The Portrait of Women’s Participation on Inland Fishery Activities in Lao PDR

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Abstract. Lao PDR faces the challenges of raising the standard of living because of a rapidly expanding population, and one way is to increase the fishery sector roles. Women also involved in fishery activities, however, information on the roles and functions of women of capture fishery and aquaculture activities, fish processing, and marketing is still completely limited. The field survey was conducted in 2016-2019 in Lao PDR (Nam Xouang Reservoir, Nam Ngum Reservoir, and Nam Houm Reservoir). The study was carried out by collecting the primary data and secondary data. The primary data was obtained by interviewing the women who practiced fishery activities, while the secondary data was from the statistical data. The data was arranged in tabulation and descriptive, as well as analyzed qualitatively. The results showed that the participation status of the women who live surrounding the reservoir is satisfactory. Nevertheless, it needs to improve the women's consciousness of modern techniques for capturing, culturing, processing the fish, and marketing. It is expected that the finding of this research will help policymakers to take a useful initiative to improve the women's roles in participating in increase their family welfare and as the actor in the fishery community.

1. Introduction

As the mountainous landlocked country in Southeast Asia, Lao PDR was bordered by five countries: China, Myanmar, Cambodia, Viet Nam, and Thailand. Lao PDR has an area of 236,800 km², with the capital is Vientiane. 87.7 percent (207,674 km²) freshwater drain into the Mekong River, make it necessary for both fishery resources and aquatic biodiversity [1]. Based on [2], the Lao People's Democratic Republic's current population is 7,294,119, with a population density is 32 per km². 35.7 % of the population is urban. Lao PDR does not have a marine area. [3] reported that the average estimated the country’s fish consumption of freshwater fish is 24.5 kg/capita/year.

The inland fishery is practiced on freshwater resource ecosystems, which are rivers, streams, reservoirs, flood plains, as well as rice-fields [1]. In the dry season, the Mekong Basin water flow is decreased, whereas the fisheries and water quality for domestic need had got a large impact by decreasing river discharge. The decline of fish catch had a serious impact on local villages. Nowadays, the river downstream of the dam has fewer species [4]. Lao PDR has a diverse ecosystem and aquatic species. More than 480 freshwater fish species have been identified that include 22 exotics [1]. Most of these aquatic species are produced through inland capture fisheries and aquaculture, mainly for human consumption [5].

Fish is one of the cheap protein sources. The need for food and nutrition security is concomitant with the country’s population growth. The demand for fishery products continues to grow, and the greatest effort fisheries sector is to supply the increasing demand. But it needs to ensure the supply will be continuously available for future generations. Lao PDR's rapidly expanding population faces the challenges of raising the standard of living to support economic development. Therefore, it is...
necessary to increase the fishery sector roles but constantly keep sustainability, one of which is to improve women's ability. However, information on women's roles and functions on capture fishery, aquaculture activities, fish processing, and marketing for increasing their livelihood are still completely limited, making it an interesting subject for a study.

2. Materials and methods

In this study, the primary and secondary data were collected. Researchers used individual interviews, direct observation methods to identify and analyse data as the primary data. At the same time, the secondary data were collected from the institutions and previous studies. Ten respondents for each reservoir were the women involved in fishery practices surrounding the Nam Ngum Reservoir, Nam Xouang Reservoir, and Nam Houm Reservoir of Lao PDR (Figure 1). The field survey was conducted in 2016-2019.

![Figure 1. Map of Lao PDR, (a) Nam Houm Reservoir; (b) Nam Xouang Reservoir; (c) Nam Ngum Reservoir](image)

The designed questionnaires covered women's role in fish capturing, fish culturing, fish processing, and marketing. The fishery staff of the government selected the respondents. The respondents were encouraged to express their opinion about fishery practices in a discussion. District officers also provided the local fishery profile information. The discussion was conducted in the Lao language, and the district officer assisted to translate it into English. The results showed in tabulation and description. The data were analyzed qualitatively. The score was given to show the condition's level, plays a role or not, for each activity. Score 1 means "somewhat" that can be increased, while score 2 means "very" indicates the strength.

3. Results and discussion

3.1. Issues and constraints

The fisheries management in Lao PDR focuses on three aspects: (1) management of people; (2) management of fish; and (3) management of fish habitats [5]. This paper talked about the management of people. Management of people entails organizing the local fishers, fishers’ groups, gender issues, and other key stakeholders into local fisheries management bodies with clear roles and responsibilities and officially approved by local authorities. The communities directly depend on fishing and aquaculture, and it makes the reservoirs fisheries are increasingly important. For that reason, It is important to keep sustainable biodiversity [6]. The promotion of alternative livelihood is encouraged to improve the well-being of local fishing communities [5], and one way is to identify women's participation.

