

Fisheries, Aquaculture and Stock Enhancement in Lao PDR

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Introduction

Fisheries development in Lao PDR is confined to inland fisheries development and sustainable freshwater aquaculture including culture-enhanced capture fisheries and fishery-enhanced aquaculture. Given the potential of water, wetland and aquatic resources and the magnitude of decline in fish catches from the Mekong River and its tributaries, the Government of Lao PDR has given priority to fisheries development with strong concern for sustainable aquaculture. The overall policy framework is therefore geared toward the sustainable use, appropriate management and protection of natural resources: forest, land and water resource including aquatic biodiversity. The national goal for fisheries development during the last decade was focused on how to increase fish production from aquaculture while maintaining capture fisheries, recognizing that about 50% of the

dietary protein of Lao people comes from living aquatic resources which are important for food security of the nation.

Endangered Species in Fisheries

According to Article 18 of the Regulation of the National Conservation Forest, Aquatic Animal and Wildlife (Reference No. 0524/MAF.2001, 7 June 2001), endangered aquatic animals and wildlife in Lao PDR are classified into two categories:

- 1) Protected species – rare aquatic animals and terrestrial wildlife with high conservation value, importance and usefulness to society (Table 1). Fishing and hunting of protected species are prohibited for all seasons.
- 2) Controlled species – rare aquatic animals and wildlife whose populations are threatened

Table 1. List of protected freshwater species.

Lao name	English name	Scientific name
Pa kha	Irrawaddy dolphin	<i>Orcaella brevirostris</i>
Pa phalay	Sting ray	<i>Dasyatis laosensis</i>
Pa kouang	Croaker	<i>Boesemania microlepis</i>
Pa beuk	Giant catfish	<i>Pangasianodon gigas</i>
Pa leum		<i>Pangasius sanitwongsei</i>
Pa seua	Tiger perch	<i>Datnioides pulcher</i>
Pa laifaitfa	Electric eel	<i>Anguilla marmorata</i>
Pa meo		<i>Setipinna melanochir</i>
Pa eun khao	Thicklip barb	<i>Probarbus labeamajor</i>
Pa bou	Gobies	<i>Oxyeleotris marmorata</i>
Pa kheung		<i>Hemibagrus wykoides</i>

Table 2. List of controlled freshwater species.

Lao name	English name	Scientific name
Pa souay	Pangasius	<i>Pangasius krempfi</i>
Pa fa ong	Freshwater turtle	<i>Amyda</i> spp.
Pa khoun		<i>Wallago marmorata</i>
Pa deng		<i>Tor</i> spp.
Pa nang deng		<i>Hemisilurus</i>
Pa phone		<i>Cirrhinus microlepis</i>
Pa makway		<i>Luciosoma</i> spp.
Pa keng		<i>Cirrhinus molitorella</i>

with extinction. People can use these species for home consumption but not for large scale harvesting or trade. Fishing and hunting are not allowed during the breeding season.

There is insufficient information regarding the current status of the protected and controlled aquatic species in Lao PDR. Many are most likely in critical status, while others may require a review of their conservation status. Based on Tables 1 and 2, only three species are included in the CITES list: *Orcaella brevirostris* (Pa kha), *Pangasianodon gigas* (Pa beuk) and *Probarbus labeamajor* (Pa eun khao).

Why endangered?

With the country's vast water resources, a large number of indigenous species is present within the different ecosystems. The Mekong River and its tributaries have been heavily fished resulting in the decline and endangered status of many species especially the Mekong River Irrawaddy dolphin at the Cambodia-Lao PDR transboundary pool. The Government of Lao is a CITES member and retains internationally important populations of many declining and otherwise threatened species.

The causes for declining species are as follows:

- 1) Illegal fishing (electro-fishing and no seasonal fishing)
- 2) Harassment from tourist, fishing and passenger boats in the dolphin areas

- 3) No dolphin management committee
- 4) Use of gill nets (all mesh sizes)
- 5) Overfishing and increase in number of fishers (especially large scale commercial fisheries)
- 6) Use of explosives
- 7) Shallowing of deep pools due to sedimentation and habitat change
- 8) Water pollution from oil and mining
- 9) Noise problems created by fast boats
- 10) Natural death and disease

Status of Seed Production Technology of Freshwater Species

Aquaculture development in Lao PDR has been a tradition with lessons learned from neighboring China, Vietnam and Thailand. The seed farms were built in many provincial capitals especially in Vientiane, Savannakhet, Pakse, Sayeboury, Louang Prabang, Houaphanh, Xiengkhouang and Oudomxay. As of 2001, there were 30 existing hatcheries (17 government-managed and 13 privately run farms), and 9 are under construction. This will be the basic infrastructure for expansion of aquaculture in the near future.

