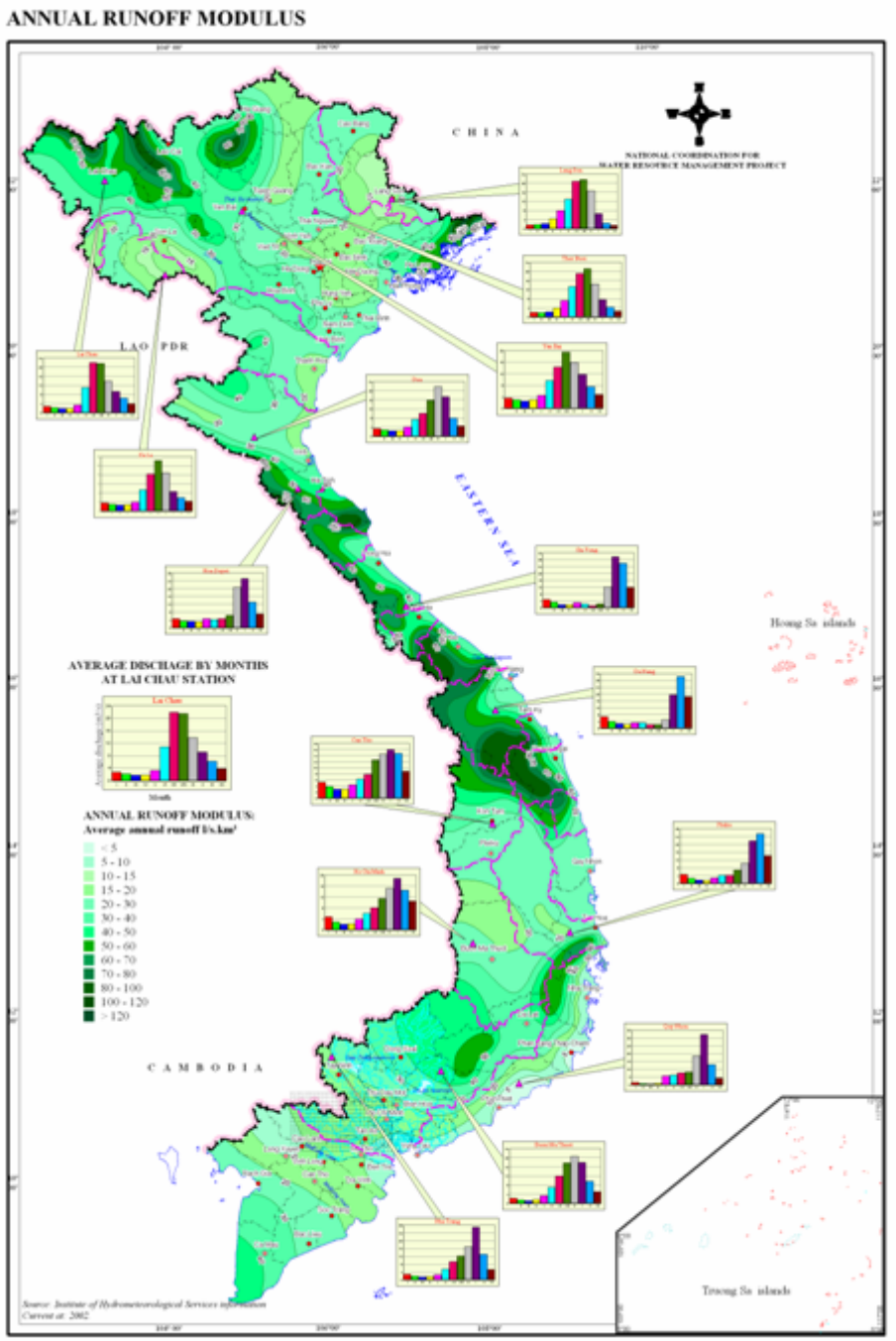
Content

- Introduction of the VN water resources and Red River Delta (RRD)
- Multi-nations issues in the RRD management
- Management of water resources
- Conflict between development and environmental pollution
- Food security
- Impacts of climate change (CC)
- How to mitigate and translate the Challenges into Opportunities in Vietnamese context
- Conclusions

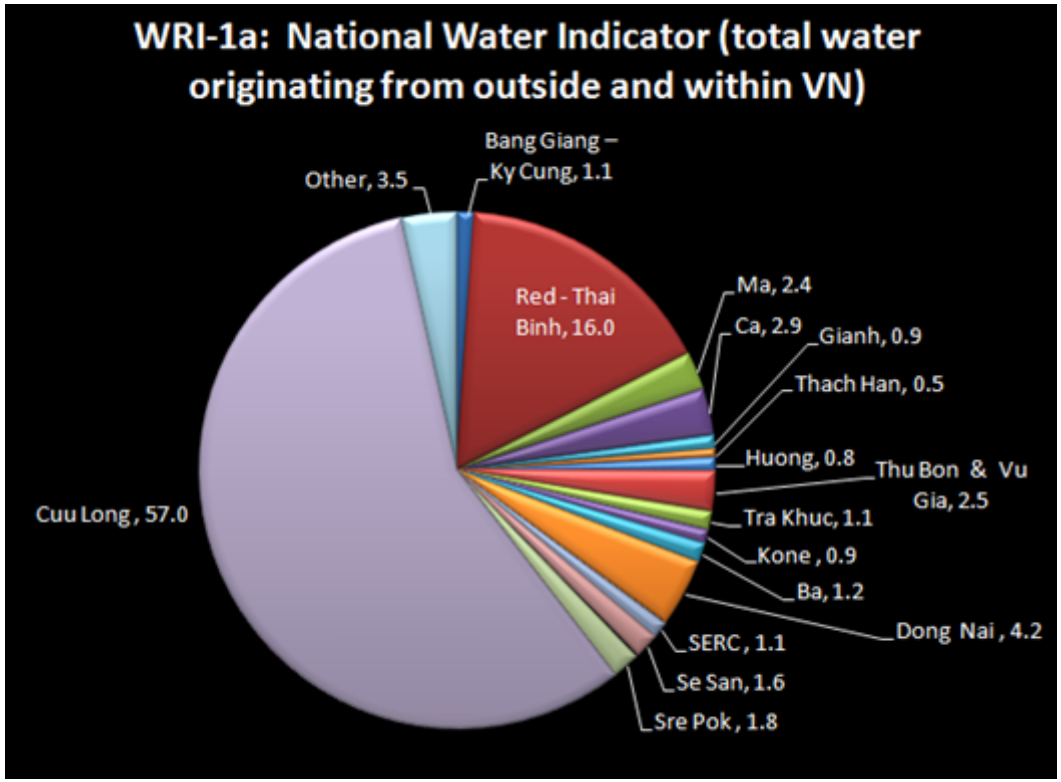
Water Resources

VN has 4400 m3 per capita/year (worldwide average - 7400 m3 per capita/year).

- 2/3 of water resources comes from neighboring countries -> **difficult to control and even unusable**.
- Rainfall and runoff: distributes unevenly over space and time scale
- Rainy season: holds 65 – 90% of total annual rainfall in 3 – 6 months.
- Maximum amount of rainfall in one day: > 1500 mm;



