

FISHERIES BASELINE ASSESSMENT



Outline

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1- Past trends and current situation

Catch

- Catch in the Mekong ; comparisons

- Fisheries and food security

Biodiversity

- Global level

- Local level

Drivers of the fisheries production

- Environmental drivers

- Migrations

Fisheries and aquaculture

2- Future trends without LMB mainstream hydropower development

Key strategic questions

Relationship with the BDP scenario assessment framework

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Key strategic questions

To what extent can mainstream dams alter fish biodiversity, fish migration patterns and fish catches in the Mekong aquatic systems?

To what extent can changes in fish biodiversity, migration patterns and catches be mitigated?

BDP: 1.5 Maintain productivity of the fishery sector

Indicators

Annual average capture fish availability

Relationship between flow/flood conditions & capture fish production

Tributary map with obstructions

Changes in flow conditions

Annual average aquaculture production

Net economic value

PAST TRENDS AND CURRENT SITUATION

Catch

Catch in the Mekong

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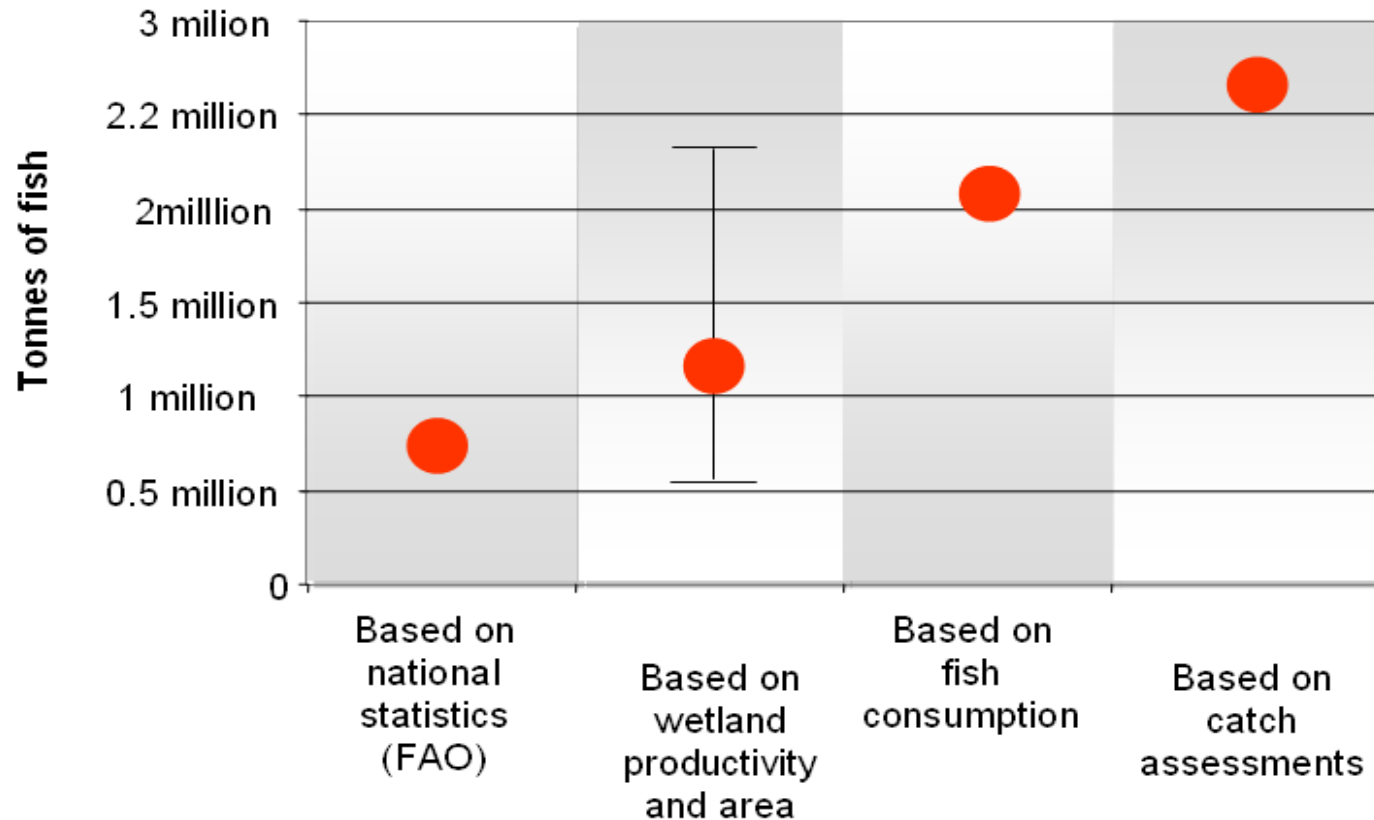
According to respective national statistics (and the FAO), the inland fishery sector in the four countries of the Lower Mekong produces around 755,000 tonnes each year, i.e. 7% of the world's freshwater fisheries

According to alternative scientific estimates, the fish catch of the Lower Mekong amounts to more than one million tonnes, and up to 2.6 million tonnes.

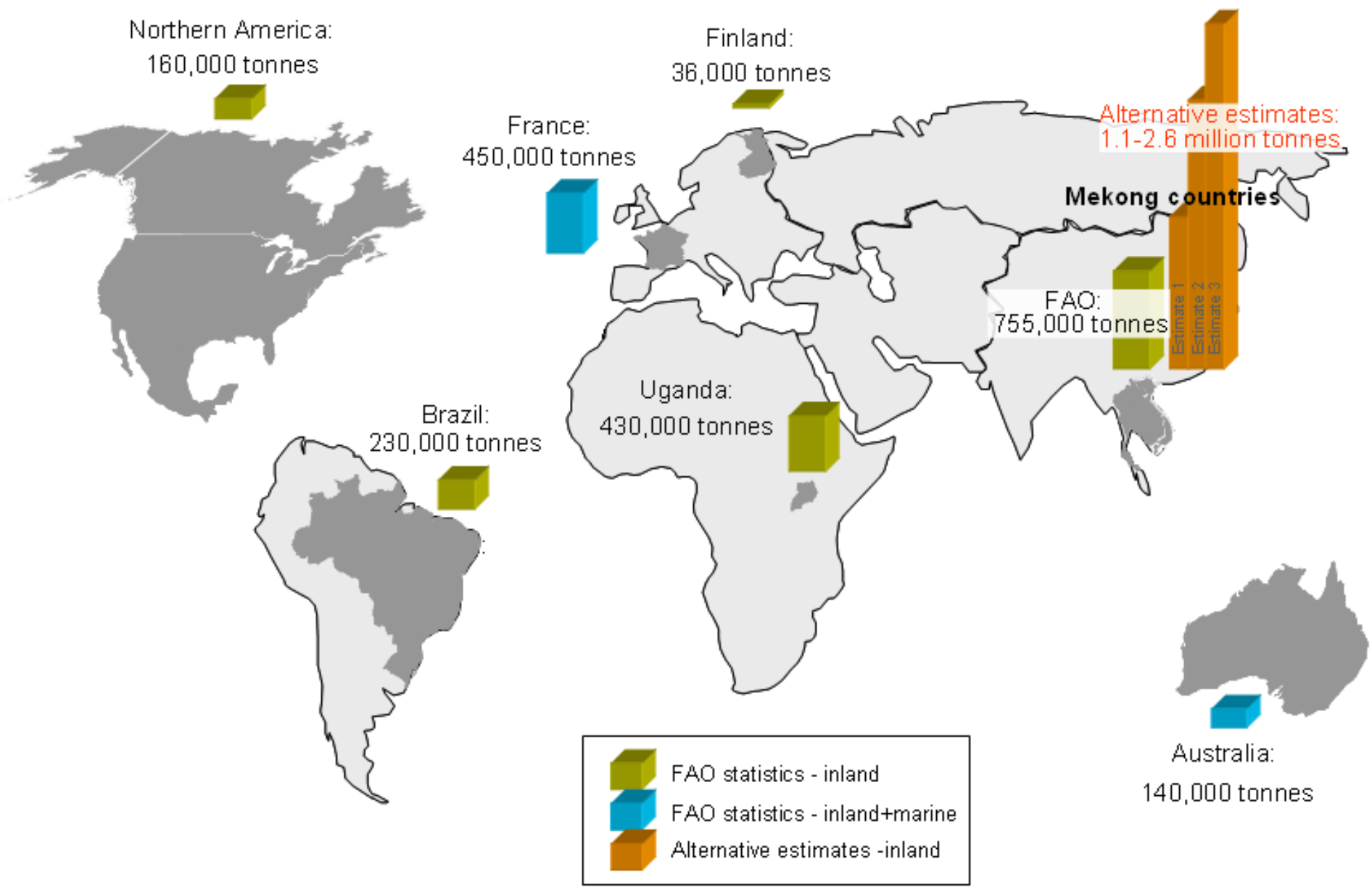
Catch

Different estimates

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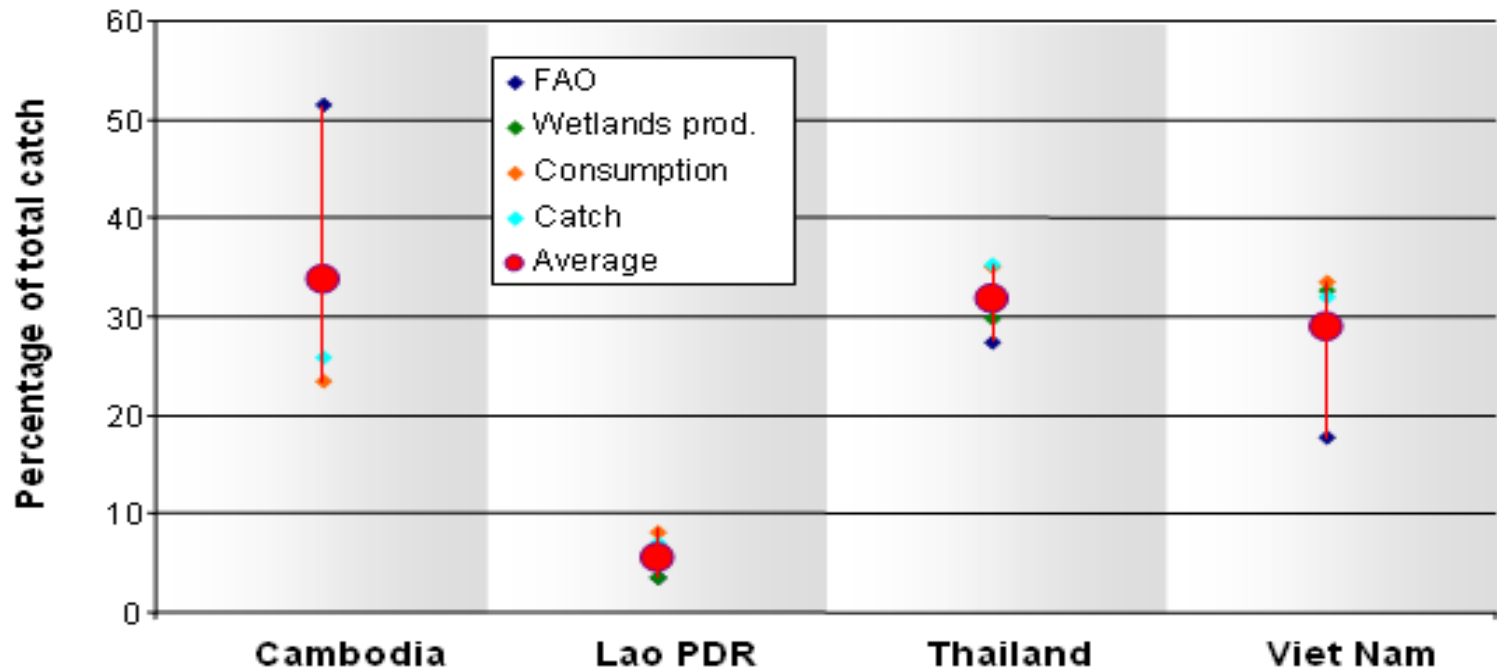
Thus, depending on the source of information considered, Mekong fisheries produce between 7% and 22% of the world's freshwater capture fish



