

# Utilization of aquatic biodiversity in mountainous rice-based ecosystems of China and Viet Nam

## Background

Aquatic resources from rice fields and other aquatic habitats often constitute a large share of the **animal protein and essential fatty acid intake of poor households**, particularly in SE Asia. Unfortunately, although this dietary contribution is obvious to rural households, the **role of aquatic resources in food security** is poorly understood by policy makers because of the complexities of seasonally and spatially variable resources, habitats and farmers' activities. However, documentation of this essential contribution is needed by policy makers for formulating more pro-poor policies or to make resource allocation decisions. Recognizing this need, and with a general view towards raising awareness of the important role of aquatic biodiversity in rice fields, the Inland Water Resources and Aquaculture Service of the FAO Fisheries Department initiated a regional activity on the availability and use of aquatic organisms in rice-based farming in Cambodia, China, Laos and Viet Nam.



## Making aquatic biodiversity visible

The **objectives** of two case studies in Xishuangbanna, Yunnan Province, China, and Hoa Binh and Lai Chau provinces, Viet Nam, were to **collect and document information on the availability and use of living aquatic resources in mountainous rice-based ecosystems**. Specific attention focused on the application of participatory methods needed to **document the traditional knowledge of farmers**.

Aquatic species were collected by the farmers themselves using their own tools and techniques. Farmers identified the species in local languages and information was listed in databases providing local and scientific names, collection methods and use, and, as far as possible, information on consumption and marketing.

## Results to date

The study shows that rice field ecosystems contain a **rich aquatic biodiversity with 95 species found in China and 74 in Viet Nam. This diversity is extensively used by the local people**. The most important group are the fishes. A total of 60 and 42 different fish species were found in the China and Viet Nam study, respectively, most of which are consumed fresh or fermented into fish paste. Fewer species are fermented either as fillet or in smaller pieces, dried, salted, smoked, or used for preparing fish sauce.

## Study sites (mountainous and lowland):

- Cambodia (completed)
- Viet Nam (field work completed)
- China (field work completed)
- Laos (on-going)

Fish, fresh or processed, were found to be usually part of every meal and were the primary source of protein and essential fatty acids, which play key roles in brain and visual development. In China this was especially true for the rice farming Dai minority in Xishuangbanna. In addition to fish, many species of **crustaceans, molluscs, amphibians, insects, reptiles, and aquatic plants** were recorded in these studies all of which are either used directly or processed for human consumption, as animal feeds or bait, or for medicinal value.

Although the consumption of aquatic animals has remained constant, its relative contribution derived from capture has declined over the past decade: In the Chinese study it was estimated that nowadays one fifth to one third of the consumption were derived from rice-based farming systems, a decade ago the capture supplied half of the needed fish in the diet.

## Threats to the Aquatic Biodiversity

The **availability of aquatic resources is declining**. Farmers in Xishuangbanna claim that fish are becoming less and less abundant, and that the amount of aquatic organisms collected in one day nowadays is equivalent to what was collected a decade ago in one hour. Similarly, the Vietnamese study points out that fish catches have greatly decreased over the past decades.

## Threats:

- Human population increase and the consequent increased fishing pressure on aquatic resources
- Pollution from pesticide use
- Habitat loss and destruction of fish breeding grounds
- Illegal and destructive fishing methods such as electro-fishing or chemical poisoning

## Collecting organisms...



## Identifying species...



## Evaluating availability and preference...

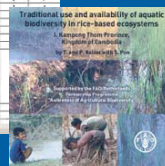


## Documenting techniques and collection tools...



## Creating database, communicating results...

Number	Species name	Scientific name	Family	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	Other	Collected to	
1	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...



