

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



Eric BARAN
MITH Somountha

OUTLINE

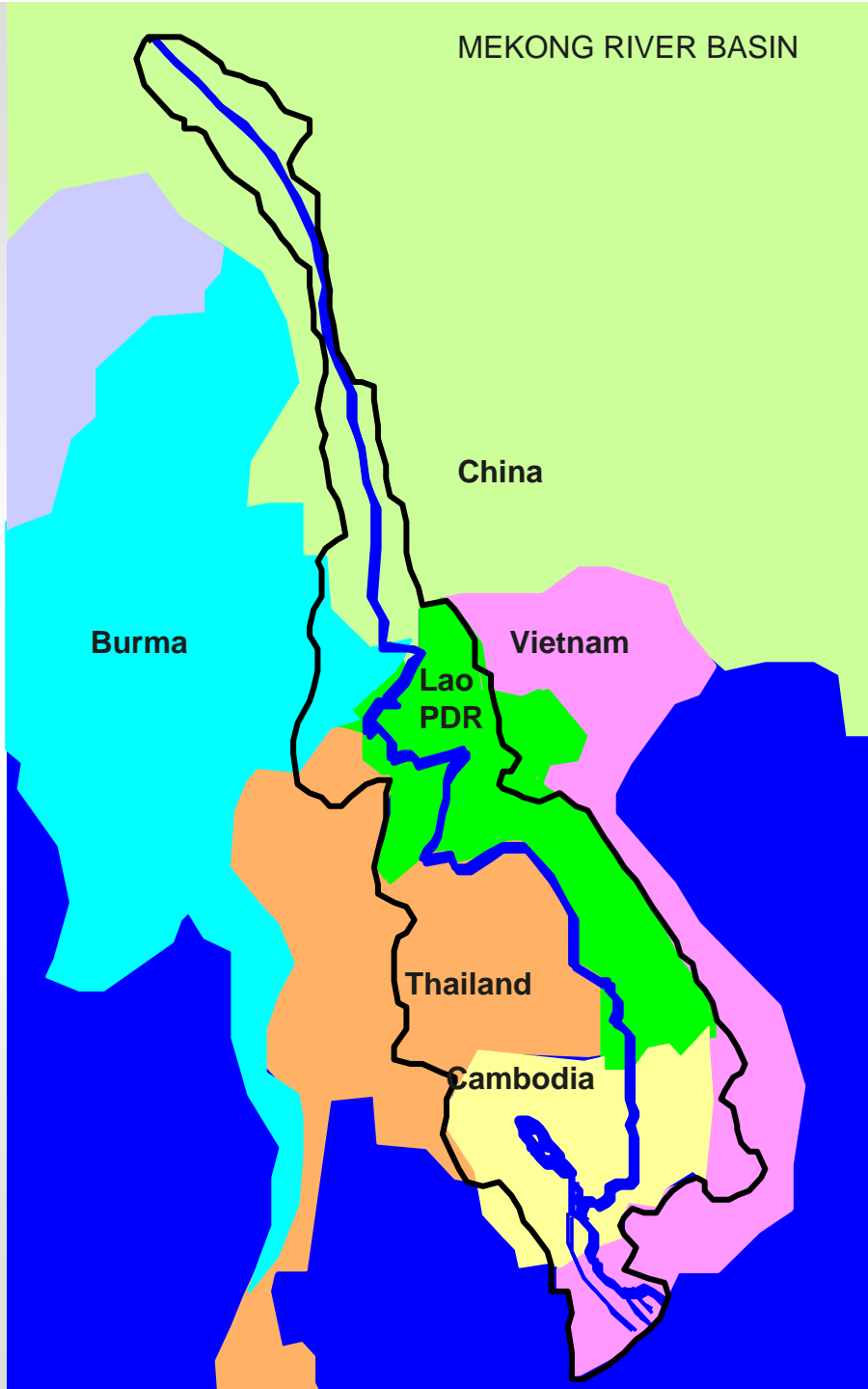
- **Main features of the Mekong River**
- **Tour of the Mekong, from Tibet down to the Delta**
- **Mekong fisheries**
- **Factors driving fish production**
- **Threats to Mekong fish biodiversity**
- **Tools for fish biodiversity researchers**

MAIN FEATURES OF THE MEKONG RIVER

Hydrology, fish biodiversity, population



MEKONG RIVER BASIN



China

Burma

Vietnam

Lao
PDR

Thailand

Cambodia

Mekong hydrology

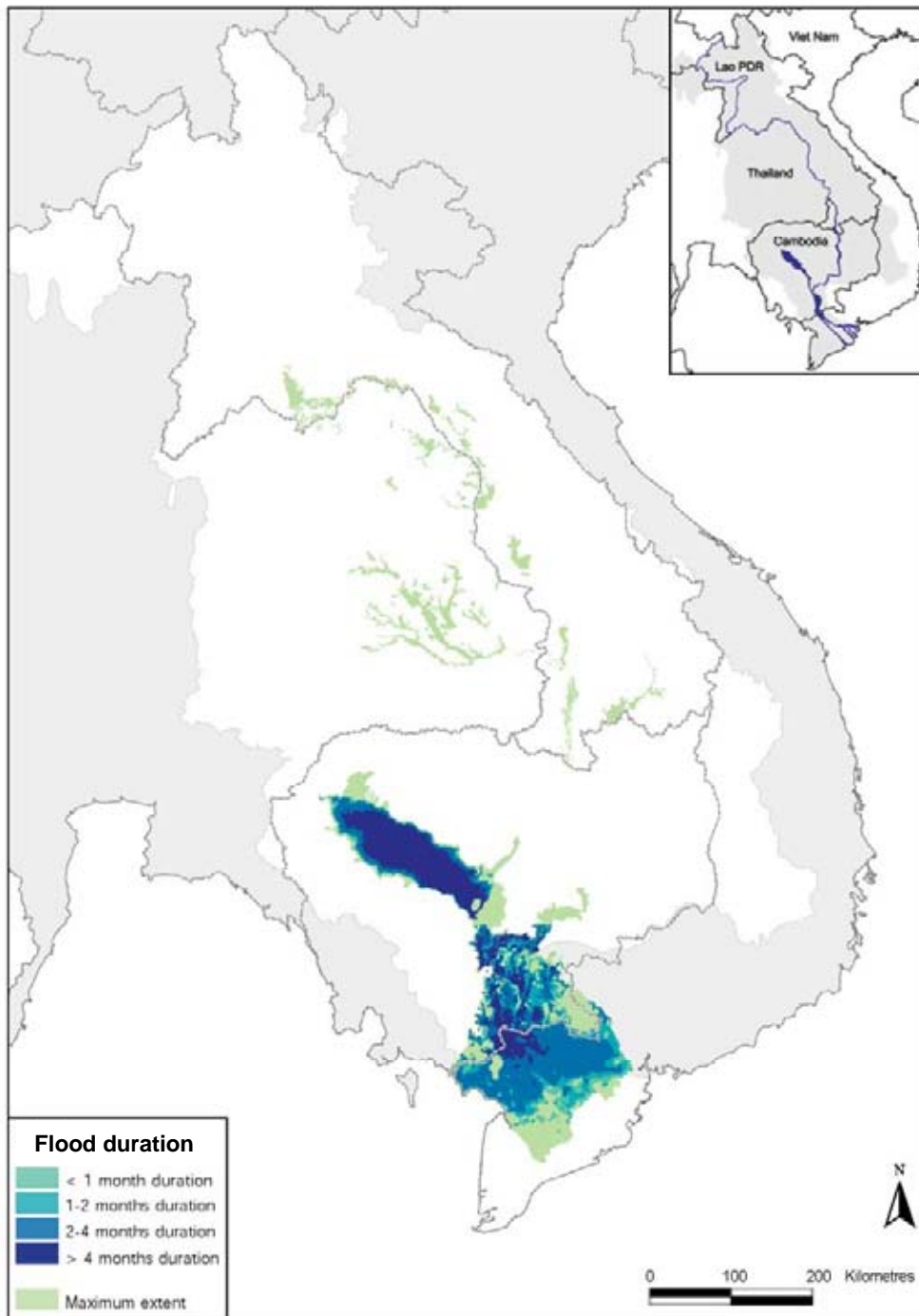
10th river of the world in length (4350 km = 2700 mi)

