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The Practice Of Local Wisdom On Serrated Mud Crab Fattening In The Mangrove Of La-Ngu District, Satun Province

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Abstract

This aim of this study was to investigate the practice of serrated mud crab fattening **(**SMCF**)** in relation to local wisdom in the mangrove forest of La**-**ngu district, Satun Province**.** The researchers conducted a documentary review involving local scholars and farmer**'**s interview on the practice of SMCF, fishery biologist interview, focus group discussion with farmers, and observations on the practices that were subjected to content analysis and interpretation by the use of triangulation**.** The results show that there are three types of SMCF practices: local wisdom culture, commercial culture, and mixed culture**.** There are also two types of SMCF practices identified in relation to local wisdom in La-ngu district among family members; namely: the single (sole) culture and the common (shared) culture. Furthermore, they inherited indigenous knowledge about the practice of serrated mud crab fattening for three generations. In addition, the SMCF local wisdom farmers provided their descendants with seven steps of SMCF practices through demonstrations and discussions. Also, their children and family learnt from them through observation and follow-up.

Keywords Serrated Mud Crab Fattening Practice, Mangrove Forest, Local Wisdoms

Introduction

The district of La-ngu is located in Satun Province, adjacent to the Andaman Sea in southern Thailand. The coastal areas of La-ngu district have a variety of fishing activities, such as marine and brackish water fisheries, aquaculture, and the practice of serrated mud crab fattening (SMCF) for commercial purposes. The SMCF practice is abundantly found in the mangrove forest of La-ngu, Pak-nam, and Lamson sub-districts. The SMCF relies primarily on local wisdom inherited from local ancestors, using existing natural resources such as clean salt water from the sea and local fish as feed (e.g., chopped and horse mussel). The cultural management and practice of SMCF is not complicated, and generates high incomes for farmers and their families.

Today, fisheries and aquaculture encounter problems due to the development of coastal areas, such as housing, the establishment of recreational facilities and other uses. In addition, these developments have further created problems such as eco-deterioration, particularly pollution caused also by the extreme and adverse effects of changing climatic conditions, the consumption of immature aquatic animals, mangrove forest encroachment and prawn farming in nearby coastal areas. More importantly, the use of high-tech fishing tools causes damage and a significant effect in the capture of large numbers of aquatic animals and a decrease in the practice of serrated mud crab fattening.

Currently, this practice is done by the local elders who serve as indigenous knowledge bearers of SMCF. Consequently, if the practice is not recorded and taught to the younger generation, it will be forgotten and the practice will not prosper. It is important, therefore, that this indigenous knowledge be documented and shared, as well as having improvement in the

cultural management skills of current users and interested individuals.

Research Question

How is the practice of serrated mud crab fattening through the local wisdom employed by farmers in the La-ngu district?

Research Objective

The study aimed to investigate the practice of serrated mud crab fattening in the mangrove forest of La-ngu district, Satun Province.

Scope and Delimitation of the Study

1. The study site is located in the La-ngu, Pak-nam, and Lamson sub-districts, with abundant mangrove forests suitable for the practice of serrated mud crab fattening.
2. The target group consists of serrated mud crab farmers, local indigenous knowledge bearers (scholars) of serrated mud crab fattening practice, and fishery biologist in Satun Province.

Research Methodology

The study employed qualitative research using a documentary review, primary/secondary data, interview notes, and SMCF practice observations supported by photo/video documentation. The collected research data was analyzed and interpreted using triangulation (context analysis, historical analysis and key informant interviews to confirm validity).

