



Water and air environmental research center



Vietnam: Water Quality Monitoring Network and Challenges

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Content

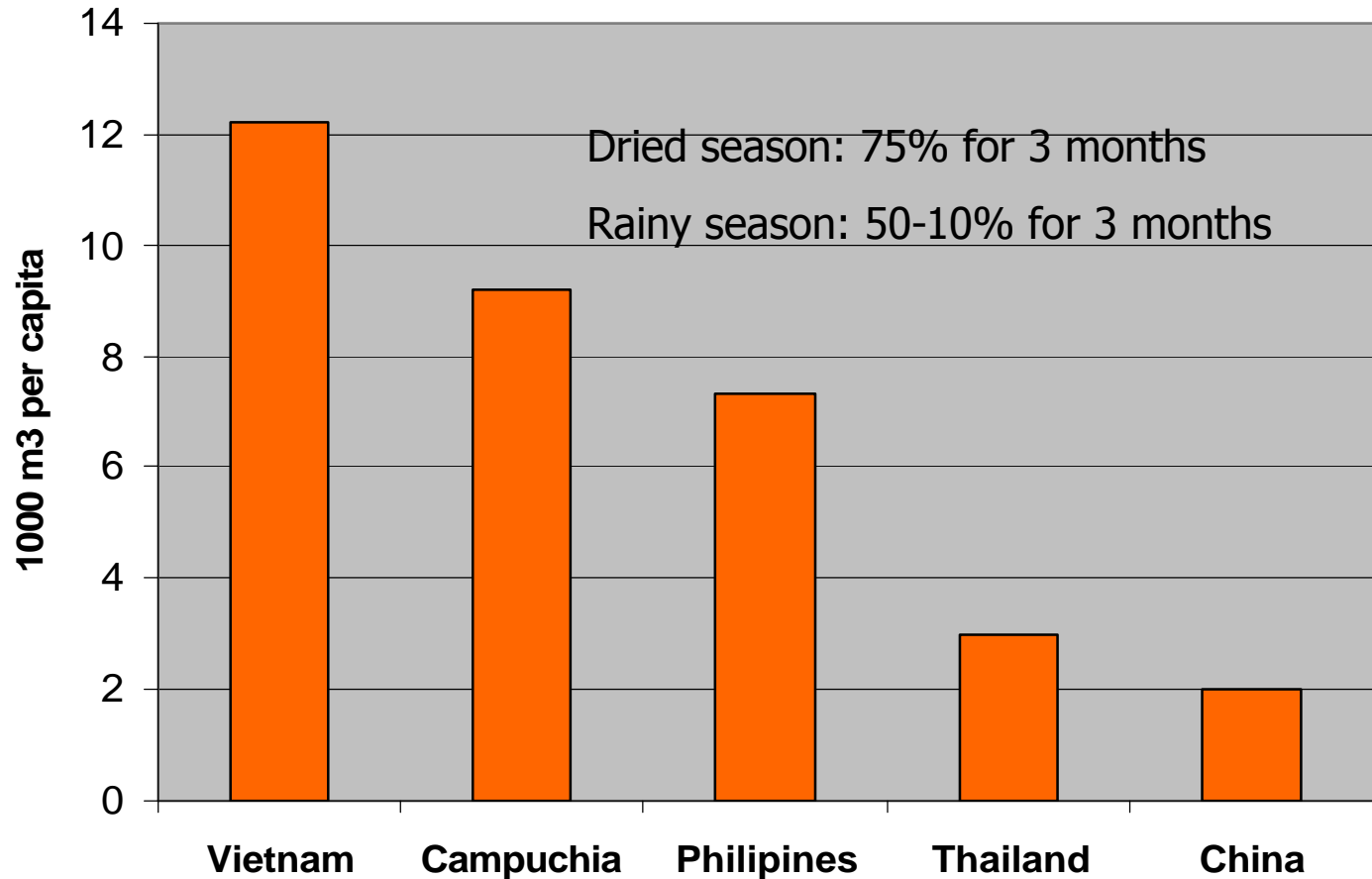
- WQ Monitoring:
 - National Monitoring Network
 - Experimental Stations
 - Lab
- WQ Modeling:
- Challenge & proposals
 - Red river delta
 - Mekong River delta



