Long-term monitoring of freshwater fish biodiversity in SE Asia

Our strategy for “long-term” monitoring:

Simpler and cheaper

Human resources are so limited……

Focus on……

Hydropower dam

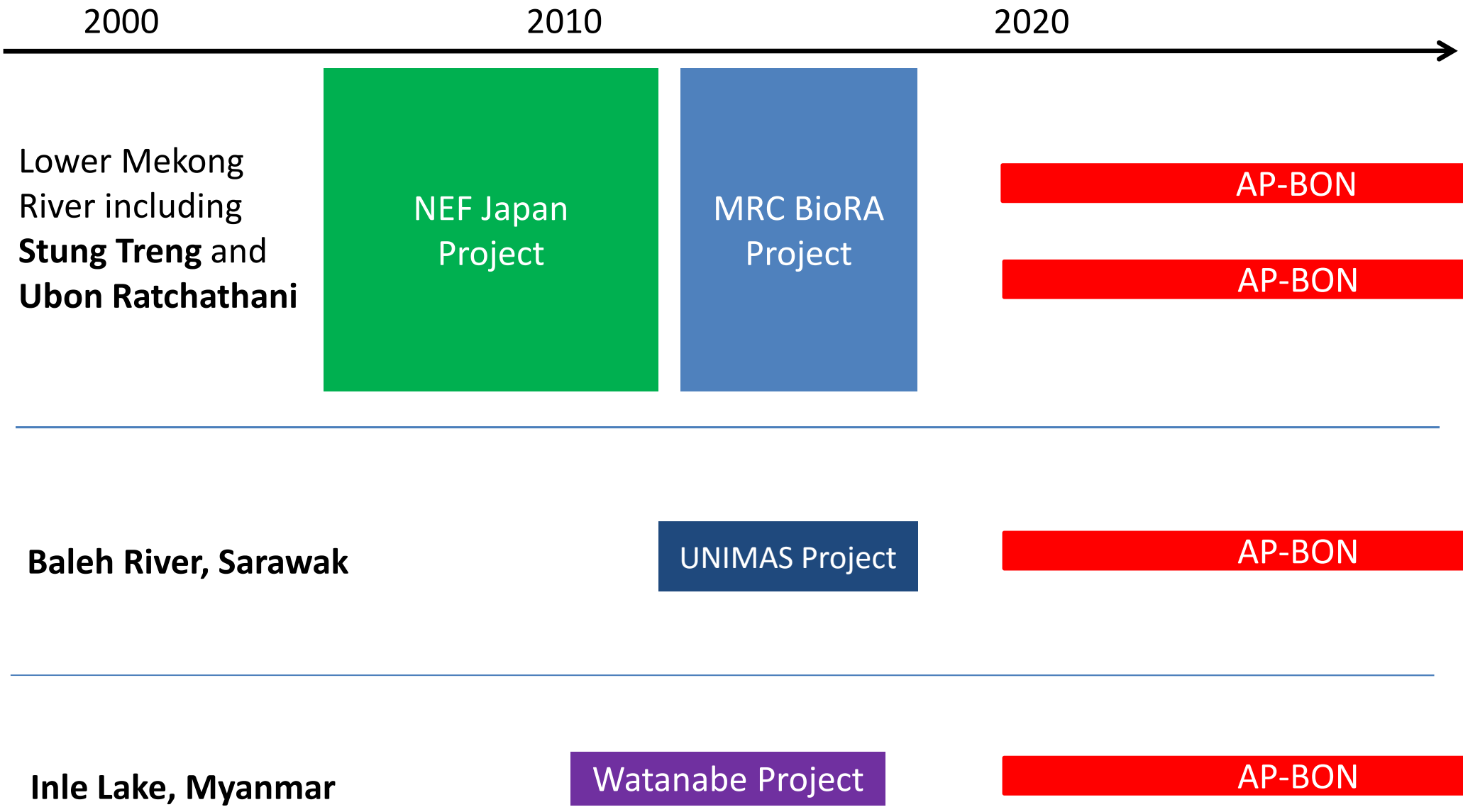
Alien fish


Method
Monitoring site

Candidates of monitoring site

Historical monitoring status

(We have actual achievement in each site)



