Section 3

Fish Passage on Mainstream Dams

Dialogue Meeting
Preliminary design guidance for proposed mainstream dams in the Lower Mekong Basin

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Focus of Fisheries Programme

- "*Putting fish on the map*" (*Assessment of Mekong Fisheries* and *FEVM* components) (size and importance of fishery, drivers of production, migrations, opportunities and threats
- River and reservoir fisheries management (*MRF* and *FMG* components)
- Aquaculture of indigenous Mekong species (*AIMS*)
- 'Hydropower and fisheries' is a relatively new issue for MRC/FP as well as for fisheries scientists in the region in general

Contents of Section

- What the Section provides
  - Introduction to the theme
  - Considerations to be taken into account in fish pass design and operation
  - Some basic principles on tasks and responsibilities
- What the Section not provides
  - Specifications or standards for fish pass design
  - (Location-specific) fisheries information necessary for better fish passage design and operation

Magnitude of Mekong fisheries

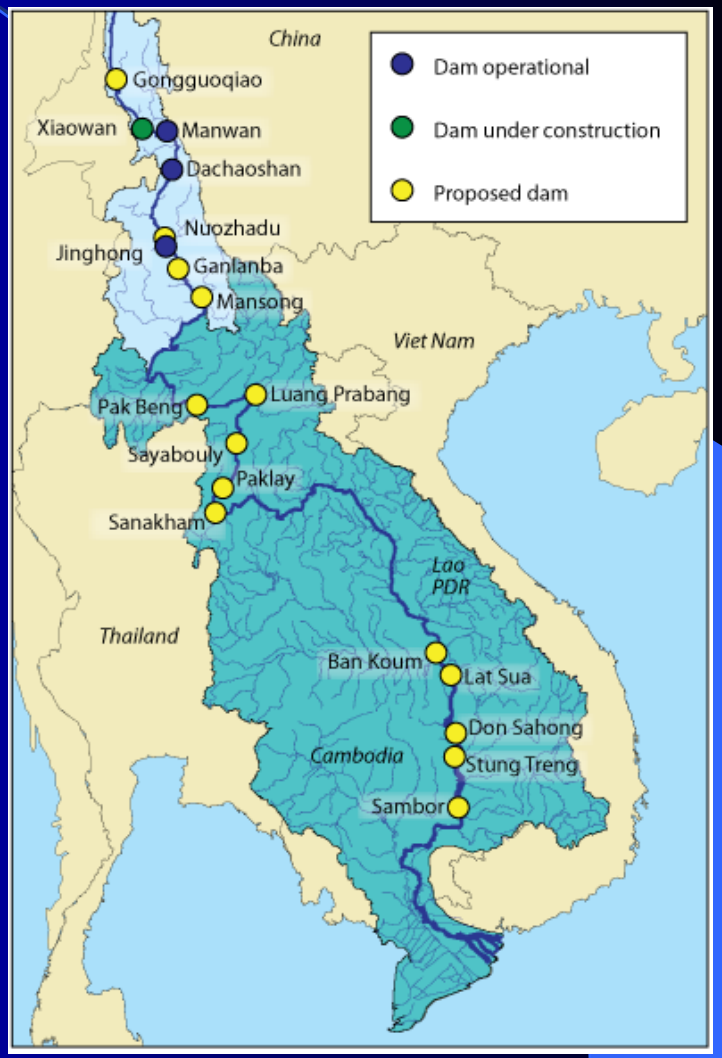
- The world's largest inland fisheries
- Total yield 2.6 million t/yr (70% fish, 30% OAA)
  - About 2% of the world's total annual fishery yield
- Value US$ 2-3 billion/yr
- Socio-economic importance
  - Food security:
    - Source of 50-80% of animal protein, Vitamin A and calcium in diet
    - 'Actual' per capita consumption 29-39 kg/yr
  - Economic activity for 50-80% of the basin's rural population
  - Source of 20% of financial income on average

Fish migration patterns

- How many?
  - About 50% of fish species – 1 million t/yr
- Why?
  - Spawning, feeding and refuge habitats separated geographically
- Where?
  - 'White Fish', long-distance migrants along Mekong mainstream
- Which and for what?
  - Adult fish migrate upstream for spawning
  - Eggs/larvae drift downstream, juveniles may migrate to nursery and feeding grounds
  - Adults migrate downstream to feeding and refuge areas

Dams impact on Mekong fish and fisheries

- Fish need flows to navigate - dams change up- and downstream flows
- Dams are physical barriers for up- and downstream migration
- Dams change ecology upstream
- Overall: Altered and lost environmental conditions



Options for mitigation

- Impacts from dams on fisheries have to be mitigated!
- Options
  - Reservoir fisheries
    - Productivity increase will be for a short time only
    - Changes in characteristics of fishery (more capital intensive; different users; new institutional arrangements)
  - Aquaculture
    - Need large area for culture
    - Added cost of 'fish production' (US 1 per 1 kg of fish)
    - Changes in beneficiaries
  - Fish passes

FP contribution!

- MRC Technical Paper No 25. Modelling the cumulative effects of hydropower dams on the migratory fish populations in the Lower Mekong Basin (end-2009)
- MRC Technical Paper No 26. Dams and Fish: Impacts and mitigation. Methods and guidelines to forecast, assess and mitigate the impact of hydropower dams on fish resources in the Mekong Basin (end-2009)
- MRC Development Series No 7. Dams as barriers to fish migration (end-2009)
- "Larvae survey"; FP and DOF Thailand; preliminary results to be presented in November 2009
- Section 3 of Design Guidance; FP based on expert experiences presented at meeting; available.

