

# Sustainable Aquaculture and Resource Enhancement in Lao PDR

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## Introduction

Lao Peoples Democratic Republic (Lao PDR) is a landlocked country. Located in Southeast Asia, it is bordered by Viet Nam to the east, Cambodia to the south, Thailand to the west and south, and Myanmar and China to the north. It has rugged terrain, largely mountainous, but not in the developed part of the country. The surface area of Lao PDR covers 236,800 km<sup>2</sup>. It suffers from limited infrastructure and a limited human capital base. It is home to many emerging social and economic institutions.

Fish and fisheries play an important economic role. Their contribution has been estimated at 7-13% of GDP by various surveys. The population depends heavily on the Mekong River and its tributaries, flood plains, swamps and rice fields for fish production. The waters are rich in biodiversity, but catches are declining due to increased fishing pressure brought on by increasing population and especially from modifications in the hydrology of the river due to implementation of irrigation, flood control and hydro-power development projects, deforestation and pollution.

Lao PDR has no outlet to the sea. It borders five countries. It is not a very populous country. Based upon the United Nation's estimates, its population is slightly more than 7.1 million people. Less than half of the population live in or around urban areas which are located near the rivers.

Nevertheless, between 70 and 80% of the people in Laos PDR live a rural lifestyle and many of those living in rural communities rely heavily on aquatic resources for animal protein. Thus, fish and fish production are of critical importance.

There is substantial opportunity and resources available to enhance and augment aquaculture development in Lao PDR. It has abundant water resources and potentials for fisheries. Included in these are the Mekong River and its 14 tributaries, large reservoirs, shallow irrigation and weirs, wetlands and swamps, and rain fed rice fields. Lao PDR has twelve reservoirs which could possibly be used for fish stock enhancement practices. Other fish stocking sites have been identified. Almost 500 fish species have been found in Lao PDR including 22 exotic species and more are being identified (Vonglokkham, 2017).

The fish farming systems are diverse and independent varying from rice farms, cages, ponds, community ponds and hatcheries. More than 18 indigenous species have been used in various types of fish farming: collecting the fry from the wild, artificial reproduction in captivity; and reproduction in fishpond culture by private and government hatcheries. Several common carp species which are easy to rear and are fast growing are being used for fish stocking.

Despite the steps which Lao PDR has

taken, significant challenges remain. To begin with, there is a need to gather baseline data for various types of water bodies, establishing simple and low-cost monitoring programs for selected water bodies and training the technical staff at all levels and obtaining the support and cooperation of local authorities.

It must be remembered, too, that Lao PDR is a poor country. Human and capital resources are in short supply and constant demand. In order to succeed, the focus must be on certain priority areas. Fish culture systems must be adapted to a specific area depending on local conditions. More focus must be given to discovering what works best and most productive in different fish farming systems. Finally, we must improve feeding techniques and the quality of the feeds.

Government estimates of fish consumption per capita in 2003 is 18 kg which accounts for 40 to 50% of animal protein intake (Mantingh, 2006). By 2020, the government has targeted fish consumption per capita at 20-23 kg.

## **Administration of fisheries and legal framework**

In Lao PDR, fisheries and aquaculture activities are administered by the ministry responsible for agriculture. The Fisheries Section is lodged in the Technical Division of the Department of Livestock and Fisheries (DLF) of the Ministry of Agriculture and Forestry (MAF).

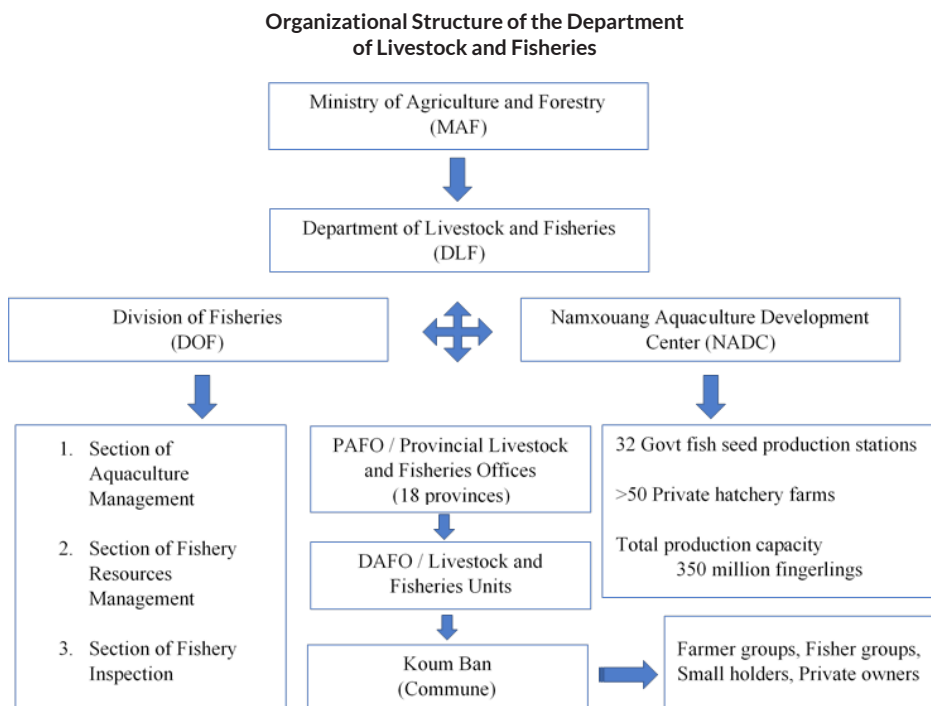
In 2007, the government undertook an overhaul of the major ministries which included the MAF. It was implemented by a committee which was established to improve the effectiveness of the administration by identifying institutional deficiencies and suggest re-organization of the ministry. The Fisheries Division

