



## Section 5

# Water Quality and Aquatic Ecology

(Preliminary Design Guidance for Proposed Mainstream  
Dams in the Lower Mekong Basin)

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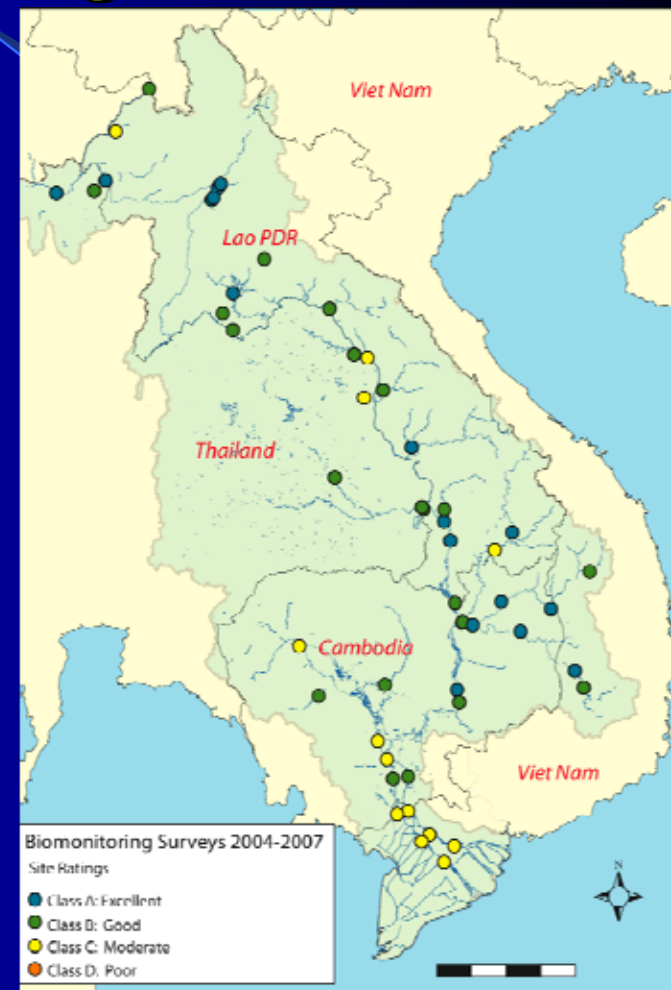
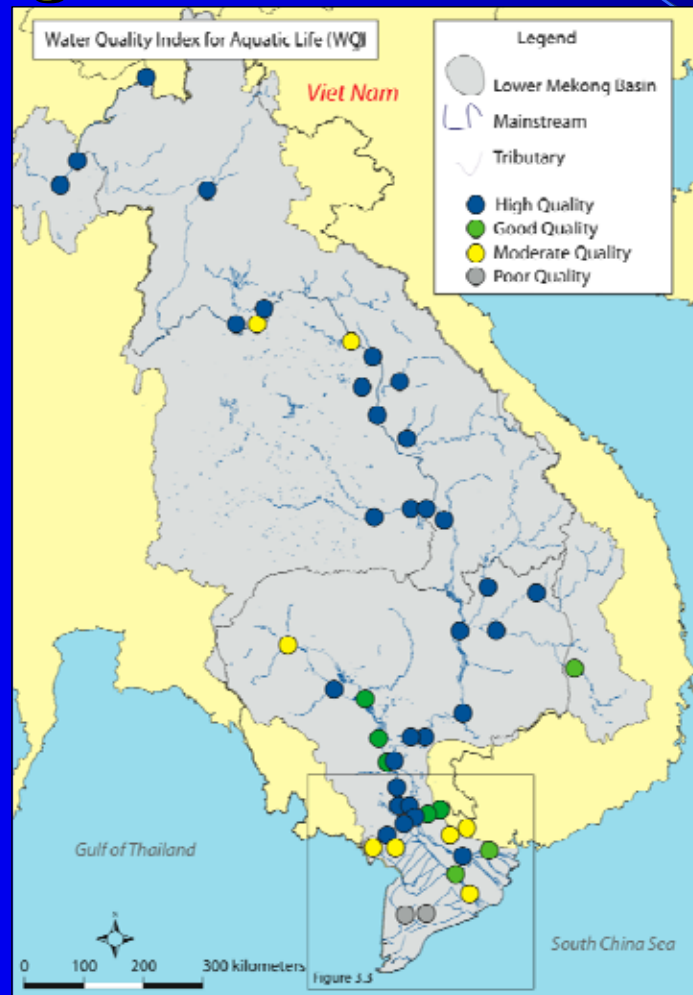
# Content of the section: Guidance for Water Quality and Aquatic Ecology