Water Resources

| No | River | Basin Area (km ²) | | | Ann. Disc. (bill. m ³) | |
|----|--------------------|-------------------------------|--------|-----|------------------------------------|--------------|
| | | Total | In VN | % | Total | % of VN |
| 1 | Banggiang - Kycung | 12,880 | 11,220 | 87 | 8.9 | 1.0 |
| 2 | Red-Thai Binh | 169,000 | 86,660 | 51 | 137.0 | 15.6 |
| 3 | Ma | 28,490 | 17,810 | 63 | 20.1 | 2.3 |
| 4 | Ca | 27,200 | 17,730 | 65 | 24.2 | 2.7 |
| 5 | Thubon | 10,496 | 10,496 | 100 | 19.3 | 2.2 |
| 6 | Ba | 13,900 | 13,900 | 100 | 10.4 | 1.2 |
| 7 | Dongnai | 42,655 | 36,261 | 85 | 30.6 | 3.5 |
| 8 | Mekong | 795,000 | 72,000 | 9 | 520.6 | 59.2 |
| 9 | Others | | | | 108.0 | 12.3 |
| | Total | | | | 879.0 | 100.0 |

Water Resources





Organization

Government

**Ministry of Sciences,
Technology and
Environment (MOSTE)**

**Hydrological and
Meteorological Services
(MHS)**

National Environment
Agency (NEA)

Data Center

Institute of
Meteorology
and Hydrology
(IMH)