Catch

Share of each country in the total fish catch

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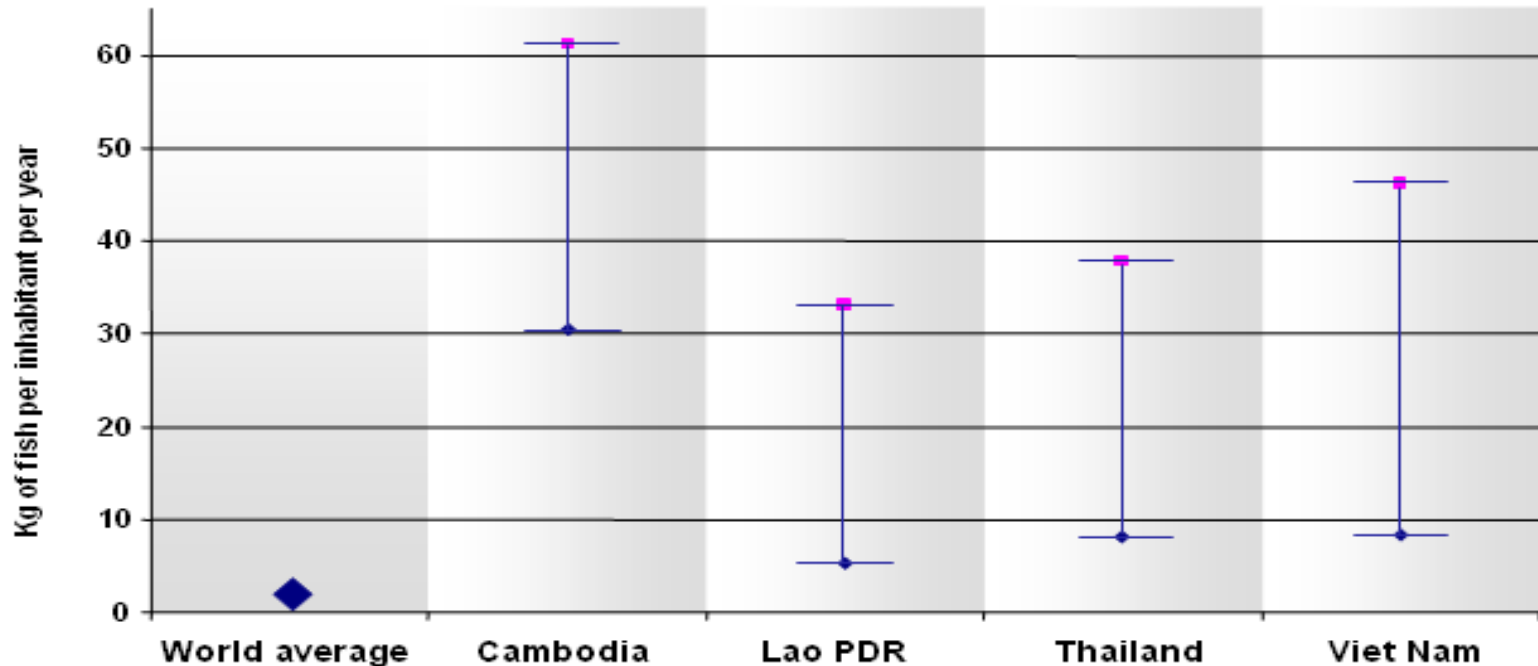


According to all studies and sources of data, Cambodia, Thailand and Vietnam contribute respectively about one third of the overall Mekong fish catch, and Lao PDR contributes around 5%

Catch

Catch per inhabitant within the watershed

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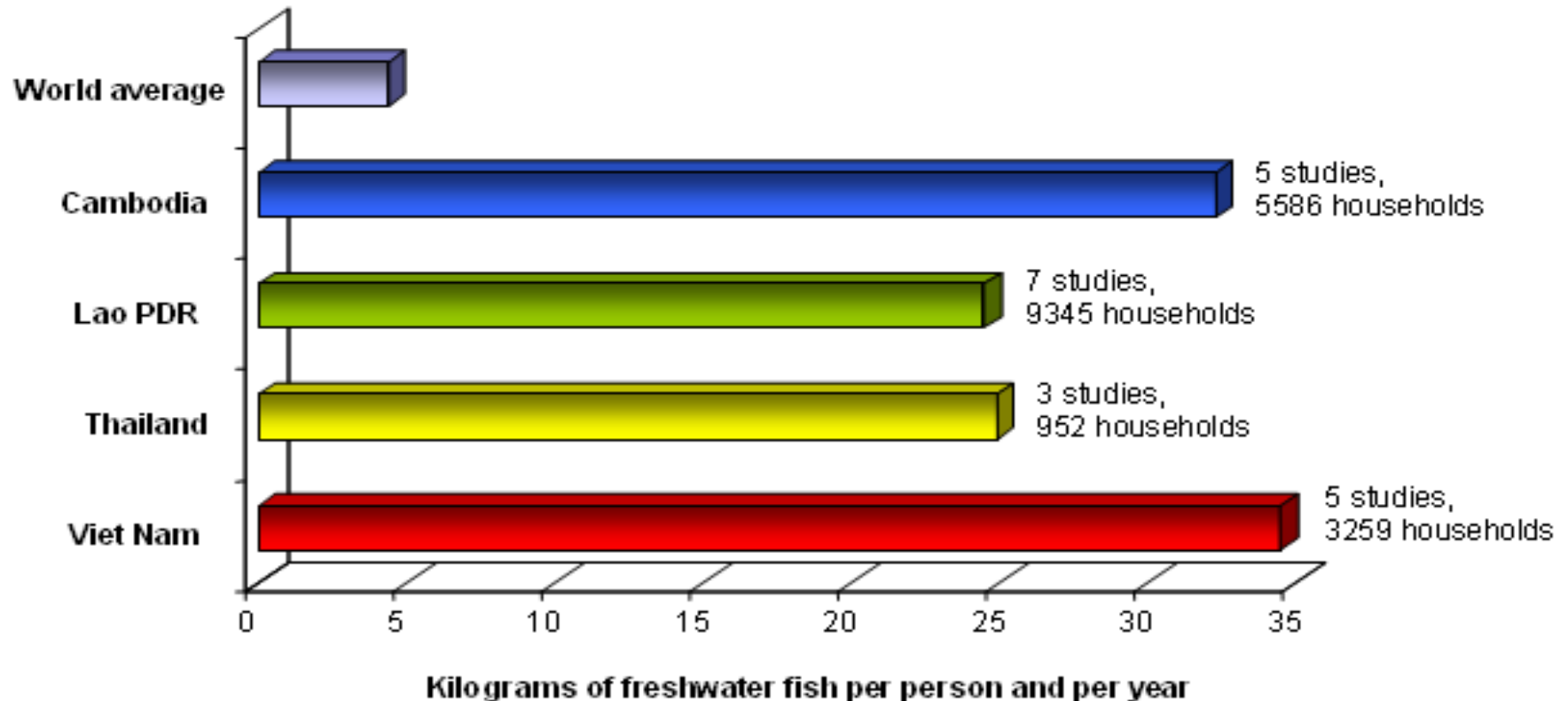
Each inhabitant of the watershed in Laos, Thailand and Vietnam produces 5 to 29 times more freshwater fish than the world average.

Each Cambodian produces 26-53 times more freshwater fish than the world average (**largest freshwater fish catch by inhabitant in the world**)

Fisheries and food security

Freshwater fish consumption (scientific studies)

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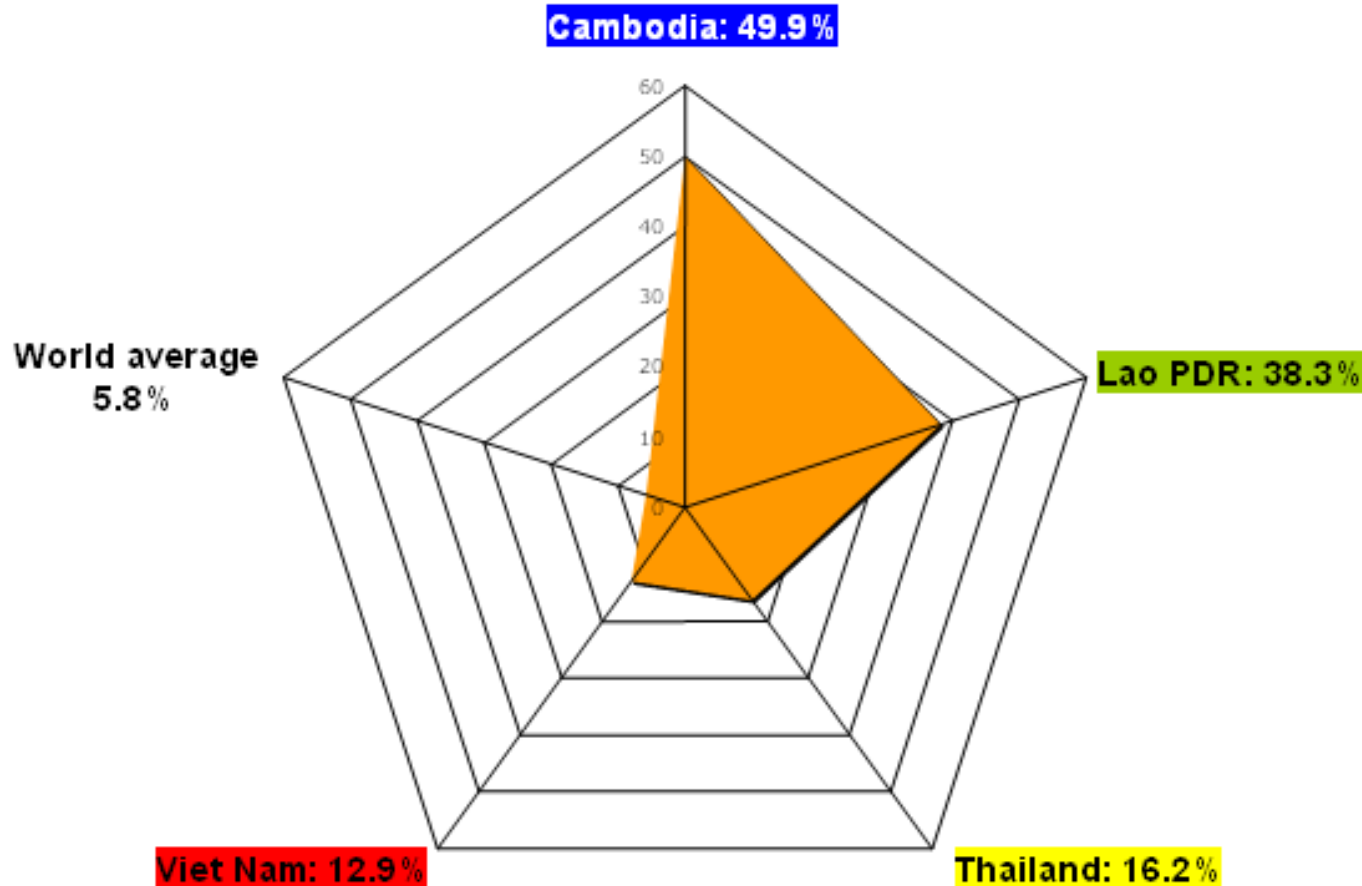


FAO figures and other studies lead to the same conclusion: the four countries of the Lower Mekong Basin feature the highest consumption of freshwater fish in the world.