- Background and Basic approach
- How the guidance was derived
- What the guidance covers
- MRC support to implement the Guidance



## Water and ecological quality status and monitoring of the Lower Mekong Basin

In general,  
still good/  
satisfactory  
based on  
WQ  
monitoring  
and  
Ecological  
Health  
Monitoring





Hydropower operation



Temporal river flow patterns



Water quality

Ecosystem health

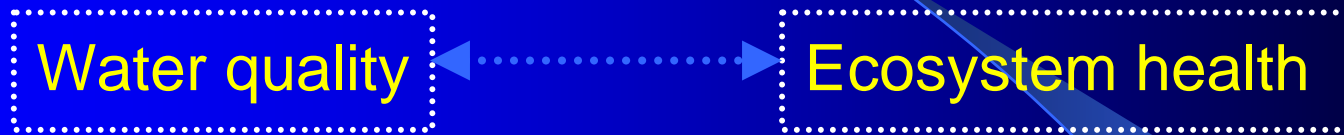


Mekong riverine functions, productivity and ecosystem services

*Affecting complex food web and aquatic ecosystem dynamics that support fish productivity*



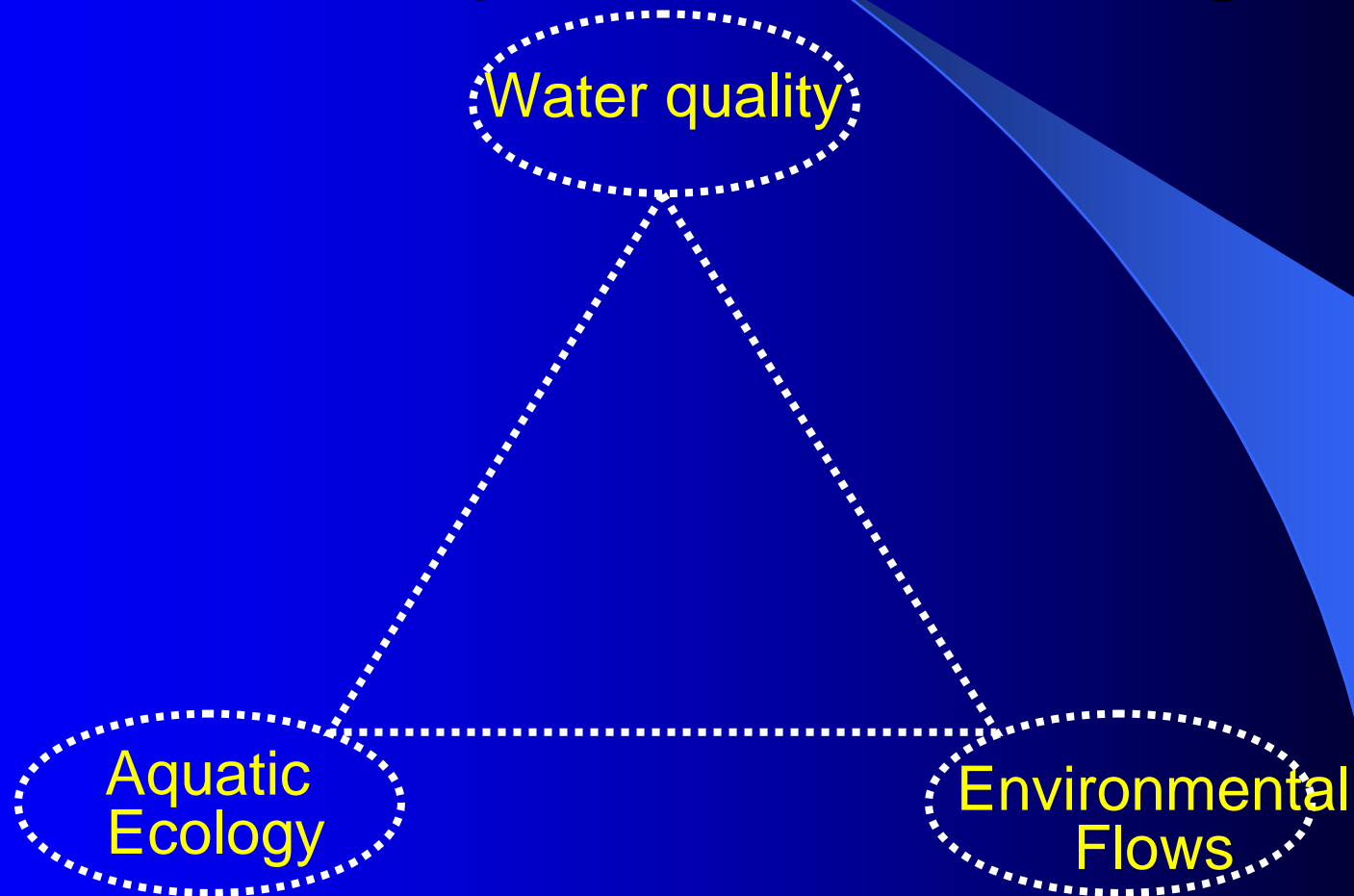
# Dam Impacts on



DEGREE depends on:

- Volume of reservoir impoundment
- Water retention times
- Depth of impoundment
- Patterns of land use in catchments

# Basic approach: Three performance targets





# Water Quality

- Consider water quality parameters:
  - Cited in national regulations
  - Provided in MRC Procedures on Water Quality and its three Technical Guidelines on
    - Protection of Human Health
    - Protection of Aquatic Life
    - Water Quality Emergency Management
- If necessary, modification for application to impoundments (reservoirs)



# Aquatic Ecology

- Be affected by dams;
  - Blocking migration routes
  - Fragmentation of habitats
  - Change in habitats and ecosystems
  - Impact on ecological balance
  - Affect to biodiversity loss
- Requirement to ensure downstream regime of the dams





# Environmental Flows

- River flows required for all water uses
- In terms of sufficient quality, quantity, timing and duration of river flows
- Be integrated with EIA tool
- Be incorporated at all hydropower project stages (design, implementation, operation and monitoring)
- Be introduced at the EIA stage



## Summary

- 1) General requirements
- 2) Water quality monitoring
- 3) Environmental Flow assessment and provision
- 4) Monitoring of environmental flow provision



### ✓ General requirements

- Optimization of operation to meet water quality objectives
- Demonstration of meeting the Mekong Agreement requirements (as EIA)
- Use Environmental Flows Assessment approach to provide minimum flow needs
- Focus on localized impacts by peaking and daily operation cycles for hydropower generation
- Covering all expenses by developers to the design and implementation of water quality monitoring and environmental flows assessments and provision