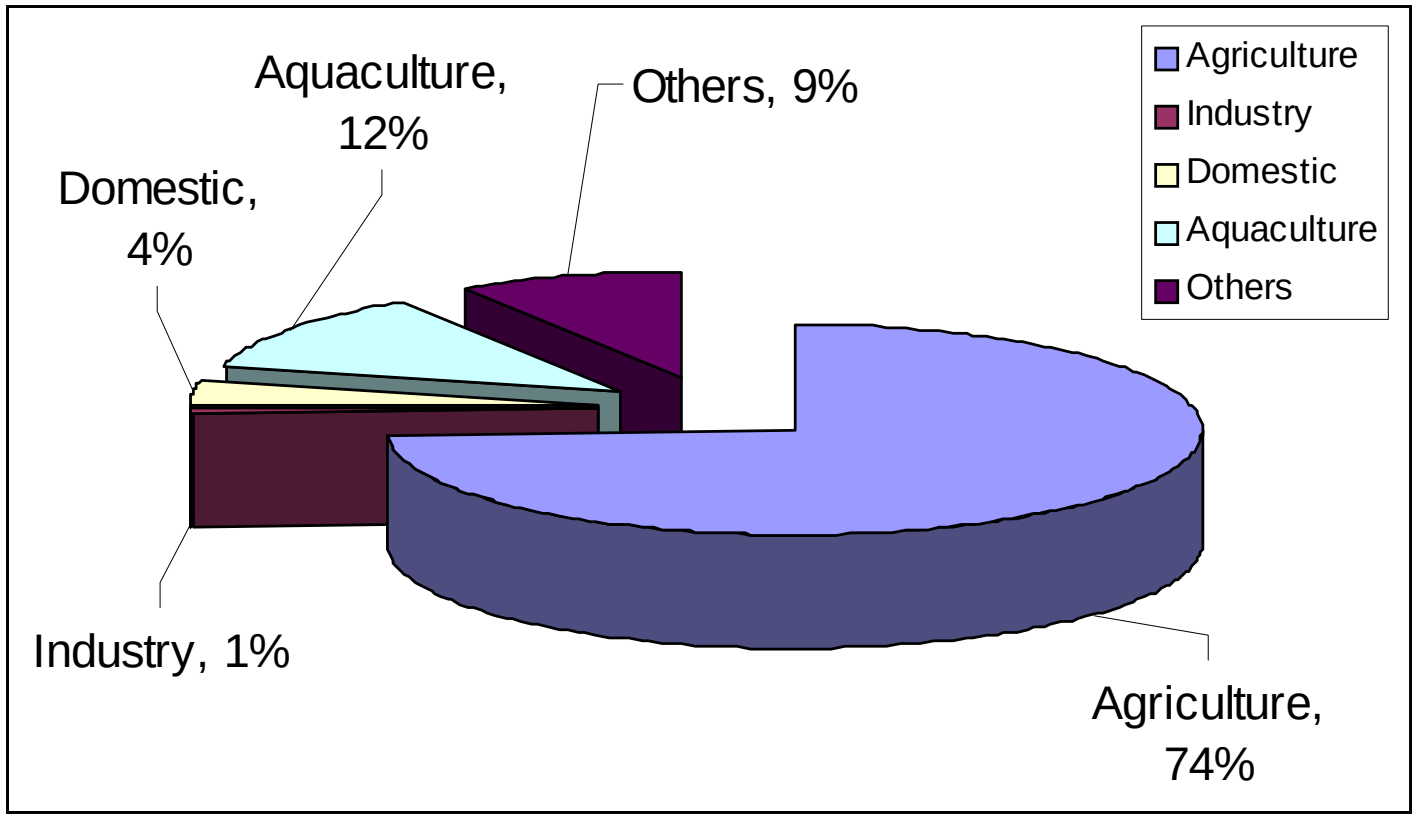
Six basins depend on water inflowing from other countries:



- **Almost 95% of average yearly Cuu Long surface water flows are generated in the upstream Mekong River countries;**
- **Nearly 40% of the Red-Thai Binh basin surface water originates in China;**
- **30% of the Ma basin flows, and 22% of the Ca basin flows come from Lao PDR;**
- **almost 17% of Dong Nai basin flows come from Cambodia.**
- **Bang Giang-Ky Cung flows from China through Viet Nam, and back to China.**
- **Se San and Sre Pok contribute significant flows to Cambodia**

Water utilization

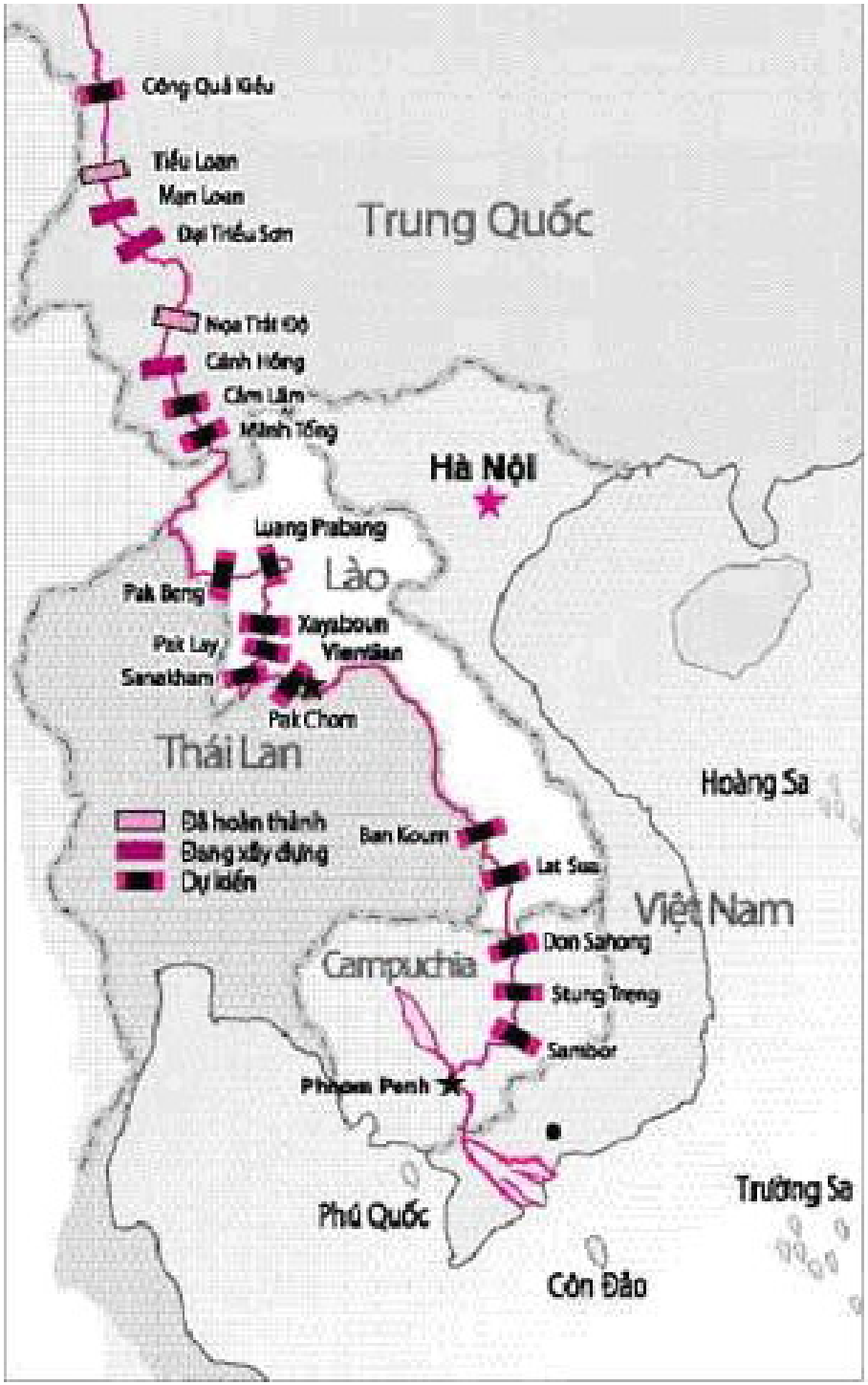
Water demand of sectors in major river basins (2000)



Major Challenges of River basin management

1.The **quantity and quality of VN surface water depends on the use of water in the upstream countries, which increases fast**