was inaugurated as a division under the authority of the DLF. It enabled the fisheries and aquaculture issues to receive more prominence although it remains a small department with a small staff and limited financial resources. Subsequently there have been additional resources allocated so that fisheries and veterinary staff were strengthened in both the province and district levels.

It is worthwhile to draw attention to the National Fisheries Development Center (NFDC). It was the first facility in Lao PDR that housed both a training and research facility and which can organize international courses and workshops and hold international events and collaborate on research with foreign organizations. It has assisted in the promotion of target species such as common carp, tilapia and catfish.

## **Fisheries law**

Beginning in the mid 1990's the government began to recognize the interconnectedness of aquatic resource management. There were series of laws enacted, i.e. The Agricultural Law, The Penal Law, Forestry Law, Water Resources Law and the Aquatic and Wild Animals Law. Those laws had been the basis for guidelines and instructions issued by local authorities to local communities for the management of aquatic resources as well as aquatic biodiversity of their areas. A new fisheries law was enacted in 2009. It is comprised of 10 chapters and 72 articles. The law defines the framework for implementing, managing, monitoring, and inspecting capture fisheries and aquaculture. It aims to promote aquaculture, conserve and protect fisheries resources for sustainable development and ensure the availability of fish and other aquatic animals for food security, contributing to the socio-economic development of the nation.



**Figure 1.** Organization Structure of the Department of Livestock and Fisheries (DLF) in Lao PDR (Phounsavath, 2015)

The law provides for community fisheries management and control measures indicating the right of local communities to manage and utilize their resources. In addition, the law empowers communities to establish village or community fisheries management committees for specific water bodies. The law also covers their organizational structure and roles and responsibilities in establishing fisheries protected areas and community ponds as well as the formulation of village fishing regulations.

The law provides for a very significant improvement of the former situation bringing fisheries management within one cohesive framework. The law provides for protection of aquatic resources and ecosystems and prohibits capture of designated threatened species and for some other species the law provides for special management by local authorities.

Some articles prohibit destructive fishing methods such as, but not limited to, use of illegal fishing gear, explosives and electric current. Other articles protect breeding, nursing and feeding grounds including other ecosystems such as deep pools, fish conservation zones, important wetlands and rapids.

## Water resources, fish, and fisheries in Lao PDR

Lao PDR can be divided into three physiographic zones: the Northern Highlands, the Annamite Range, and the Mekong Plain. The three zones are parts of four biogeographic units - the unit of Annam, the tropical lowlands, the tropical montane or mountainous country, and the sub-tropical transition zone. Approximately 88% of the total surface area of Lao PDR forms the catchment of the Lower Mekong Basin. The Mekong

and its 14 tributaries have been estimated to have an approximate water surface of 2,500 km<sup>2</sup>. Additionally, there are many other streams and rivers draining to the Mekong River.

Capture fisheries and aquaculture are based on water resources ecosystems mainly consisting of rivers, streams, irrigation reservoirs, hydropower reservoirs, weirs, swamps, natural water bodies, flood plains, and wet season rice fields. The people of Lao PDR especially in the rural communities which account for nearly 75% of the population depend upon the country's fish and other aquatic animals as their most reliable sources of protein.

As mentioned earlier, nearly 500 fish species have been identified in Lao PDR which includes 22 exotic species. Other aquatic animals include about 37 amphibians, seven species of crabs and 10 species of shrimp. More than 18 indigenous fish species have been used in various types of farming and more than 20 species of freshwater fish are cultured in the country. Some of those species are Chinese carp, grass carp, bighead carp, tilapias, African catfish snake head and silver barb. Fish culture can reward the farmers financially as well as nutritionally.

There are several fish farming systems common in Lao PDR: pond fish culture, integrated fish-livestock farming, rice-fish farming, cage fish culture, and culture-based capture fisheries.

