

Country reports

Alien aquatic species in Lao People's Democratic Republic

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Aquaculture development in Lao People's Democratic Republic is a combination of traditional methods and lessons learned from the neighbouring countries, such as China, Viet Nam and Thailand

Introduction

Policy formulation and strategies in fisheries are a recent development in Lao People's Democratic Republic, emerging over the past decade. More recently, interventions in fisheries have been directed towards the conservation of natural resources and the development of fish farming by decentralizing the fisheries management functions to local authorities. These activities have included:

- ▶ awareness building on the adverse impacts on the use of illegal and destructive fishing gears;
- ▶ promoting the sustainable exploitation and use of indigenous fish species;
- ▶ the establishment of fish breeding facilities;
- ▶ the use of non-carnivorous species in aquaculture;
- ▶ the careful use of exotic species in aquaculture.

Previous fisheries management measures that have been enforced by local authorities and by communities themselves have often resulted in conflicts and problems because of the lack of scientific based information responding to the root causes of the situations. This situation started to improve through the guidance of the Prime Minister Decree No. 118 on 5 October 1989 concerning the management and conservation of aquatic animals, wild animals, the hunting and fishing.

Fisheries management in Lao People's Democratic Republic in Nam Ngum reservoir has been assisted successively by many donors such as Netherlands,



Switzerland, FAO and Denmark, through MRC since the beginning of the establishment of the Hydro-Power reservoir. mainly Netherlands, Switzerland, FAO and Denmark.

Aquaculture development in Lao People's Democratic Republic is a combination of traditional methods and lessons learned from the neighbouring countries, such as China, Viet Nam and Thailand. Fish seed farms were built in many provincial capitals during the Indochina war period, especially during 1960s with USAID assistance in Vientiane, Savannakhet, Pakse, Sayaboury and Luang Prabang. In early 1970s, hatcheries were constructed in northern provinces (Houa Phanh, Xieng Khouang and Oudomxay) with the assistance of China and Viet Nam. From 1997 onwards there were a number of external assistance projects. A FAO/UNDP intervention assisting the Government in aquaculture development in areas such as capacity building, extension, fish seed production demonstration, fish culture techniques, information on technologies, hatchery rehabilitation. By the end of 2001 throughout the country there were fish seed hatcheries scattered throughout 18 provinces of Lao People's Democratic Republic, 30 existing hatcheries in which 17 belong to provincial Government and 13 belong to private farms. There were nine new hatcheries under construction. Altogether, these hatcheries and their production will form the basic infrastructure for the expansion of aquaculture in the near future.

Fisheries Development Program

Throughout the development of fisheries sub sector and particularly aquaculture, the promotion of the introduction of exotic species for aquaculture was problematic due to lack of supply and the inability to maintain the broodstock in sufficient numbers and quality. Several projects have also been targeted at the use and exploration of indigenous species. More than 500 species out of 1200 species in the Mekong River Basin have been identified (Fish of Lao by Maurice Kottelat 2001) with the assistance of World Bank, IUCN and WWF. This elucidated the high degree of fish species diversity, even though it is still incomplete. In the field of aquaculture, checking only the available aquatic biodiversity that is currently being utilized, it was found that there are nine exotic species and around 18 indigenous species found in subsistence farming type aquaculture. .

Indigenous species found in aquaculture comprised of: *Barbodes gonionotus* (Pa pak), *Channa micropeltes* (pa do), *Hampala macrolepidola* (pa soud), *Hemibagrus numerus* (pa kod), *Hemibagrus wyckioides* (pa kheung), *Pangassius kremfi* (pa souay), *Wallago leeri* (pa khoun), *Wallago attu* (pa khao), *Wallagodimina* (pa khop), *Osteochilus melanopleurus* (pa nock khao), *Cirrhinus molitorella* (pa keng), *Cirrhinus microlepis* (pa phone), *Labeo behri* (pa va), *Morulius chrysophekadion* (pa phia), *Probarbus jullieni* (pa eun), *Clarias* spp. (pa duk na), *Osphronemus exodon* (pa men).

Of the exotic species that are typically found (Table 1) are the: major India Carps like: *Labeo rohita*, *C. mrigala*, *Catla catla*, *Cyprinus carpio*, some Chinese carps: *Aristichthys nobilis*, *H. molitrix*, *Ctenopharyngodon idella* and *Oreochromis niloticus*.