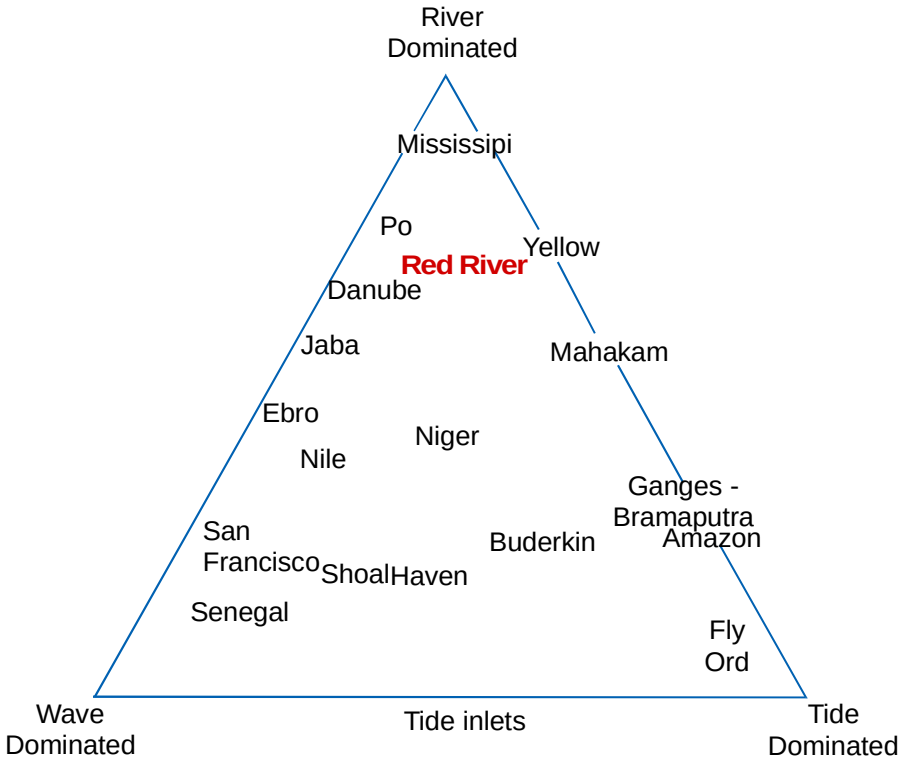
Red river in rainy season

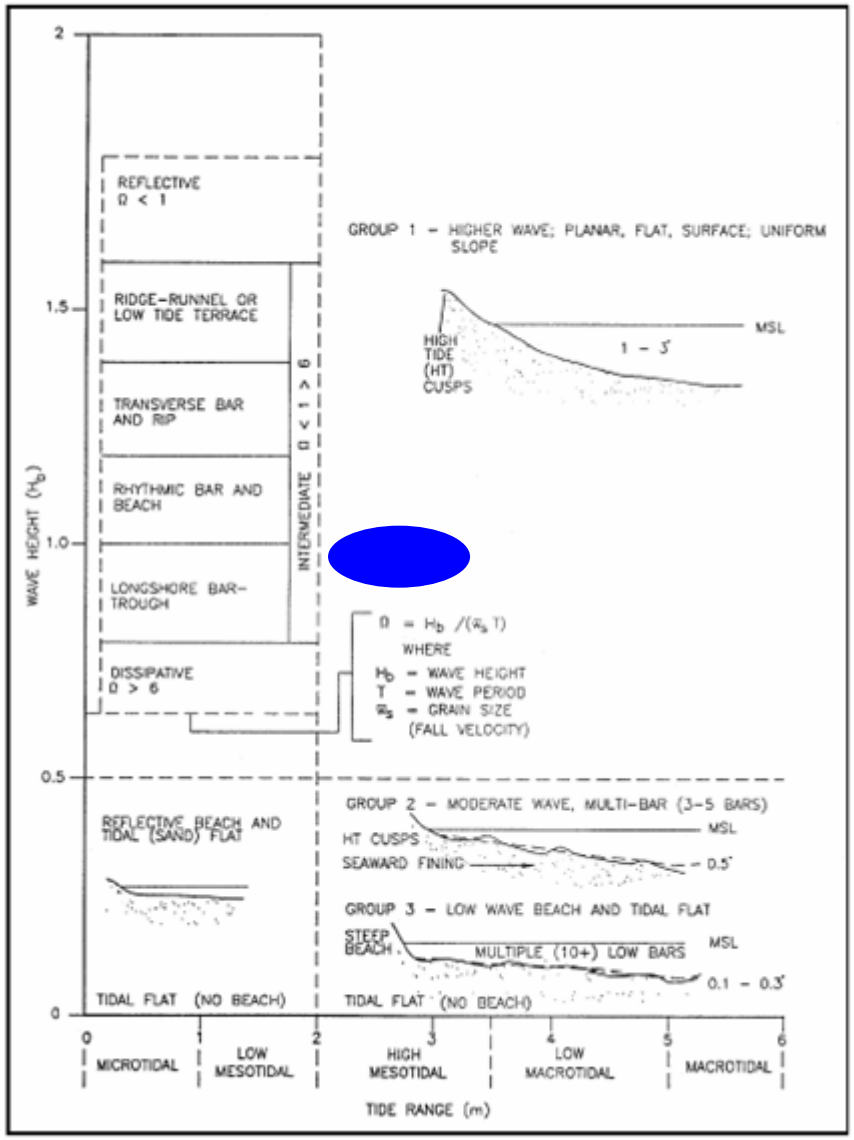


Major Challenges of River basin management

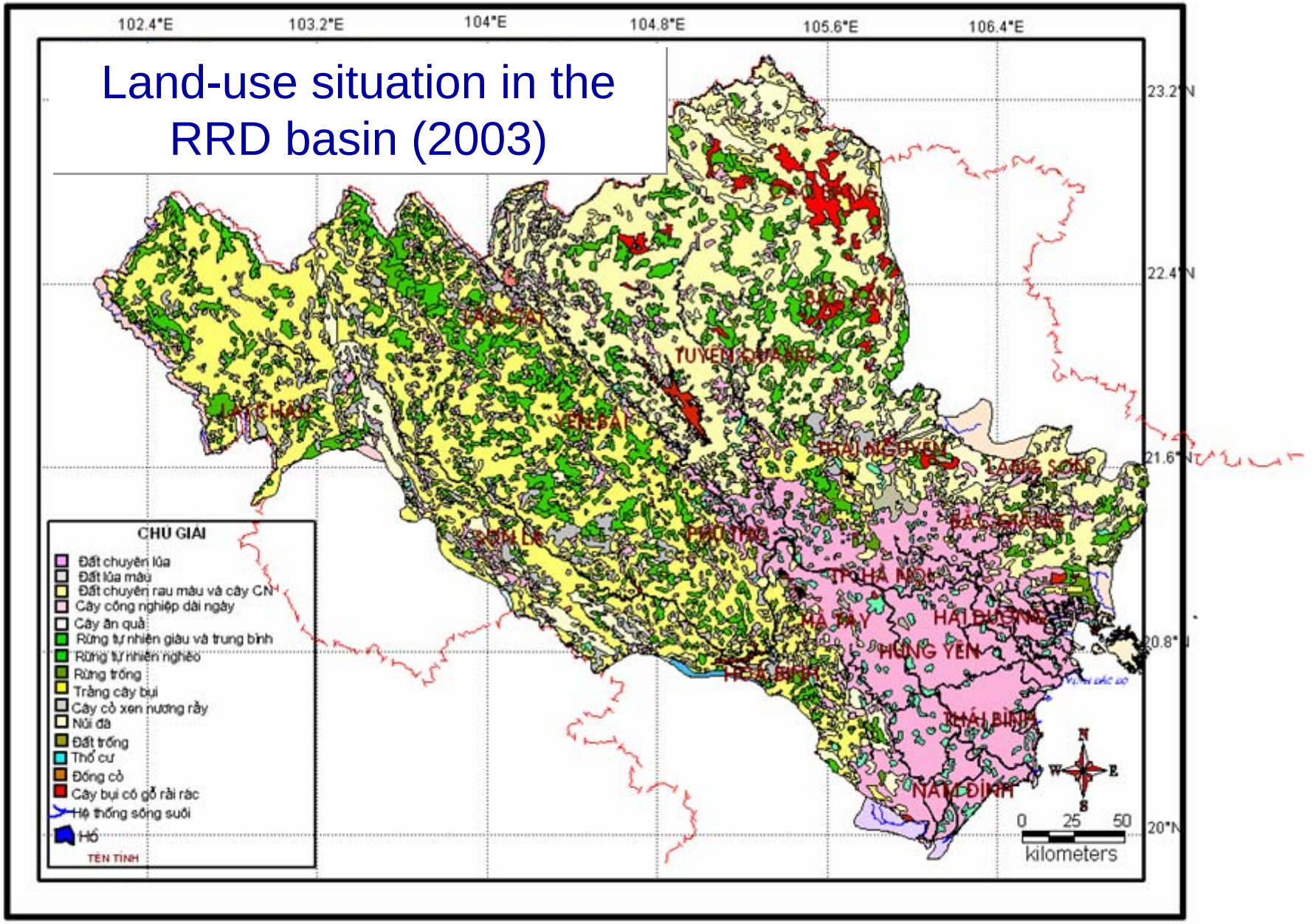
- ***Harmonizing the demand from different sectors*** (Energy-Agriculture – waterway navigation...);
- ***The degradation of water quality, biodiversity due to economic activities (*urbanization, industrialization and modernization...);**
- ***Management*** (policies, legal system, coordination mechanism , not enough awareness, *inaccurate information and data ...);*
- ***Impact of global climate change***