- ✓ **Water quality and ecological health monitoring**
  - Targeted and localized monitoring systems
  - Fund for Environmental Management Plan for whole duration of concession period



### ✓ Environmental Flow assessment and provision

- Introducing EFA at the EIA and feasibility study stage
- Establishing for average and low hydrology regime at the detailed design stage
- Pay attention to the impacts due to daily releases for peak power generation
- Releases (ramping rates) slow to minimize adverse effects on downstream
- Incorporate EFA provisions into environmental Management Plan for the construction and operation phases

## What the Guidance covers



### ✓ **Monitoring of environmental flow provision**

- Ensure the E-Flows considerations are reflected in operating policies with good practice and environment management and monitoring plan
- Integrate E-Flows with overall environmental monitoring system for the operation stage
- Provide an independent review of the flow release regime, report and submit to the government to ensure compliance.



## MRC support to implement the Guidance

- ❖ MRC Procedure for Water Quality *(completed by 2010)*
  - ❖ Technical Guideline for Protection of Human Health
  - ❖ Technical Guideline for Protection of Aquatic Life
- ❖ Water Quality Monitoring Network and Ecological Monitoring Network of the Member Countries *( water quality and ecological health database in Mekong mainstream and main tributaries; both historical and continuous data)*
- ❖ Environmental Flows management and approach for Mekong river under planned mainstream hydropower dams *( approach and methodology introduced with future development and application for each Mekong river portions)*

Dialogue Workshop with Developers/line agencies for  
Preliminary Design Guidance for Proposed Dams  
In the Lower Mekong Basin,  
Vientiane, Lao PDR, 20<sup>th</sup> Oct 09

## MRC Support to implement the Guidance

MRC Water quality  
monitoring programme  
started in 1998

### Scope

- Mekong River Mainstream
- Major tributaries
- Trans-boundary

### Objectives

- Timely data and/or information on the status and changes
- Identify specific existing water quality trans boundary and basin wide issues
- Gather national priorities information for specific management purpose.