Broodstock development and management

The basic element of profitable fish production is sufficient and good quality breeding material including brood fish, eggs, larvae,

fry and fingerlings for supply to the farmers. The important parts of broodstock management are:

- 1) Procurement, development, rearing and maintaining of broodstock
- 2) Provision of optimal living conditions for broodstock and young
- 3) Selection and basic genetic improvement of broodstock
- 4) Preparation of spawners for reproduction
- 5) Development of breeding program and providing good quality seeds to the farmers

Broodstock management as a substantial component of fish farming depends on hatchery managers, technicians and fish farmers who maintain, select, and produce the broodfish. Hatchery managers should take care of all the responsibility of breeding work. Environmental conditions during rearing also strongly determine the spawning potential of broodfish, feeding management and handling methods.

Nursery systems

The recommended stocking rate for one-week old fish fry commonly cultured in the country are 400-500/m² in earthen ponds (more than 60 cm water depth) and 250/m² in cement tanks (more than 50 cm water depth). Fish fry are stocked at these densities for up to one month or until they reach a size of 2-3 cm, after which densities are reduced since competition for food and space will increase quickly, and growth and survival of the fry could decline. Once the fry reach 2-3 cm, intensive nursing in net cages is an option if flowing water and aeration are available.

Legislation

The Lao PDR government has given emphasis to fisheries and aquatic resources management, while other related laws covering forestry, land, water, and environment have also been formulated in support of fisheries

management. Fisheries management functions have been decentralized and local authorities have been assigned to ensure the conservation of natural resources and development of fish farming. Local authorities are responsible for promoting public awareness on the adverse impacts of illegal and destructive fishing gears, sustainable exploitation, use of indigenous fish and non-carnivorous species, and the careful use of exotic species in aquaculture.

Fisheries management measures have been enforced by local authorities and communities themselves with many prejudices, conflicts and problems. It was due to unverified scientific information responding to the causes of the problems at the grassroots level. For this reason, the Prime Ministerial Decree 118 (5 October 1989) concerning the management and conservation of terrestrial and aquatic animals, as well as regulation of fishing and hunting activities, was declared and enforced.

At present, regulatory policies for aquaculture and fisheries have not been formulated. There is a need to establish appropriate laws in aquatic resource management, development and research in the country.

Stock Enhancement

With the increase in economic development and growth in both domestic and regional trade, the demand for fish has likewise increased. It is believed that increased production from capture fisheries may not be possible, so it has to come from aquaculture or enhancement of fisheries. Viable fish farming systems and management practices have been promoted, with more focus on rural aquaculture, e.g., fish seed production and nursery, small-scale fish culture in pond, rice-cum-fish farming, enhancement of communal water bodies, integrated fish-livestock farming, extensive to semi-extensive cage culture of fish, and environmentally sustainable commercial fish farming.

National restocking/stock enhancement program

Fisheries and aquatic resources in Lao PDR are also of immense importance in restocking, if we consider more than one million hectares of water resources from the Mekong River and its tributaries, swamps, rainfed ricefields, flood plains, reservoirs (natural and man-made), and other wetlands. Capture fisheries resources have been declining. For sustainable use of aquatic resources, the Forestry Law (Reference No. 01-96 dated 10 November 1996, Article 46) declared 13 July of each year as the day for releasing fish and protecting aquatic animals and wild life. The current stocking rates in natural water resources are generally low due to a shortage of seedstock. However, about 34.5 million fish were stocked in lakes and reservoirs throughout the country last 1-13 July 2004. The species were mostly tilapia, *Cirrhinus microlepis* (Pa phone), *Brobarbus jullieni* and *Hypophthalmichthys nobilis* (Big-head carp).

The development program of aquaculture in Lao PDR is focused on the following activities:

1. Rehabilitation of fish hatcheries and expansion of fish seed production and distribution
2. Development of small-scale breeding facilities at local level
3. Development of rural aquaculture
4. Improvement of fish feed

Strategies

Fisheries and aquatic resources research and development should concentrate on resource assessment and also community studies, aquaculture and extension. Therefore, short and long-term research and development priorities for the fisheries sub-sector should focus on the sound management of declining harvests from rivers and reservoirs,

minimizing impacts, and preserving aquatic biodiversity. Different forms of aquaculture must be promoted, especially of species which are preferred by local folk and which comprise most of the total fish production in the country. Government programs should be geared towards the promotion of low-input technologies such as rainfed rice-cum-fish and integrated small fish culture, which are well within the reach of marginalized fish farmers in the rural areas.