- Topography
  - + Lowering from northwest to southeast
  - + Average elevation 1,090m.
  - + Average slope 10% đến 15%.
- Many big faults: Red River, Lai Chau-Dien Bien, Thai Nguyen - Cho Moi


River Dominated
Mississipi
Po
Yellow
Red River
Danube
Jaba
Mahakam
Ebro
Niger
Nile
Ganges - Bramaputra
Amazon
San Francisco
Shoal
Haven
Buderkin
Senegal
Fly
Ord
Wave Dominated
Tide inlets
Tide Dominated


WAVE HEIGHT (H_b)
REFLECTIVE Ω < 1
RIDGE-RUNNEL OR LOW TIDE TERRACE
TRANSVERSE BAR AND RIP
RHYTHMIC BAR AND BEACH
LONGSHORE BAR-TROUGH
INTERMEDIATE Ω < 1 > 6
DISSIPATIVE Ω > 6
Ω = H_b /(w_s T)
WHERE
H_b = WAVE HEIGHT
T = WAVE PERIOD
w_s = GRAIN SIZE (FALL VELOCITY)
GROUP 1 - HIGHER WAVE; PLANAR, FLAT, SURFACE; UNIFORM SLOPE
HIGH TIDE (HT) CUSPS
MSL
1 - 3'
REFLECTIVE BEACH AND TIDAL (SAND) FLAT
TIDAL FLAT (NO BEACH)
GROUP 2 - MODERATE WAVE, MULTI-BAR (3-5 BARS)
HT CUSPS
SEAWARD FINING
0.5'
GROUP 3 - LOW WAVE BEACH AND TIDAL FLAT
STEEP BEACH
MULTIPLE (10+) LOW BARS
0.1 - 0.3'
TIDAL FLAT (NO BEACH)
MICROTIDAL
LOW MESOTIDAL
HIGH MESOTIDAL
LOW MACROTIDAL
MACROTIDAL
TIDE RANGE (m)

Land-use situation in the RRD basin (2003)



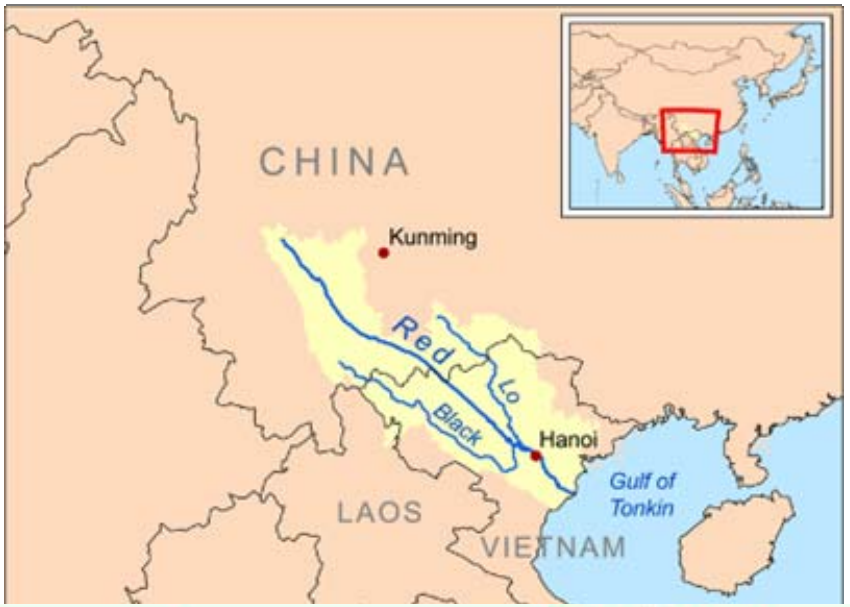
RED RIVER BASIN Management – A multi-nations issue

Area of the basin 169,020 km^2

+ 81,240 km^2 in China (48%)

+ 1,100 km^2 in Laos (0.65%)

+ 86,660 km2 in Vietnam (51,35%)



Management of Water Resource

+ Da river, 5 hydraulic stages:
  - Hoa Binh: 1,920 MW
  - Son La: 2,400 MW
  - Lai Chau: 1,200 MW
  - Huoi Quang: 520 MW
  - Ban Chat: 180 MW
+ Lo river:
  - Tuyen Quang: 342 MW

Hydropower plants in China

In recent 4-5 years lots of hydropower plants constructed in the catchments of the Red River, including:

+ 7 in the upstream of the Da river;

+ 8 in the upstream of the Lo and Gam rivers

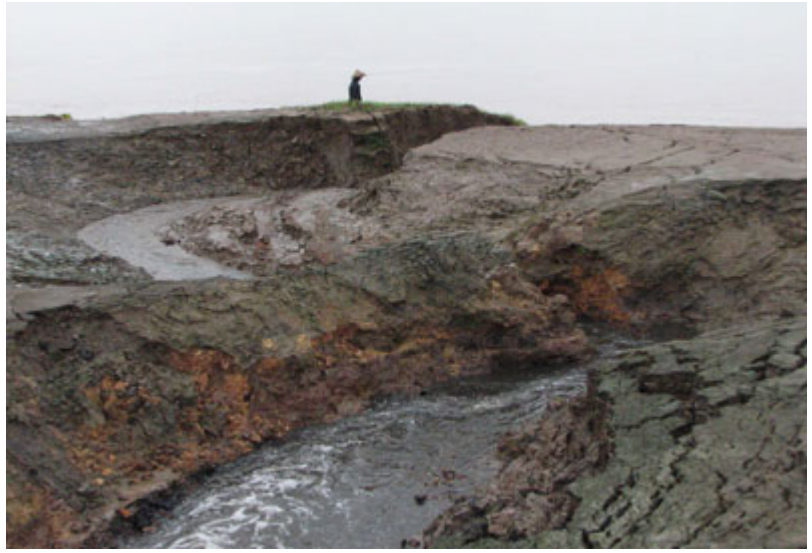
+ 1 in the upstream of the Thao river.

Development and Environmental Pollution

The Red River runoff composes of 40% water from China, 48% of catchments where is highly industrialized.