14th river of the world in discharge,

...but first in hydrological variability

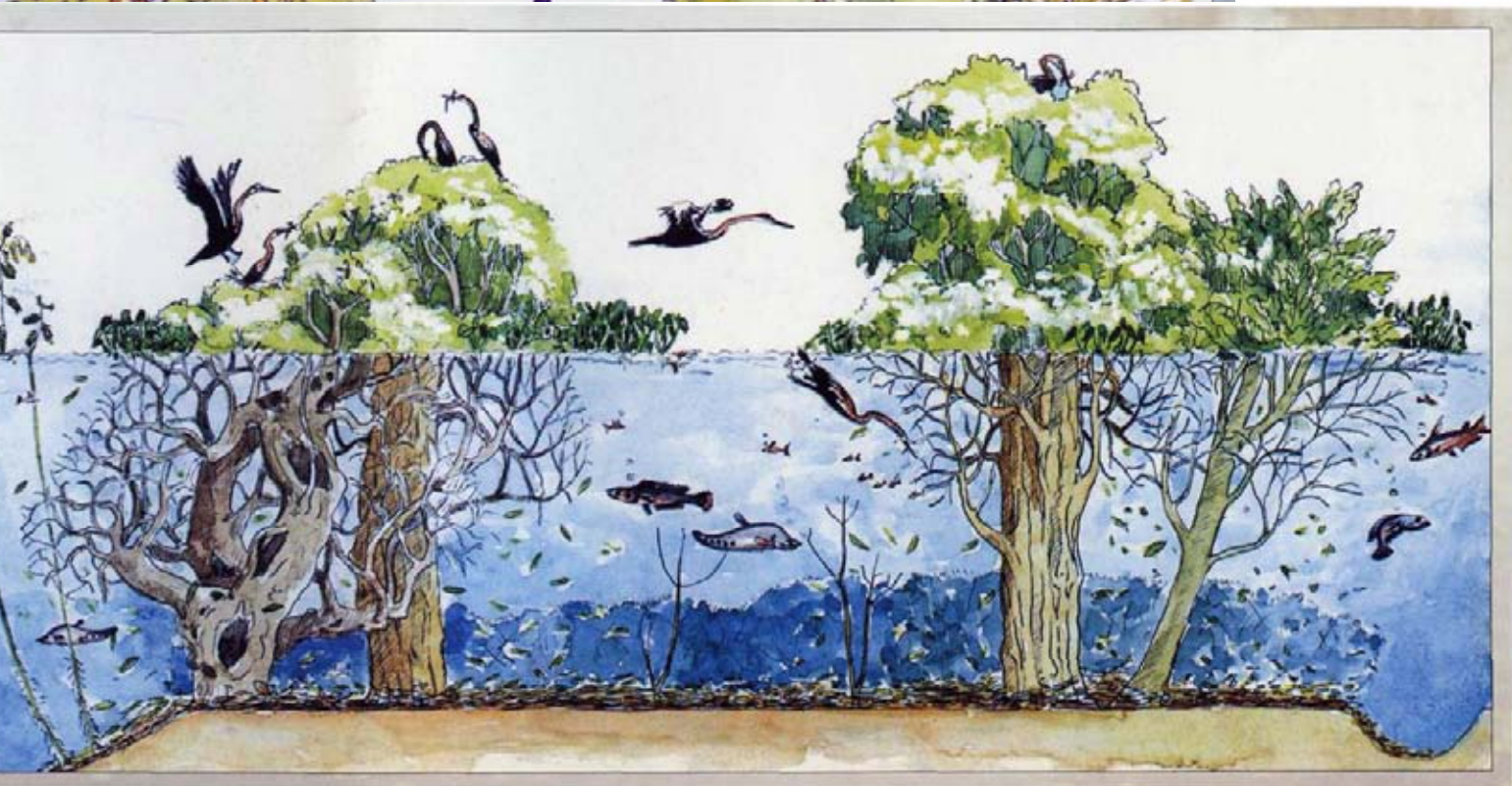
1250 - 67,000 m³.s⁻¹

Large-scale seasonal flooding → huge area of wetlands



Laos: along 1700 km of river
 Cambodia: 20% of the country
 Vietnam: surface of Belgium

Total: the surface of Ireland



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.



Catlocarpio siamensis



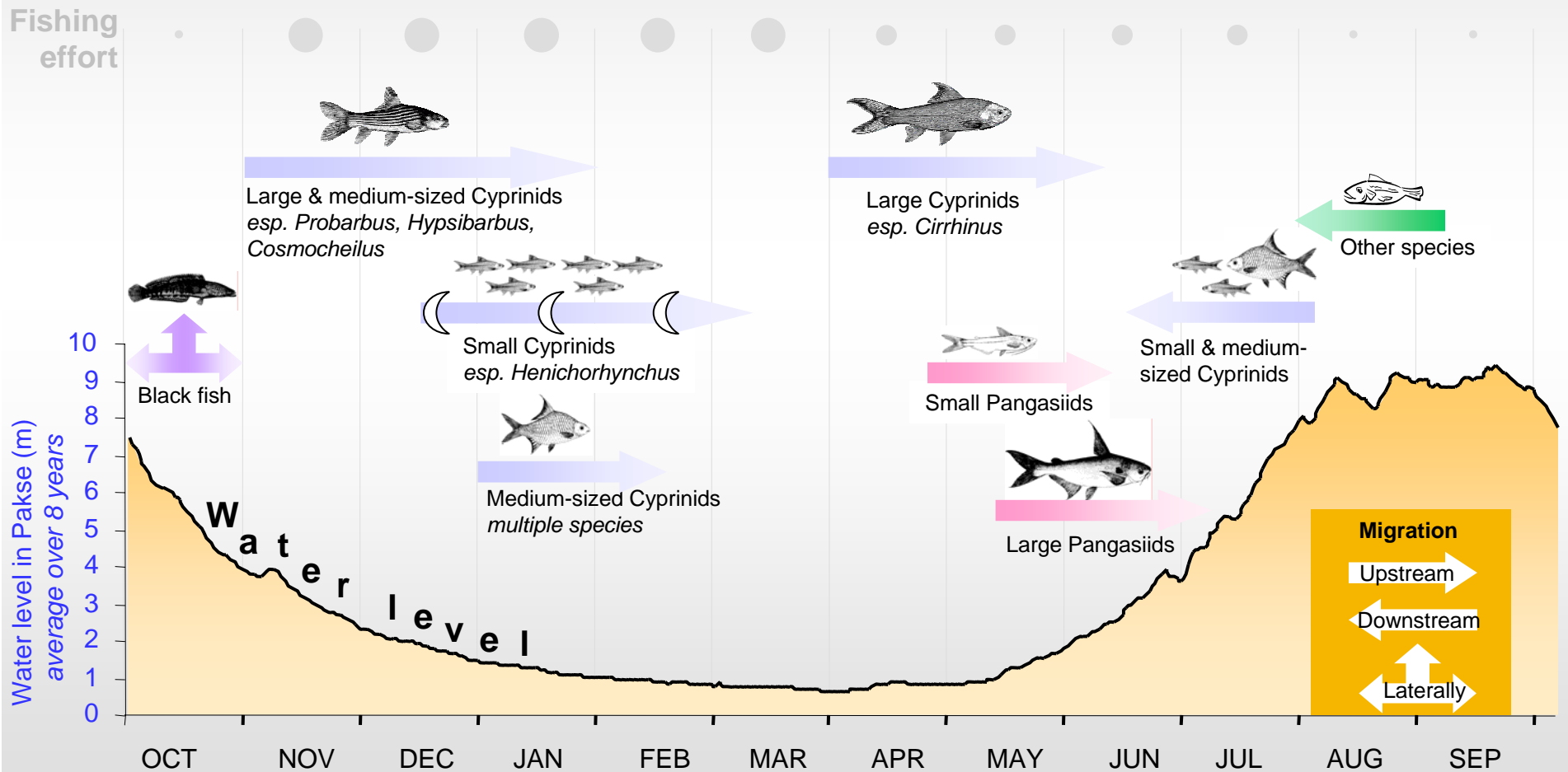
Himantura oxyrhynchus



Minute carp max. 2.5 cm)

Oreichthys 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 salmon*s per year)

Country	Annual Fish Catch (FW, tonnes)	Annual Fish Consumption (kg/person)
China (Yunnan)	~ 25,000 ≈1%	-
Lao PDR	~ 180,000 t ≈7%	24
Cambodia	~ 680,000 t ≈25%	32
Thailand	~ 930,000 ≈35%	25
Vietnam	~ 840,000 ≈32%	34