In the aquaculture of indigenous Mekong fish species project (AIMS), Lao People's Democratic Republic has chosen to study seven species among 17 namely: *Barbodes gonionotus*, *C. microlepis* (by Km 8 Pakse station), *C. molitorella* and *Puntioplites falcifer* (by Nah Luang station), *Clarias macrocephalus*, *Morulius chrysophekadion*, and *Osphronemus exodon* (by Nam Huang station).

Fish farming systems and fish species

The main fish farming systems that are practiced in the country are: pond fish culture, integrated farming with livestock, rice cum fish culture and fish seed production. The above-mentioned fish farming systems are generally followed by farmers according to traditional methods that as prevail in their respective localities and according to their own experience and that of their neighbours. Other fish cultures systems are becoming increasingly popular in the country namely:

- ▶ cage culture in the main stream of rivers and reservoirs,
- ▶ hatchery and nursery farming systems,
- ▶ fish stock enhancement in small water bodies.

The indigenous species currently being bred and cultured extensively by farmers are pa pak (*Barbodes gonionotus*); While the snakehead (*Channa* sp.), and Gouramy (*Osphoronemus gourami*) are cultured by few farmers.

Other species indigenous to the Mekong and its tributaries have been imported to Lao People's Democratic Republic from adjoining Thailand. Fingerlings of *Barbodes gonionotus* were introduced to the Nong Teng fish farm in 1978 from Nongkhai fisheries station (on the opposite bank of the Mekong River Thailand) and were successfully bred for the first time in Lao People's Democratic Republic in 1980. Subsequently pa eun (*Probarbus jullieni*), pa keng (*Osteochilus prosemion*), pa phone (*Cirrhinus microlepis*), pa kaho (*Catlocarpio siamensis*), pa hou mat (*Pangassius larnaudii*), pa phia (*Morulus chrysophekadion*), pa men (*Osphoronemus gouramy*) and pa suey (*Pangassius hypothalamus*) were also subsequently introduced for culture.

Table 1. Information on alien species in Lao People's Democratic Republic

Fish Species	Date of first introduction	Origin	Reason	Ecological impact		Social economic impact	
				Positive	Negative	Positive	Negative
<i>Catla catla</i>	1977	Thailand/India	Aquaculture	Not destroy aquatic environment	None	Beneficial	Cannot breed in natural water bodies
<i>Ctenopharynx-odon Idella</i>	1977	China	Aquaculture		Probably yes		Cannot breed in natural water bodies
<i>Cirrhinus mrigala</i>	1977	Thailand/India	Aquaculture		Probably yes		Cannot breed in natural water bodies
<i>Clarias gariepinus</i>	1980	Viet Nam	Aquaculture		Yes		Low price, hybrid
<i>Cyprinus carpio</i>	1965	Thailand	Aquaculture		Yes	Beneficial, productive	
<i>Laobeo rohita</i>	1965	Thailand	Aquaculture	Not destroy aquatic environment	None	Beneficial	Cannot breed in natural water bodies
<i>Oreochomis mossambicus</i>	1965	Thailand/Japan	Aquaculture		Yes	Beneficial	People prefer
<i>Oreochromis niloticus</i>	Unknown	Thailand	Aquaculture		Yes	Beneficial	People prefer
<i>Pomacea canaliculata</i>	1986	Thailand	Ornamental	Unknown			Loss of money (impact on rice cultivation)

Apart from the import of indigenous species for culture, there is a long tradition of fish culture in paddy fields in northern parts of Lao People's Democratic Republic and the similarities with that practiced in surrounding countries (such as bordering provinces in Viet Nam and Yunnan, PR China) suggests that it has a long history in the region. *Carassius carassius*, known locally as "Pa fek" (or possibly *Carassius auratus*) is an exotic species that appears to be feral in northern Lao People's Democratic Republic in upland streams and paddy systems and has probably been introduced historically by the tribes in the mountains that practice rice fish culture. The common carp (*Cyprinus carpio*) is a more recent introduction to paddy field culture, but again, may have been translocated by migrations of tribes between China, Viet Nam and Thailand and therefore its arrival in Lao People's Democratic Republic is not certain but may well extend back well over a century.