What needs to be investigated	Target group	Investigation Method	Research instrument	Data inspection	Data analysis
Step 1. Investigation of the practice of serrated mud crab fattening (SMCF) in mangrove forests in La-ngu district, Satun Province.	- Local scholars knowledgeable about the practice of serrated mud crab fattening . - Fishery biologist from La-ngu Fisheries District Office	- Documentary review - Key informant interviews - Personal Interviews - Observations and photo/video documentation of SMCF practice	- Official documents - Structured interview - Documentations using Electronic devices	1. Triangulation method 1.1 Data - Personnel 1.2 Data collection method - Documentation - Interview and discussion	The data were directly obtained, consolidated, integrated, analyzed, interpreted and synthesized during actual field observations and after fieldwork/survey
Step 2. A survey on the practice of serrated mud crab fattening in relation to local wisdoms of the farmers in La-ngu district, Satun Province	- Practicing farmers of Serrated mud crab fattening - Local scholars knowledgeable about SMCF practice	- In-depth Interview - Observations and documentations on SMCF practice	- Official Documents - Interview schedule - Survey forms -Documentations using Electronic devices	1. Triangulation method 1.1 Data collection method - Documentation - In-depth Interview 1.2 Theory inspection - Adoption concepts, techniques/strategies 2. Field survey on concerned individuals	1. The data were obtained, analyzed by the researchers including the actual field survey and observations 2. Specialists shared, validated through discussions and evaluation, and confirmed research results
Step 3. Observations on the SMCF practice in relation to local wisdom of the farmers in La-ngu district, Satun Province.	- Farmers of the SMCF practice in relation to local wisdom - Local scholars of SMCF practice	- Observations Photo/video documentation - Focus group discussions - Key informant interviews	- Field notes - Observations and photo/video recordings using - Electronic devices	1. Triangulation method 1.1 Data - Place - Personnel 1.2 Data collection method - Documentation - Focus Group Discussion 1.3 Theory inspection - Adoption concepts 2. Field survey on concerned individuals	- The data were obtained, analyzed by the researchers including the actual field survey - Specialists shared, validated through discussions and evaluation, and confirmed research results

Results and Discussion

The practice of serrated mud crab fattening (SMCF) in relation to local wisdoms in mangrove forest of La-ngu district, Satun Province comprises of 3 important results as follows:

Step 1. Description of the SMCF Practices and Characteristics

The investigation of serrated mud crab fattening (SMCF) practices in the mangrove forests in La-ngu district, Satun Province after interviewing the head of the La-ngu Fishing District Office, found that there were 202 farmers from 3 sub-districts to practice SMCF: La-ngu, Pak-nam, and Lamson. Two types of SMCF were found in the mangrove forest of La-ngu district, Satun province: earthen pond culture and intensive culture. The earthen pond culture utilizes natural resources in the mangrove forest, but the intensive culture uses less natural resources in the mangrove forest (Chatsuwan, personal communication, January 17, 2014).

According to the local scholar from the La-ngu sub-district, there are three types of the SMCF practice: local wisdom culture, commercial culture, and mixed culture. The local wisdom culture is characterized by the use of earthen ponds, materials and equipment from the mangrove forest, and low investment. The commercial culture is characterized by the use of cement ponds, materials and equipment from the agricultural shop, chemicals in the treatment of serrated mud crabs, and high investment. The mixed culture uses earthen ponds or cement ponds, materials and equipment from the mangrove forest, and the agricultural shop (Tohpalad, personal communication, October 18, 2014).

The local scholar from Pak-nam sub-district supported the mixed culture and said that "….the application of an aerator pump to increase oxygen in the water can help the crab survive, but with a large investment...." (Ongsala, personal communication, October 22, 2014). In addition, the local scholar from the Lamson sub-district said: "…the practice of SMCF through the use of local wisdom culture does not receive good returns, so most of the farmers in this sub-district sell the soft-shell crab. At present, the SMCF practice no longer exists through the use of the local wisdom culture in this sub-district…" (Tingsanga, personal communication, October 29, 2014).

Although the local wisdom culture is using the natural resources from the mangrove forest if the farmers utilize mangrove resources lavishly, the ecosystem of the mangrove forest will have a lack of balance and effect in the practice of SMCF. This means that there is no juvenile mud crab for fattening (Kawichit, Rawangan, Puechon, Prasarnkarn, & Prasarnkarn, 2003). The local wisdom farmers are aware of mangrove forest conservation. They will classify the size of the black crab before fattening. If the serrated mud crabs are too small and weak, they will release the juvenile crabs into the mangrove forest. This cultured crab has no chemical residues and is safe for consumers. They will resist the promotion of commercial crab farming by the government because it is a large investment and will abandon them at the end of the project, resulting in debts. How long are their earthen ponds cleaned of the chemical (Tohpalad, personal communication, October 18, 2014)?