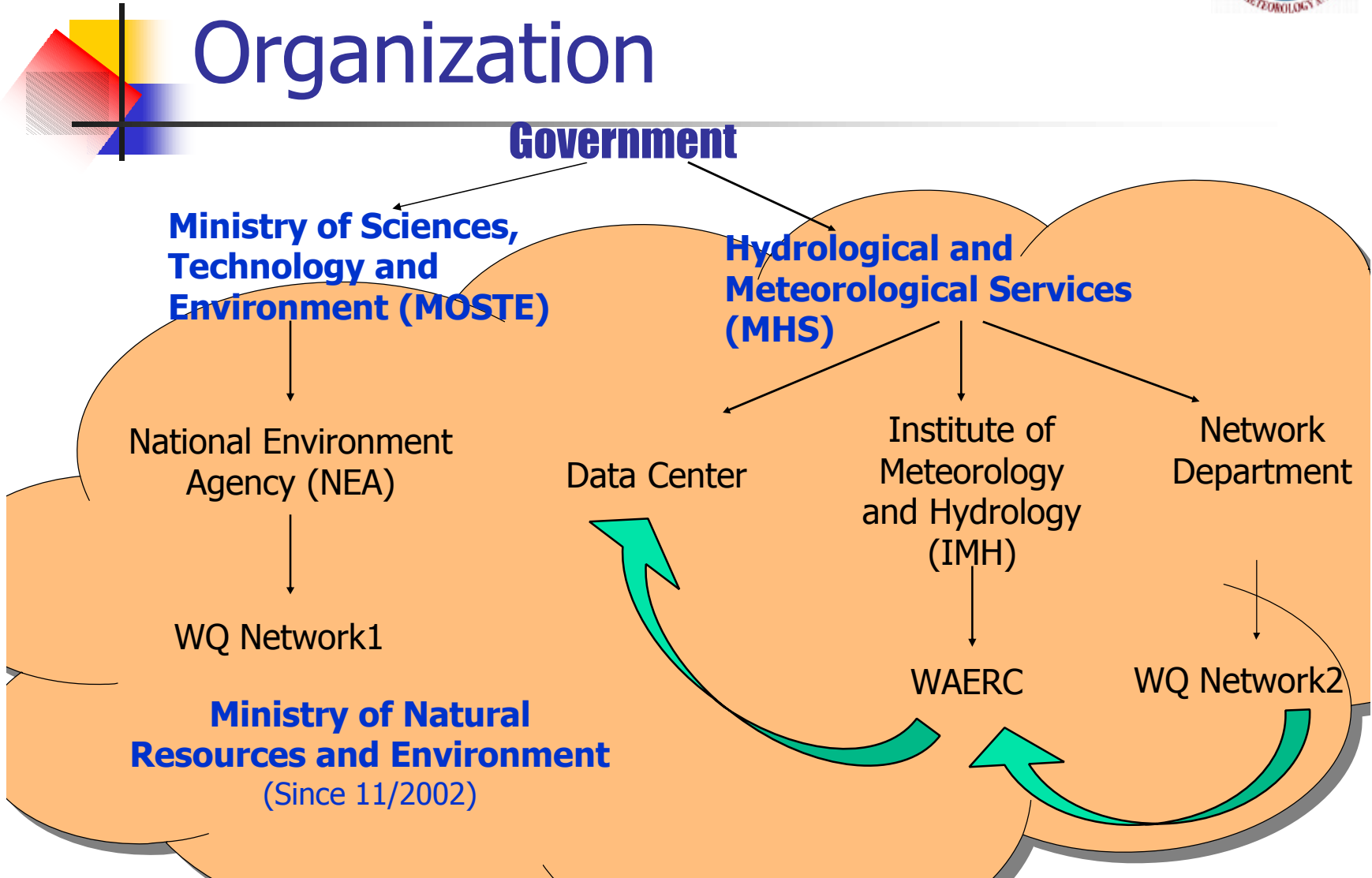
Network
Department

WQ Network1

WAERC

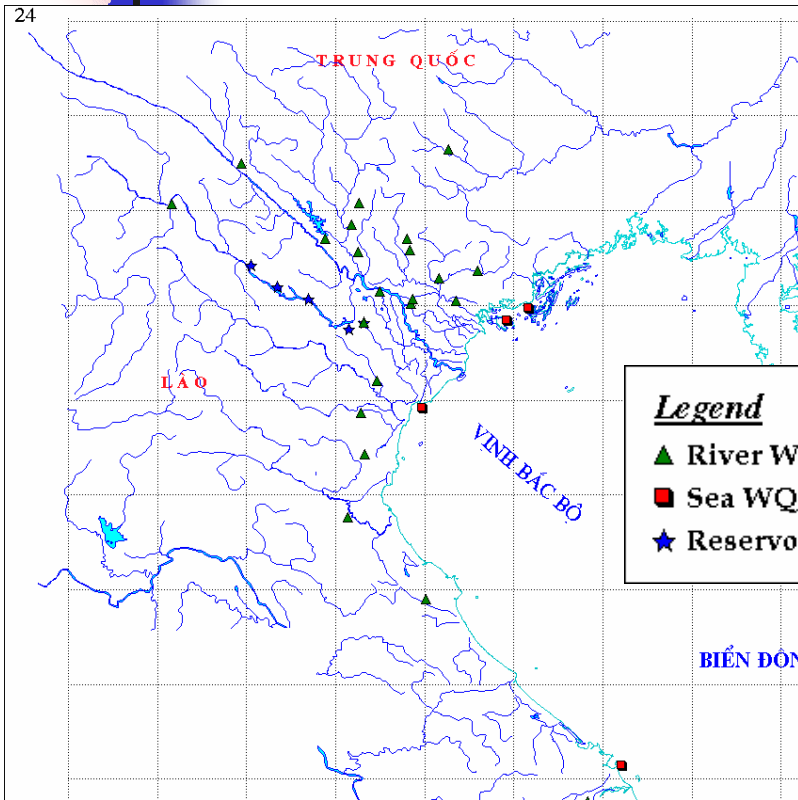
WQ Network2

**Ministry of Natural
Resources and Environment
(Since 11/2002)**

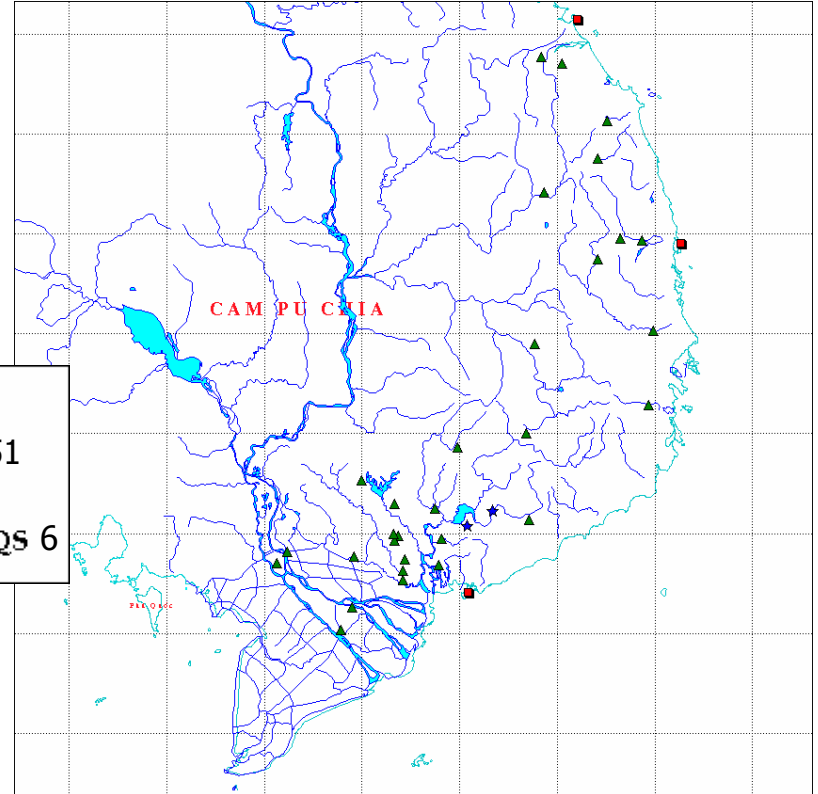


Water Quality Monitoring Network

24



North



South

Legend

- ▲ River WQS 51
- Sea WQS 6
- ★ Reservoir WQS 6

Water Quality Monitoring Network

- Parameters:
 - Discharge, Water level, T, pH, Total Fe, SiO₂, Ca²⁺, Mg²⁺, Cl⁻, SO₄²⁻, HCO₃, COD
 - In some stations: DO, BOD₅, COD, NH₄⁺, NO₃⁻, PO₄³⁻, Cl⁻, heavy metals, zooplankton, phytoplankton, oil, ...
- Frequency: day 15 of a month
- Analyzing Methods:
 - Samples monthly posted to 3 Laboratories
 - Data Center

Water Quality Monitoring Network

■ Lab Facilities:

- UV-Visible spectrometer (UV-Vis System HP 8453).
- Ion chromatographic Mic-3 (Metrohm)
- HACH Portable Water Quality Analyzer: spectrometer Drell 2010, COD Decomposer, pH meter EC10, EC CO 150, ...
- Portable MicroBiology Analyzer Mel/MF (HACH)
- Portable Water Quality Analyzer: TOA 22A
- Jenway, Spekoll 11, Mettler AB 204 etc.