It has been identified that increasing the role of women is a challenge. Many constraints come because of the certain perspective that men are higher than women. [7] reported that before 1975, women in Lao PDR were mostly involved with household management and child care. Generally, women did not have access to school or increase their agriculture and fishery skills. This lasted until 1992, Lao women had still far from achieved parity with Lao men. Although some women had a chance to reach greater levels by getting a higher education and having better employment, women’s social status and representation have remained low. Women made up 52.8 percent of active workers. They are involved in various sectors, including fishery practices. Even so, the women were still childcare and housework as the major responsibilities.
The educational background of women is an essential factor as it eases to absorb new knowledge and technologies. Lack of training outside of school has also constrained the women in making decisions on their livelihoods, including fishery practices. As a result, they continue to do the same traditional ways without any improvements. Recently, the government and its partners' projects taught the training on capture fisheries, aquaculture activity, processing the fish, and marketing for women. Hence, their enhanced knowledge can help them to practice and implement in their life.

3.2. The fisher community

The people traditionally live side of rivers, and fisheries are a part of their livelihood. They earned money by going to fish and raising the fish in both natural and constructed habitats. The main fish production in Lao PDR is from capture fisheries, support by stocking the seed from the aquaculture. Stocking the seed plays an important role in increasing the wild catch. Since the rapidly expanding population, Lao PDR encounters the challenges of raising the standard of people living. Simultaneously, Lao PDR has to protect the environment for supporting the life and income source for people and the future. Women make up 47% of the fisheries supply chain workforce [8]. The overview of employment and income in fisheries has to count the fishing and aquaculture, leading to fish production for home consumption and money earned. Generally, the role of women in fisheries has been most visible in post-harvest activities [9].

To increase women's participation in all aspects of the fishery, gender motivators' roles are needed, and the government encourages these issues. In developing the Fisheries management committee (FMC), as a fisher organization and fishers' association to manage fisheries, women's roles are raised. In the FMC, the fishers could effectively manage the fisheries and resources by themselves. The persons who participated in the community organization list are both men and women. FMC actively holds the meeting every month to know the problem of their fishery activities.

Nam Ngum reservoir is located in Vientiane and Bolikhamsai Province. It was built in 1970 with a total area of 477 km2, and the maximum depth is 90m. About 16,000 people are living around the reservoir in 74 villages. There are 52 fish inhabited in the reservoir, including the exotic species such as Nile tilapia (Oreochromis niloticus), grass carp (Ctenopharyngodon idella), rohu carp (Labeo rohita), and common carp (Cyprinus carpio). There are two groups of fish processing. They make dried fish, salted fish, smoked fish, and fish sources. There are five aquaculture activities in this area. They operate two freshwater aquaculture types: Cage culture (for culturing the giant snakehead) and pen culture (culturing the tilapia and carps). Fishers are classified into two categories, “non-registered” fishers who can operate fisheries just in front of their house (for their own consumption), and “registered” fishers.

Nam Ngum Fisheries Management Centre (FMC) was established in 1997. The respondents were the Head Village and 6 women who include in the FMC. Nam Ngum FMC gives license for fishers, and it is called the registered fisher. A registered fisher is a full-time fisher who earns money from capture practice and marketing by themself. Nam Xouang reservoir is located on the border between Naxaythong district, Vientiane Prefecture, and Phonhong district, Vientiane Province. It was built in 1976 and had a total area of 16 km2. It is used for irrigation, capture fishery, and aquaculture. There are 10 villages around the reservoir. 20 fish species inhabit this reservoir, but the restocking activities changed the species composition.

The fishers in Nam Xouang reservoir divide into 2 categories, part-time fishers (who operate just for their own consumption), and full-time fishers (who operate for earning money by selling fish). The fisheries committee records the catch of full-time fishers who operate the whole year. Naxaythong District has been set up the FMC by Mekong River Commission (MRC) in 2000. While in Phonhong District, the FMC establishment started to conduct the meeting in 2017. There are 45 FMC members (seven women and 38 men).

Nam Houm Reservoir is located in Naxaythong district, Vientiane Prefecture. It was built from 1978 to 1982 and has 12 km2, a total volume of 60 million m3 (both are the maximum value in the rainy season) [10]. It is used for irrigation and fish culture in cages and pens, as well as capture fisheries. There are 28 species of fishes inhibiting this reservoir. The dominant species is Tilapia. Fishers operated in Nam Houm reservoir classified into 3 categories: 1) Part-time fishers who operate...
just for their own consumption, 2) Part-time fishers who operate for their consumption and selling fish, and 3) Full-time fishers who operate for earning money by selling fish. The landings by part-time fishers are not recorded. While the full-time fishers operate the whole year, and the FMC records their landings. As the first model of sustainable management of fisheries for small-scale irrigation reservoirs, in 2007, Nam Houm reservoir FMC was established. The committee treated the management on three important factors - people, fish stocks, and habitats.

To notify the fishing regulation and area of fish conservation, the announcement was written on the signboards set up in the reservoir sites [6]. It noted that such illegal capture fishery is still being in remote water areas, i.e., the uses of explosives, chemicals, and electric fishing [11]. Although it had been banned as stipulated in the country's Fishery Law. As FMC members, the women exhibited that they can be excellent negotiators for illegal fishing cases by fishers who are not members of the fisheries community. The characteristic of women looks more polite and negotiation skills than men.