From the discussion with scholars from 3 districts (Ongsala, personal communication, October 22, 2014; Tingsanga, personal communication, October 29, 2014; Tohpalad, personal communication, October 18, 2014), the study discovered that there are few families that practice the local wisdom of SMCF practice. Most SMCF farmers do not practice local wisdom because: 1) there is a less appropriate area, in which the appropriate area with the local wisdom of SMCF practice should be around the mangrove forest, 2) the rental pond is expensive, in which the appropriate pond is less and that is why the pond is expensive, and 3) did not take the knowledge to descendant seriously, where some of the farmers do not have children and it is complicated for them to teach others who are not the relatives. They are also worried about a competitor in the local wisdom of SMCF society. Some of the farmers have children who believe that their children grow up with the daily life of SMCF practice. Then, their children can learn by watching and helping with SMCF practices, without the need to teach them. More so, their children should have higher incomes in other occupations.

From the interview with the local scholars of La-ngu (Tohpalad, personal communication, October 18, 2014) and Pak-nam sub-district

(Ongsala, personal communication, October 22, 2014), two types of SMCF practices were identified in relation to local wisdom in the La-ngu district among family members; namely: the single (sole) culture and the common (shared) culture. The single culture is an inherited earthen pond from the parents while the common culture is the shared ownership of earthen ponds among family members. Both the single and the common culture apply mutual dependence between relatives and families in crab farming. Some family members may choose to rent an earthen pond from an individual or a family having several ponds with no children to cultivate the crabs. The earthen pond rentals were mostly done through friendly negotiation among the community members. This practice confirms the opinion of Jones and Goffee (2001) who cited that the friend dimension is a social relationship, unity, and trustworthiness.

The crab culture practice employed by each family differs in the techniques used depending on the location and cultural purpose. However, all serrated mud crab farmers must constantly improve the fattening practice to obtain good yields as confirmed by the study of Nuengchalerm (2003), who affirmed that the use of dynamic local wisdom improves and creates appropriate adoption.

Step 2. Adoption of SMCF practice by the local farmers

From in-depth interviews with the serrated mud crab farmers, the results of the study revealed that serrated mud crab farmers who adopted local wisdom were found mostly in the Pak-nam sub-district with 14 individuals from 5 families, followed by La-ngu sub-district with 4 individuals from one family. Most of them were Muslims, middle-aged men (30-77 years old) and stayed in an extended family. Also, knowledge about the SMCF practice was derived from their ancestors, who are the original serrated mud crab farmers in the area. Farmers produced the serrated mud crabs for fattening with additional income ranging from THB 5,000 to 10,000 per pond per month.

The farmers surveyed show that they inherited indigenous knowledge about serrated mud crab fattening practice for three generations now. Interestingly, serrated mud crab fattening practices in relation to local wisdom was not found in the mangrove forest area of the Lamson sub-district due to the problem of the high cost of renting the land. This is consistent with the local scholar of the Lamson sub-district, who said that the local wisdom culture does not get good performance (Tingsanga, personal communication, October 29, 2014).

Based on the results, it can be noted that there are only 18 serrated mud crab male farmers from 6 families who adopted the local wisdom of SMCF practice in the area. Accordingly, it was observed that the SMCF practice will be lost if the elders will pass away in the coming years because there is a limitation in the interest/motivation of the younger generation.

Thus, it has been suggested and discussed with the local people that the SMCF practice should be shared, applied and extended to the younger generation to experience the actual cultivation process. Furthermore, this practice should cultivate appropriate teaching and learning skills in order to provide additional job for extra income.