Japan freshwater fish catch: ~ 60,000 tonnes/year



Biodiversity = food security



FACTORS DRIVING FISH PRODUCTION

HYDROLOGY

*Water level
Flood duration
Flood timing*

FLOODPLAIN ENVIRONMENT

*Flooded vegetation
Refuges*

MIGRATIONS

*Triggers
Obstacles*

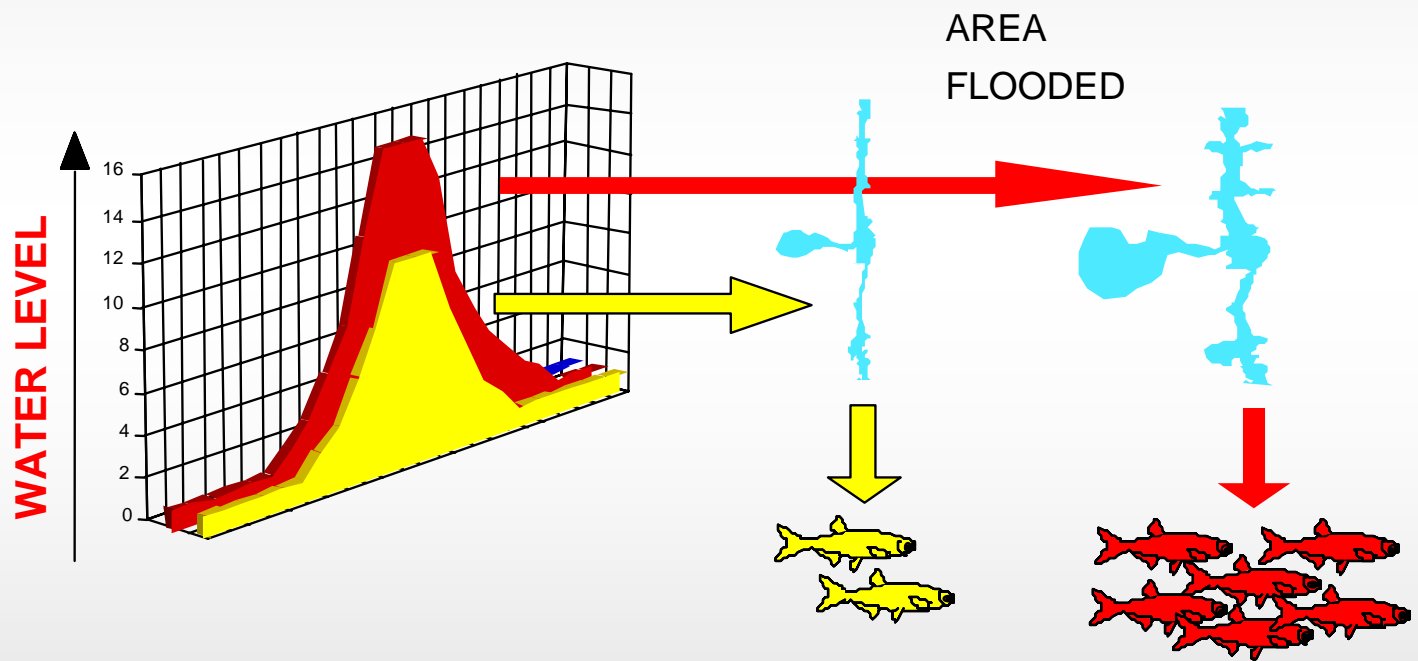
FISH PRODUCTION

FISHING

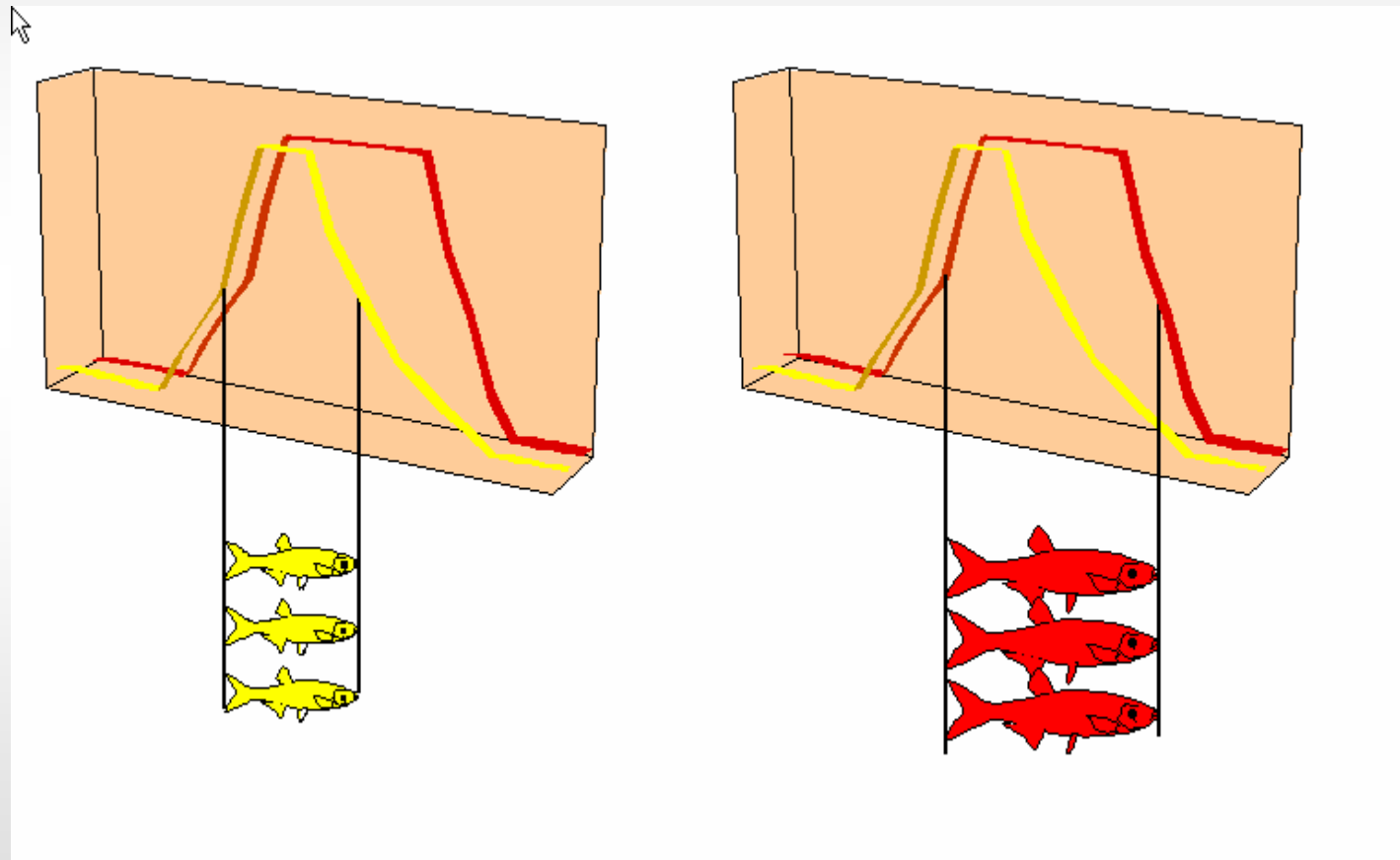
*Fishers groups
Fishing intensity*

A sustained fish production is possible only through a coordinated effort encompassing these 4 components