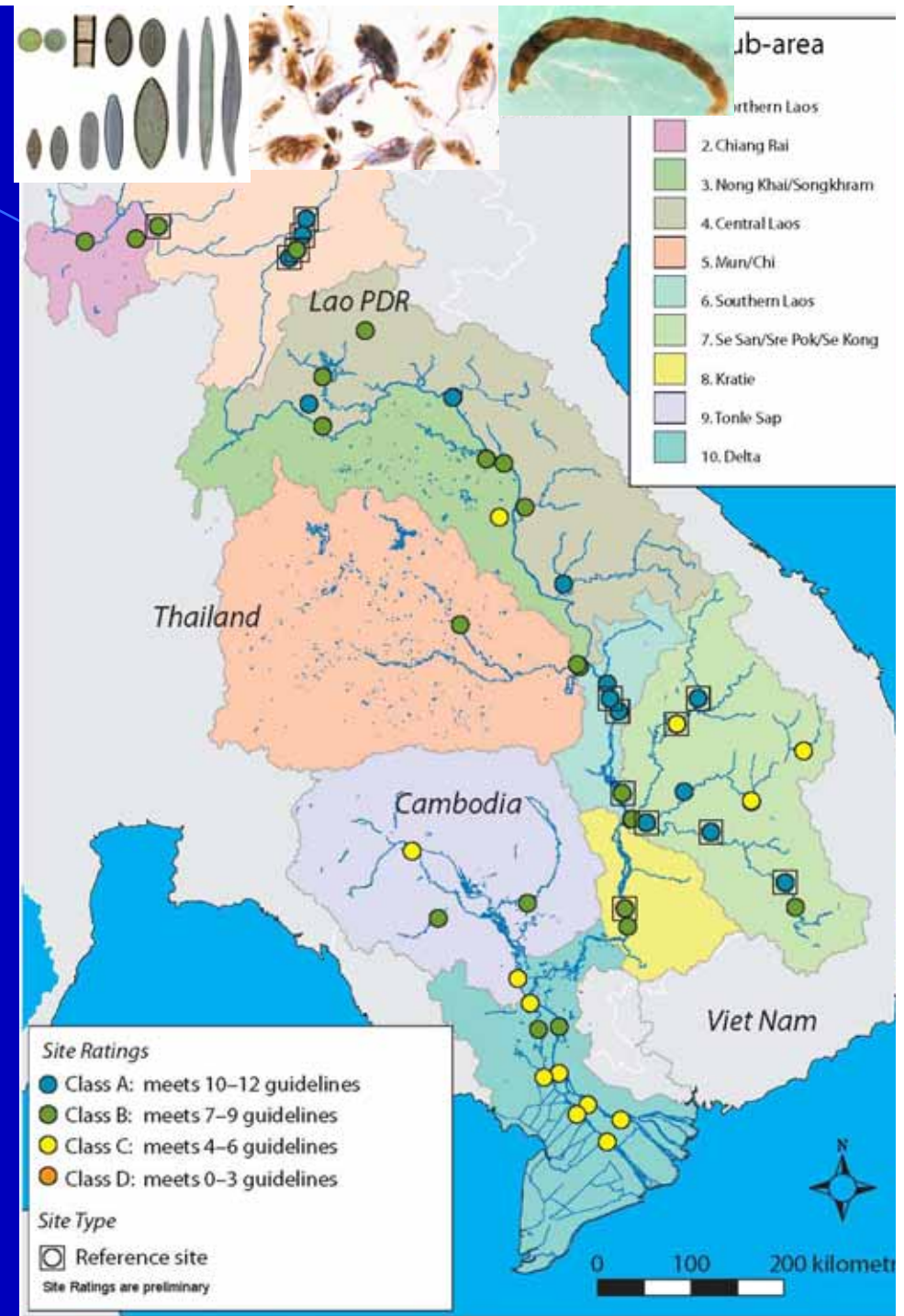
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# MRC Support to implement the Guidance

Ecological Health monitoring Started in 2004

Diatom, zooplankton, benthic and littoral invertebrates

Capacity strengthening of national institutions and line agencies on field sampling, identification, analysis and reporting



Dialogue Workshop with Developers/line agencies for Preliminary Design Guidance for Proposed Dams In the Lower Mekong Basin, Vientiane, Lao PDR, 20<sup>th</sup> Oct 09

# MRC Support to implement the Guidance

**Integrated basin flow management (IBFM):**  
started in 2005

Assess the impacts of Basin development on water flow, ecosystems & people

Holistic, integrated assessment to provide a basis for “trade-off” discussions by decision makers



Costs/benefits ←

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**THANK YOU**