Through the process of actual application and extension work, the researchers believe that SMCF farmers in the La-ngu district of Satun Province can revive and enhance, including innovating the cultural practice within the area to make it sustainable. Chansawang (1984) studied the guidelines for solving problems about land use and the reform towards technological adoption, supporting the findings of the present study. In view of this, it further supports the claim that concerned government agencies should have the means to ensure security and create a stable system, particularly in the area of land leasing, and provide additional opportunities for land tenants with equitable rental of land or even owning lands with land rights for local people.

Step 3. The local wisdom of SMCF practice

From a focused group discussion of the local wisdom SMCF farmers, it was discovered that SMCF local wisdom farmers have passed on their knowledge to their descendants through demonstration and discussion in everyday life, since most of them are extended families. Their children will learn from them through observation and follow-up until they are skilful. In addition, the local wisdom SMCF farmers share and exchange their experiences of SMCF practice within group of local wisdom SMCF farmers. They also share their knowledge with

local people interested in SMCF practice. A local school, including the La-ngu and Pak-nam sub-district, will have a competition on black crab straps from the Nipa leaf for students. The schools invited the SMCF local scholars to serve as referees. From the observation and focus group discussion, there are seven (7) stages of SMCF practice in relation to local wisdom in the mangrove forest area in the La-Ngu district, Satun Province, which farmers deliver to their children and the local people of the community.

Stage 1. Catching serrated mud crabs.
The date, time and place for bamboo crab trap laying should be set according to the lunar calendar. Each time the bamboo crab trap is laid, it should follow the inherited indigenous knowledge using the lunar calendar that depends on the water level to ensure appropriate and timely trap laying. The local wisdom SMCF farmers will cross on the lunar calendar and their children will know when their parents will lay the bamboo crab trap. They will enjoy laying the bamboo crab trap with their parents. They will be also willing to help their parents prepare equipment/materials for making bamboo crab trap.

Based on the observations, parents will explain to their children the time to catch crabs. The catching serrated mud crab starts on the 9th day of waxing moon (full moon) up to the 5th day of the waning moon. During the new moon, the practice is done in a different manner; laying and catching would stop on the 5th day of the waning moon up to 8th day of the waning moon. It is believed that the serrated mud crabs are claimed to be smaller and less fleshy as pointed out by the local farmers.

In addition, it was observed that there are 5 stages of bamboo crab trap laying that determine the catching of crabs that could be cultured to grow into marketable sizes and weigh enough to harvest, as shown in Figure 1.

