ESTABLISHING A REGIONAL NETWORK OF UNIVERSITIES FOR MONITORING OF MEKONG FISH RESOURCES

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1. INTRODUCTION

The WorldFish Center supporter by ACIAR launched a project in 2012 called "Valuation of Fisheries in Cambodia". The overall objective of the project is to quantify the multiple values of fish resources and convey information to national decision-makers and development agencies for sustainable and improved rural livelihoods.

One of the components in the project is to *establish a coordinated monitoring of fish resources through a network of universities*. In fact the main objective of this component is to develop a low-cost network, in coordination between all universities, a series of research topics that will be implemented over years by BSc and MSc students program of the 4 universities in the region focusing on fisheries and a monitoring framework in the 4 Lower Mekong Basin countries. These 4 universities will also constitute the first scientific network in the Lower Mekong for coordinated data gathering related to the value of fish resources. During the coming decade, the improved capacity of young researchers and practitioners trained in the four partner universities will benefit their respective countries, and the monitoring program put in place during this project will create a capacity to assess trends in fisheries issues basin wide, which does not exist at the moment.

The 4 partner universities are the National University of Laos, the Ubon Ratchathani University, the Royal University of Phnom Penh and Can Tho University. The proposed research will i) focus upon direct use values of fish resources, and ii) assess the welfare values of the resource, i.e. non-monetary (but quantitative and comparative) contribution to livelihoods.

2. UNIVERSITY PROFILES

2.1. ROYAL UNIVERSITY OF PHNOM PENH, CAMBODIA

The University features 2 faculties (Social Sciences and Science). 12,000 students, 300 academic staff (mainly in science)Department of Biology: 25 academic staff, 50-80 students each year; 3 to 5 of the best students do a thesis (in Khmer) each year. The university also offers a MSc program which has started since 2007. This is a 2-4 years program dedicating the first year to the course work and the second year to thesis. 50% out of 20-25 students finish the program on time each year. The project will work with the Biodiversity Conservation research program. Currently, there are 14 students in the Biodiversity Conservation program. So far, the department has not done much fisheries studies but has worked on aquatic animals (otters, rotifers) and social science. For the moment students are on field work around the Lower Sesan Dam site, and they are working on the creation of a zoological collection.

2.2. UBON RATCHATHANI UNIVERSITY, THAILAND

Ubon Ratchathani University consists of 15,000 students and 500 staff. The Department of Fisheries under the Faculty of Agriculture features 120 students over 4 years, i.e. around 30 per year, and 8 lecturers. BSc, MSc in Thai, PhD in English. The fisheries department has been worked on fish biodiversity and fisheries management in the Mekong basin with local and international organizations. Regarding to the curriculum, the fourth year students are obligated to conduct mini-these on the topic

related to biodiversity, socioeconomics and fisheries management in the Mekong basin. This can be integrated to the activities of the project and feasible for long-term monitoring.

2.3. CAN THO UNIVERSITY, VIETNAM

Can Tho University features 9 faculties, with 100-200 staff in each faculty, including 4 big faculties (agronomy, fisheries, economics, and environment). Each big faculty accommodates 5000-10000 students. There are 40,000 students all together. BSc, MSc, and PhD programs are conducted in Vietnamese language. Fisheries are classified under the Faculty of Environment (with wetland ecosystems and natural resource management courses).

As part of the Ministry of Agriculture and Rural Development, each of the 13 provinces of the delta has a fish resources management unit and a biodiversity management plan. Dr. Duong Van Ni, university partner, routinely combines students from 3 big faculties and government staff into teams focusing on fish monitoring in 3 zones (deep water/floodplains, medium and coastal).

2.4. NATIONAL UNIVERSITY OF LAOS, LAOS

The National University of Laos features 11 faculties with 25,000 students and 1000 staff. 2000 students enroll in Faculty of Science, but mostly in Computer science. The Department of Biology holds 23 staff supervising 250 students over 4 years, but there are only a few MSc students per year. Their theses are written in Lao language. The university has been working for many projects on Dam development and Environmental Impact Assessment, with support from WWF and the Nagao foundation (for fish taxonomy).

3. APPROACH

The focus, as commonly agreed, will be on the long-term gathering of fisheries data at different locations. The field studies will be coordinated and standardized so that data gathered are comparable between the 4 countries and over years. Since there is currently no coordinated fisheries monitoring in the basin, this can substantially improve the scientific assessment of the resource and improve local capacity to do so in the future. Defining common topics and approaches among the 4 network universities is done in the first year of the project, implementation will be done during years 2 and 3 (including testing and refining the methods), and a protocol will be finalized for the ten years to come during the fourth year of the project (see Table 1). Each year the project will provide 3 research grants for students ($2500/year each grant) to each University. Each partner universities will contribute 22 days a year of their lecturer's time as in kind contribution to the project including attending annual meeting, providing inputs to new theses programs, and supervising project-related theses.