The Red River catchment in Vietnam is the second polluted basin

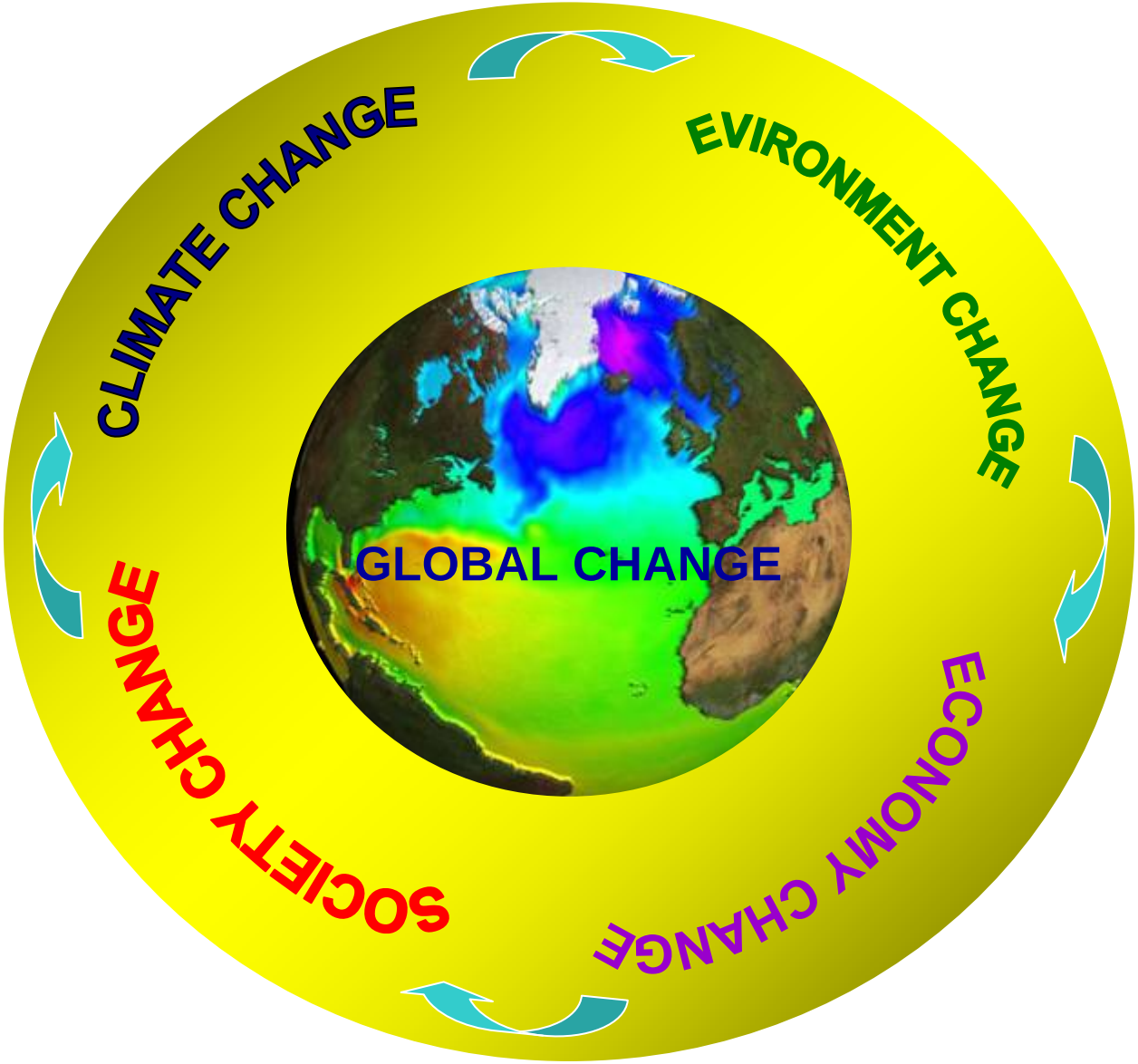
- Along the Red River many chemical, paper plants discharge polluted water to the river
- Along the Nhue - Day river more than 4,000 plants, 8 industrial zones, 266 private enterprises, more than 450 traditional working villages.
- Lots waste water of more than 10 millions people discharged to the river system without any treatment
- Increasing of solid waste from urbanized areas



Waste water of Miwon company discharging to the Red River

Waste water of Viet Tri paper plant

Impact of climate change

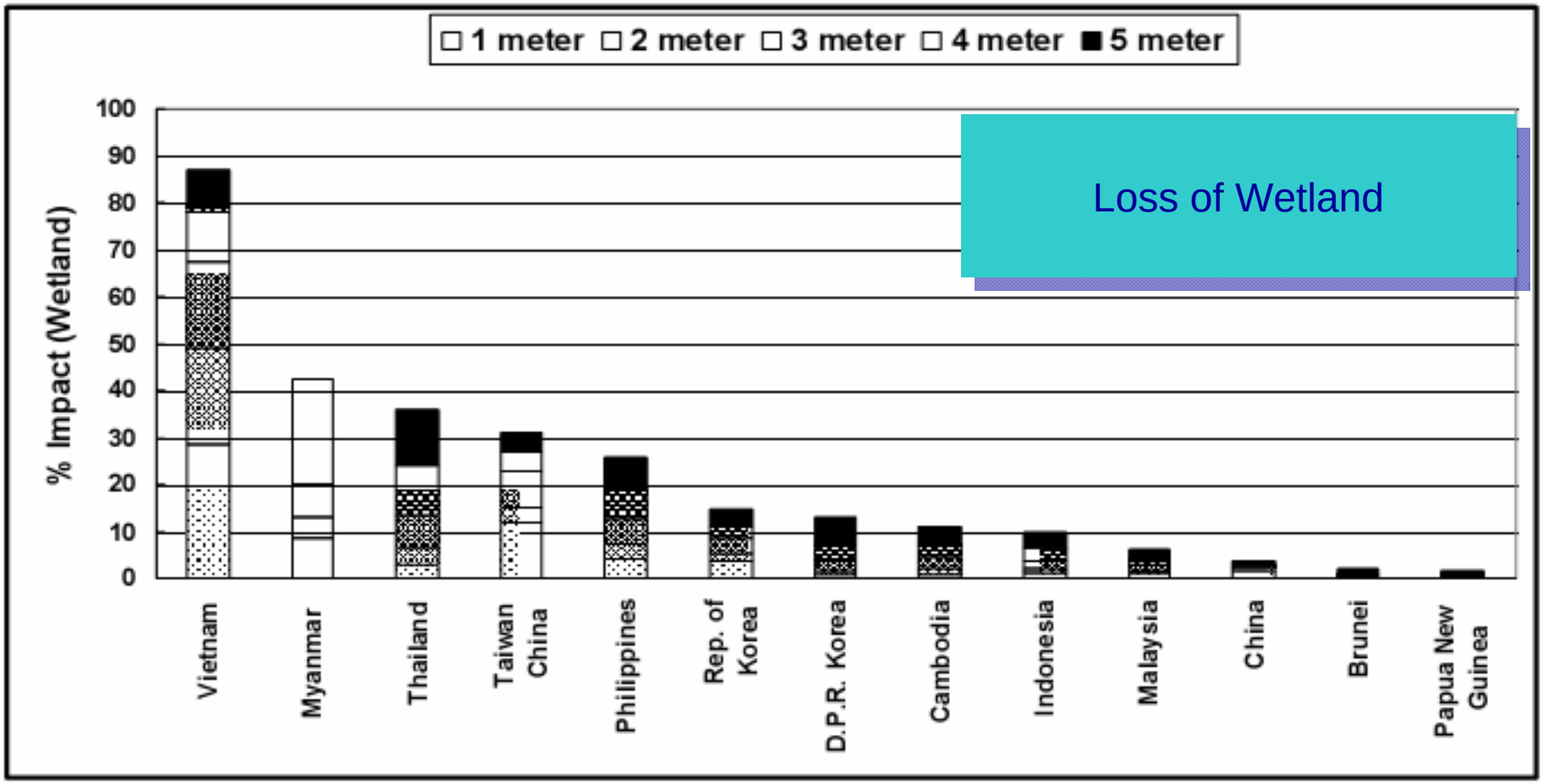


Vietnamese context

- Fast economic growth after Doi Moi
- World Second Rice Exporter (emission of CH4)
- 70% of population still living in rural areas
- Urbanization and industrialization are absorbing a lot of agriculture land
- Vietnam is considered as one among the most potentially affected by SLR
- Extreme Weathers start to increase the irregularity of flood and drought in Vietnam
- Vietnam is still in the list of the countries of less GHG emission