POND FISH CULTURE

Pond culture is pursued as both polyculture and monoculture. There are 23 species of fresh water fish that are reportedly cultured in the country, of which the most popularly cultured species are: Tilapia (the strains are unknown and have been extensively mixed through serial introductions and movement), common carp (*Cyprinus carpio* as with Tilapia, this species has local coloured strains that may have along history, more recent introductions have been from development assistance activities and bilateral support from Hungary and Viet Nam), silver carp (*Hypophthalmichthys molitrix*), bighead carp (*Aristichthys nobilis*), grass carp (*Ctenopharyngodon idella*), Rohu (*Labeo rohita*), Mrigal (*Cirrhinus mrigala*), African catfish (*Clarias gariepinus*), Giant snake head (*Channa micropeltes*), silver barb (*Barbodes gonionotus*), *Cirrhinus microlepis*, *Cirrhinus molitorella*, *Morulius chrysophekadion*, *Osphronemus exodon* and *Clarias macrocephalus*.

INTEGRATED FISH LIVESTOCK FARMING

In addition to rice farming, livestock raising is a traditional practice in rural households. Fish culture with livestock (pig and poultry) has been introduced and is practiced by some farmers but is still relatively uncommon in the country – partly due to the tendency of small farmers to not pen livestock, limiting manure introduction directly to the pond. Fish production in demonstration areas where high levels of manure were delivered to the pond was increased from 100-500 kg/ha without integration to 1200-2500 kg/ha with integration (Gupta, 2000).

RICE CUM FISH CULTURE

Traditionally Lao farmers caught wild fish from natural sources than introduced to their paddy fields. However due to declining fish supply from natural sources and given importance of rice farming, there is growing interest in recent years in integrating aquaculture with rice farming in the country. This form of aquaculture is quite common in the northern Lao People's Democratic Republic.

CAGE FISH CULTURE

In recent year fish culture in cages is developed largely in the central part down to southern part of the country namely Vientiane Municipality, Vientiane province, Khammouane, Savannakhet and Champassak provinces. The farmers culture fish in cage in reservoir (Nam Ngum, Nam Houm, and Nam Xuang) and along the Mekong River, Ngum River. The most popular fingerlings being raised are sex reversed Nile tilapia which are typically imported from hatcheries across the Mekong river in Thailand. The result from cage fish culture are quite encouraging so far to the farmer who do not have access to ponds.

Recommendation of the national workshop on the impact of exotic fish species in Lao People's Democratic Republic

The national workshop on the impact of exotic fish species in Lao People's Democratic Republic was conducted by the Department of Livestock and Fisheries of Lao People's Democratic Republic (DLF) and Asian Institute of Technology (AIT) with financial support from SIDA. The workshop was held in Thalat, Vientiane province from 22 to 24 November 2002.

The workshop reviewed the alien species currently cultured in Lao People's Democratic Republic (Table 1). The summary of this review is presented in Table 1.

The workshop:

- ▶ Recognized that the introduction of introduced fish has positive impact to the socio-economy of the country and also has had impacts on aquatic resources.
- ▶ Understood that grass carp, African catfish and common carp are a risk to aquatic environment. The meeting agreed that these alien species should not be released into water bodies without deep technical study.
- ▶ Recognized that the importation of aquatic animal and aquatic plants are a high risk for the introduction of fish disease into the country. Therefore the country should consider an arrangement to establish regulations for controlling aquatic animals.
- ▶ Recognized that due to the high risk of alien fish species, they should only be promoted in suitable areas that are secure enough to minimize impacts.
- ▶ Recommended publishing of technical guidelines, regulations and policy on sustainable aquaculture and fisheries in order to reduce negative impacts of alien species and promote their positive impact.
- ▶ Recommended appropriate conditions and methodologies in establishing the technical infrastructure for serving export and import services.
- ▶ Noted that there was a need to enhance public awareness on the negative impact of import introduced aquatic animals and aquatic plants into the country nationwide, in order to ensure wide participation in their monitoring and management.
- ▶ Recommended that there should be continuing studies to solve the anticipated problems of the future.
- ▶ Realized that there was a need to study new indigenous aquatic animal species in order to develop economically in the future.

Future Plans and Cooperation

Lao People's Democratic Republic lists the following as important elements of a national plan on responsible use of alien species:

National Plan

- ▶ Study on new biogenetic resources and technologies.
- ▶ Study on an appropriate environment for culture.
- ▶ Assessments on aquatic animal and aquatic plant diseases.
- ▶ Study on types of fish farming.
- ▶ Study on the fish farming and fish feeding.
- ▶ Study on the brood stock management and culture.
- ▶ Study on culture of indigenous fish and promotion of indigenous species as for the ornamental fish market.

Regional Cooperation to promote the Plan includes:

- ▶ exchange of information on health issues in aquatic animals and plants;
- ▶ establishment of Set regional guidelines on quarantine and health certification;
- ▶ immediately reporting to neighbouring countries on outbreaks of aquatic animal disease.