## Documenting and sharing information

In order to inform a larger audience, particularly agricultural policy makers, recent activities have included:

- Publication of the **Cambodian case study**<sup>1</sup>
- Presentations at various international fora such as the International Rice Commission, the Global Environment Facility 2<sup>nd</sup> Assembly, and the Secretariat of the Convention on Biological Diversity

Policy impacts:  
**The 20<sup>th</sup> Session of the International Rice Commission, 23-26 July 2002** recommended that:  
*Member countries should promote the sustainable development of aquatic biodiversity in rice-based ecosystems and policy decisions. Management measures should enhance the living aquatic resource base. In areas where wild fish are depleted, rice-fish farming should be considered as a means of enhancing food security and securing sustainable rural development. Attention should be given to the nutritional contribution of aquatic organisms in the diet of rural people who produce or depend on rice*

## Outlook

Rice-based ecosystems were shown to be rich in aquatic biodiversity that is essential to rural households. However, more work and information exchange is needed. A regional workshop<sup>3</sup> in Xishuangbanna, China, in October 2002 which brought together the collaborators from the four Asian countries and selected policy makers highlighted the need for:

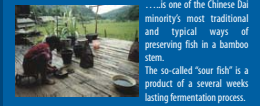
- Further analysis and follow-up of the Chinese and Vietnamese studies to include other countries in the region
- Increased information exchange to be facilitated by creating an informal Asian Aquatic Biodiversity Group
- More detailed, longer-term studies focussing *inter alia* on the quantitative contribution and nutritional aspects of the aquatic biodiversity to the diet of rice farming families

These studies are expected to provide a good basis for further insights not only into aquatic biodiversity but also into risks and benefits of alien species, endangered species, food security, gender and sustainable resource use aspects as well as possibilities for post-harvest value adding. Findings will also serve as important background information for similar activities in other regions such as Africa and Latin America.

The findings will support collaborative programmes with other organizations, in particular for a recently initiated joint activity between FAO, DFID, VSO, and NACA entitled Support to Regional Aquatic Resource Management (STREAM). Organizations in the field of sustainable development need to work further to integrate and mainstream agricultural biodiversity in their policies, programmes and activities in order to develop action plans on the conservation and sustainable utilization of agricultural biodiversity. An example would be **capacity building efforts** through integrated pest management and production (including aquatic resources) training as part of **Farmer Field Schools**.

## Traditional use

### Bangmai Bong Basong...



...is one of the Chinese Dai minority's most traditional and typical ways of preserving fish in a bamboo stem. The so-called "sour fish" is a product of a several weeks lasting fermentation process. Fresh fish, caught from rice fields or the river is first washed and scales and viscera removed (small fishes are used as a whole), then it is put into one part of the bamboo stem ("jar"), mixing it with salt and different spices such as chili, creating a tasty fish sauce during the fermentation. Then the "jar" is sealed with the other part of the bamboo stem and the fish is fermenting for at least two weeks. Bangmai Bong Basong served with rice is a common dish that becomes especially popular during the water splashing festival where it is usually served to honoured guests.

<sup>1</sup> Balzer, U., Balzer, P. and S. Pon. Traditional use and availability of aquatic biodiversity in rice-based ecosystems. I. Kampong Thom Province, Kingdom of Cambodia. Edited by M. Halwart & D. Bartley (FAO) and H. Göttsman (Guest editor, MRC). CD ROM. FAO, Rome, Italy. ISBN 92-5-104202-7. Also available at [www.ecoport.org](http://www.ecoport.org), click on eharrative, then cErticle, enter ID 131.  
<sup>2</sup> FAO 2002. Report of the International Rice Commission, Twentieth Session, Bangkok, Thailand, 23-26 July 2002. FAO, Rome.  
<sup>3</sup> FAO/NACA 2003. Traditional use and availability of aquatic biodiversity in rice-based ecosystems. Report of a Workshop held in Xishuangbanna, Yunnan, PR. China, 21-23 October 2002. FAO, Rome.

**Authors:** M. Halwart, A. Luo, E. Meusch, J. Margraf, N. Huy Dien, D. Bartley, I. Fleischer

**Contacts:** Matthias.Halwart@fao.org or Devin.Bartley@fao.org

**Acknowledgements:** Supported by the FAO/Netherlands Partnership Programme



**Food and Agriculture  
Organization of the  
United Nations**

[www.fao.org](http://www.fao.org)

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.