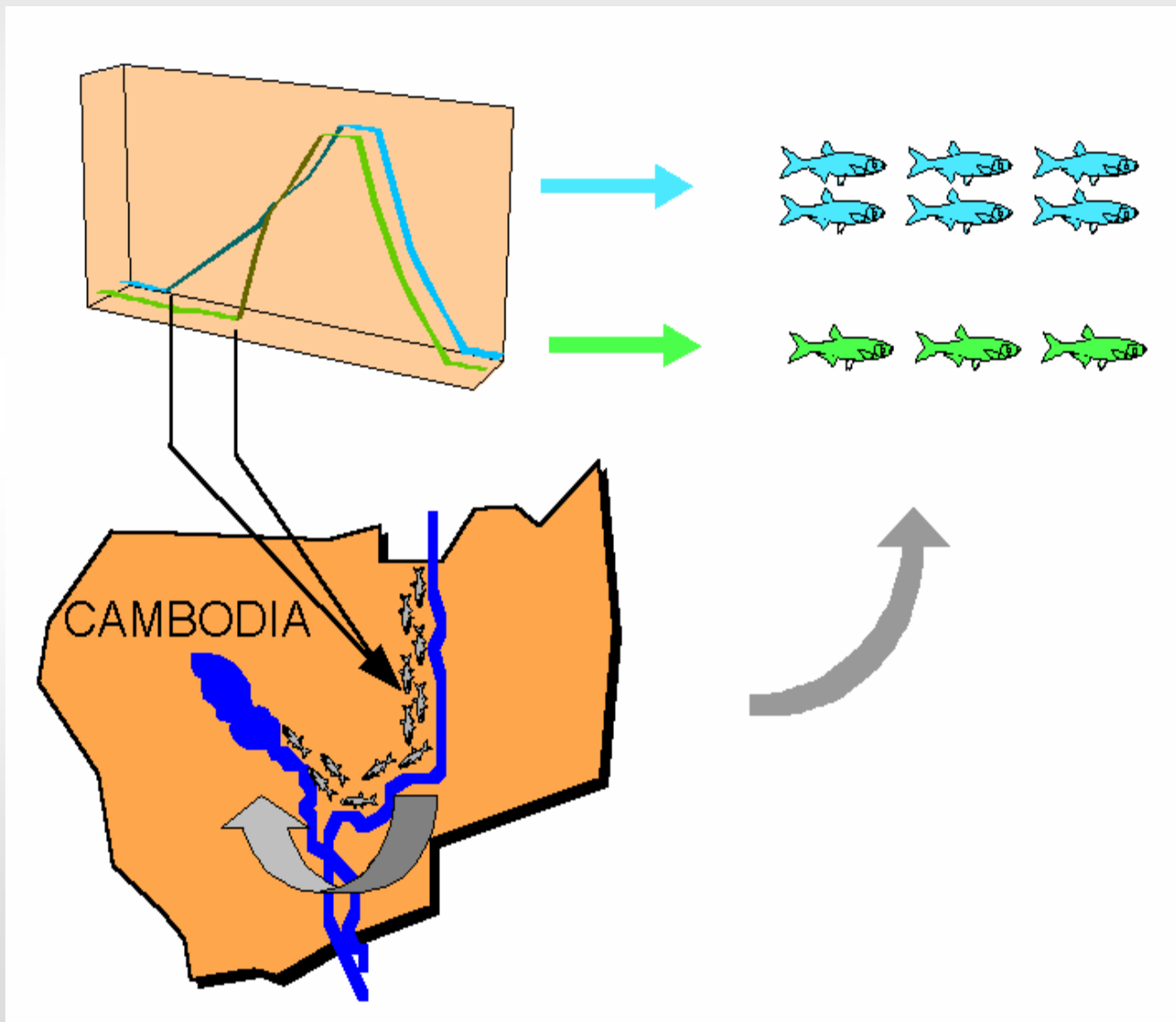
Hydrology: surface area flooded



Hydrology: duration of the flood



Hydrology: timing of the flood



Migrations: 3 main zones



Lower Mekong system

750-950,000 tonnes of migratory fishes



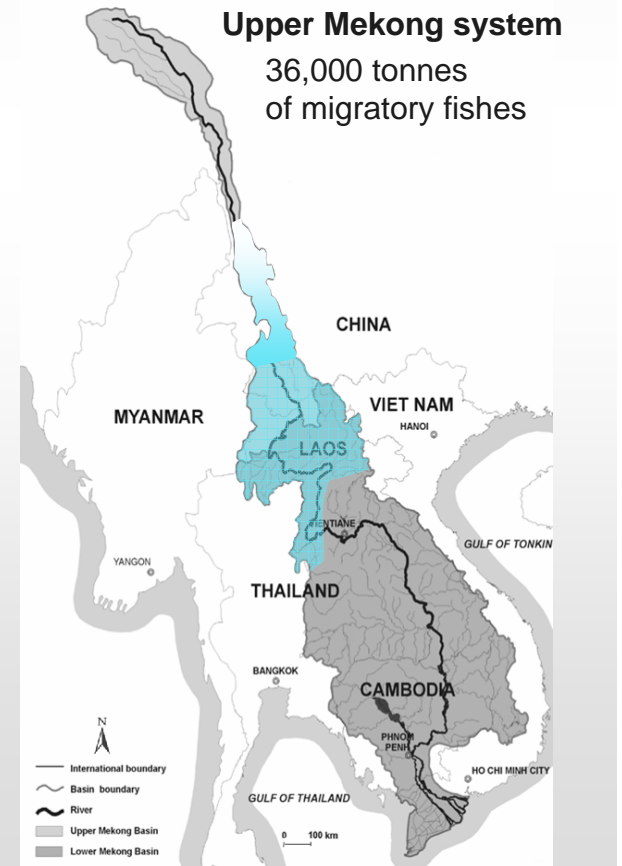
Middle Mekong system

500-600,000 tonnes of migratory fishes

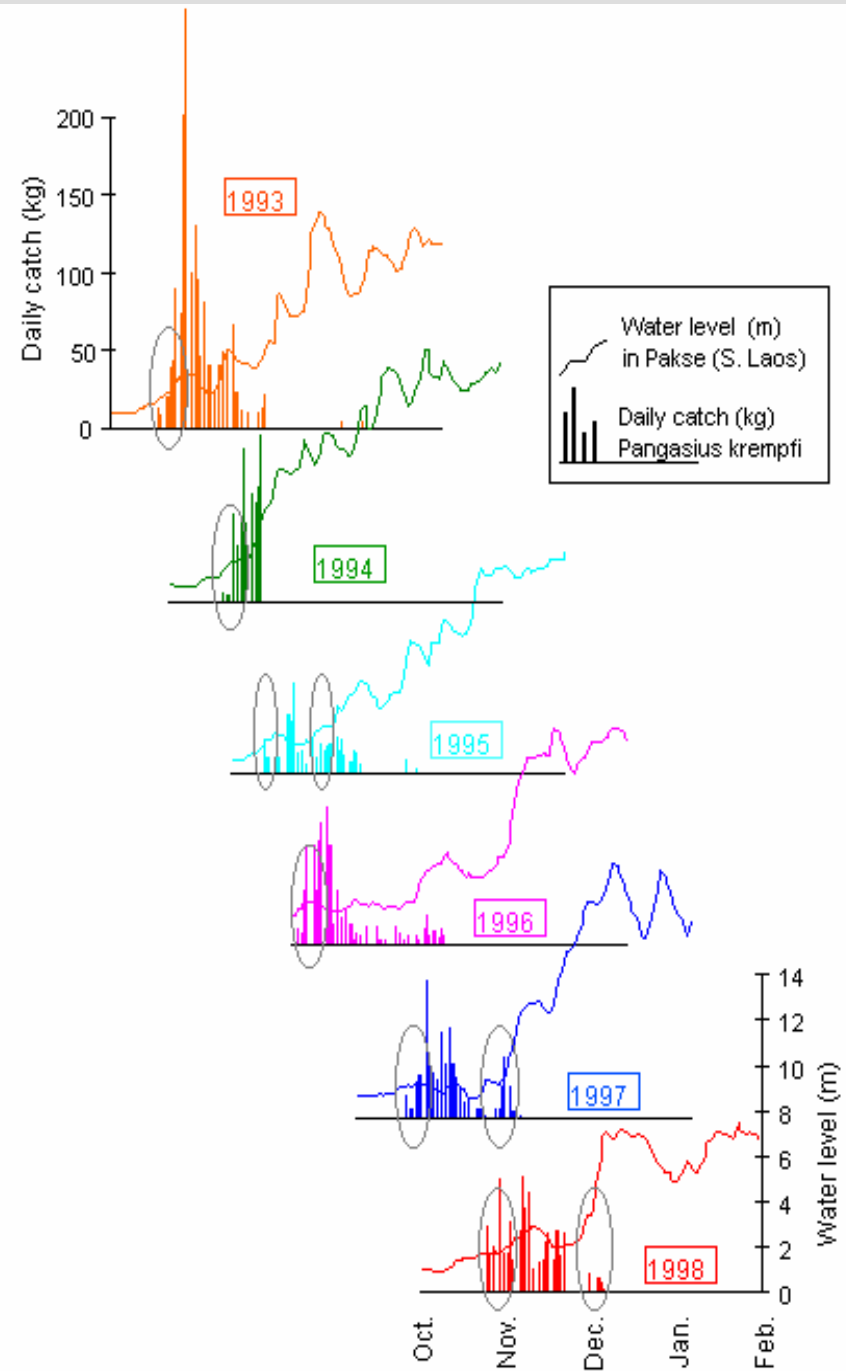


Upper Mekong system

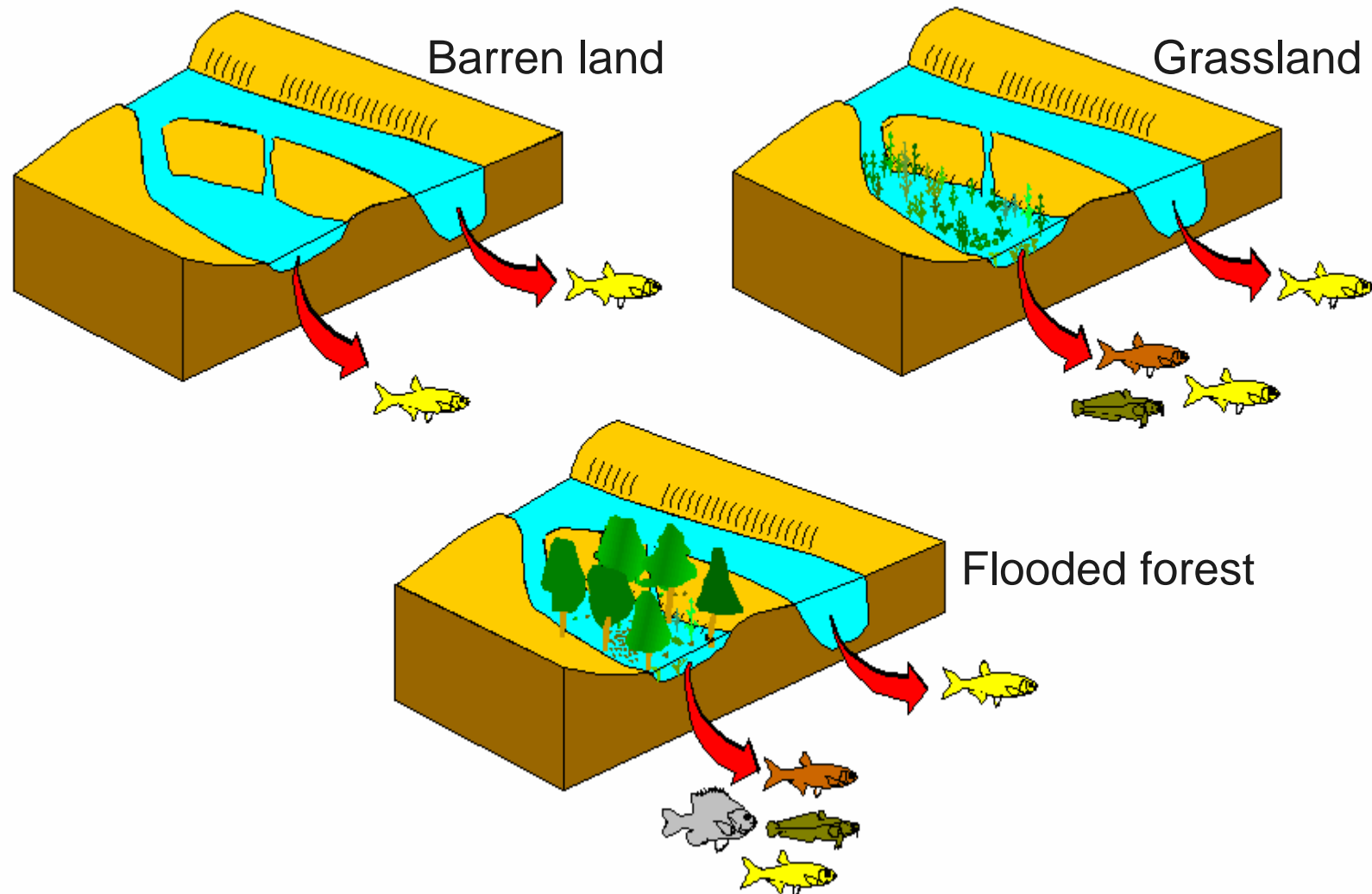
36,000 tonnes of migratory fishes



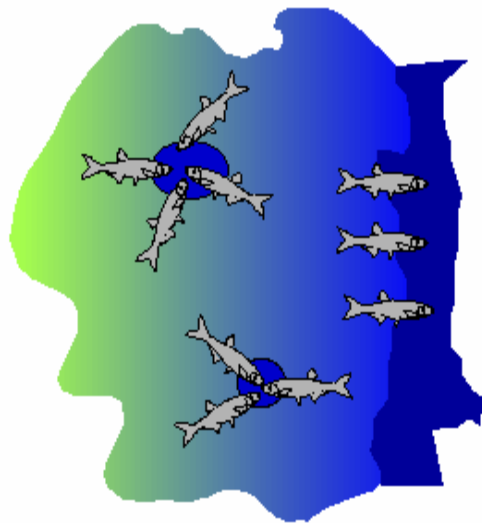