Experimental Station: 2

Hoa Binh Reservoir



S=200 km²

V=9.5 10⁹ m³



**Since
1988**

Experimental Station: 2

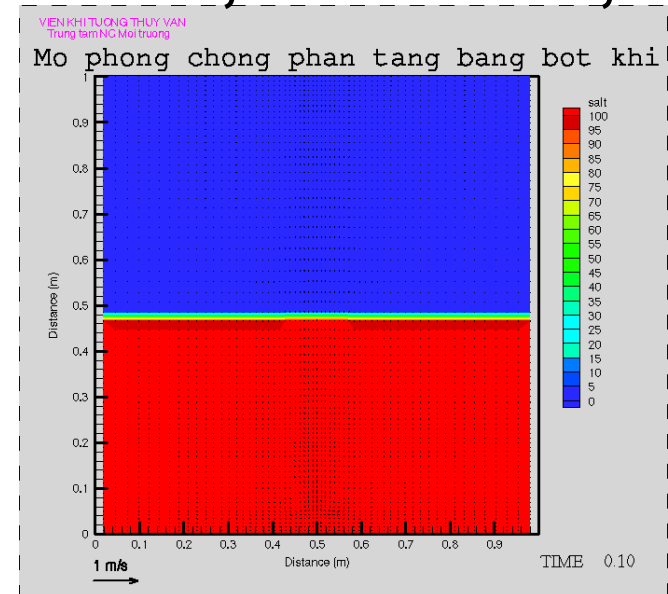
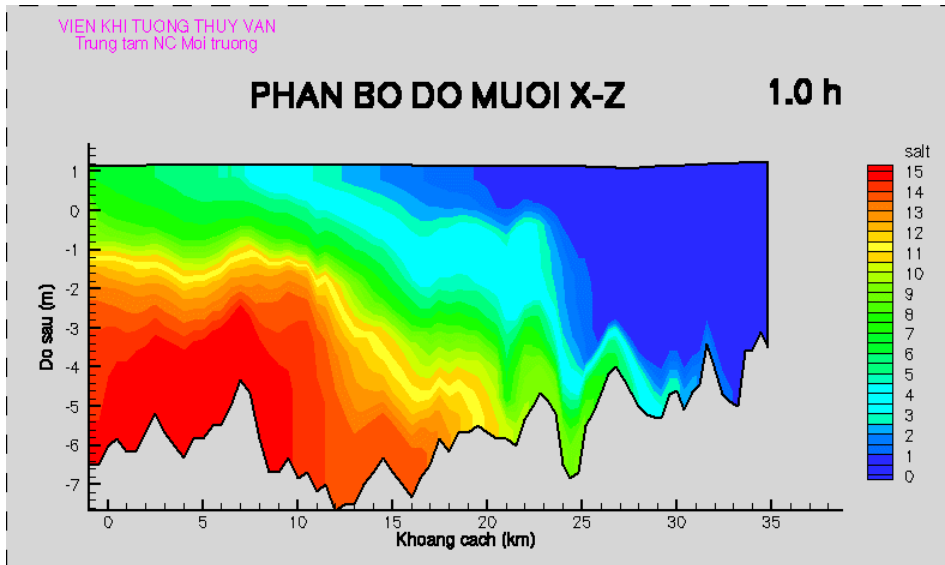


Thac Ba Reservoir

Since 2001

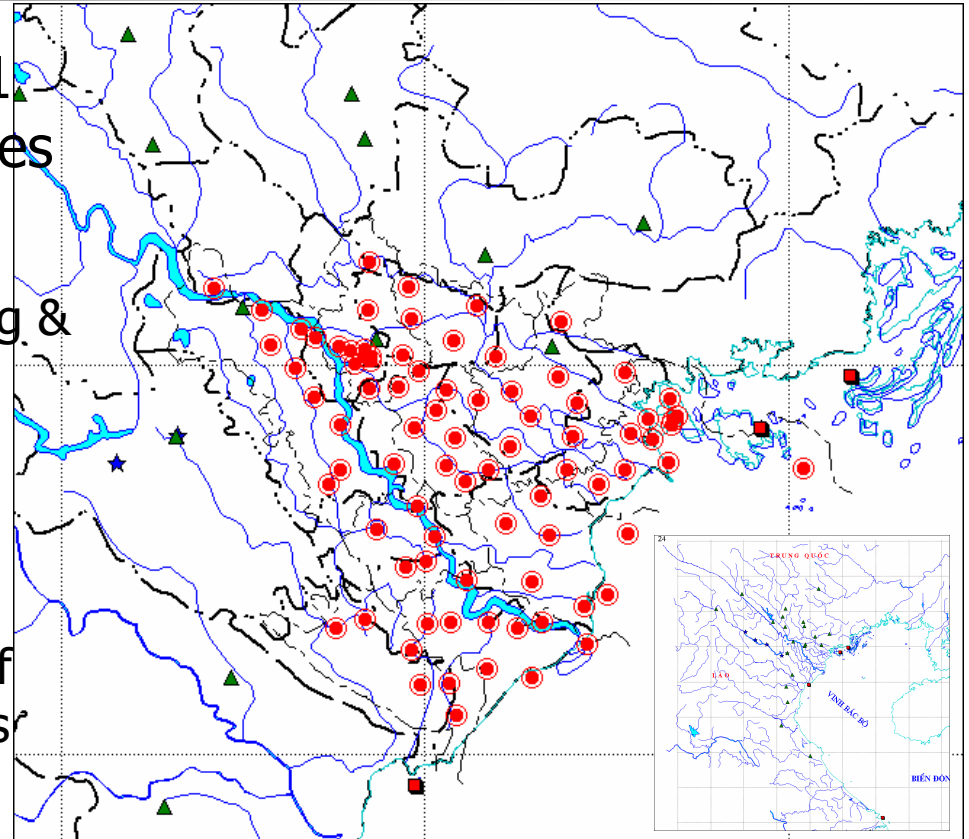
Water Quality Modeling

- Hydraulics & Water quality (Toxic, Nutrients, Ecology, oil pollution, ... for Water bodies)
- Develop & apply models: SWMM, ECOMSED, ROMS ...