Context of Vietnam

Environment Change caused by Sea Level Rise



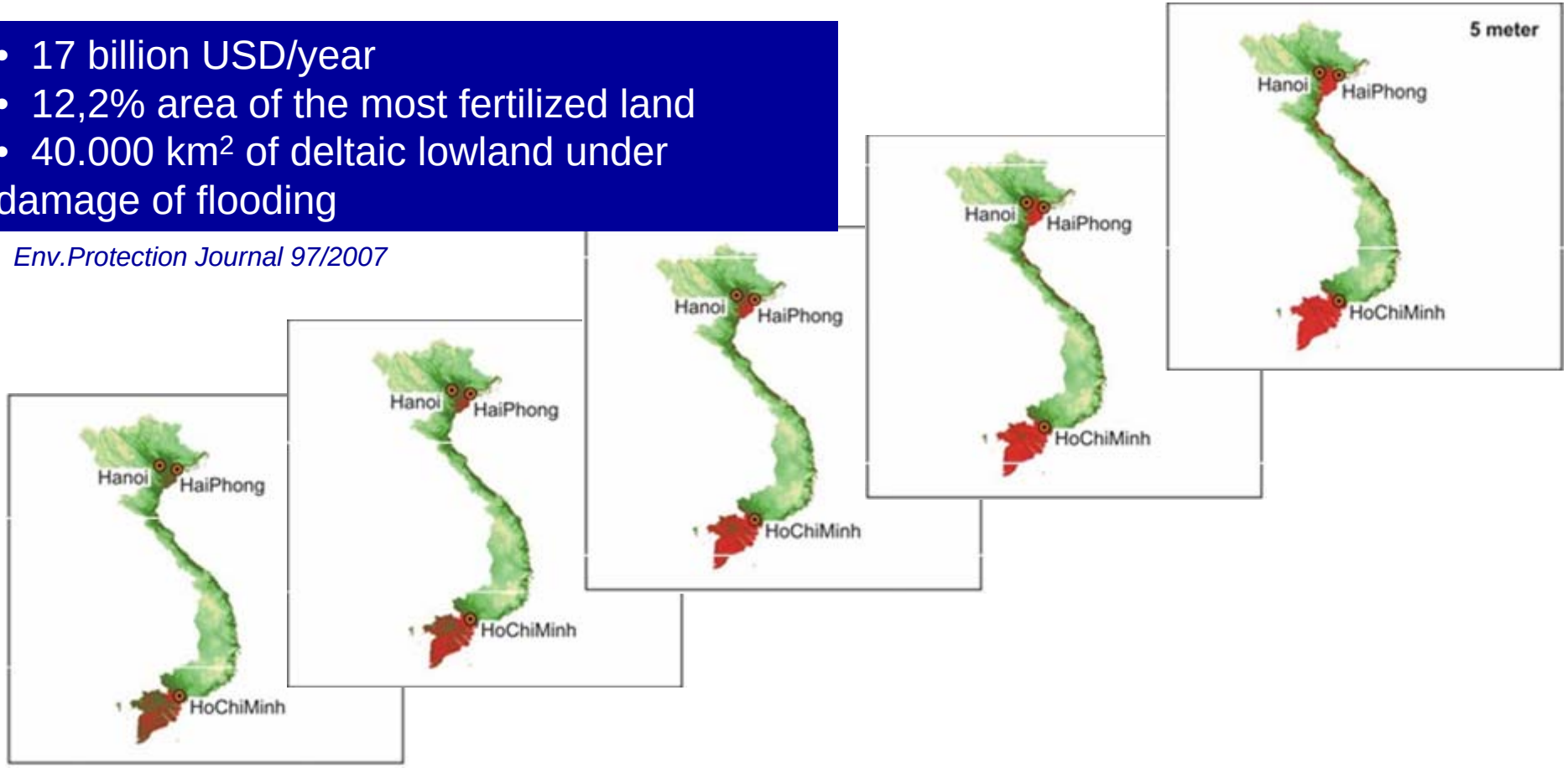
World Bank, 2007

Land Loss and Land use change caused by Sea Level Rise

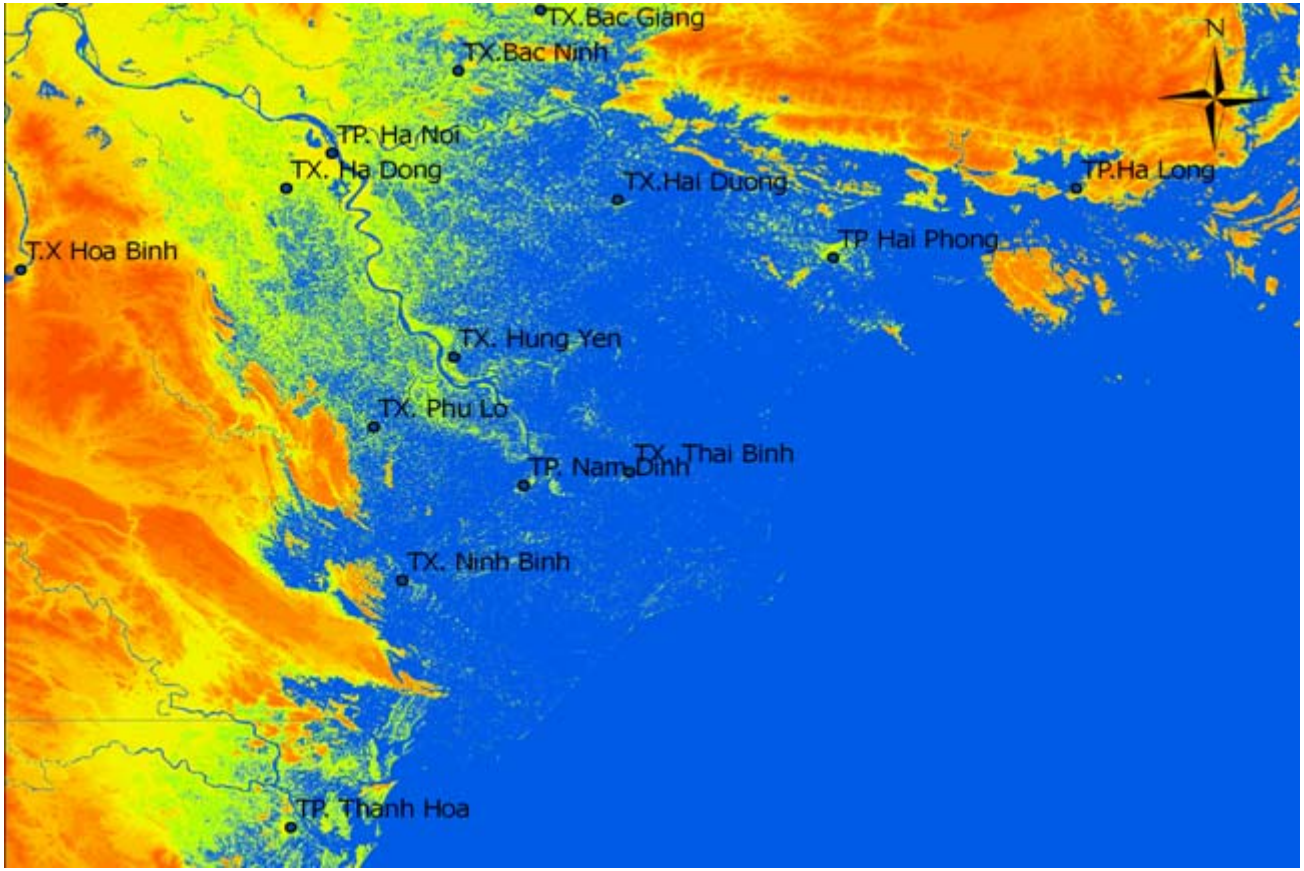
Estimated Loss when SLR = 1m

- 17 billion USD/year
- 12,2% area of the most fertilized land
- 40.000 km^2 of deltaic lowland under damage of flooding