Fisheries and food security

Contribution of freshwater fish to protein supply (FAO data)

13

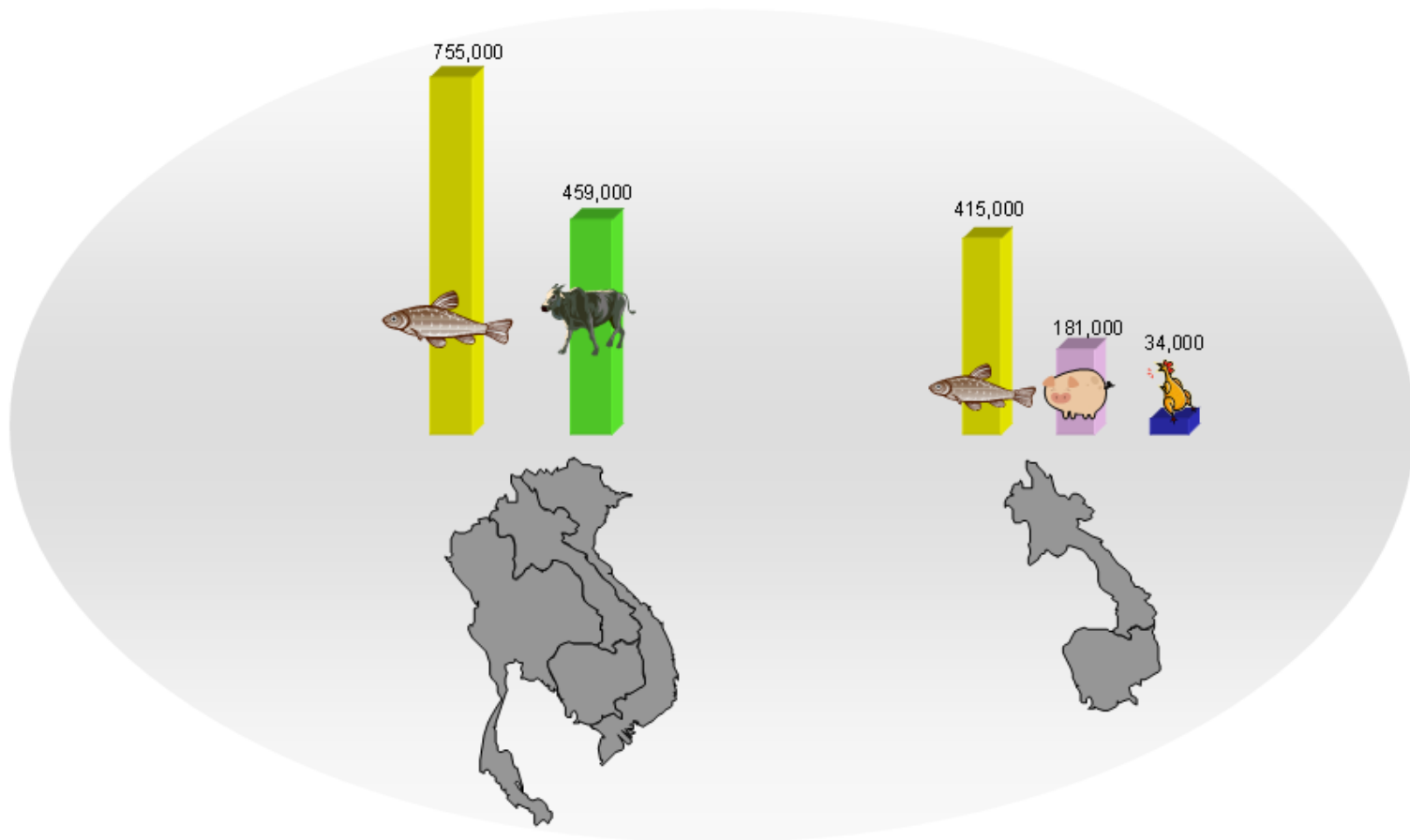


In the LMB, the share of protein coming from freshwater fish represents between 2.2 and 8.6 times the world average.

Fisheries and food security

Fish and other sources of proteins

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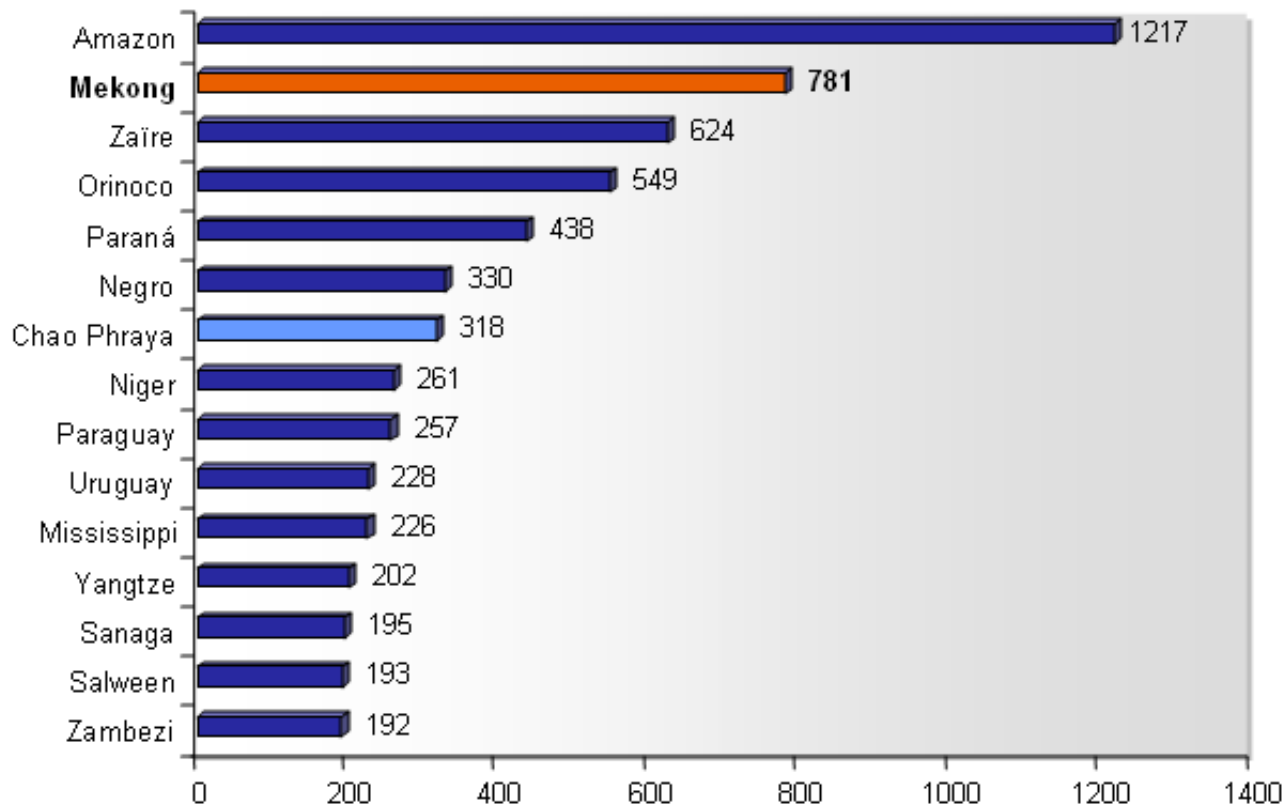


There are alternatives to fish in three of the Lower Mekong countries (either chicken or pork), but not in Cambodia where fish is by far the dominant source of protein.

Biodiversity

Number of riverine fish species

15

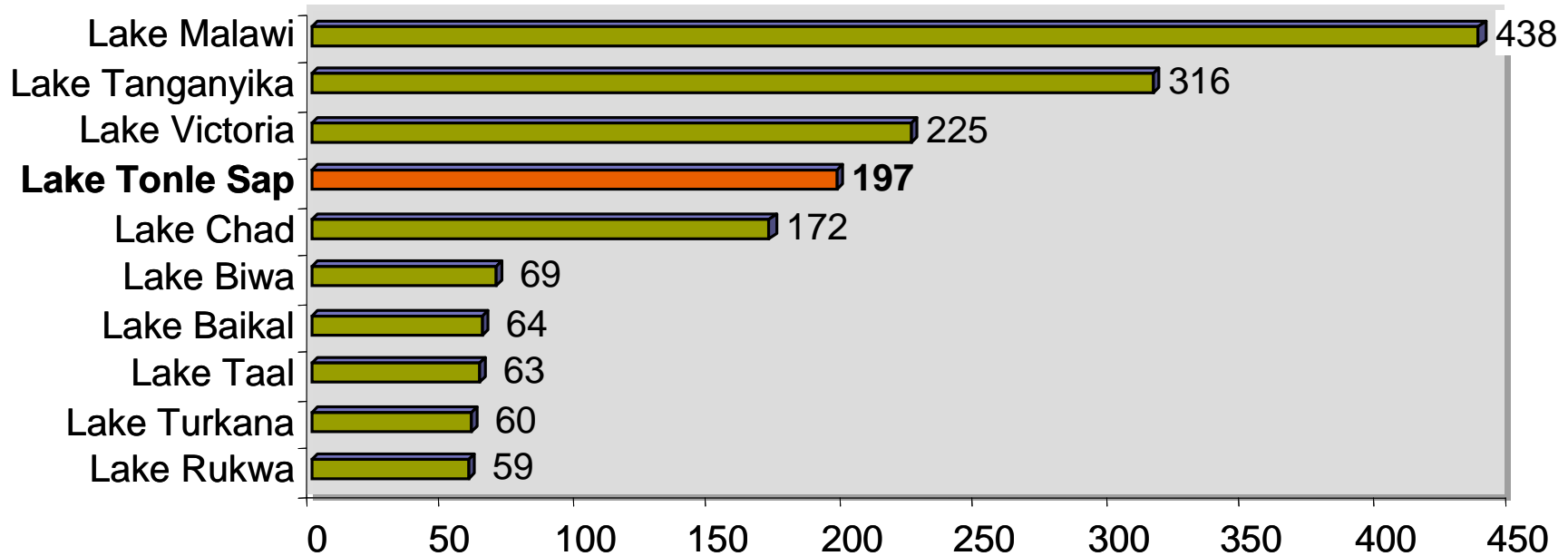


The Mekong River is the second river in the world for its fish biodiversity

Biodiversity

Number of lacustrine fish species

16



Fish species richness in different lakes of the world

With 197 species recorded so far, the Tonle Sap Lake has the fourth highest fish biodiversity in the world