Capture fisheries

Appropriate strategies for fisheries management should be based on the Code of Conduct for Responsible Fisheries (FAO 1995), Convention on Biological Diversity (particularly its implications for fisheries management), and Convention on Migratory Species.

In the context of Lao PDR and the Lower Mekong Basin, there is still a need for greater understanding of the physical and socio-economic settings of present endowments in aquatic resources. Riverine ecology, taxonomy, fish life cycle, fish habitats and breeding grounds, aquatic plants and animals, and wetland values need to be indentified and reassessed.

For best management practices, some key factors should be considered such as:

1. Centralization of fisheries management functions to empower local communities to participate in co-management functions using local knowledge and effective traditional management systems
2. Implementation of policies that prohibit illegal and destructive fishing gears and practices, by building awareness on adverse impacts, enforcement of regulation and encouragement of alternative means of livelihood
3. Introduction of rights-based fisheries in some important reservoirs and fishing grounds

4. Promotion of the importance of freshwater fisheries for local food security, rehabilitation and restoration of habitats for migratory fish, restocking of indigenous fish species, and promotion of culture-based freshwater fisheries, where appropriate
5. Use of national statistical systems by focusing on clear objectives and results directly related to fishery management decision-making and planning processes

Aquaculture

For the development of aquaculture in Lao PDR, the basic principle adhered to is poverty alleviation covering aspects of social equity, gender equity, environmental sustainability, economic viability and good governance. Among the key elements identified during the February 2000 Conference on Aquaculture in the Third Millennium is The Bangkok Declaration and Strategy. At this stage of aquaculture development, Lao PDR should incorporate the following elements in the government's development strategies:

- 1) Invest in aquaculture development
- 2) Integrate aquaculture into rural development
- 3) Manage aquaculture health
- 4) Apply genetic methods in aquaculture
- 5) Improve nutrition in aquaculture
- 6) Improve food fish quality and safety
- 7) Promote market development and trade
- 8) Strengthen institutional support
- 9) Strong regional and inter-regional cooperation

Monitoring

Monitoring of fisheries and aquaculture management include the following:

- 1) Establish and implement comprehensive policies for innovation in fisheries management
- 2) Develop measures to prevent unauthorized fishing and eliminate the use of illegal and destructive fishing gears,

build awareness of their adverse impacts, develop and promote responsible and selective fishing gears and practices, enforce regulations and encourage alternative means of livelihood

- 3) Investigate the potential of under-utilized fisheries resources and promote their exploitation in a precautionary manner based on the best available scientific information under rights-based fisheries regimes
- 4) Coordinate and decentralize collection and use of fisheries-related statistical data among national fisheries and other authorities, including those responsible for food, trade, vessel registration, aquaculture and rural development
- 5) Develop national statistical mechanisms for the exchange of statistical data and related information
- 6) Ensure production of high quality seeds, develop domesticated broodstock and promote responsible collection and use of wild broodstock and seeds
- 7) Reduce the risks of negative environment impact, loss of biodiversity and diseases
- 8) Build human resource capabilities for environment-friendly aquaculture

Government agencies and NGOs involved

For fisheries development and management and sustainable aquaculture, the Ministry of Agriculture and Forestry, and Department of Livestock and Fisheries cooperates with the Forestry Department, Irrigation Department, National Agriculture Research Institute and Science and Technology and Environment Agency. Over the last decade (1990-2000), numerous activities have been conducted with the valuable assistance and cooperation of many donor countries, international organizations and NGOs namely the Mekong River Commission, Fisheries and Agriculture Organization-United Nations Development Programme, Danish International Develop-

ment Agency, International Development Research Centre of Canada, Japan International Cooperation Agency, Swedish International Development Agency, and Australian Center for International Agricultural Research.

More than 30 activities have been carried out for sound fisheries management and interventions in collaboration with other sectors, and private firms through bilateral, multilateral and regional assistance. These include inventories, assessment, biophysical studies of resources, surveys, socio-economic studies, community awareness, post-impoundment management, etc.

Co-management of fisheries

The process of establishing fisheries co-management in Lao PDR includes the following: field survey, data collection, meetings and discussion with farmers to find out problems, organizing the commu-

nity, election of representatives from fisher groups, planning the activities to address the identified problems, implementation of activities, monitoring and evaluation of activities, and reviewing current plans and establishing new plans.

Conclusion

An expanding human population and poverty make the conservation of endangered species in Lao PDR difficult because poor people in rural areas still suffer from inadequate nutrition. The importance of indigenous fish species in Lao PDR and the value of food and income generated from capture fisheries have not been emphasized and made aware to the public. It is in this regard that people must be informed of their social responsibility to maintain and conserve fish biodiversity if only to protect this valuable food source.