Migrations: hydrological triggers



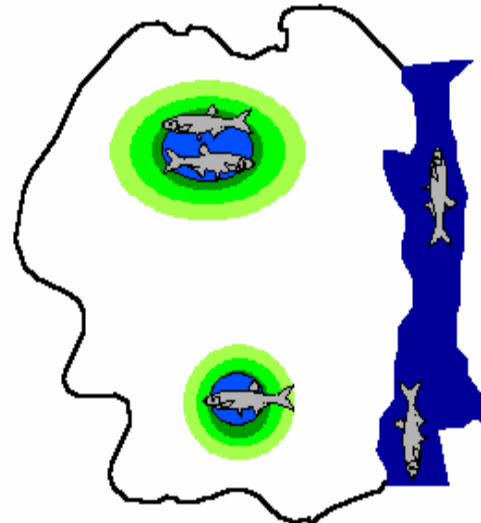
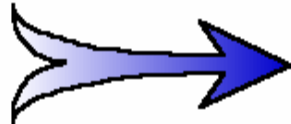
Environment: floodplain vegetation



Environment: dry season refuges



Flood recession



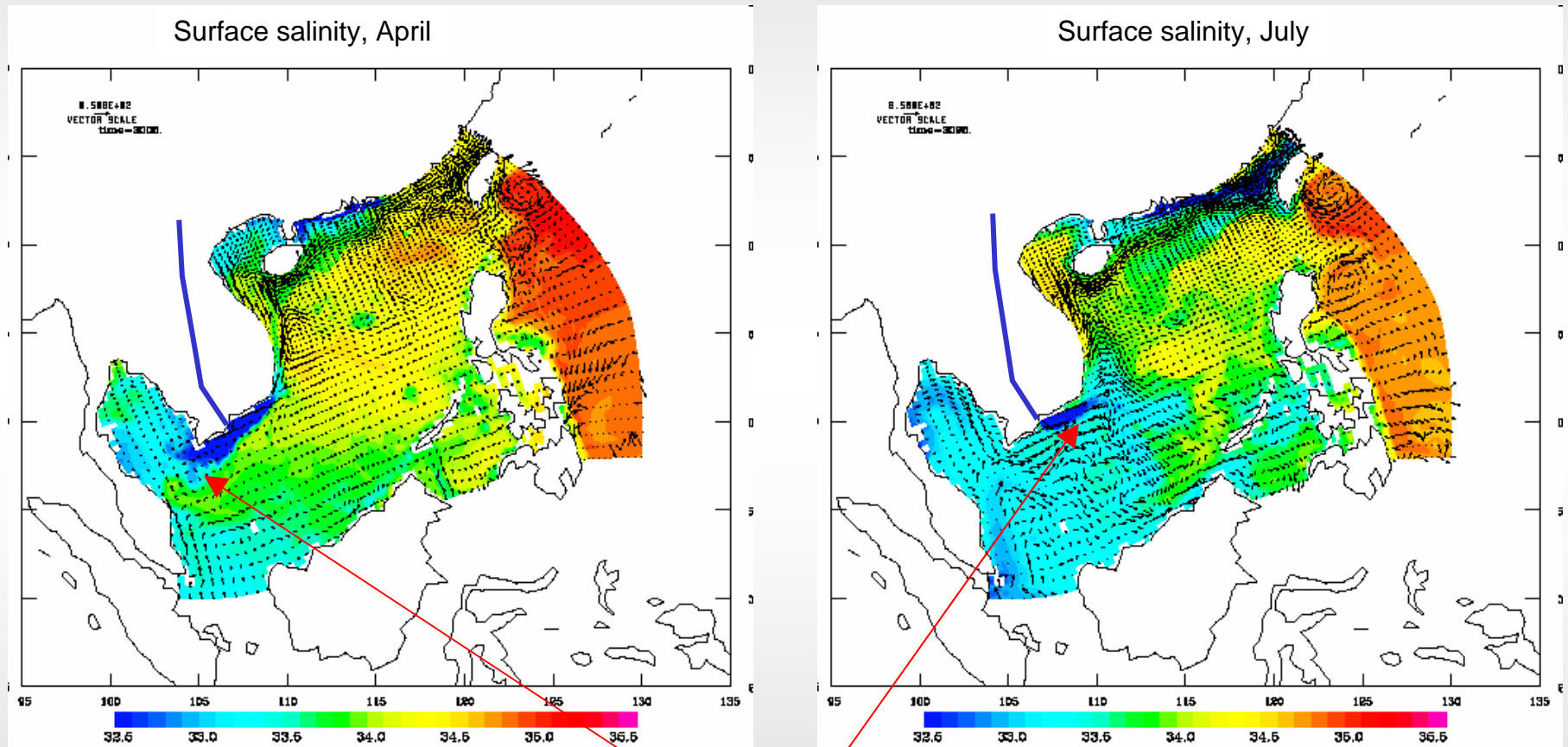
Dry season



Flood extension

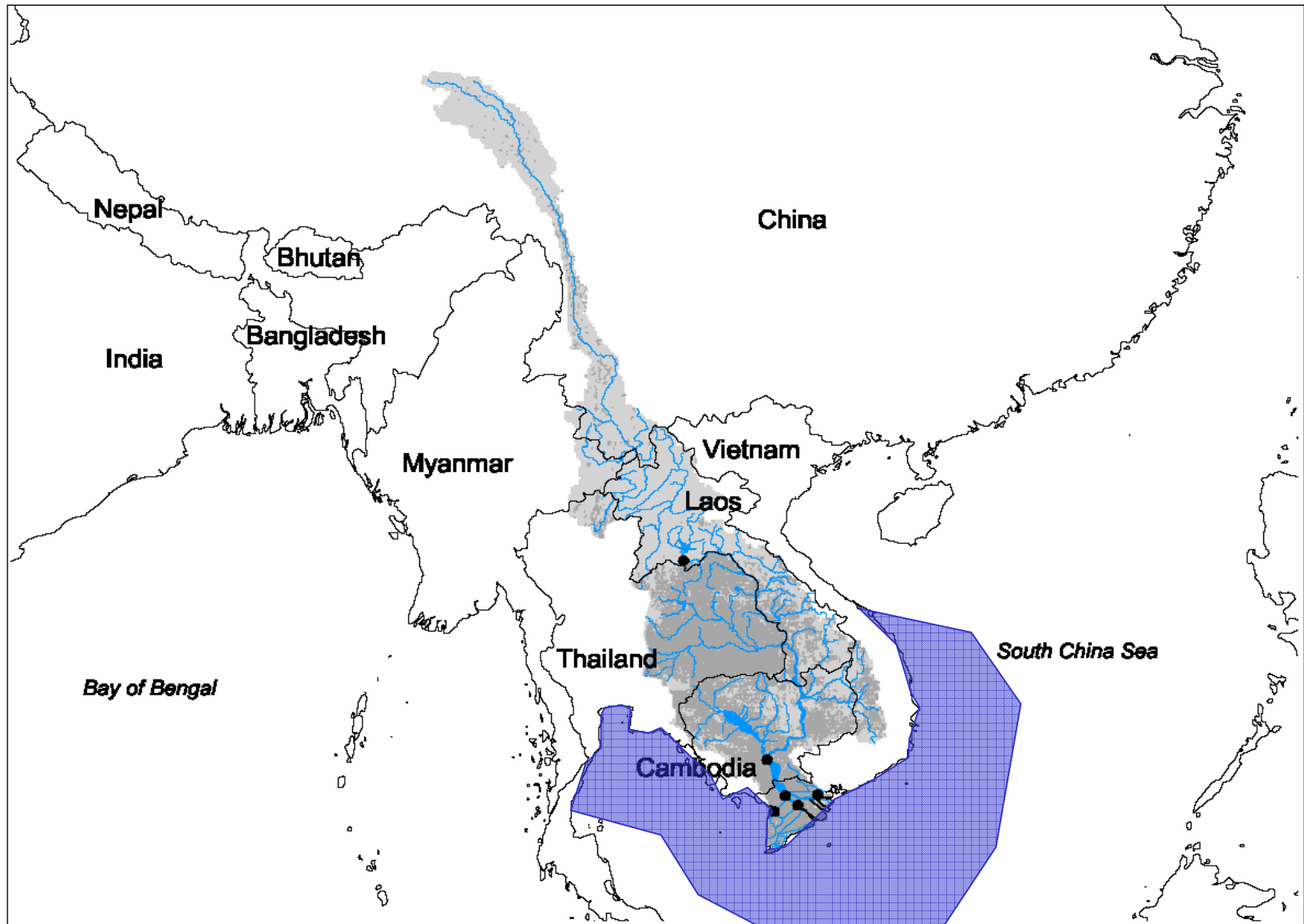


Environment: beyond the river banks

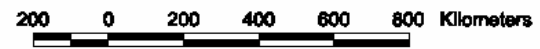


Mekong plume

A 3D Circulation Model of the South China Sea
Huijie Xue, Fei Chai, Neal Pettigrew, Danya Xu, Maochong Shi