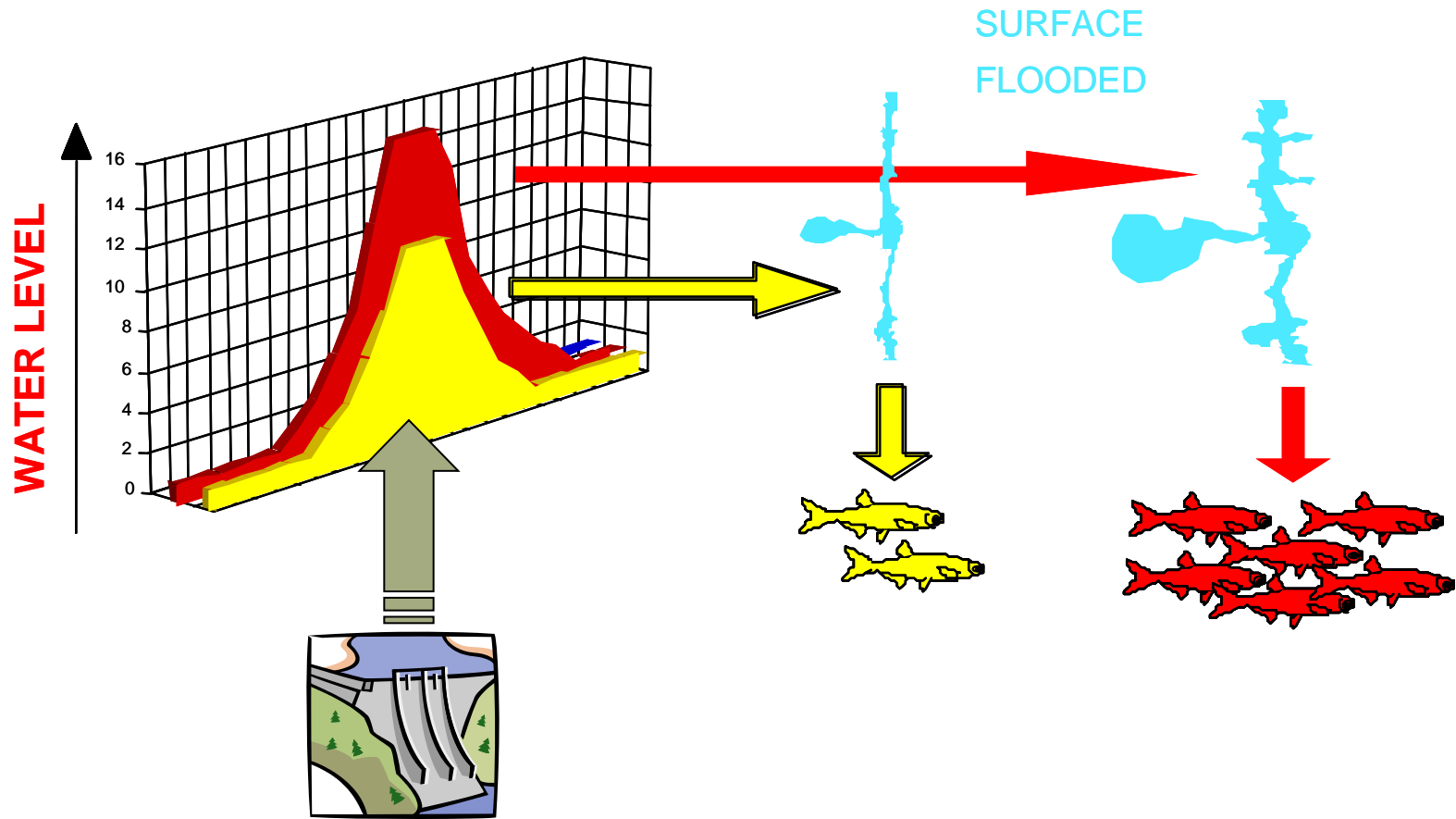
Laos, Thailand and Vietnam are among the top 5% countries for their number of freshwater fish species and of threatened fish species

Drivers of the fisheries production

Environmental drivers

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1) *a high flood is correlated to a high fish production*

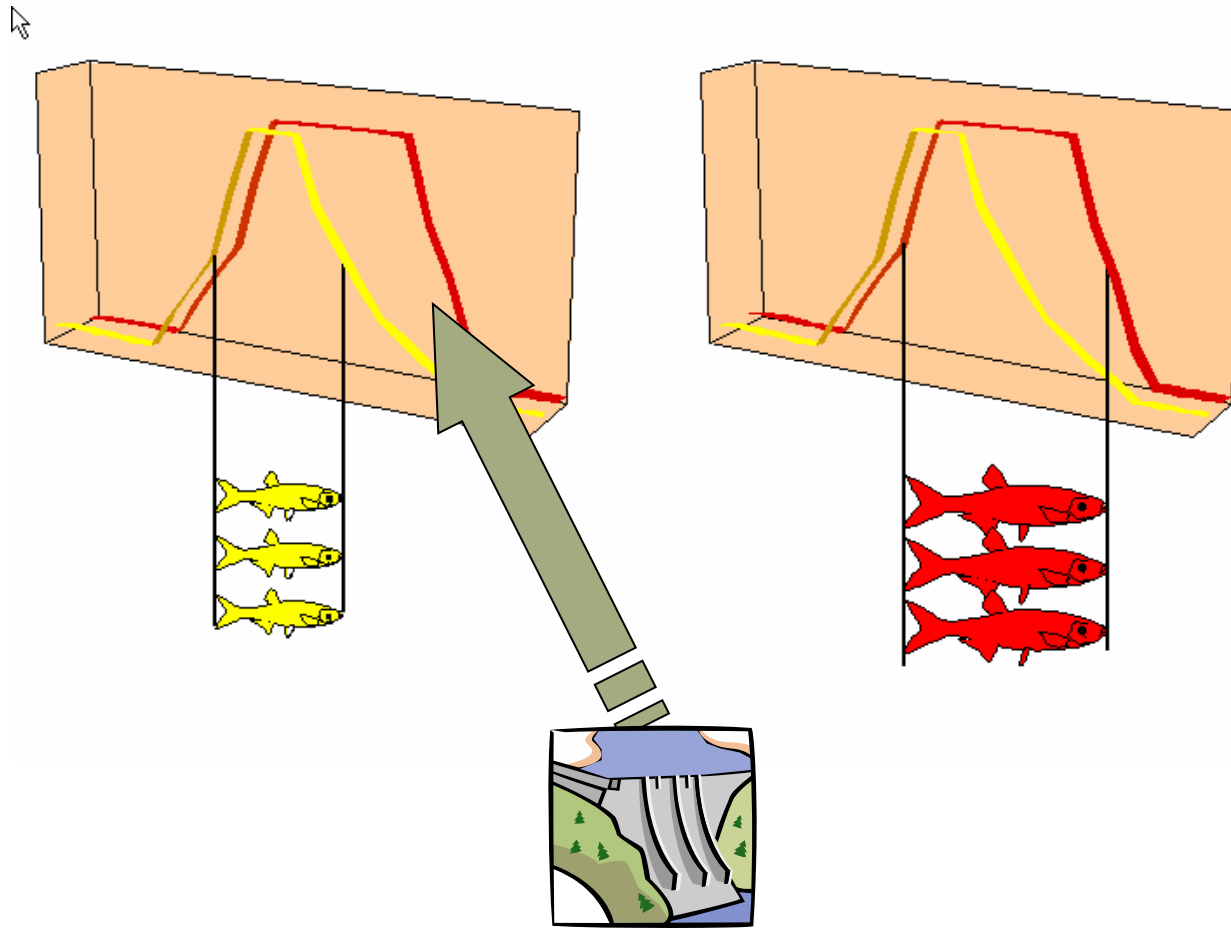


Drivers of the fisheries production

Environmental drivers

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2) a long flood is correlated to a high fish production

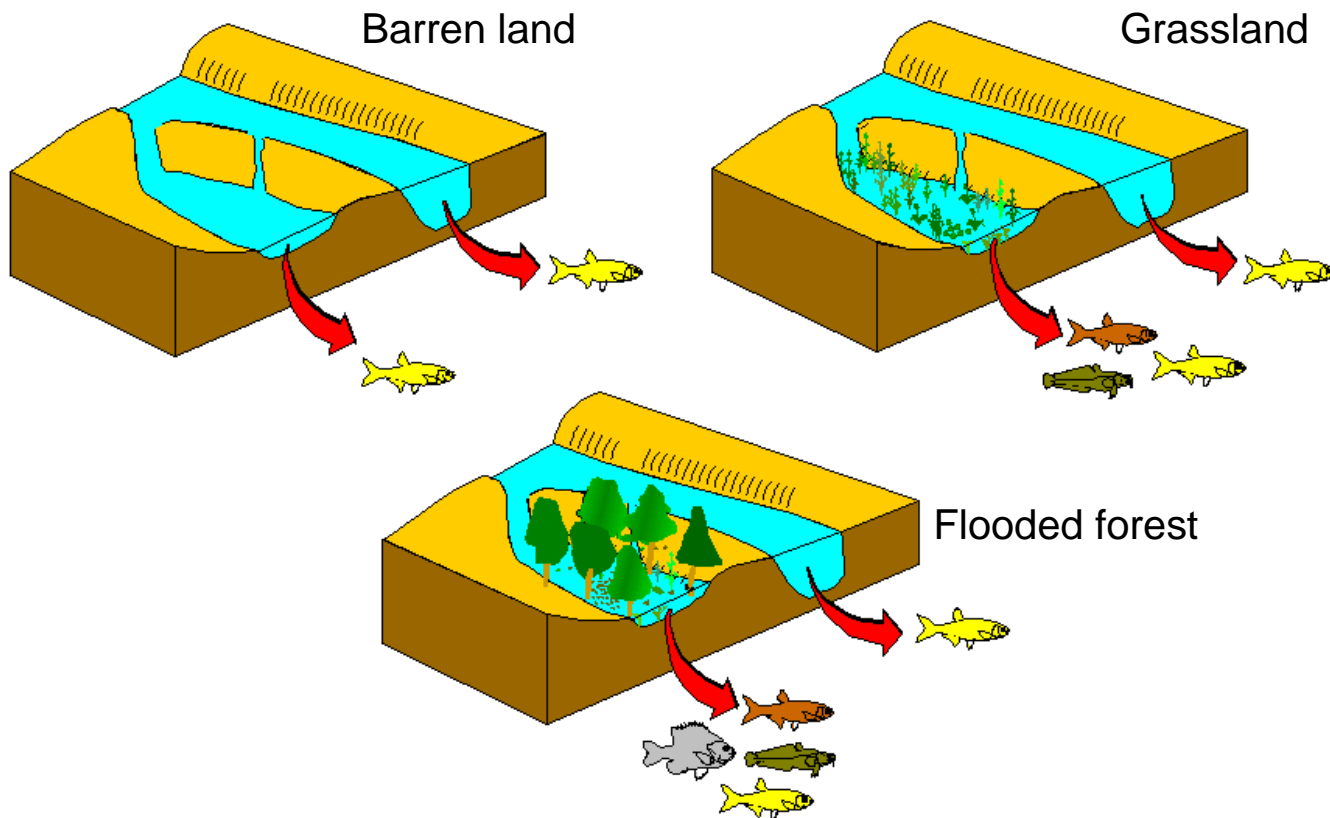


Drivers of the fisheries production

Environmental drivers

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3) the nature and diversity of the vegetation in the flooded areas is most probably correlated to the diversity and abundance of the fish production