How the guidance was derived

- A group of 17 world experts in the area of fisheries scientists and engineering was established (early 2008)
- A meeting of the Expert Group was held (September 2008):
  - Lessons learned from Columbia, Fraser, Parana rivers and others were presented and discussed
  - This information was applied to the case of the Mekong, its fish and fisheries
- The knowledge obtained was written-up (early 2009)
- The expert core group is being retained for continued specialist advice

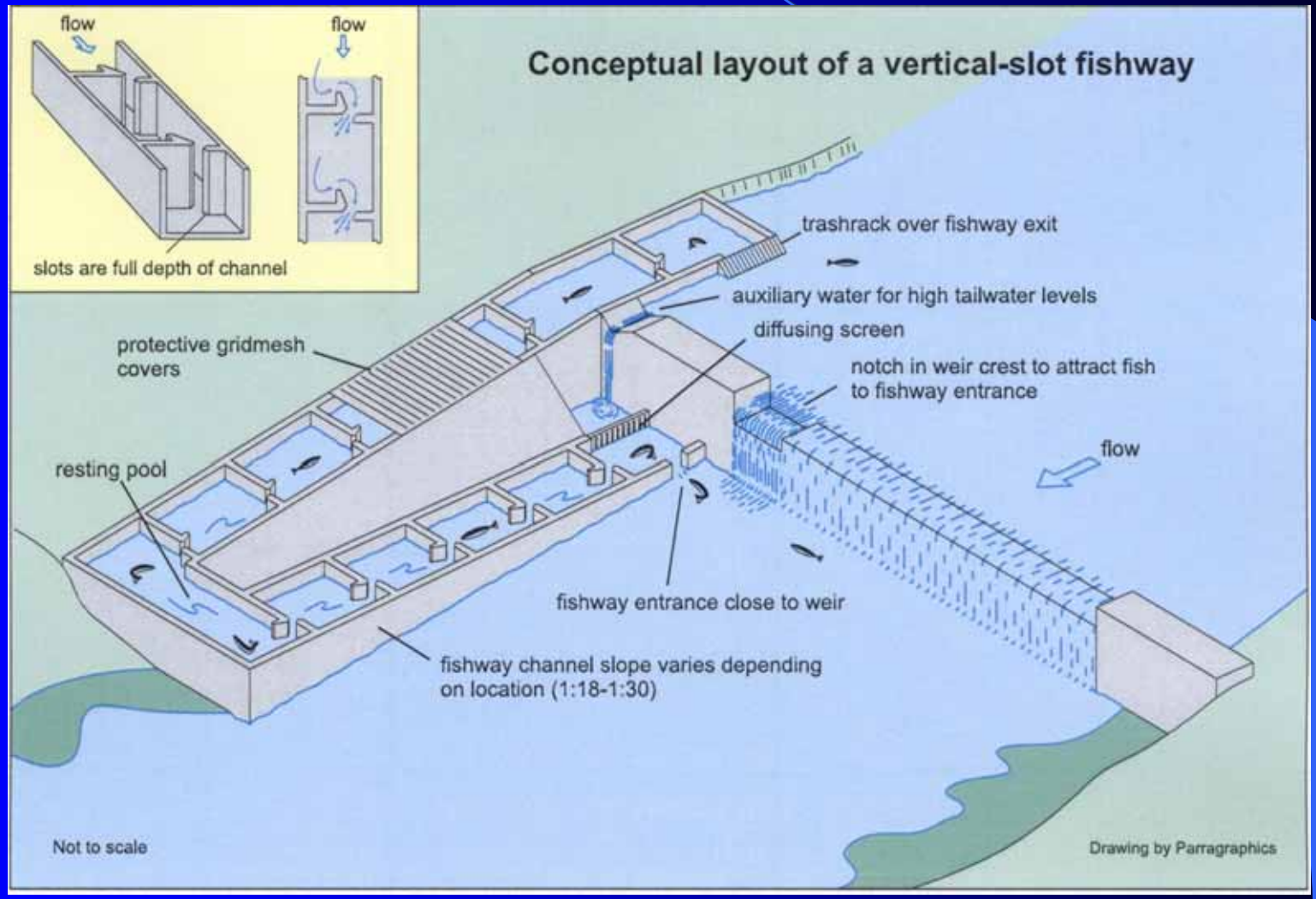
Is the solution to build a fish pass???

Major concern of Expert Group meeting: Fish pass facilities over dams on Mekong

Three requirements for successful fish passes:

1. Fish must find entrances
2. Fish must be able to ascend / descend
3. Fish must exit and continue migration

Solution = Build a fish pass???



Solution = Build a fish pass???

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1) Designing effective fish passes → need for more detailed knowledge of migrating fish species and their behavior
2) Diversity and volume of migrating fish → multiple systems necessary
3) Most common solution of fish pass = fish ladder → on tropical rivers effective only up to a height of max. 10m

Preliminary design guidance document

- Based on 5 basic principles
  - Avoidance of impacts where possible
  - Precautionary principle (especially with regard to biodiversity loss)
  - User pays
  - Adaptive management of facilities (adaptation; modification)
  - International good practice

Design guidance document

60. Fish passage must be incorporated – upstream and downstream
61. Safe passage for 95% target species and individuals, at all flow conditions
65. Adopt best international practice, utilize core expert group (developer pays…)
73. Adequate flows through fish pass
71. Mortality through fishways < 5%
89. Contingency fund for modification – 20% of initial cost of fish pass