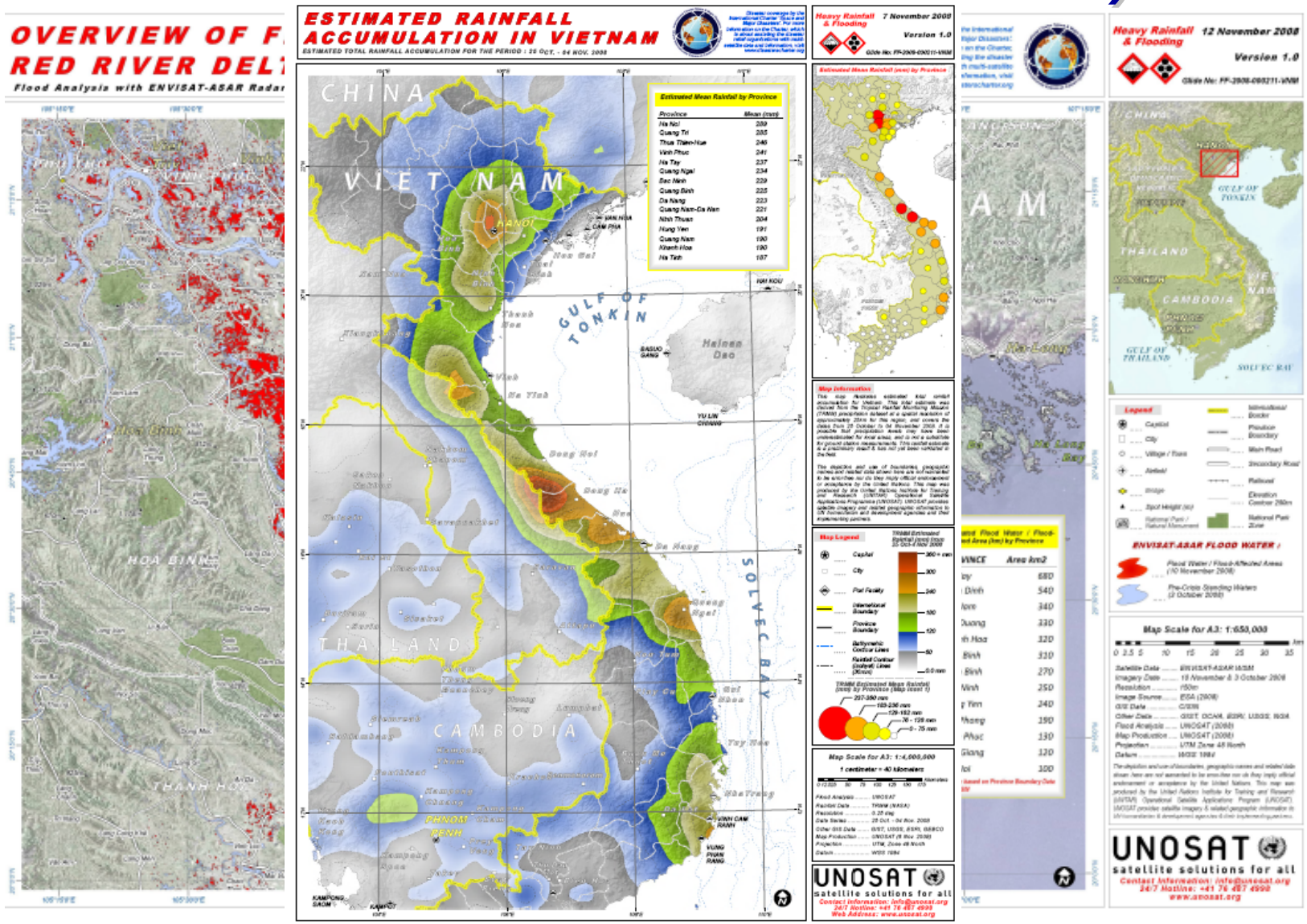
Env.Protection Journal 97/2007



Area of Red River delta of level less 5 m



Increasing of Irregularity of Extreme Rainfall and Flood (ex. Nov. 2008)