- Watershed
- Cities (population > 100,000)
- Ramsar Sites
- Political Boundaries (Intl.)
- Political Boundaries (Natl.)
- Rivers
- Modified Landscape



MAIN THREATS TO MEKONG FISH BIODIVERSITY

Dams

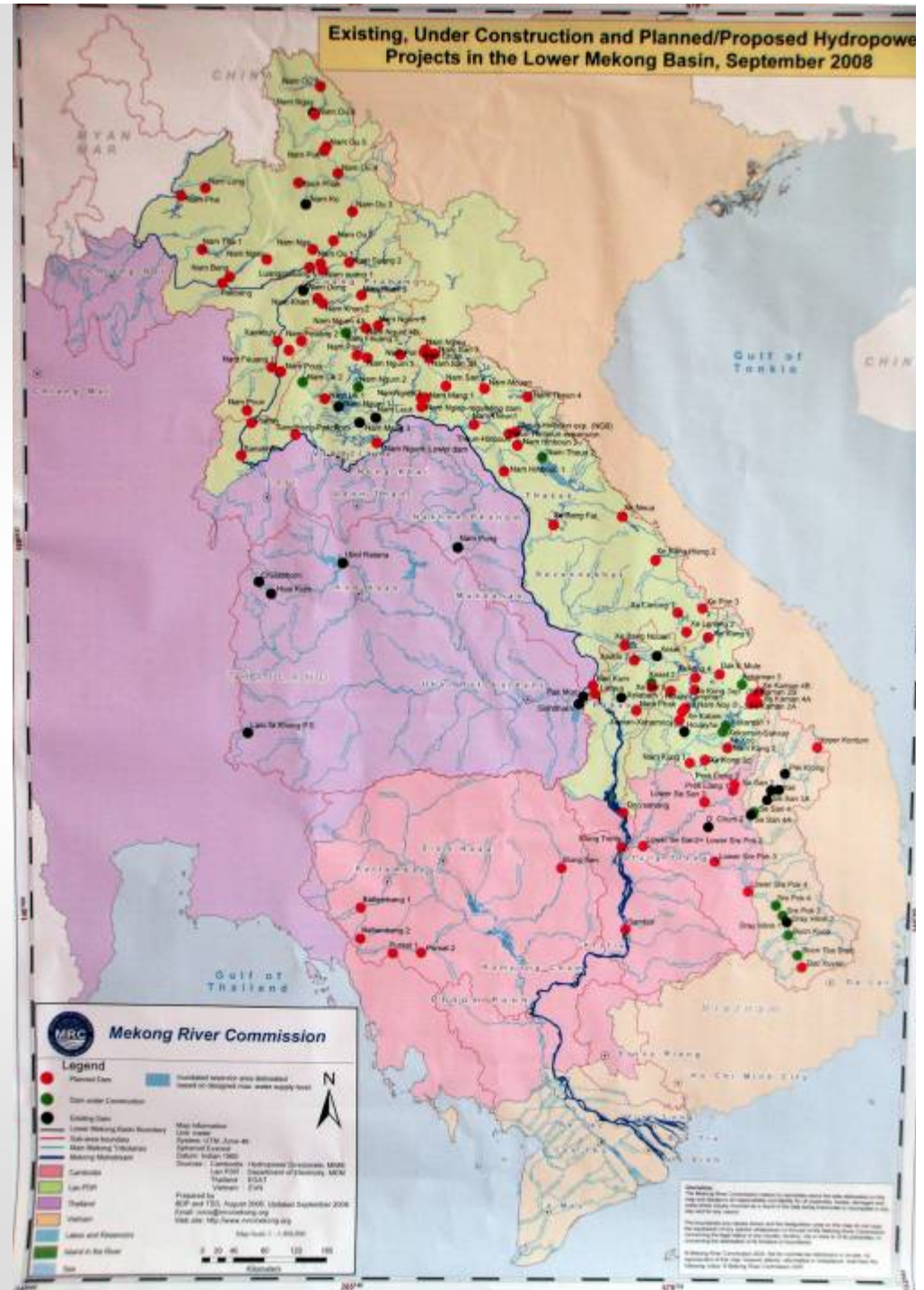


Dams are the main threat to fish biodiversity and fisheries production

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

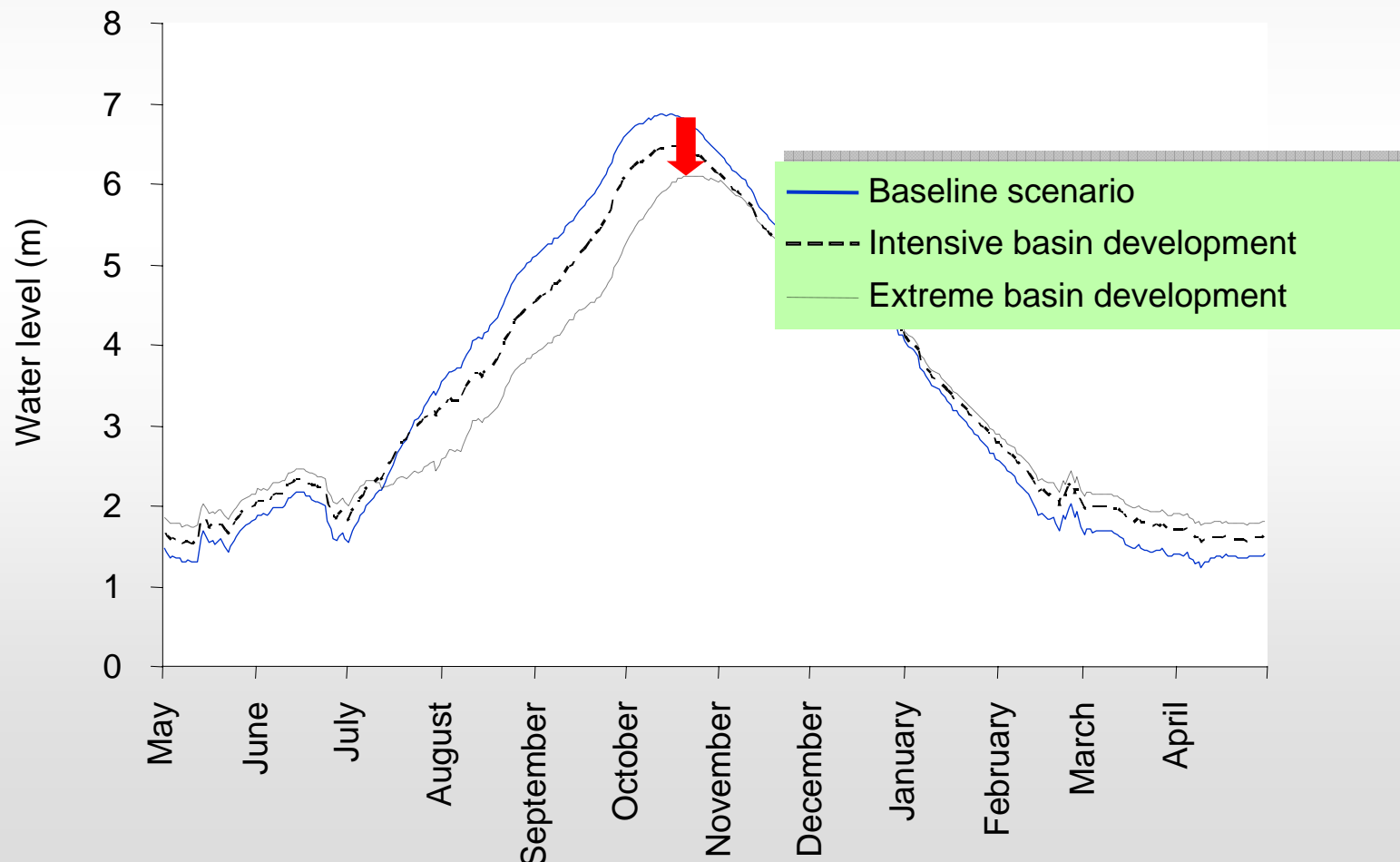
Dam development will:

- obstruct migration routes
- modify flood height
- modify flood duration
- modify flood timing