Table 1: Implementation plan

Year 1; definition of a workplan common to 4 universities	**Year 2;** 1 to 3 students in each university	**Year 3:** 2 to 3 students in each university	**Year 4:** 3 students in each university

4. COMPONENT STRATEGY

Monitoring river or river resources through students' theses has been done in a few countries (e.g. monitoring of river quality by University Lyon-1 in France, monitoring of the costal intertidal fauna by the LIMPETS program in the US - Long-term Monitoring Program and Experimental Training for Students-, etc). The requirements are threefold:

- Topics feasible by BSc or MSc/PhD students

- Topics that can be repeated each year during several years by successive students (for comparisons in time)

- Topics that are standard between universities and thus allow comparing results between sites and countries (for comparisons in space)

This approach has to be underpinned by a solid protocol focussed on the objectives of monitoring, and the project participants agreed to deepen in the course of 2012 the criteria for monitoring, following in particular the guidance from Gitzen et al. 2012 ("Design and analysis of long-term ecological monitoring studies") and Lindenmayers and Likens 2010 ("Effective ecological monitoring"). This implies assessing the objective, the attributes selection and the intended audience, leading to the definition of *Objectives, Sampling design, Field methods, Data handling, Analysis and reporting* and *Budget considerations*. These points will become a checklist for the definition of each research thesis in each university (a work to be done during Year 1 by the students themselves, with guidance from their supervisor).

During that year 1 one basic topic proposed will be a review in English of all the BSc and MSc theses on fish resources or fisheries valuation done in national language in each country.

Exchange programs between the 4 universities are being considered.

Students from IT department can be involved in the project by creating some form of data sharing through web-based platform.

4.1. TOPICS AGREED BY ALL UNIVERSITIES

Out of a list of possible topics to be considered (species composition in catches, catch per unit effort, economic value of fish, livelihood value of fish, role of women in fisheries, etc) the team identified three topics of interest to each university and comparable between universities:

- **Fish catch monitoring upstream and downstream of significant fish sites**

- **Socio-economic monitoring upstream and downstream of significant fish sites**

- **Identification of fish breeding sites / special fish habitats along selected rivers**

The selected research topics have been selected because:

- they will allow monitoring threatening processes: river anthropization, biodiversity loss, and risks for the population. S

- they will generate background information for early warning, for informing decision makers and for publishing

4.2. SCALE OF THE STUDIES

Building on the table below, the team decided that the scale to be addressed in students' theses would be that of individuals (biology, socioeconomics) and multi-species groups (community ecology).

Table 2. Summary of various levels of organization in relation to designing and implementing ecological monitoring program (adapted from Hinds 1984).

Level of Organization	Ease of Interpretation	Ecological Effects	Current Understanding	Design Development	Probable Cost
Individuals (physiology and behavior)	Moderate	Unclear	High	Easy	Low
Populations (structure and dynamics)	Easy	Moderate	High	Moderate	Low
Multispecies groups (guilds and trophic transfers)	Easy	Important	Moderate	Moderate	Moderate
Communities (composition and dynamics)	Moderate	Important	Moderate	Difficult	High
Ecosystems (structure and function)	Difficult	Uniquely significant	Small	Unexplored difficulties	Unknown

4.3. SITE LOCATION

Taking as selection criteria

- systems threatened by human development
- systems likely to be sensitive to change,
- systems involved in management decisions,
- systems characterized by high fish productivity or biodiversity and
- sites accessible to students,

the team decided to focus on:

- the Mekong mainstream in Xayaburi Province in Laos,
- the Mekong mainstream in upstream and downstream of the Mun River confluence in Thailand
- the rivers of the Stung Treng province in Cambodia
- irrigation systems near Can Tho in Vietnam.

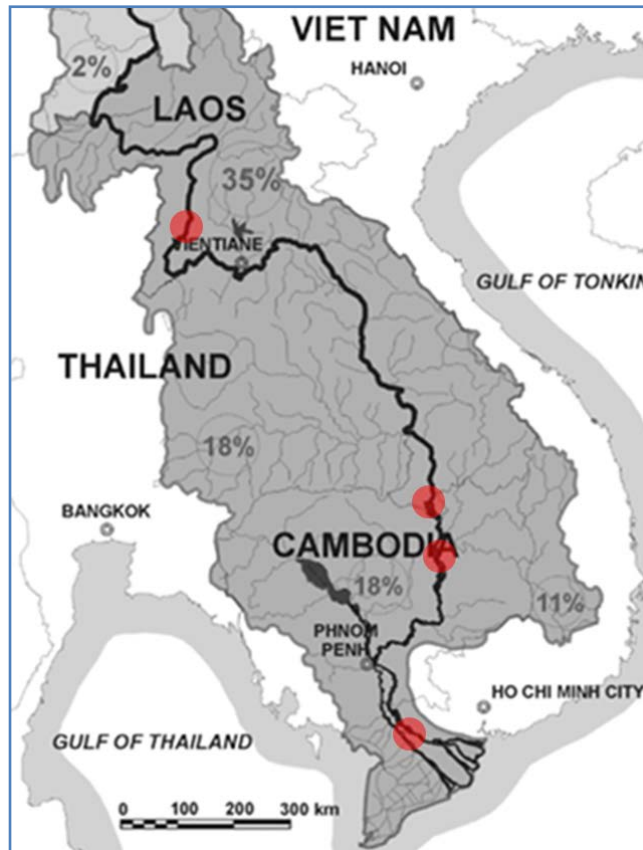The sites selected are illustrated by a red dot in Figure 1 below.