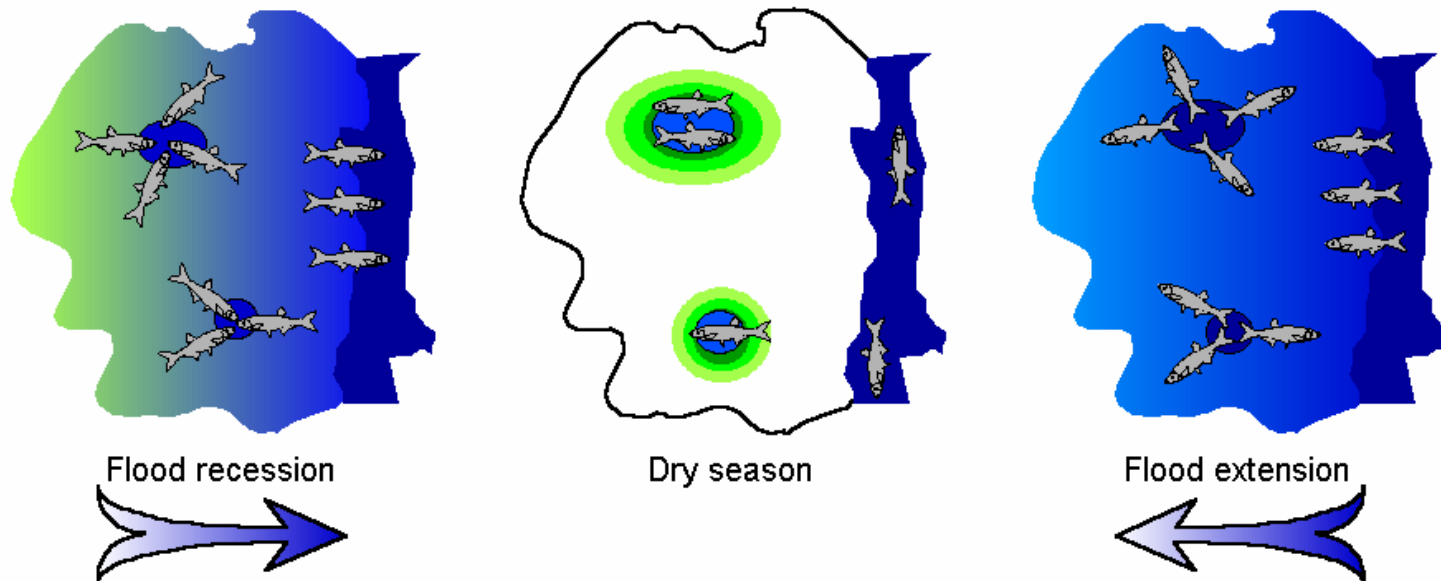


Drivers of the fisheries production

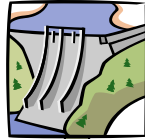
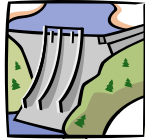
Environmental drivers

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4) the sustainability of the fish resource is dependent upon the presence and accessibility of refuges for fish in the dry season.



5) the possibility for fish to move between their breeding and feeding zones is central to fish production sustainability



HYDROLOGY

Water level

(higher flood = more fish)

Flood duration

(longer flood = more fish)

Flood timing

(early flood = more fish)

FLOODPLAIN ENVIRONMENT

Flooded vegetation

(less trees = less fish)

Built structures

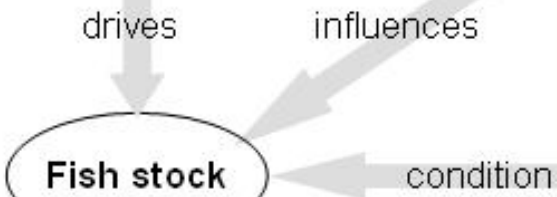
(more structures = less fish)

MIGRATIONS

Access to feeding and breeding areas

Access to refuges

*(ponds, sanctuaries, deep pools)
(better protection = more fish)*



Fish stock

allows

FISH CATCH

yields

FISHING

Number of fishers
Impossible to control

Fishing intensity
Difficult to assess



Drivers of the fisheries production

Migrations

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Fish migrations are a **major** feature of the Mekong Basin

Upstream migrations are mainly breeding migrations undertaken by larger, often adult, fish;
downstream migrations are mainly feeding migrations undertaken at both life stages.

Fish movements also include lateral migrations between the mainstream or tributaries and floodplains.

There are 3 main fish groups corresponding to 3 main migration patterns:

Drivers of the fisheries production

Migrations

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Examples of black fishes:



Channa striata



Clarias batrachus



Anabas testudineus

Black fishes: migrate between floodplains and ponds

Examples of white fishes:



Henicorhynchus siamensis



Paralaubuca typus



Pangasius krempfi

White fishes: migrate between floodplains and remote tributaries

Examples of "grey" fishes:



Belodontichthys dinema



Mystus albolineatus



Kryptopterus cheveyi

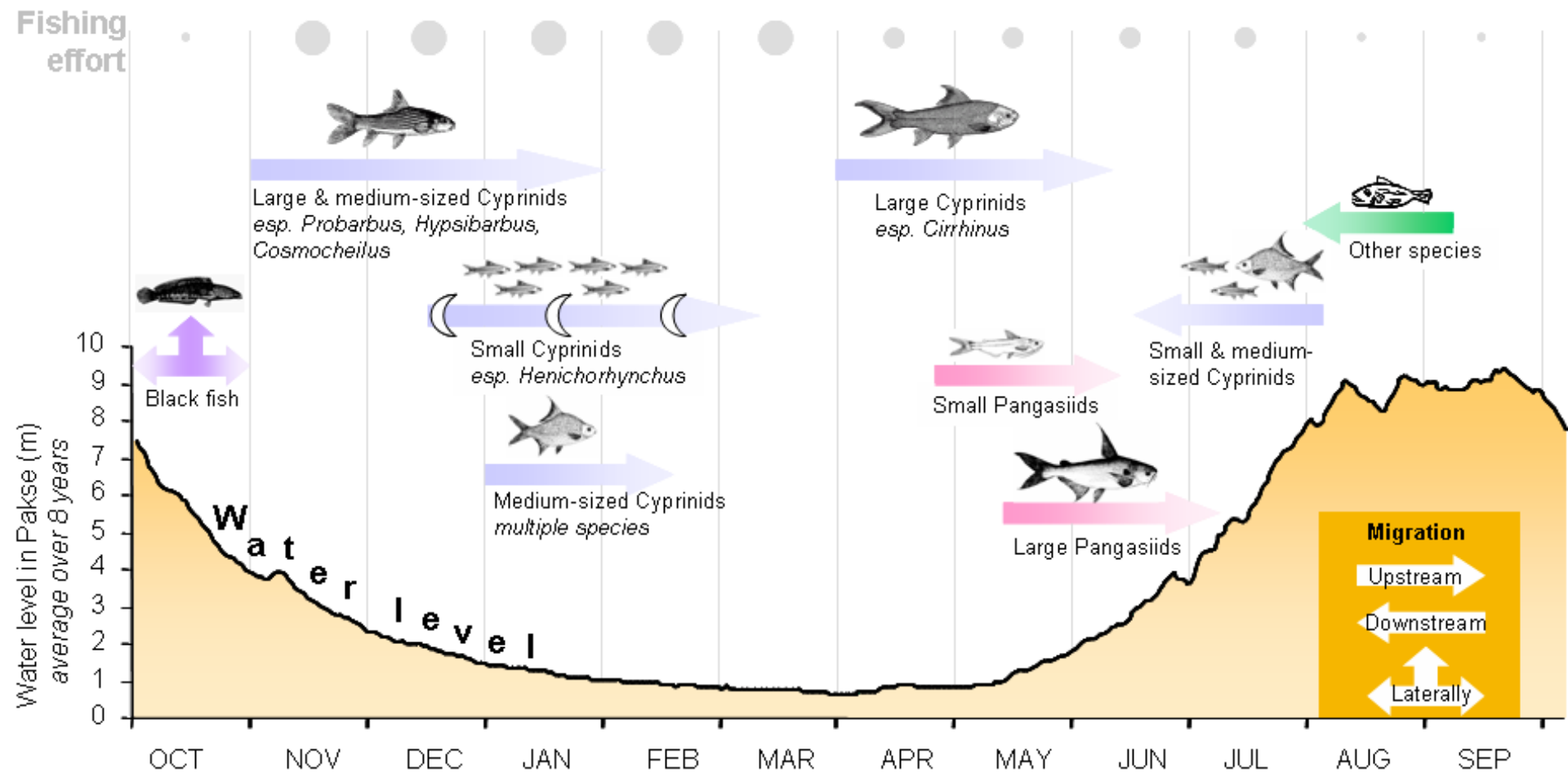
Grey fishes: migrate between floodplains and local tributaries

Drivers of the fisheries production

Migrations

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Migrations in time



Drivers of the fisheries production

Migrations

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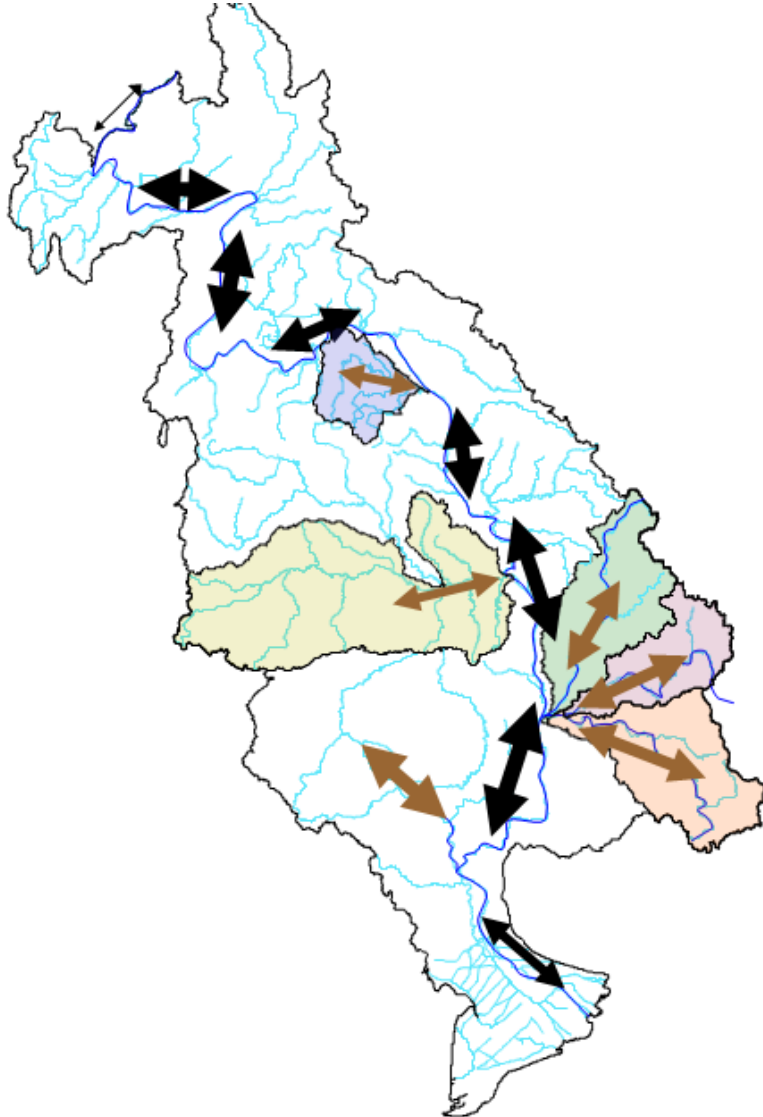
Migrations in space