Studies conducted in neighboring countries have shown the viability of integrating agriculture, aquaculture and livestock farming as waste from one system can be recycled in the other system. This fish farming system is only applicable in rural households. Most households are small

farm holders who grow rice and raise some livestock such as pigs, chicken and ducks. Integrating different farming systems can assist small farm holders who face obstacles in obtaining and paying for feeds. Although this system may help small farm holders it will have minimal impact on the overall goal of increasing fish production.

Rice-fish farming has been practiced for centuries. The government has sought to codify provisions governing access to rice field fisheries. Initially, it recognized two separate regimes of access depending on whether the area where the rice fields are located is flooded. Normally, a person wishing to fish in a rice field must obtain permission from the field owner or from whoever has the land use right over that field. However, in the event of a flood there is no requirement to obtain permission. Farmers in the north objected to this provision since their rice fields are flooded for a much shorter time than in the south and those farmers feared damage to their rice crops. The laws were adapted to reflect the diversity of practices throughout the country. Nevertheless, rice-fish farming like integrated fish-livestock farming has little impact on the overall goal of increasing fish production.

Unlike rice-fish farming and integrated fish-livestock farming, fish cage culture has the potential to significantly impact fish production. Farmers who do not have access to ponds can practice aquaculture in bodies of surface water such as reservoirs, rivers, irrigation canals, etc. In neighboring countries, farmers grow high value species with supplemental feeding. Fish culture in cage should encouraged as well as regulated.

In many villages in the country, there are communal ponds and water bodies used by village inhabitants as open access for

fishing. Some villagers stock fingerlings of various species to supplement the wild fish in the water body. This system of culture-based capture fisheries can serve to augment the local diet and source of nutrition to the villagers. Where possible, this practice should be encouraged and aided by government resources.

## **National strategy for fisheries management and development**

It is the government's highest priority to obtain food self-sufficiency in agriculture and fish products. This is expected to aid in overcoming poverty in rural areas, improve the nutritional level and economic status. Current national agricultural and fisheries development policies will center around the following objectives (USAID Oceans and Fisheries Partnership, 2020):

1. To meet food security, especially protein intake. It is estimated that 33% of Lao PDR children under 5 years of age PDR suffer from stunting i.e. impaired growth and development due to poor nutrition;
2. To ensure the provision of fishery products as commercial commodities for local markets and for future export;
3. To support the rural development to alleviate poverty and create income generating opportunities;
4. To reduce slash and burn cultivation by integrating fish culture into the upland farming systems;
5. To contribute to the sustainable use, appropriate management and protection of aquatic resources including aquatic biodiversity.

6. To upgrade and establish basic infrastructure required for further aquatic resources research management and development.
7. To strengthen, upgrade, and perform the technical support services in research, extension, management, and development of subsectors such as Living Aquatic Resources Research Institute, Inland Fisheries Development Center, and Aquatic Animal Health Diagnostic Network.

## **DLF Policy for aquaculture development focus on priority areas.**

In conjunction with the National Strategy the DLF has adopted the following strategies to focus on the following priority areas:

1. Assess traditional fish culture systems and flood plain resource potentials in different agro-ecological zones.
2. Search for and promote appropriate types of extensive and semi-extensive farming systems.
3. Search for approaches and efficient interventions or extending fish seed distribution networks.
4. Search for and develop appropriate extension approaches for upgrading the many small holder farmers in rural areas.
5. Fish disease prevention.
6. Improvement of feeding techniques and quality of feeds.

## Challenges

Lao PDR is a small country with a small population. Although the economy of Lao PDR is one of the world's fastest growing, it is still one of the poorest countries in the region. It has a large but uneducated workforce. A large portion of its economy is maintained by foreign investment. Lao PDR has a great deal of hilly and mountainous national land with different climate areas. Although it has abundant traditional fish varieties, it makes poor use of improved varieties. It has the potential to harness organic aquaculture, but currently makes limited use of inputs.

## Recommendations

The development of aquatic resources should be given a higher priority by the government since it is a key component in improving food security. Aquatic resources have the potential to generate cash income, provide employment opportunities, and diversify aquaculture as well as agricultural development.

Lao PDR should monitor capture fisheries as regards to resource management, as

well as promote sustainable aquaculture. Research and development issues mandate balance development between aquaculture, fisheries and the aquatic environment. Each sub-sector demands technical development, training at all levels, and the involvement of higher education.

As mentioned earlier, there is a need to gather baseline data for various types of water bodies, establishing simple and low-cost monitoring programs for selected water bodies. It is also necessary to conduct surveys and research on the protection of fisheries production and biodiversity, while keeping in mind the habitat change, overfishing, pollution and the impact of newly introduced species.

Flexibility is critical. Farmers have been culturing fish without government inputs. New methods must be introduced with care and the farmers must be convinced of the benefits of change. Farmers and villages must be encouraged to consider and implement fish culture in cages and the DLF must be ready to assist in the implementation.

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