

# Learning the Lessons from the Integrated Small-scale Inland Fisheries Business in Kampong Patin Village, Indonesia

Dina Muthmainnah, Zulkarnaen Fahmi, Freddy Supriyadi, Aroef Hukmanan Rais, Sevi Sawestri, and Eko Prianto

Inland fisheries are not often a priority in national and regional governance, being undervalued and overlooked, although it is recognized as important to food security, livelihoods, and human well-being. In inland waters, fishing is an important occupation for many rural people and plays a major role in social and economic development (Muthmainnah & Prisantoso, 2016). Inland fishery is also known as “subsistence fishing” or “family fishing.” The community who lives surrounding the waterbody perceives that inland fishery resource is common property and open to all at any time of the year. Since it is worked by individuals with traditional fishing gear and small boats, it is called small-scale fishery. Small-scale fisheries in inland waters are carried out in a wide diversity of ecosystems, namely: lakes, rivers, reservoirs, ponds, and wetlands (DFID, 2002), as well as in rice fields during the rainy season.

However, inland fisheries are strongly impacted by other users of water and land resources, such as agriculture, transportation, and home industries. The management of inland fisheries requires an ecosystem approach and the engagement of relevant stakeholders. The priority focus of inland fishery management is sustainability to ensure that short-term actions do not jeopardize the options for future generations to benefit from the full range of goods and services provided by freshwater inland water ecosystems.

SEAFDEC Inland Fishery Resources Development and Management Department (IFRDMD) is currently implementing the project “Management Scheme of Inland Fisheries in the Southeast Asian Region” with support from the Japan Trust Fund VI Phase 2. Under the Project, SEAFDEC/IFRDMD assessed the inland fisheries activities in Kampong Patin, XIII Koto Kampar District, Kampar Regency, Riau Province, Indonesia during 2020 to 2022 to obtain data and information on the potential of inland fisheries that would improve the livelihoods of local fishers.

In Southeast Asia, Indonesia has the largest inland waters with an area of around 54 million ha consisting of 11.95 million ha of river waters and their floodplain, 39.4 million ha of swamp waters 2.1 million ha of lakes and reservoirs as well as other inundations (Kartamihardja *et al.*, 2017). It is estimated that 1,300 fish species inhabit the country’s inland waters, and some of them are economically important as food and ornamental fish (Kottelat *et al.*, 2013). In 2019, the inland fishery production of the country was around 649,978 t (2.8 %

of total fish production) with a value of about USD 1.16 million and engaged 515,545 fishers (SEAFDEC, 2019). However, changes in land use and runoff from household and industrial activities have reduced the benefits of inland waters, including decreasing fish diversity and decreasing income of fishers. Management actions have been carried out by the competent authorities but there are still more issues that need to be addressed. If the management of inland waters is further developed, the potential of inland capture fisheries can reach more than 3 million t. Moreover, inland aquaculture development could also increase fishery production to support food and economic security.

In Riau Province in Indonesia, Kampar Regency has a high potential for inland fisheries (including capture and aquaculture) with a total production of 52,884 t in 2019 which is the highest in the province (**Figure 1**). The inland fishery production was mainly from the Kotopanjang Reservoir and Kampar River including the floodplain and oxbow lake. These inland water bodies have high biodiversity of endemic and economically important fish species. Moreover, the aquaculture production of Kampar Regency is approximately 70 % of aquaculture production in Riau Province (**Figure 1**) and is among the highest in the country. Therefore, the Kampar Regency government is implementing programs to support aquaculture production.