Drivers of the fisheries production

Migrations

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Combination of species migration maps and of catches basinwide

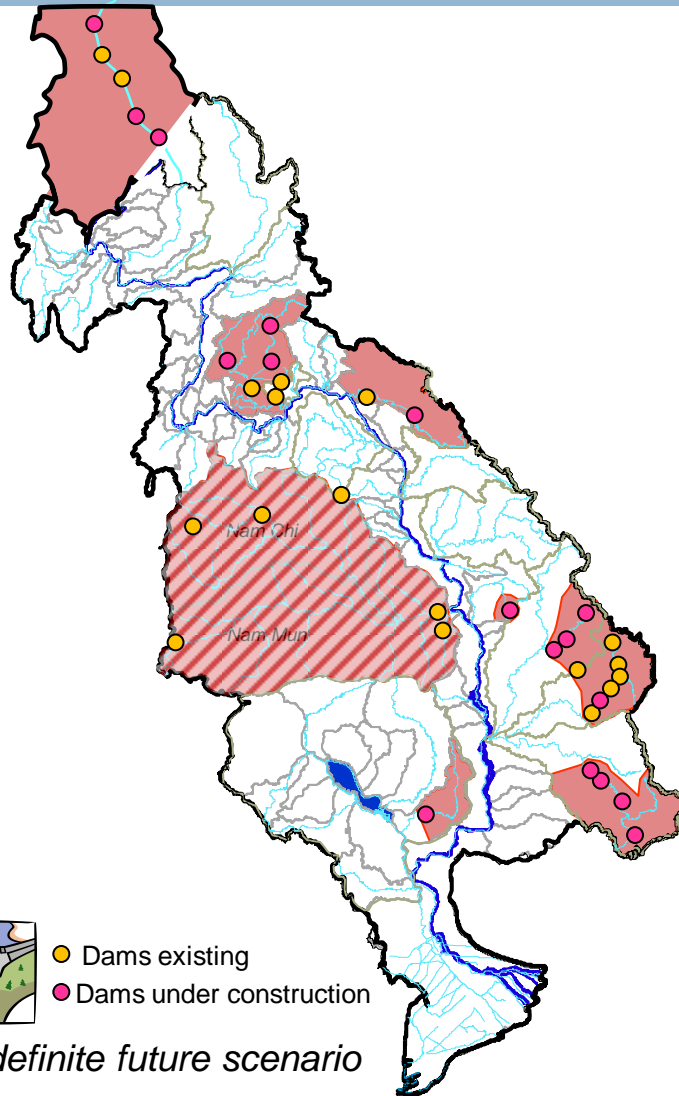
The area between Phnom Penh and Stung Treng is the biggest migration route.

The 3S system (Sesan, Srepok, Sekong Rivers) seems to play an important role (as important as the Tonle Sap River) among migrant species

Drivers of the fisheries production

Migrations

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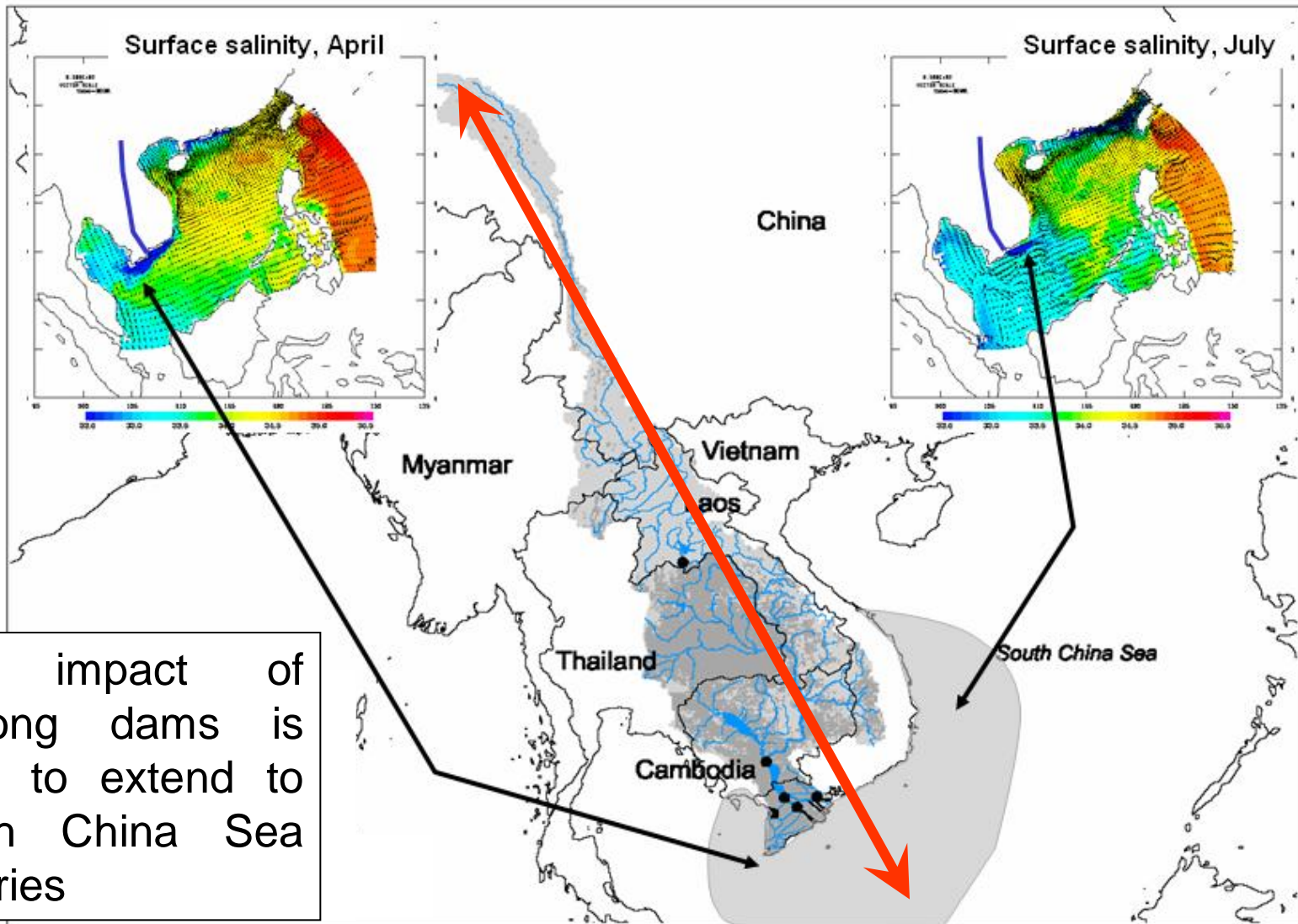


The migratory fish resource at risk from mainstream dam development ranges between 0.7 and 1.6 million tonnes per year

Drivers of the fisheries production

Mekong fish production = freshwater + coastal

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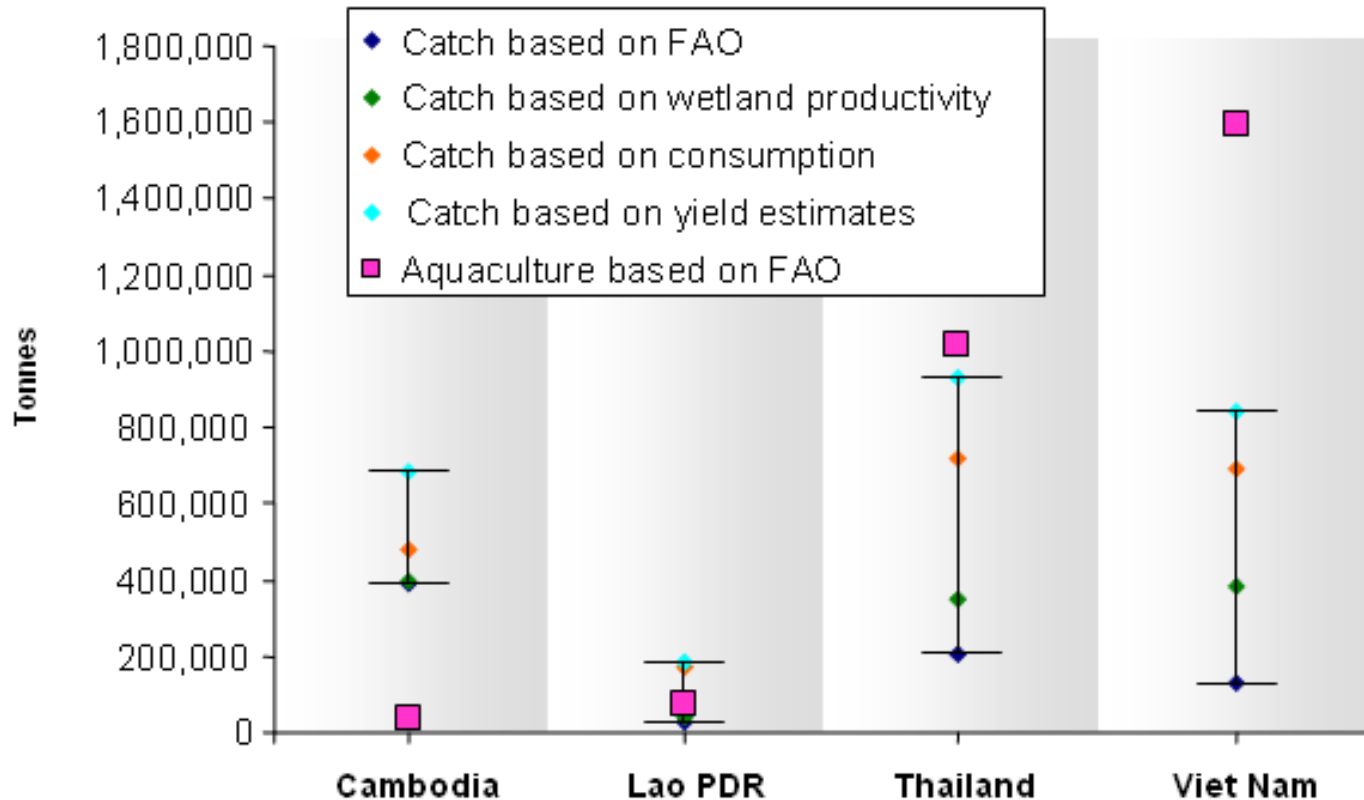