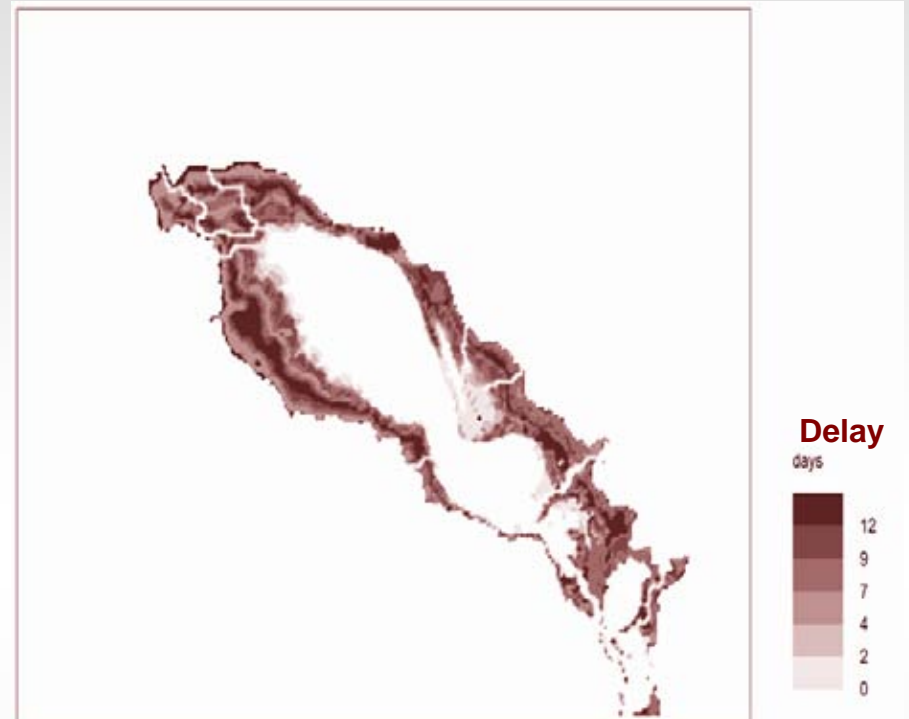
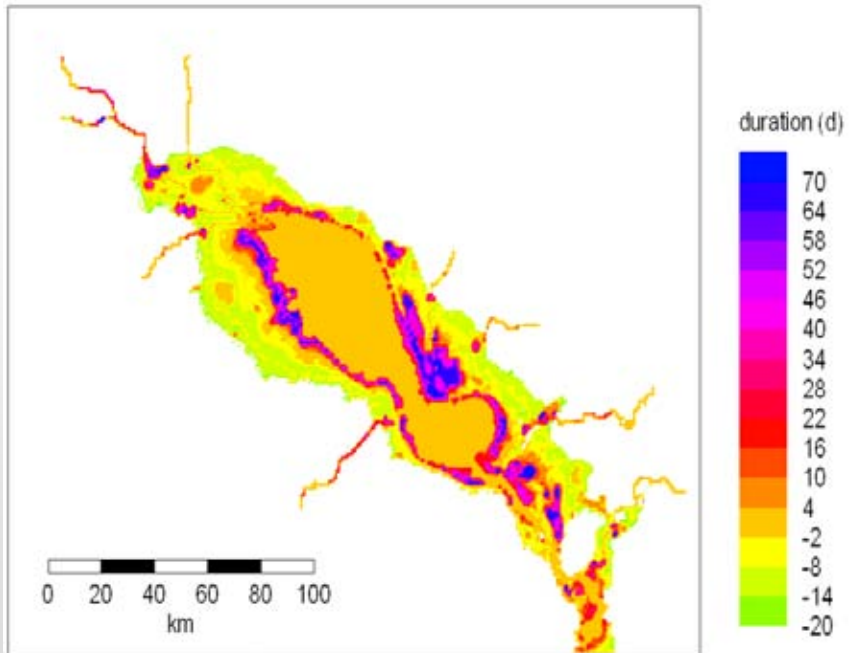


Upstream developments

will reduce the water level and the surface area flooded

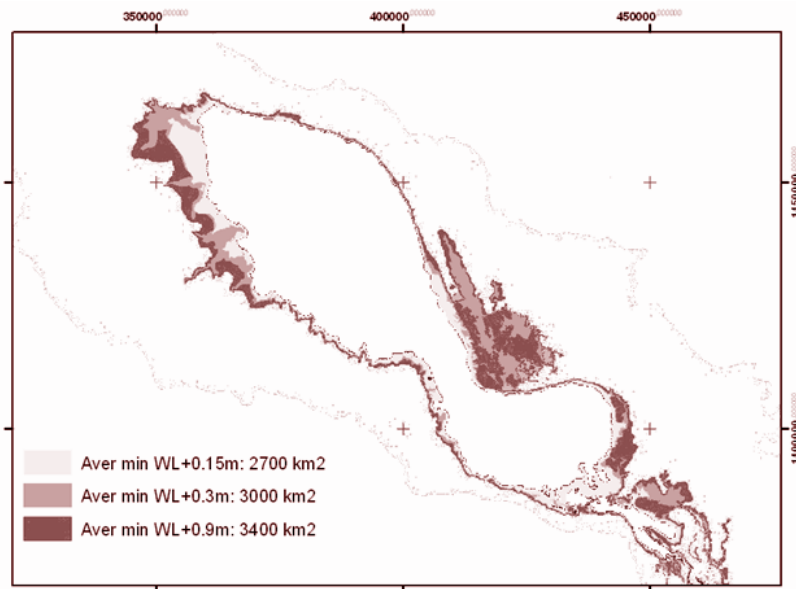
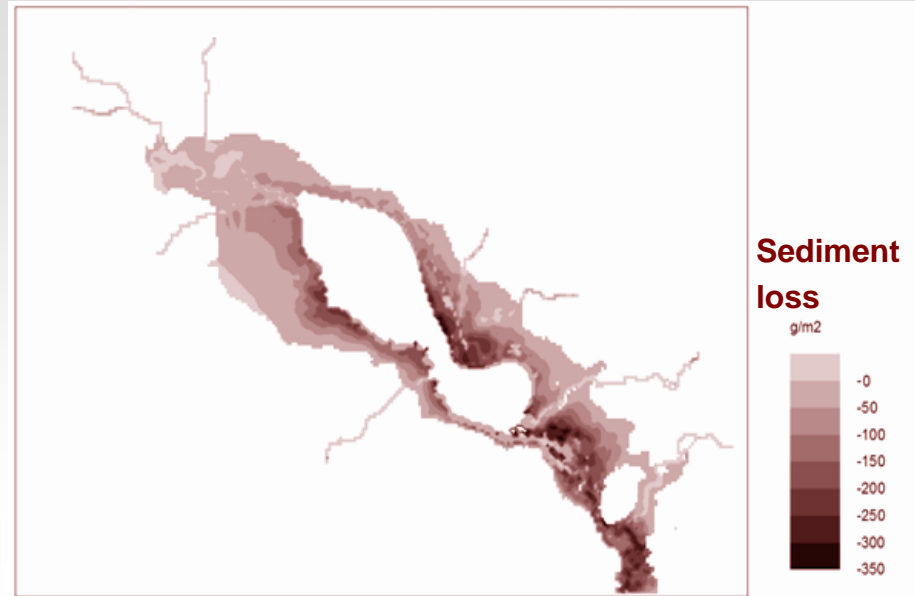


Upstream dams
will result in floods arriving later



Upstream dams
will, in average, shorten
the duration of the flood

Upstream developments
will sharply reduce
the amount of sediments
arriving to the lake