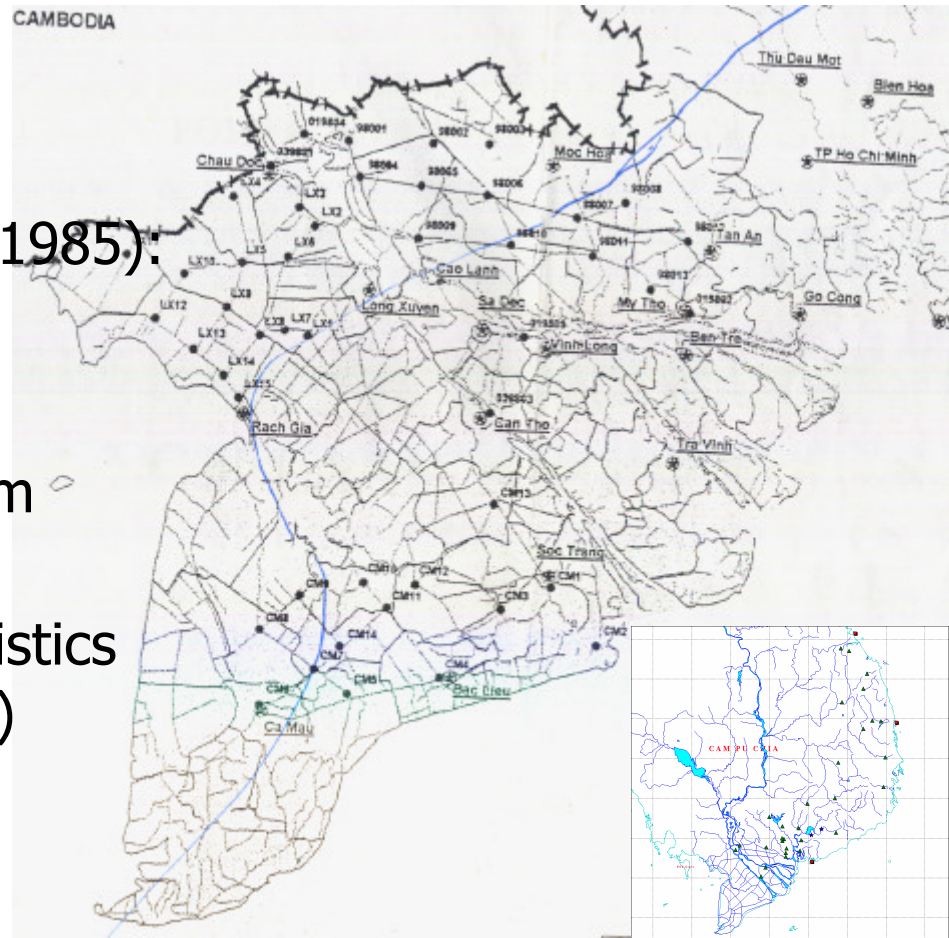
Challenge: Red River delta

- 1,266,254 ha; 17 mil.; 11 provinces, 21 indust. zones
- WQ monitoring:
 - Stations: different sampling & Analyzing Method ... (authorized organizations)
- WQ Modeling:
 - Embryonic stage
 - Uncertainties in quantity of modeling, Polluted Sources
 - Need long-term forecast (2020)



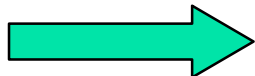
Challenge: Mekong River delta

- WQ monitoring:
 - National Network
 - MR Commission (since 1985): technically better
- WQ Modeling:
 - Trans-boundary problem (upstream)
 - Geographical characteristics (annually flooding area)
 - Evaluation of Polluted Sources?

