Fish biodiversity
along the Mekong River
from the Himalaya to the coast

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OUTLINE

- Main features of the Mekong River
- Tour of the Mekong, from Tibet down to the Delta
- Mekong fisheries
- Factors driving fish production
- Threats to Mekong fish biodiversity
- Tools for fish biodiversity researchers
MAIN FEATURES OF THE MEKONG RIVER

Hydrology, fish biodiversity, population
Mekong hydrology

10\textsuperscript{th} river of the world in length (4350 km = 2700 mi)
14\textsuperscript{th} river of the world in discharge,
…but first in hydrological variability
1250 - 67,000 m\textsuperscript{3}.s\textsuperscript{-1}

Large-scale seasonal flooding $\rightarrow$ huge area of wetlands
Laos: along 1700 km of river
Cambodia: 20% of the country
Vietnam: surface of Belgium

*Total: the surface of Ireland*
Painting from Osmose NGO, Prek Toal, Cambodia
Mekong fish biodiversity

Very high species richness: around 1000 fish species (between 768 and 1200)

Main characteristic: migrations
- 87% of known species are migratory
- ~ 50% of the catch made of long distance migrants

A majority of fish species depends on flooded areas for food and reproduction
Pangasianodon gigas

Himantura oxyrhynchus

Catlocarpio siamensis

Minute carp max. 2.5 cm

Oreicthys parvus
Mekong fish migrations

Example from Khone Falls (Southern Laos)
Species richness, wetlands and fish migrations characterize aquatic ecology in the Lower Mekong Basin
Mekong population

60 million people in the watershed
(76 million by 2020)

Countries characterized by
a poor and rural population

UNDP Human Development Index 2004

- Thailand: 76/177
- Viet Nam: 112
- Lao PDR: 135
- Cambodia: 130

High economic dependence on fisheries in rural households
(can exceed 80% in rural households)

Fish consumption in the Mekong Basin: 24 – 34 kg/person/year
= 49 – 82% of animal protein consumed

Fish is central to the food security and livelihood
of rural communities in the Mekong basin
MEKONG FISHERIES
The Mekong River produces around 2.6 million tonnes of fish per year

This represents
- 7 times the inland fisheries production in Northern America
- 13 times the marine fisheries sector in Australia
- 4 times the whole fisheries sector in France

Value of Mekong fish catches: > USD 2000 million / year

Cambodia: most productive inland fishery in the world
(1ha = up to 230 kg/y)

In the Tonle Sap River, during the migration peak, 34 tonnes of fish (i.e. about 3 million individual fishes) are caught every hour
(Columbia River: 2 million salmons per year)
<table>
<thead>
<tr>
<th>Country</th>
<th>Annual Fish Catch (FW, tonnes)</th>
<th>Annual Fish Consumption (kg/person)</th>
</tr>
</thead>
<tbody>
<tr>
<td>China (Yunnan)</td>
<td>~ 25,000</td>
<td>≈1%</td>
</tr>
<tr>
<td>Lao PDR</td>
<td>~ 180,000 t</td>
<td>≈7%</td>
</tr>
<tr>
<td>Cambodia</td>
<td>~ 680,000 t</td>
<td>24</td>
</tr>
<tr>
<td>Thailand</td>
<td>~ 930,000</td>
<td>≈25%</td>
</tr>
<tr>
<td>Vietnam</td>
<td>~ 840,000</td>
<td>≈32%</td>
</tr>
</tbody>
</table>

Japan freshwater fish catch: ~ 60,000 tonnes/year
Biodiversity = food security
FACTORS DRIVING FISH PRODUCTION
A sustained fish production is possible only through a coordinated effort encompassing these 4 components.
Hydrology: surface area flooded
Hydrology: duration of the flood
Hydrology: timing of the flood
Migrations: 3 main zones

- **Lower Mekong system**: 750-950,000 tonnes of migratory fishes
- **Middle Mekong system**: 500-600,000 tonnes of migratory fishes
- **Upper Mekong system**: 36,000 tonnes of migratory fishes
Migrations: hydrological triggers
Environment: floodplain vegetation

Barren land

Grassland

Flooded forest
Environment: dry season refuges
Environment: beyond the river banks

Mekong plume

A 3D Circulation Model of the South China Sea
Huijie Xue, Fei Chai, Neal Pettigrew, Danya Xu, Maochong Shi
MAIN THREATS TO MEKONG FISH BIODIVERSITY
Dams are the main threat to fish biodiversity and fisheries production.

53 dams ≥ 1 MW exist or are in construction; 159 more are considered for development in the Mekong Basin.

Dam development will:
- obstruct migration routes
- modify flood height
- modify flood duration
- modify flood timing
Upstream developments will reduce the water level and the surface area flooded.
Upstream dams will result in floods arriving later

Upstream dams will, in average, shorten the duration of the flood.
Upstream developments will sharply reduce the amount of sediments arriving to the lake.

Upstream developments will result in higher water levels in the dry season.
Threat: fishing down food webs

Fishing Down Food Webs
TOOLS FOR FISH BIODIVERSITY RESEARCHERS
FISHBASE

www.fishbase.org

Information about 768 fish species of the Mekong Basin

All information published on 28,500 fish species
Taxonomy, photos, common names, records, identification keys, etc
Internet, DVD and CD-ROM
Multi-lingual access in ASEAN languages
Scientific Name
Genus is Pangasius
Species is kunyi
Genus + Species

You can search names also in the independent Catalog of Fishes.
To search without Genus, change Genus option from 'is' to 'contains'.

Main reference
Pouyaud, L., G.G. Teugels and M. Legendre 1999. (Ref. 33567)
Other references | Biblio | Coordinator | Collaborators

Size / Weight / Age
70.2 cm SL (female)

Environment
Benthopelagic; freshwater; brackish

Climate / Range
Tropical

Distribution
Asia: major drainages from Sumatra, Indonesia (Musu, Batang Han and Indragiri rivers); also present in eastern Kalimantan (Mahakam, Kapuas and Banito rivers), Sabah, Malaysia (Kinabatanagan river) and Viet Nam (Mekong delta)

Countries | FAO areas | Ecosystems | Occurrences | Introductions
Short description
MRC MEKONG FISH DATABASE

Information about 833 fish species of the Mekong Basin.

Information not as recent and reliable as in FishBase

More information on ecology and migrations

CD-ROM only (no Internet version)
Main Species Data for Pangasius kunyit

Classification

Status: Indigenous

Taxonomic Classification Remarks
The species is instantly recognizable by its bright yellow caudal fin (Ref. 12693); Apparently Pangasius pangasius is a mix of krempfi and kunyit (Ref. 1037930).

Synopsis
A rare omnivorous species; Occurring throughout the Basin; Spawns during the flood; Caught with nets and hooks; Marketed fresh.

Global Distribution
Known from major drainages from Sumatra, Indonesia (Musi, Batang Hari and the Indragiri river); also present in eastern Kalimantan (Mahakam, Kapuas and Barito river); recorded from Sabah, Malaysia (Kinabatanagan river) and Vietnam (Mekong delta) (Ref. 33567).

Occurrences
The CD covers 39 species in great detail

- distribution range based mainly on LEK
- facts about the species,
- population structure hypotheses
- critical habitats
- life cycle
- importance in fisheries.

The main focus is on life cycles of fishes and the critical habitats that each species depend on in order to complete its life cycle.
PERSPECTIVES AND NEEDS IN RESEARCH

Taxonomy

Climate change vs. dams

Artificial habitats

Wetland productivity

Relationships vegetation – fish production

Relationship river – coastal productivity

Monitoring, baseline assessments
Thank you!