Figure 1: Location of study sites selected

4.4. TIME FRAME

Having analyzed the academic calendar of each university and the feasibility of field work, the time has determined the time periods compatible with coordinated studies (Figure 2)
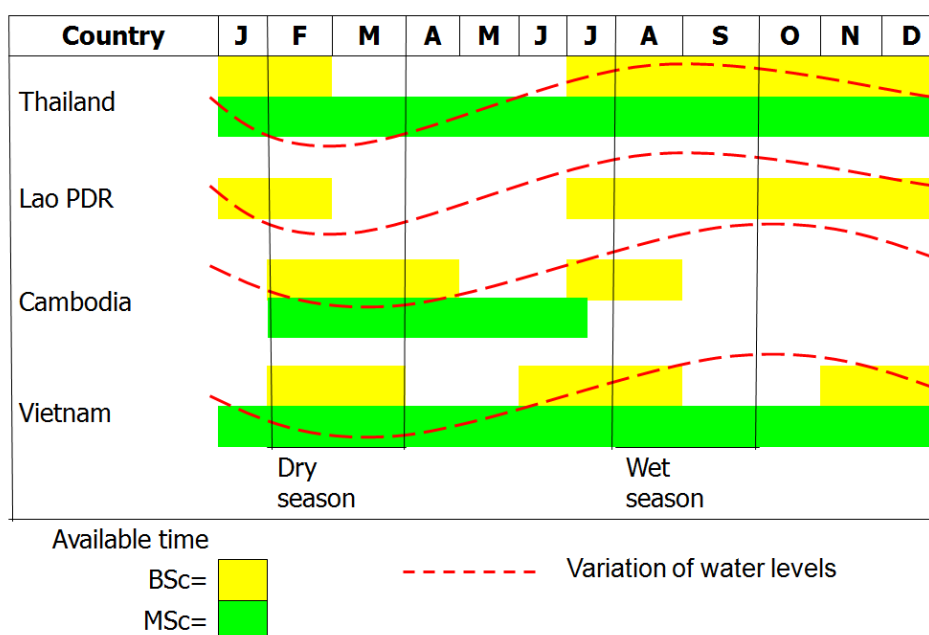

Country	J	F	M	A	M	J	J	A	S	O	N	D
Thailand												
Lao PDR												
Cambodia												
Vietnam												

Dry season   Wet season

Available time
BSc=
MSc=
------ Variation of water levels

Figure 2: Time periods for studies in each country

This review shows that the two periods compatible with coordinated approaches and field work in each country are the dry season (February-March) and the Wet season (August-September). The timing of each study will depend on the topic selected (e.g. biology or socioeconomic study) and universities will remain in contact the fine-tune coordination when the students will start selecting and defining their research topic.

In terms of data storage and custodianship, both Ubon Ratchathani and Can Tho Universities can offer space on servers and easy remote access to the theses and data compiled over years. A specific project site can be designed next year through the involvement of an IT student (to be determined).

5. NEXT STEPS

Figure 3 below summarizes the steps achieved and what remains to be done during the rest of the project, starting in the second half of 2012.
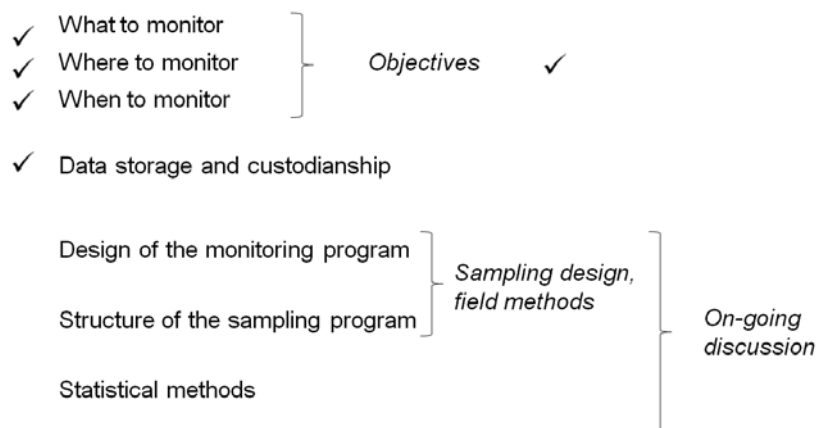
Figure 3: Steps achieved and remaining for the rest of the project period.

Statistical robustness

The team will seek advice during the second semester of 2012 from colleague statisticians in respective universities in order to define sampling protocol of students robust enough to allow for comparisons between sites or between countries.

Institutional strengthening

The project team will explore during the second the strengthening the possible ways to embed the project approach into academic structures and programs, so that institutional funding within the university framework is achieved and that sustainability is achieved beyond the life of the project.