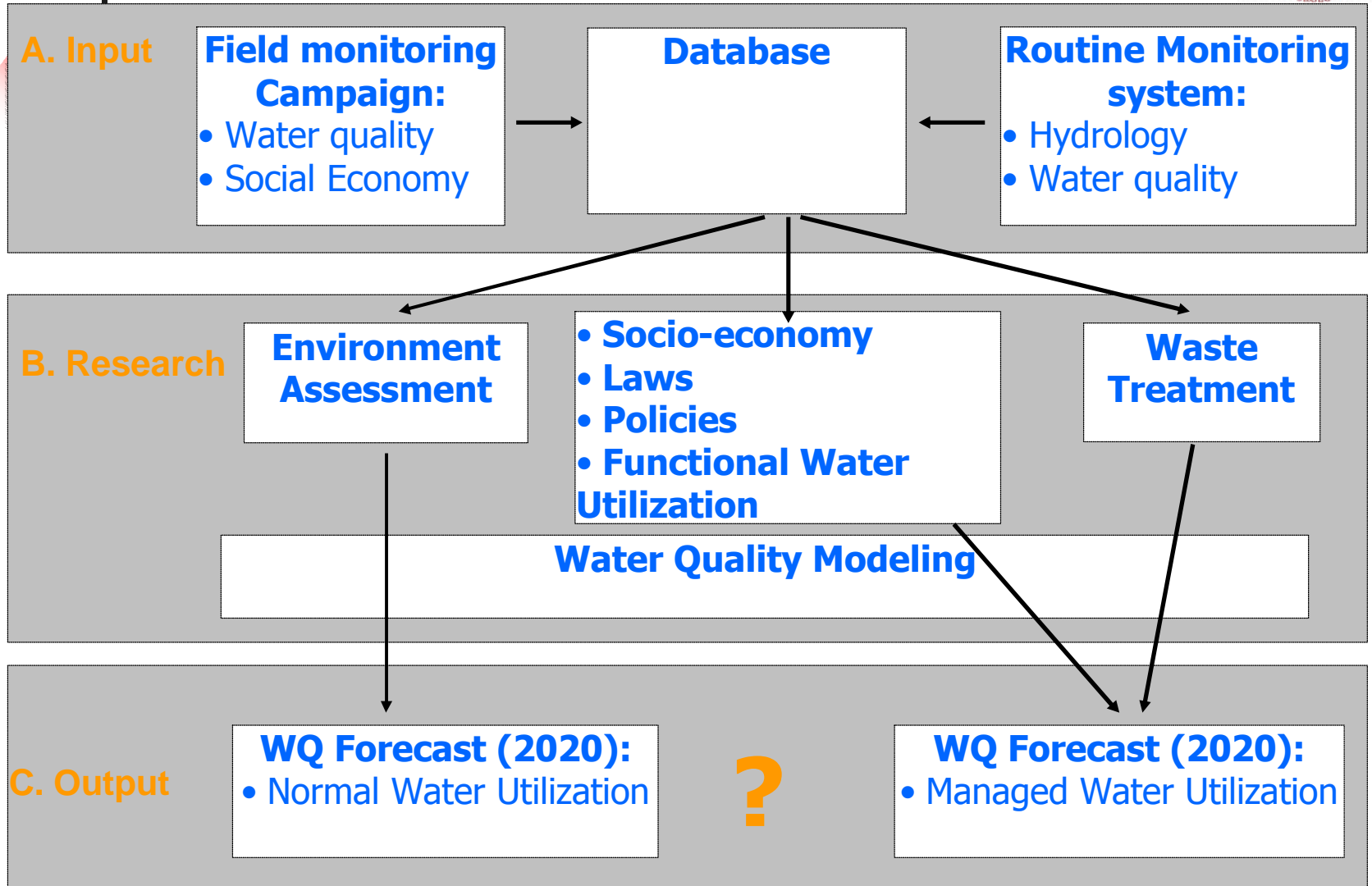


Challenge:

- WQ monitoring:
 - No network suitable for all purposes ?
- WQ Modeling:
 - Quantify Polluted Sources
 - Quantify impacts of legal, technical, financial tools
 - Relation between WQ and Ecosystem ?



Integrated Management Model





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- Thanks to
 - Japan
 - Iges