Stung Treng

Just below the Khone Falls, mainstream Mekong River

Just below the planned Don Sahong Dam

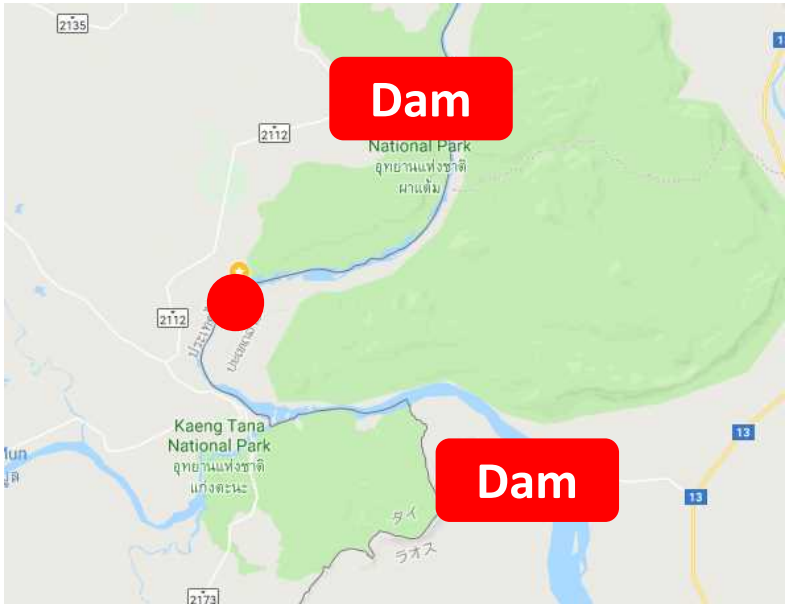
Spawning site for many fishes

Ubon Ratchathani

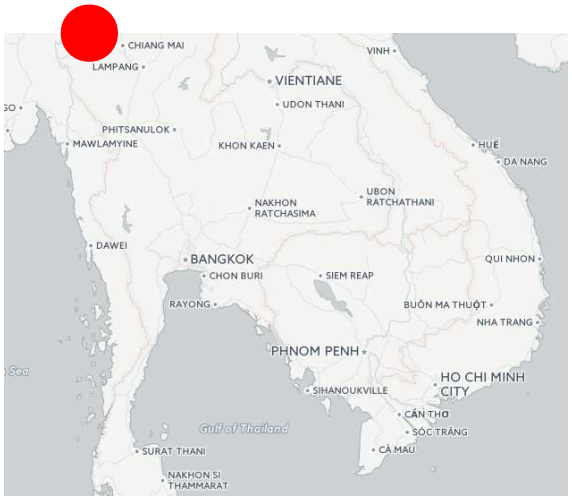
Above the Khone Falls, the deepest (100m) section of mainstream Mekong River.

Between planned dams.

Spawning site for many fishes.



Inle Lake

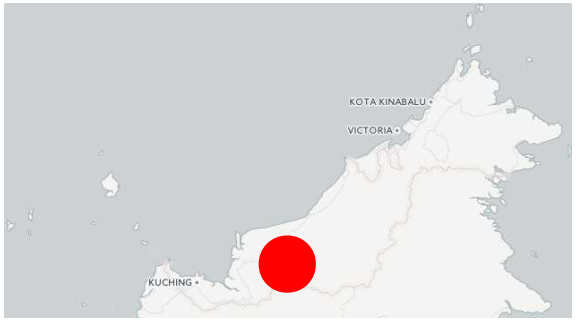


An ancient lake with many endemic species.

Alien species spreading.

One of the most major tourist spot in Myanmar.

Upper Baleh River



No oil-palm plantation (primitive forest?).

A large dam will be constructed downstream.

Habitat of *Tor* fish, which is one of the most important freshwater fish in Borneo as well as Arowana.