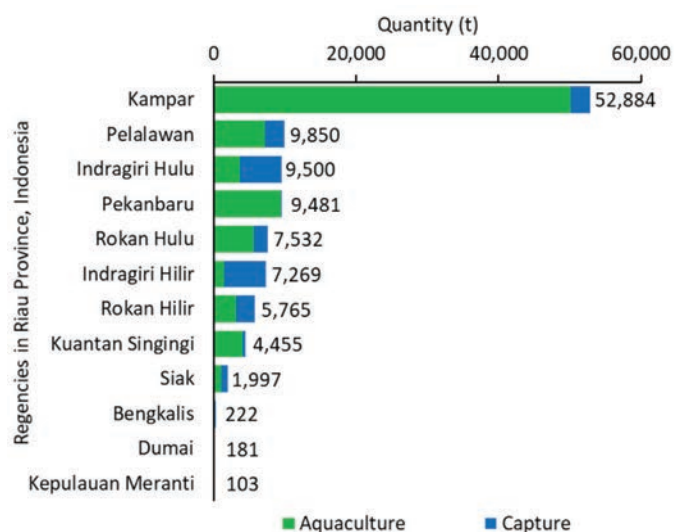


Figure 1. Inland fisheries (capture and aquaculture) production of regencies in Riau Province, Indonesia by quantity (t) in 2020 (Fishery Service of Riau Province, 2022)

In Kampar Regency, the highest inland fishery production (including capture, pond culture, and cage culture) of 21,441 t was from XIII Koto Kampar District (**Figure 2**) where the ecosystem approach to fisheries management is applied by involving relevant stakeholders including the private sector and non-government organizations in developing fishery regulations, promoting environment-friendly fishing practices, and establishing sanctuary areas based on local wisdom.

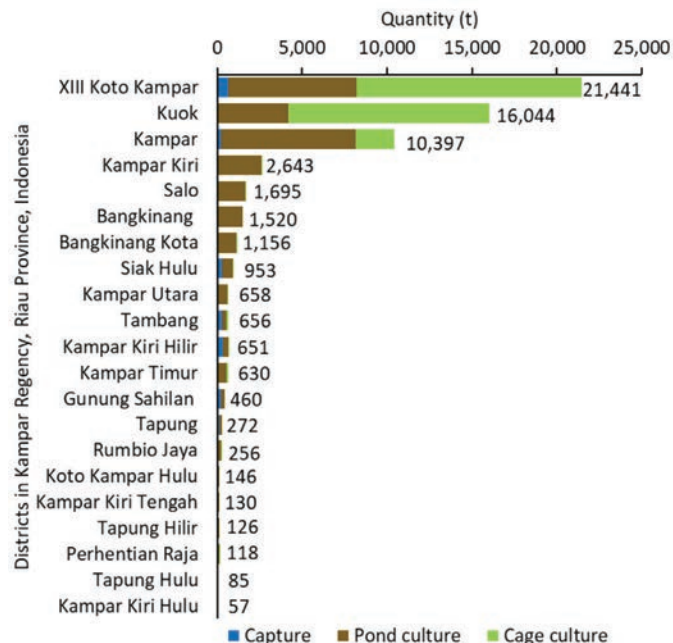


Figure 2. Inland fisheries (capture and aquaculture) production of districts in Kampar Regency, Riau Province, Indonesia by quantity (t) in 2020 (Fishery Service of Riau Province, 2022)

## Kampung Patin as the center of integrated fisheries

One of the government’s missions was to build rural areas which could be achieved through community empowerment to increase productivity and the diversity of existing businesses, provide facilities to support village economic development, strengthen institutions that support production and marketing chains, and optimize human resources for village economic growth. The participation of the community was also necessary for carrying out structural policies (Handayani *et al.*, 2021). In XIII Koto Kampar District, Koto Masjid Village (also known as Kampung Patin) is one of the villages in Indonesia where a village development strategy through community empowerment was implemented. The villagers originally lived in a watershed area but had to move to a hilly area starting in 1992 due to hydroelectric reservoir construction. For their relocation, the motto of the Village was “no house without fish pond” which meant they requested one unit of pond for each household, either a soil pond, constructed pond, or pond coated with plastic (Fadiya & Adiando, 2021).