The impact of Mekong dams is likely to extend to South China Sea fisheries

Fisheries and aquaculture

Production

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In Vietnam and Thailand, aquaculture fish > capture fish production
In Laos, aquaculture fish = capture fish production
In Cambodia capture fish >> to aquaculture fish production

Fisheries and aquaculture

Value

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Estimates:

Fishery sector (Hortle 2009)

USD 2.2 to 3.9 billion per year (at first sale)

then between USD 4.3 and 7.8 billion on retail markets

Aquaculture sector (FAO):

During the 2005-2007 period, aquaculture generated each year

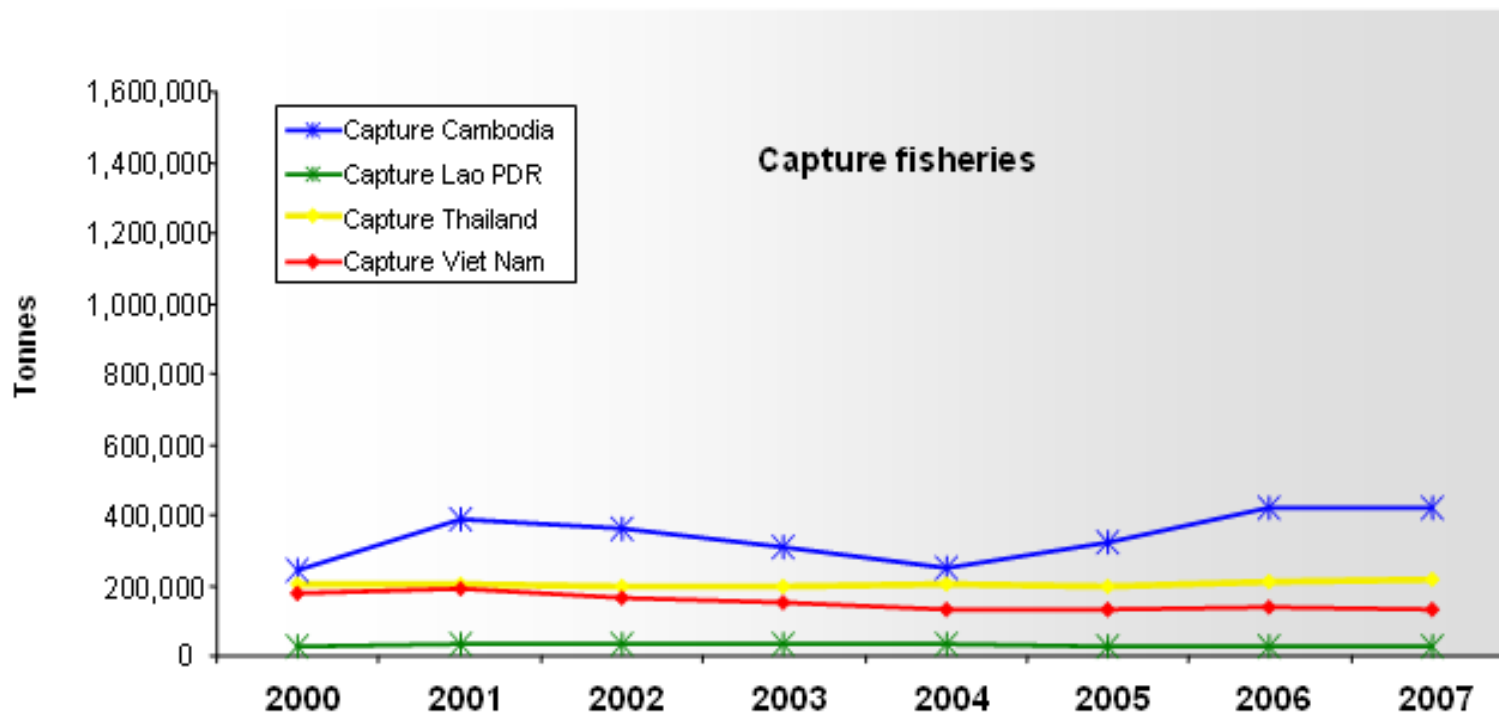
around USD 2.4 billion per year

But for the fishery sector no transparent price per kilo or tonne has ever been produced, and economic valuation of fish resources remains a much neglected issue in the Mekong Basin

Fisheries and aquaculture

Past trends in fisheries

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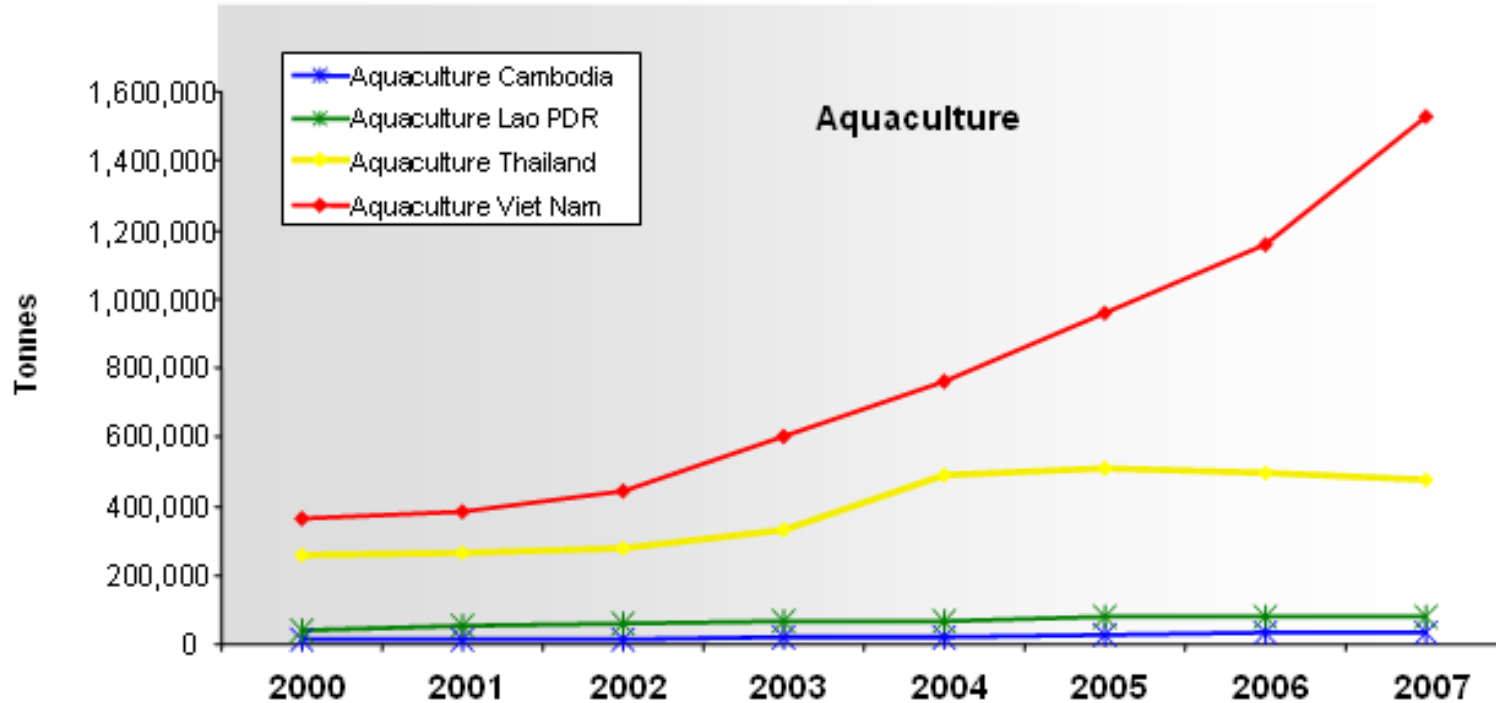


There is no evidence from national statistics that the yield from capture fisheries is declining (even though the catch per fisherman is). However, little or no growth is to be expected from that sector in the years to come

Fisheries and aquaculture

Past trends in aquaculture

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In inland/brackish water aquaculture, only Vietnam features a high annual growth (+28% a year over the last 5 years) and a high production levels (1.5 million tonnes in 2007).

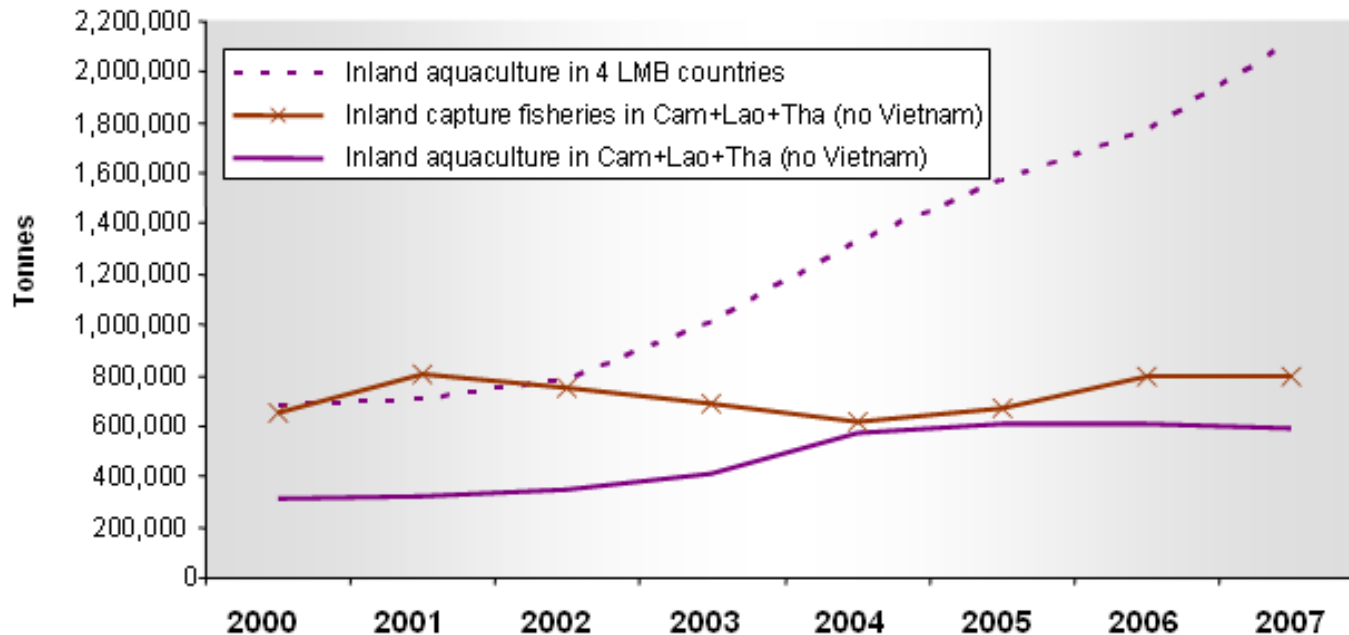
Fisheries and aquaculture

Past trends in fisheries and aquaculture

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When all countries are lumped, the production of the inland/brackish aquaculture sector in the LMB is more than double of that of the inland fisheries sector