3.3. The women in fishery practice

The fish consumed is produced in the country, and Table 1 could represent the approximate annual capture fisheries and aquaculture. The estimated annual yield from both capture fisheries and aquaculture are valued at almost US$ 150 million [13]. As noted by [14], most local communities' accessibility of aquatic resources is intimately linked to their high participation in exploiting and utilizing the fish resources. Capture fishery is the livelihood of entire communities.

| Table 1. Total fish production of Lao PDR from 2009 to 2014, in metric tons (MT) [12] |
|----------------------------------------------------------|
| **Total area (ha)** | **Production (MT/year)** |
|---------------------|-------------------------|
| Capture fisheries  | 1,238,348               | 89,097                   |
| Aquaculture        | 42,000                  | 54,750                   |
| **Total**          | **1,280,348**           | **143,847**              |

In [15] stated, women might access fish by going fishing or having fish from their husbands, or family members, as well as buying the fish directly from fishers, or traders. The classification herewith depends on how women access fish, divided into three types. The first type was the women who have direct access to fish. The second type was the women who obtain fish from members of their family or others, or through the ownership of productive tools that they rent to others. The third type was the women who buy fish directly from fishers or traders. Furthermore, [15] mentioned that it is important to understand better that women who depend on the previous linkage can increase vulnerability and marginalization. It can be suggested to improve their participation in decision-making.

The complicity of women in aquaculture was also traced in this study. Table 2 referred to the participation of women in fish culture. The participation measured by "somewhat" (pointed by 1) and "very" (pointed by 2). As reflected in Table 2, the women have been involved in aquaculture production by about half of the tasks, especially in the planning and preparing the fish farm operations. Women do the vital in the operational activity, such as feeding and keeping the water quality, processing, as well as trading. This activity almost the same with Cambodian women that they involved in every activity of aquaculture [16]. This activity could support the country's socio-economic development, especially the benefits that it could give to rural communities [17].

Moreover, women can also serve as trainers to spread the aquaculture techniques to fish grow-out farmers [15]. The fish seed supplier should deliver an onsite training course on aquaculture techniques to those who are interested in culturing fish. They also should guide on how to prepare their ponds in the actual condition. From interviewing results, the fish processing activities were very interesting for the women. The products from processing are dry fish, fermented fish, and pickled fish. The products can sell in the local market located along the street. The women also were easy to learn how to benefit members and how to manage the group. To notice women's participation in fish processing and marketing, it also interviewed women in the fishery community. Table 3 showed the results of what kind of activities they were very interested in.
Table 2. Participation of women in freshwater fish culture in Lao PDR (1) Somewhat; 2) Very

| Activities                               | Participation |
|------------------------------------------|---------------|
| Planning the aquaculture activities      | 1             |
| Decision making of ponds                 | 1             |
| Decision making of fish to be aquaculture| 1             |
| Seed rearing                             | 1             |
| Seed nursery                             | 1             |
| Releasing fingerling                      | 1             |
| Feed preparation                         | 2             |
| Keeping the water quality                | 2             |
| Harvesting                               | 1             |
| Marketing                                | 2             |

As shown in Table 3, the women were very excited to establish the group. The women also were very adapted to learn the process, working together, promoting, practicing the result of training. But they still trusted the men to do the bookkeeping and transferred the product to other cities. The income sources of households around the reservoir are mainly fisheries, and the income is extremely low. Therefore, it was considered that the production of processed fishery products by the fisher's wife was effective as a way to earn extra income for improving livelihood. Producing processed fishery products also enhances the fish's value and helps to make effective use of fish resources. Under the FMC, a fishery processing team was formed. The team consists of leaders, accountants, product technicians, and others. The training was also provided to learn fishery processing techniques. These processed products produced by the fishery processing team are sold in the capital city. However, most fish produced from inland fisheries and rural aquaculture are consumed domestically, not to import yet to other countries in Lao PDR. Only a small portion was sold in local markets due to inadequate transportation and preservation facilities in remote areas [11]. The fishery processing business by FMC is making a profit and has helped to improve their livelihoods. In the future, the sustainability of small-scale fisheries could increase the woman and her family's life up from the poverty line. By doing the processing and marketing, it can improve their socio-economic condition. The government should empower women to participate in the fishery community. The involvement of women can act in the decision-making process in co-manage the reservoir.

Table 3. Participation of women in fish processing and marketing (1) Somewhat; 2) Very

| Activities                                     | Participation |
|-----------------------------------------------|---------------|
| Establishing the group to process the fish    | 2             |
| Learning of processing the fish               | 2             |
| Working together in processing the fish       | 2             |
| Promoting their business to the buyers        | 2             |
| Following up the result of training           | 2             |
| Bookkeeping                                   | 1             |
| Transported the product to other areas        | 1             |

4. Conclusion

Considering the result of the work, it is clear that the participation status of the women who live surrounding the reservoir is satisfactory. Nevertheless, it needs to improve the women's consciousness of modern techniques for capturing, culturing, processing the fish, and marketing. It is expected that the finding of this research will help policymakers and gender trainers to take a useful initiative to improve the women's roles in participating increase their livelihood and as the important actor in the fishery community.
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