### • Aquaculture

Kampung Patin is located on the plateau close to the Kotopanjang Reservoir (**Figure 3**) with an area of 425 ha including 116 ha of ponds. The main occupation is semi-intensive aquaculture for most residents consisting of 1,156 women and 1,216 men. There are 1,747 residents of productive age (16–64 years) As potential workers. More than 1,000 floating cages are installed in the Kotopanjang

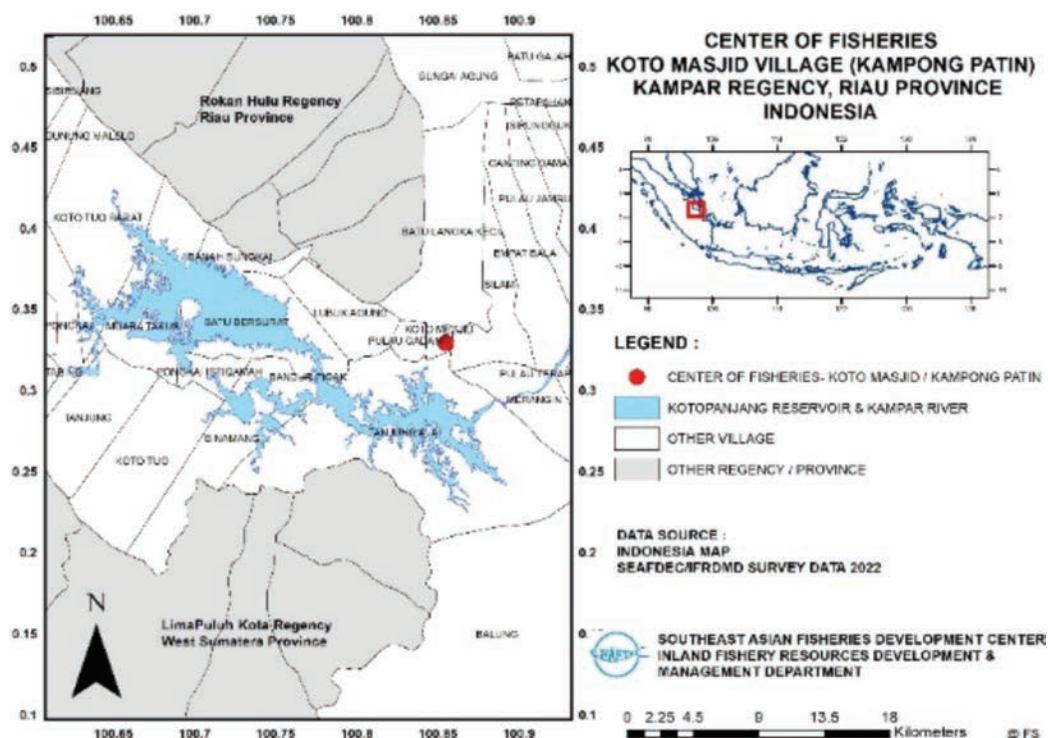


Figure 3. Location of Koto Masjid Village, XIII Koto Kampar District, Kampar Regency, Riau Province, Indonesia



Reservoir to culture *Pangasius*, common carp, and tilapia fed with floating feed, sinking feed, and worms. The stocked size is 1–4 cm and harvested when the fish reach 4–6 individuals per kilogram. The culture period is 120 days and the harvest is twice per year with total production reaching 7,304 t/year (Warningsih, 2016).

For one production cycle, inputs including vaccines and probiotics as well as the equipment for producing seed, nursery, and feed are necessary. To sustain the supply of 2.0–2.5 million seeds per month, the fish farmers in Koto Masjid Village coordinate with a local private hatchery that produces the seeds, while the broodstock is obtained from the Fisheries Service of Kampar Regency and other hatchery centers. The fish farmers believe that the quality of seeds from local hatcheries could adapt and grow well to the water source (Figure 4). Moreover, local feed producers help supply cheap feed for growing *Pangasius*. However, additional trash fish and bran come from other provinces such as North Sumatera and West Sumatera to acquire the 18–20 % feed protein.



Figure 4. Aquaculture facilities for *Pangasius* seedlings and grow-out ponds in Kampong Patin, Riau Province, Indonesia

#### • Fish processing

Koto Masjid Village has 13 fish processing facilities, one cold storage, and one fish market. Post-harvest training courses are provided by the government to add value to fish and encourage the residents to eat fish. The government established 21 groups to produce various processed fish and fishery products including 11 groups for smoked fish, three groups for fish nuggets, two groups for fish skin crackers, three groups for fish balls, and two groups for salted fish. The main product of Kampong Patin is smoked fish using *Pangasius djambal*. The product has a high-quality dried rate and taste. This fish species is locally produced, easy to cultivate, has a fast growth rate, and has a good meat texture.