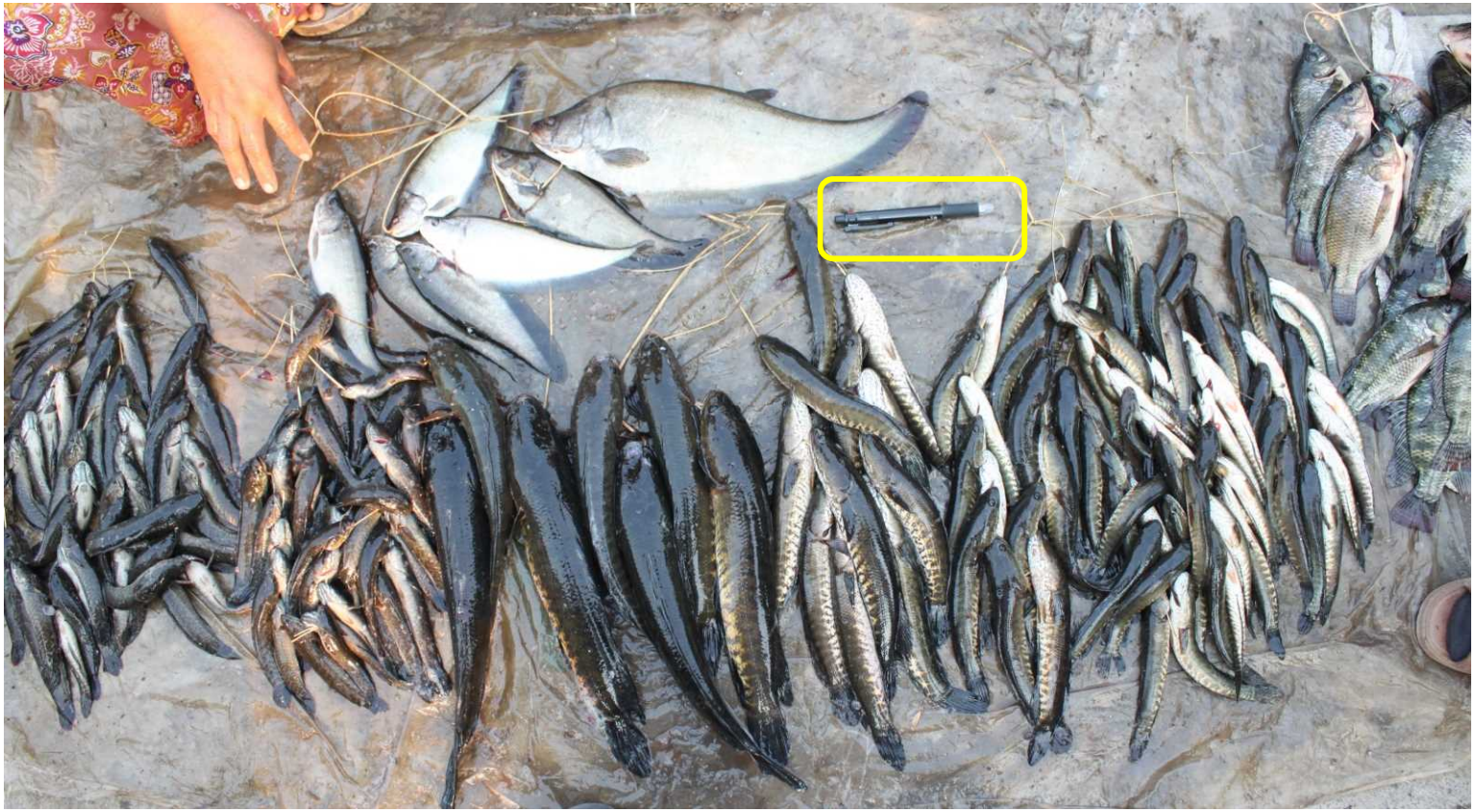
Monitoring methods

1. Field sampling

by Electrofishing, throwing net, gill net, etc.

We do NOT standardize the method among the sites, but the sampling effort are consistent in each site (not among sites), i.e. defined area with identical combination of methods and time.

2. Market survey



Take photo with a scaler to calculate the areas of

1) Wild native fish
2) Wild alien fish
3) Aquaculture fish

Simple biodiversity indices from market survey

$$\text{Nativeness index} = \frac{\text{Wild native}}{\text{Wild native + Wild alien}}$$

$$\text{Healthiness index} = \frac{\text{Wild native}}{\text{Total}}$$

$$\text{Wildness index} = \frac{\text{Wild native + Wild alien}}{\text{Total}}$$

We can compare the indices among sites

3. Environmental DNA for target species

Pangasianodon gigas

Probarbus jullieni

Cyprinus intha

Tor tambroides

eDNA is simple method, but several problems

Cost much.

Restricted equipment and human resources.

Difficult to bring the samples abroad (CITES: *Pangasianodon gigas* and *Probarbus jullieni*).

4. Bongo net for larvae (optional)

To know larvae distribution is important, but identification is difficult

5. Snorkeling (optional)

The simplest method for fish monitoring.

Only dry season when the water is clear (Feb. to May).

Mr. Sato (Siem Reap Fresh Water Fishes Labo) is now trying snorkeling survey in Stung Treng and we can follow him.

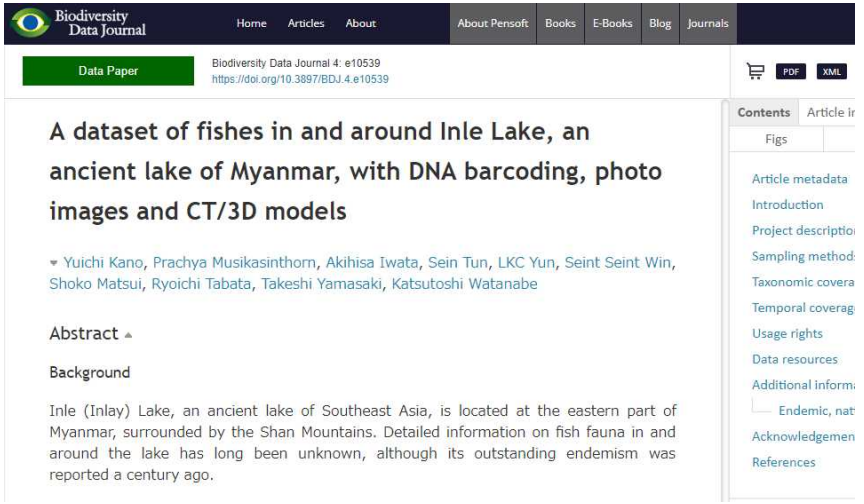
	Field sampling	Market	eDNA	Bongo net	Snorkeling
Stung Treng	●	●	△	○	○
Ubon R.	●	●	△	○	×
Inle Lake	●	●	○	×	△
Baleh River	●	×	○	×	×

● Must
○ Just try
△ By chance
× Impossible

1~2 times/year (dry and wet seasons)

Output of the monitoring

Data paper with GBIF registration



Registration into our “ffish.asia” database