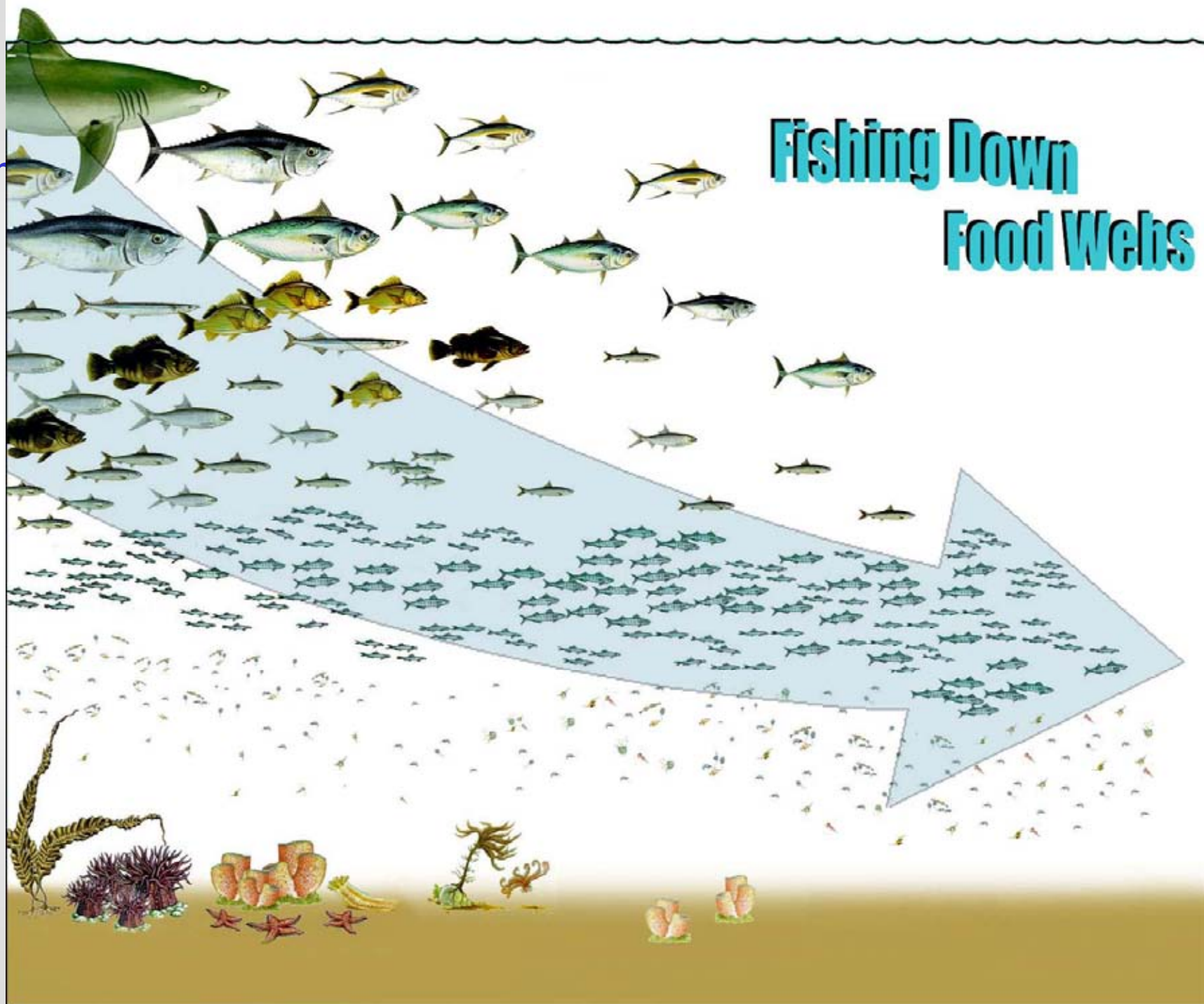
0 12.5 25 50 75 100 Kilometers



Upstream developments
will result in higher water levels in
the dry season

Th

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

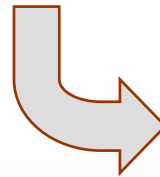
Species

Genus + Species

[A](#) [B](#) [C](#) [D](#) [E](#) [F](#) [G](#) [H](#) [I](#) [J](#) [K](#) [L](#) [M](#) [N](#) [O](#) [P](#) [Q](#) [R](#) [S](#) [T](#) [U](#) [V](#) [W](#) [X](#) [Y](#) [Z](#)

You can search names also in the independent [Catalog of Fishes](#).

To search without Genus, change Genus option from 'is' to 'contains'.



Picture by Cacul, P.

No AquaMaps available for this species.

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 (Musi, Batang Hari and Indragiri rivers); also present in eastern Kalimantan (Mahakam, Kapuas and Barito rivers), Sabah, Malaysia (Kinabatangan river) and Viet Nam (Mekong delta)

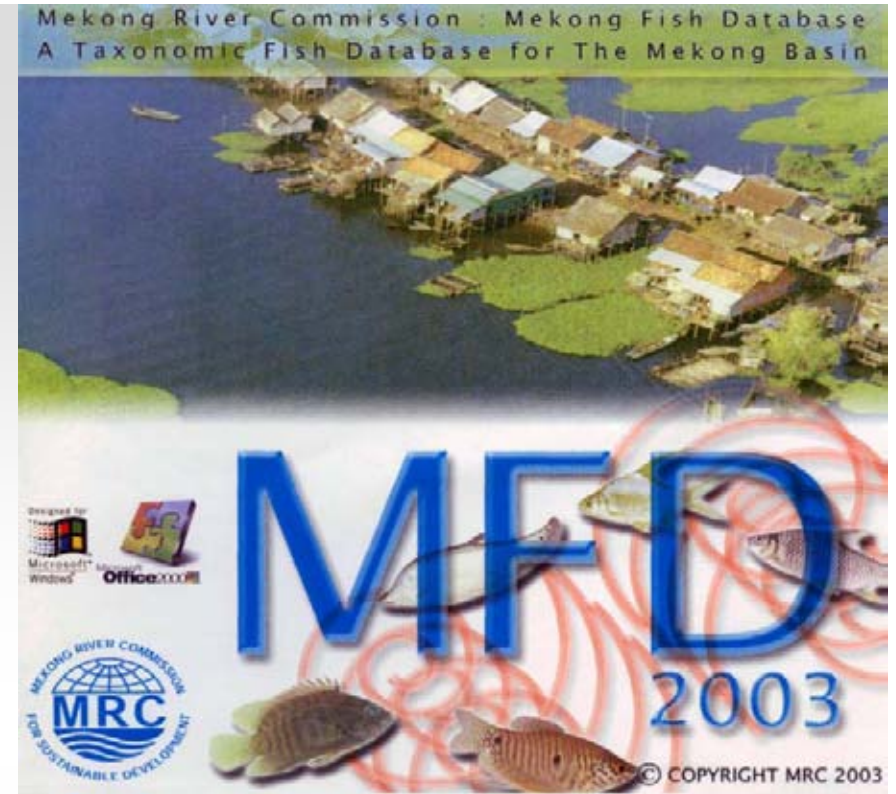
[Countries](#) | [FAO areas](#) | [Ecosystems](#) | [Occurrences](#) | [Introductions](#)

Short description

www.fishbase.org

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*

[Main Menu](#)[Select Species](#)[E](#)[T](#)[L](#)[C](#)[V](#)[Load](#)[Road Map](#)[Help](#)[Exit DataBase](#)

Genus

Pangasius

Species

kunyit

English Name

Author

Pouyoud et al., 1999

Year

1999

 Name Change[Names](#)[Classification](#)[Taxonomic info](#)

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).

Picture

[DisMap](#)[OccMap](#)[GIS layer](#)

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 (Kinabatangan river) and Vietnam (Mekong delta) (Ref. 33567).

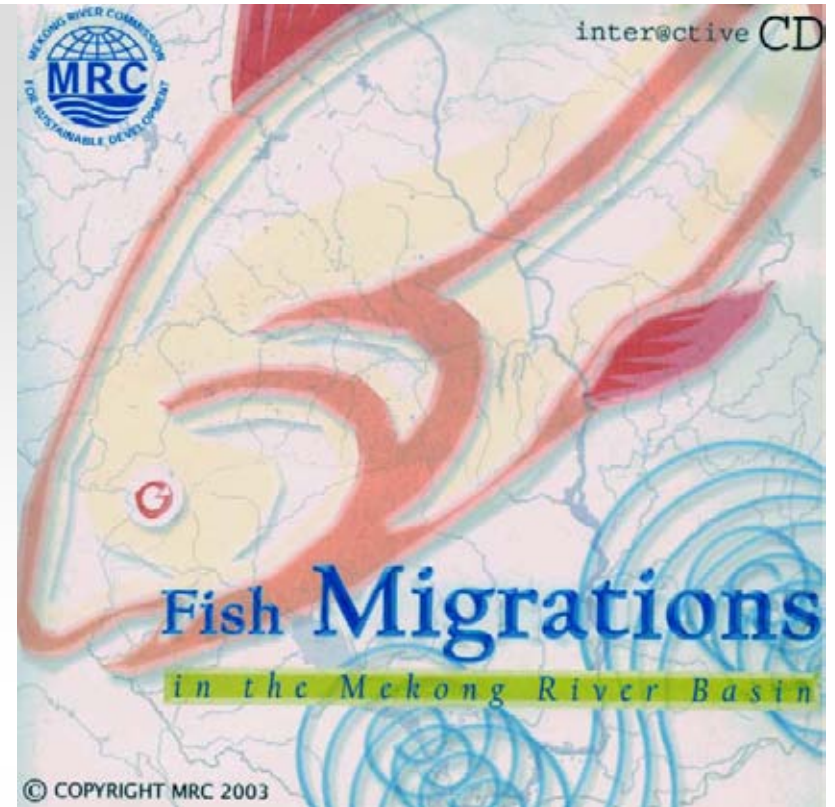
[Fisheries](#)[Length-Weight](#)[Ecology](#)[Spawning Migration](#)[Common Names](#)[Species Refs](#)[Identification](#)[Local Names](#)[Occurrence](#)[2 Synonyms](#)[Pictures](#)

MRC FISH MIGRATIONS IN THE MEKONG RIVER BASIN

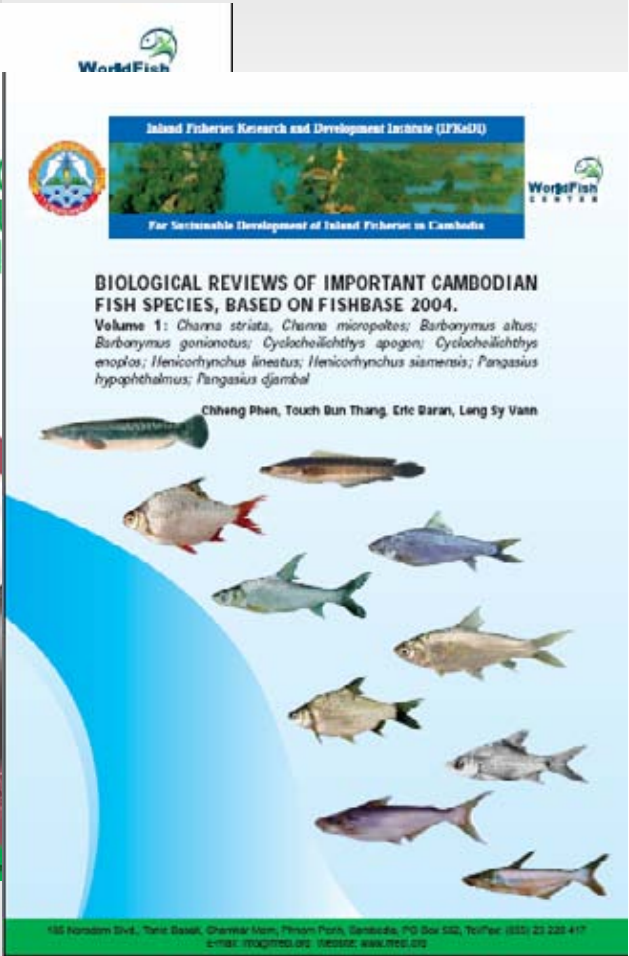
The CD covers **39 species** in great detail

- **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



INF



www.worldfishcenter.org/v2/pubs

search "Mekong"

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 !