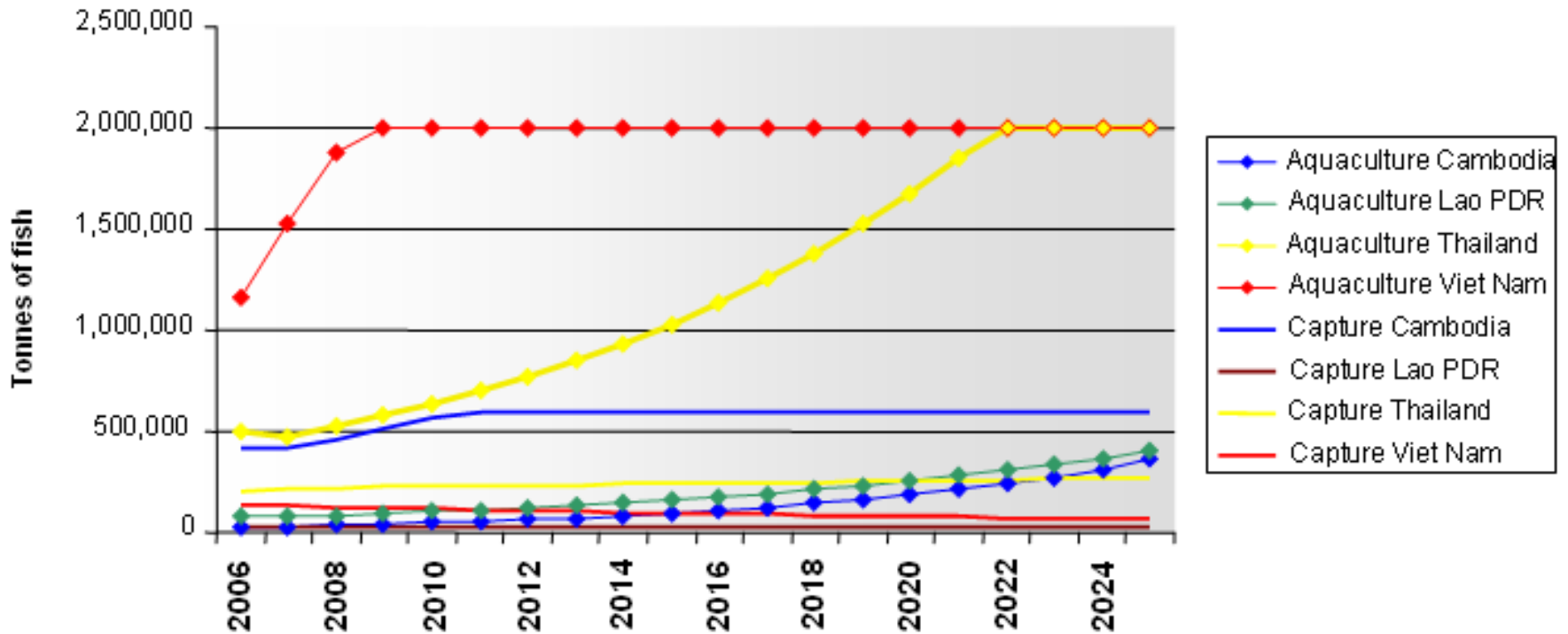
However, when the exceptional case of Vietnam is put aside, the production of the inland aquaculture sector in Cambodia, Laos and Thailand remains inferior to the production of the inland fisheries sector.



FUTURE TRENDS WITHOUT MAINSTREAM DAMS

Predictions based on the 2000-2007 average growth

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These computations are very theoretical: they assume a stable environment

Predictions based on trends in drivers of fishery production

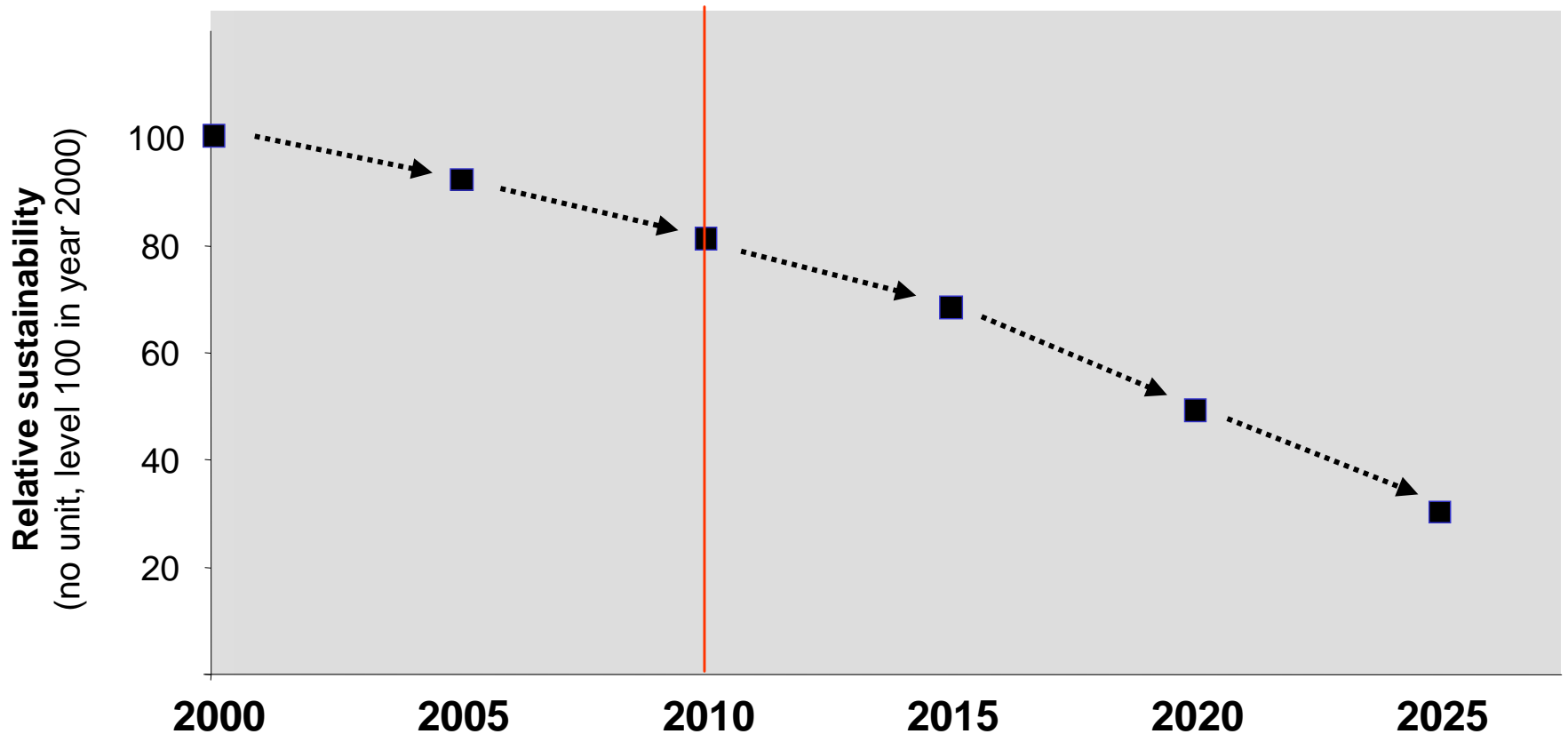
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	2000-2005				2005-2010			
	Trend	Reason	Weight	Impact	Trend	Reason	Weight	Impact
Flood level	0	Flow close to baseline	3	0	0	Flow close to baseline	3	0
Flood duration	0	Flow close to baseline	2	0	0	Flow close to baseline	2	0
Flood timing	0	Flow close to baseline	1	0	0	Flow close to baseline	1	0
Flooded vegetation	-1	Increased deforestation for rice cultivation	1	-1	-1	Increased deforestation for rice cultivation	1	-1
Built structures	0	No major infrastructure development	3	0	-1	More floodplain roads and dykes	3	-3
Refuges	-1	More pumping in floodplains, deep pools unchanged	2	-2	-1	Systematic pumping in floodplains, deep pools unchanged	2	-2
Number of fishers	1	Population growth, more demand	3	-3	1	More demand, economic crisis, women involved	3	-3
Fishing intensity (technology)	1	Gear size increases and mesh size decreases progressively	2	-2	1	Gear size increases and mesh size decreases progressively	2	-2
Overall trend (arbitrary units):	-8				-11			

	2010-2015				2015-2020				2020-2025			
	Trend	Reason	Weight	Impact	Trend	Reason	Weight	Impact	Trend	Reason	Weight	Impact
Flood level	0	Beginning of a reduction of flood level	3	0	-1	Progressive reduction of flood level	3	-3	-1	Flood level reduced by 15% in northern Laos, down to -3% in Vietnam	3	-3
Flood duration	0	Beginning of a small change in duration	2	0	-1	Modelling predicts a small shortening (5-10%) of duration	2	-2	-1	Modelling predicts a small shortening (5-10%) of duration	2	-2
Flood timing	0	Flow close to baseline	1	0	0	Modelling predicts a marginal change (a few days) in timing	1	0	0	Modelling predicts a marginal change (a few days) in timing	1	0
Flooded vegetation	-1	Deforestation, first irrigation schemes (pollutants)	1	-1	-2	Deforestation, more irrigation schemes (pollutants)	1	-2	-2	Deforestation, more irrigation schemes (pollutants)	1	-2
Built structures	-1	More floodplain roads and dykes	3	-3	-2	More floodplain roads and dykes, more dams; reservoirs won't compensate	3	-6	-2	More floodplain roads and dykes, more dams	3	-6
Refuges	-2	Systematic pumping in floodplains, deep pools unchanged	2	-4	-2	Systematic pumping in floodplains, sediments in deep pools because of reduced flushes	2	-4	-2	Systematic pumping in floodplains, deep pools unchanged	2	-4
Number of fishers	1	More population but more urban alternatives; slight augmentation	3	-3	0	More urban alternatives; CPUE decreasing	3	0	0	More urban alternatives; more agriculture; CPUE bad	3	0
Fishing intensity (technology)	1	Gear size increases and mesh size decreases progressively	2	-2	1	Gear size increases and mesh size decreases progressively	2	-2	1	Gear size increases and mesh size decreases progressively	2	-2
Overall trend (arbitrary units):	-13				-16				-16			

Predicted trend in fisheries, based on trends in multiple drivers

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Capture fish production is expected to decline in the future even in the absence of mainstream dams

Will aquaculture replace capture fisheries?

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Replacing capture fisheries production by aquaculture production is not realistic, for several reasons:

- The aquaculture sector depends on capture fisheries for feed
- The aquaculture sector depends on capture fisheries for fingerlings
- Intensive aquaculture does not contribute to food security, extensive aquaculture is not very productive
- Aquaculture fish is much more costly than capture fish

Thus aquaculture can *ameliorate* fish supply from capture fisheries but cannot replace it

Summary

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The Mekong River has the second highest fish biodiversity in the world

Mekong fisheries produce 0.75 - 2.6 million tonnes each year; this represents 7 to 22% of the world's freshwater fisheries

Capture fish production is huge, is not declining yet, but will not increase in the future

The migratory fish resource at risk from mainstream dam development ranges between 0.7 and 1.6 million tonnes per year

LMB countries feature the highest consumption of freshwater fish in the world

Freshwater fish supply is a very important component of food security in the basin, in particular in Cambodia.

Aquaculture cannot replace capture fish production



THANK YOU