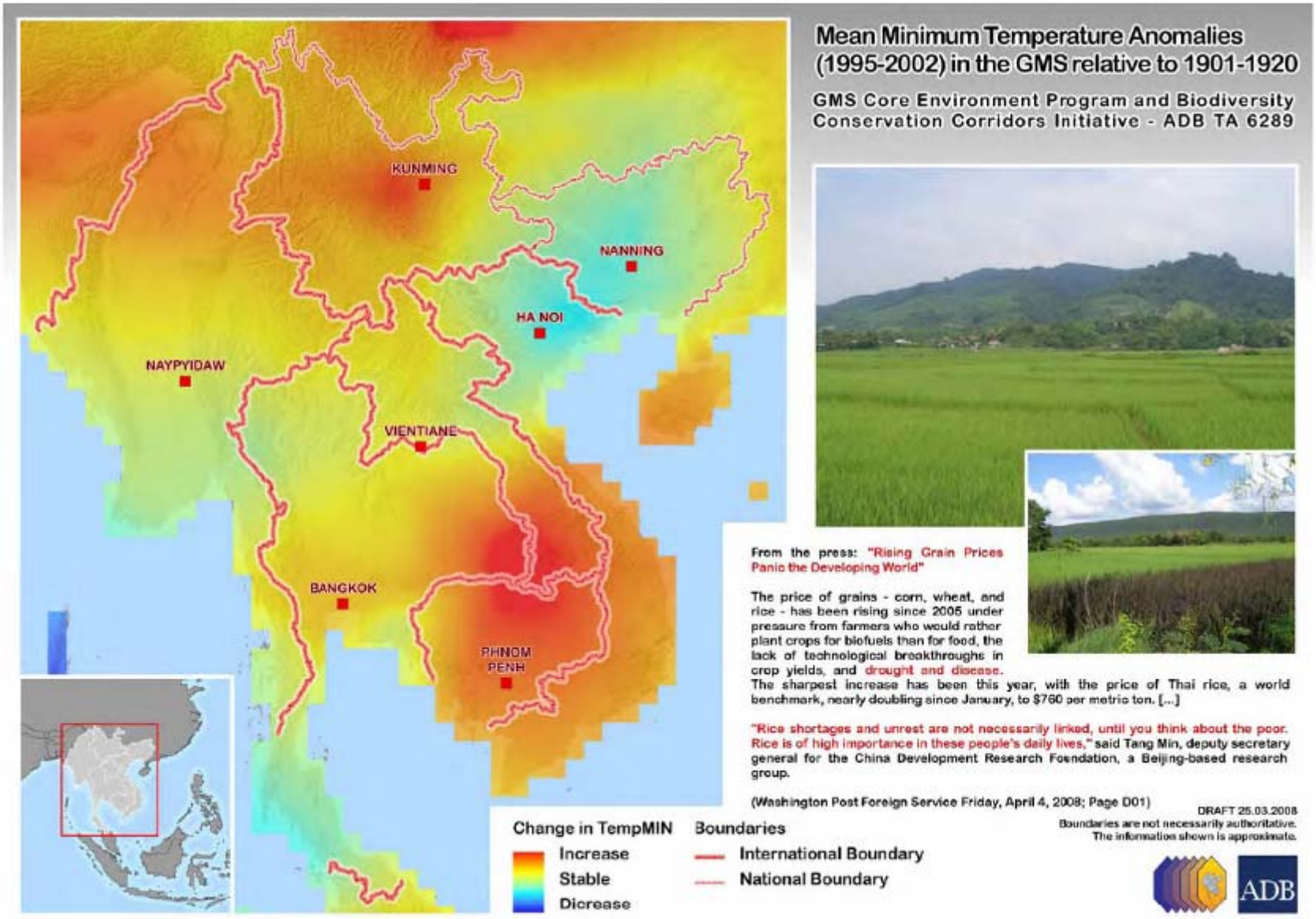
Wind in the storm
Damrey 26-27/9/2005

Waves in the storm

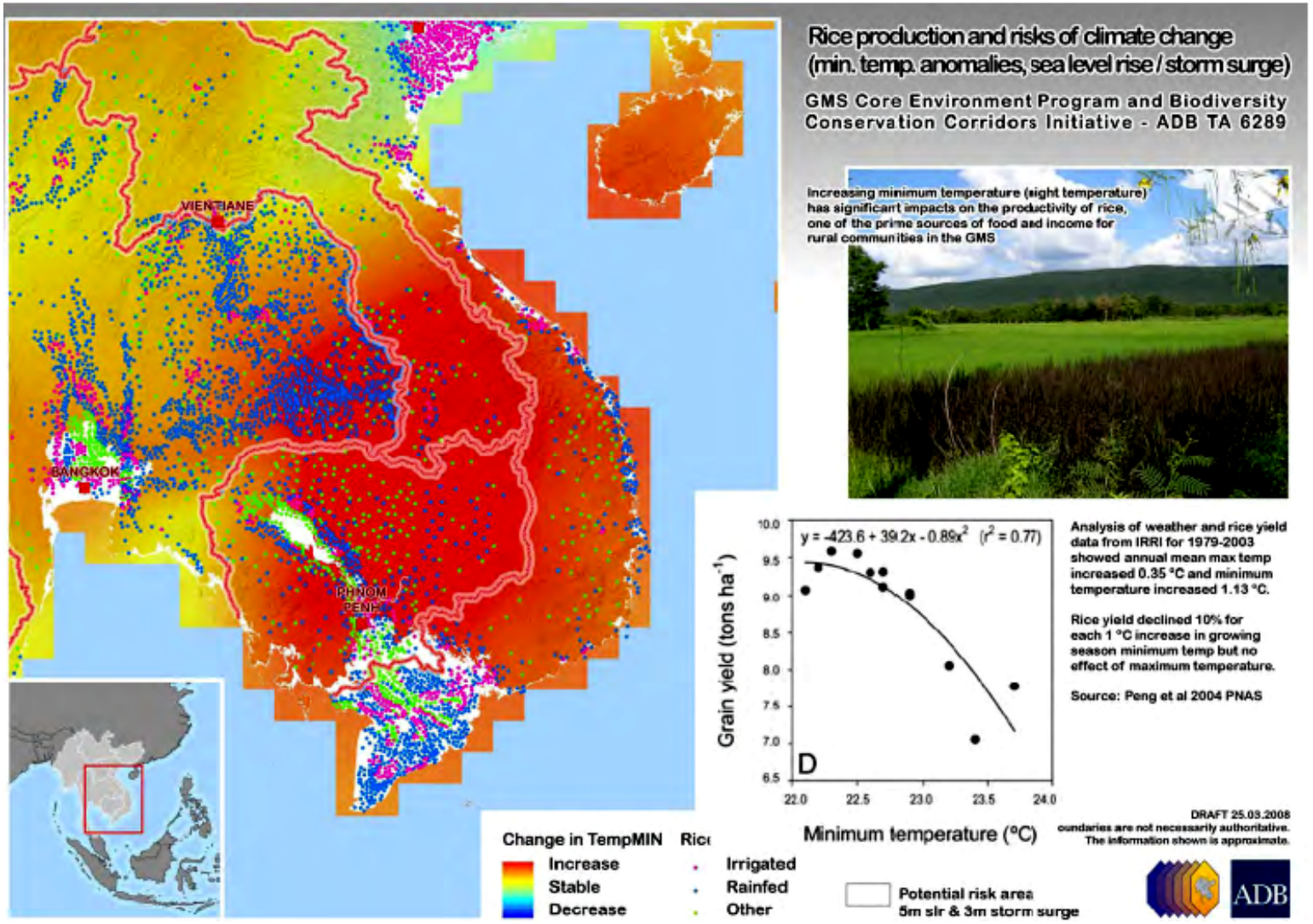
Seawater overflows seadyke causing inundation in Hai Hau

Foto: VnExpress

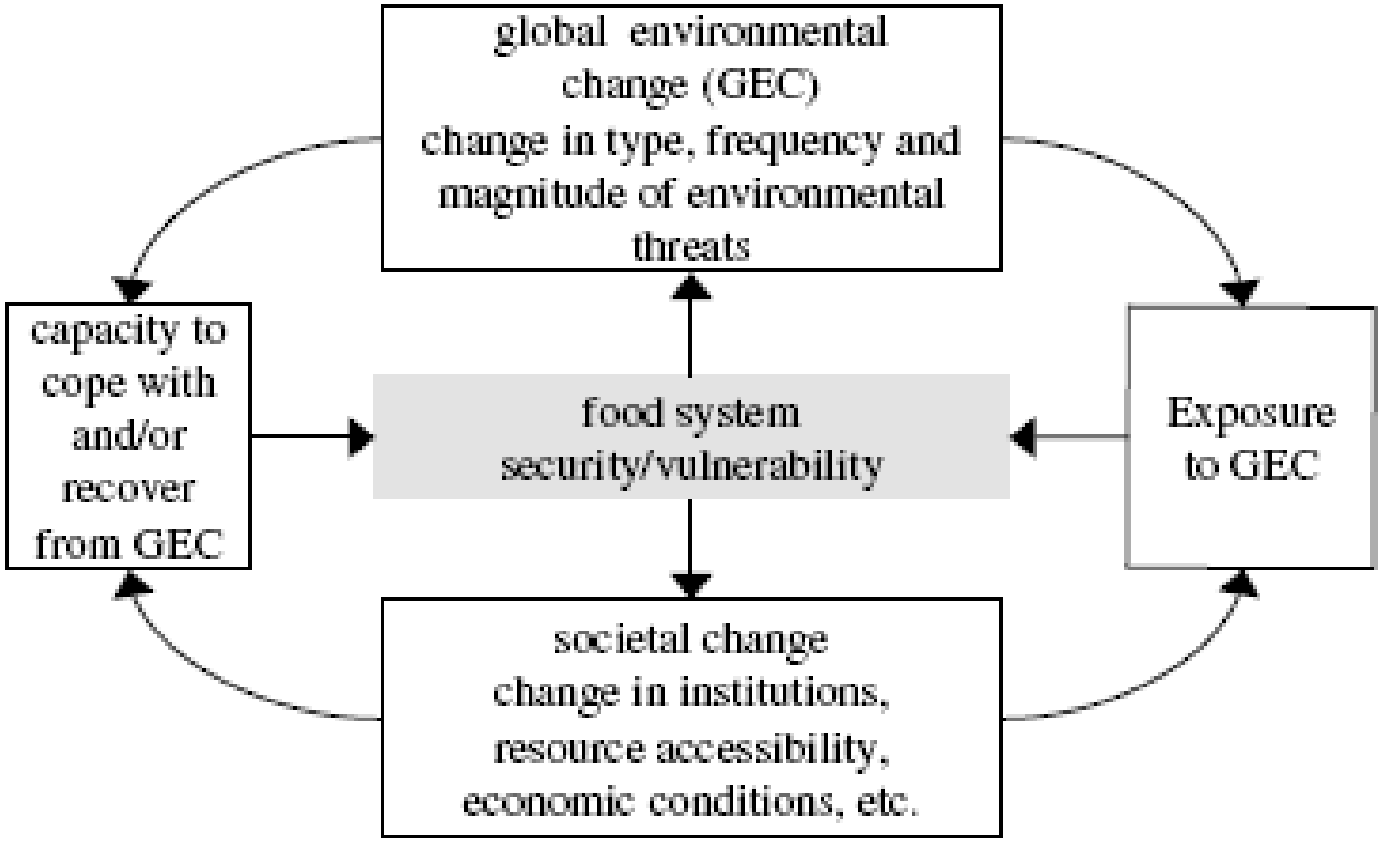
Impact of Warming



Impact of Warming ans Rice Production Risk



Impact of climate change on Food Security



Factors determining the vulnerability of food systems to GEC. (From Ingram et al. 2005.)

How to translate the Challenges into Opportunities in Vietnamese context

- Profiting the warming:
  - to increase the yield, productivity of agriculture, aquaculture, getting more revenue, conserving more land for future use;
  - to create new species adopting the warmer weather conditions
- To rapidly participate in international action plans and conventions on climate change:
  - To develop Certified Emission Reduction (CER) transaction
  - To rapidly develop clean development mechanism (CDM) in national industry
- To create new education programs
- To reinforce regional and international cooperation

Conclusions

1. The major challenges of Red River Basin Management are as follows:

   - Transboundary water utilization; water resource sharing among stakeholders

   - Quality degradation; water disasters

   - Climate change: resource and hazards

   - Management challenges : lack of co- and adaptive management, coordination, cooperation both in Central and Provincial levels in the field of water resource; water management institutional changes

   - Sharing - database for all the water-related activities in international river basins as well as monitoring network

   - Lack of Comprehensive collaboration with various related academic fields and research institutions

   - The capacity of institutions on all levels to monitor, control and sanction water use, land use or water pollution remains weak

Conclusion

3. There are urgent strategies, plan of activities to respond to the challenges, including

- Integrated river basin management (IRBM) for SD
- Capacity building for water staff working in water institutions, such as MONRE and DONRE, river basin organization, research institutions... through the training workshops, exchange of experiences, knowledge and technology, “water talent “...
- International, regional cooperation in all aspects of water resources in the context of global change : research, monitoring, database, utilization, management, capacity building...

Thank you very much for your attention !