As shown in Figure 5, the women are in charge of the preparation of raw materials including size selection, washing, and filleting 200–300 kg of fish per day. For fish size, they process 4–6 fish per kilogram, and 1 t of fresh fish could produce 290 kg of smoked fish. Moreover, the men are involved in the drying process which can be finished in approximately 2–3 days depending on the combustibles and weather conditions. The fish is smoked in the afternoon until the following day, then taken out from the oven, laid in twelve hours, and re-smoked in the afternoon. After the smoking process, the women clean and pack the smoked fish and sell the product. The packaging materials include cardboard or plastic wrap. One group can produce smoked fish around 20 times in one month.

The fresh catfish price is USD 1/kg while smoked fish can be sold for around USD 4/kg. The smoked fish product has a very large market and most of them are sent to other provinces such as West Sumatera, Jambi, North Sumatera, and Kepulauan Riau. Consumers prefer to consume the product in 3–5 fish/kg, while restaurants demand small sizes of 6–8 fish/kg.

#### • Other inland fisheries activities

The fishery activities in Kampong Patin improved the economic welfare of the local people of various ages and education levels. The Village has a total pond area of 62 ha with a daily production of around 6 t equivalent to USD 6,000 (Hasibuan *et al.*, 2019). Aside from aquaculture, the Village has an integrated fisheries business from fish processing, fish marketing, tourism, and education. With the beautiful landscape of the Kotopanjang Reservoir, the local people in Koto Masjid Village promote fishery tourism. The government is also promoting the Village as the center of education for fishery business. The local knowledge of *Lubuk Larangan* is applied by the local people where catching fish is prohibited within one year. Another conservation effort is the restocking of native fish such as *pangasius*, *mystus*, and *gourami* by the local government. *Gourami* has been successfully domesticated and cultivated in the Kotopanjang Reservoir.

#### Way Forward

Although the fisheries activities are going well in Kampong Patin, the local people still need capacity-building and strengthening to sustain their livelihood. There is a need to promote the Internet of Things (IoT) which is a growing area of interest in the Indonesian fisheries sector to carry out activities without having to make physical contact during the COVID-19 pandemic. Currently, the most widely practiced IoT-based aquaculture is the monitoring of water quality parameters, including temperature, dissolved oxygen, and pH. Moreover, the government should facilitate the addressing of the needs of the local people, such as providing venues to promote local fishery products, development of fisheries infrastructures and facilities, and providing education for prospective entrepreneurs.



Figure 5. Smoked fish processing in Kampong Patin, Riau Province, Indonesia

IFRDMD in collaboration with the local government is providing assistance to local fishers to improve their skills as well as training young workers in fisheries jobs on technology and digital application of scientific knowledge.

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## About the Authors

**Dr. Dina Muthmainnah** is the Special Department Coordinator of SEAFDEC/IFRDMD and Senior Policy Analyst at the Ministry of Marine Affairs and Fisheries, Indonesia.

**Mr. Zulkarnaen Fahmi** is the Chief of SEAFDEC/IFRDMD and Senior Fisheries Extension at the Ministry of Marine Affairs and Fisheries, Indonesia.

**Mr. Freddy Supriyadi** is an officer at SEAFDEC/IFRDMD and an Instructor at the Ministry of Marine Affairs and Fisheries, Indonesia.

**Mr. Aroef Hukmanan Rais** is an officer of SEAFDEC/IFRDMD and an Instructor at the Ministry of Marine Affairs and Fisheries, Indonesia.

**Ms. Sevi Sawestri** is an officer at SEAFDEC/IFRDMD and an Instructor at the Ministry of Marine Affairs and Fisheries, Indonesia.

**Dr. Eko Prianto** is a lecturer at the Faculty of Fisheries and Marine Science, Riau University, Pekanbaru, Indonesia.