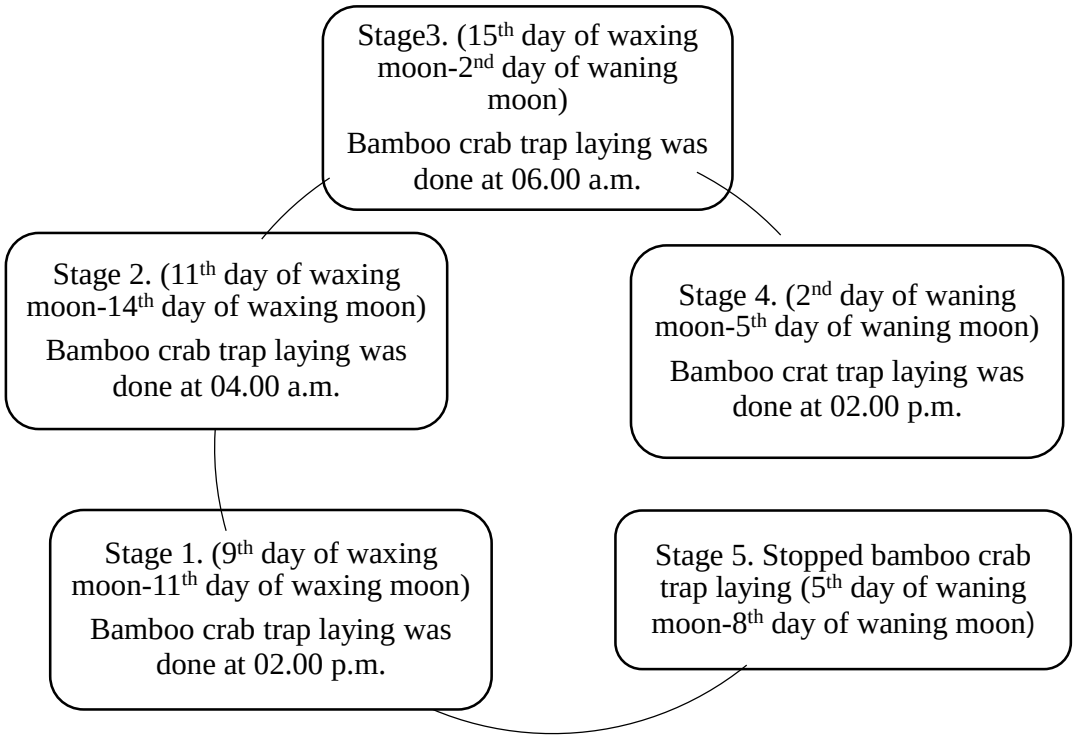

Figure 1. SMCF Practice using bamboo trap on laying crabs and juveniles.

As noted, farmers strictly follow the indigenous knowledge attached to the lunar calendar, especially in the setting and laying out of the bamboo crab trap in the mangrove. The culture management is so dependent on the flow of water levels. It is supported by the study of Leekroh (2011) that confirmed and found out that the condition of the coastal area of La-ngu district is similar to that of other coastal areas in Satun Province, where the high tide and low tide occur twice a day, resulting in the water current flowing or moving like a clock pointer

in two occasions. Such observations serve as good indicators in managing the lifting and monitoring of the traps during the growth stages of the crab.

The local wisdom SMCF farmers also repeatedly believe in harvesting crab for their children. Each culture month has several high tides and low tides that ensure water quality and sanitation, including soil that is contaminated by sandy or clay soils observed during cleaning and preparation. Furthermore, especially during the high tides of the water level, fishermen prefer to use a small boat to catch aquatic animals during the 11th day to the 6th day of waxing and waning moon, respectively, because of their belief about the better harvests.

Stage 2 Sorted marketable serrated mud crabs.

From the observation, after the local wisdom SMCF farmers have a lot of crabs in the bamboo crab trap, they will sort the size in their houses. Also, their children and neighbour will come to help. Sometimes people in the community come to buy the big black crabs for meal. This is sharing the knowledge about sorting serrated mud crab, not only in their family but also in the community. It shows that relative systems are important in collaborating between different groups and neighbours (Pojanee, 2003).

The local wisdom SMCF farmers explained and demonstrated the sorting of harvested crabs done based on different sizes for their families and neighbours. The following steps are employed by the local farmers:

a) Big sizes approximately 3-5 inches in diameter are sold immediately.

b) Small sizes are fattened and cultured in an earthen pond using local wisdom.

c) Juvenile serrated mud crabs are sold to other farmers; the price depends on the season and the need, and there is no gender classification done on the juveniles.

d) Some farmers release the juveniles back into the mangrove forest area to maintain the balance of nature and ensure its availability in the future.

The practices on sorting led the local farmers to make wise decisions to ensure that small sizes and juveniles are released back into brackish water in adjacent areas. This practice implies that SMC farmers follow some guidelines on sustainable marine conservation in relation to the directive on the Local Registration of the Conservation of Environmental and Natural Resources of the Thai Constitute Act of 1997, Section 46. Specifically, the policy aims to encourage the community to participate in the management of natural resources in a sustainable manner. In support, the act complements other related laws and regulations, such as the Fisheries Act, the Forestry Act, and the National Park Act. These laws give importance to the adoption of local wisdom, especially affecting marine and coastal indigenous knowledge held by the locals. Also, the community must maintain and rehabilitate natural resources that support the study's findings and a guideline for Thai marine crab conservation as proposed by Tiensongratsamee and Pratumchat (2002), which claims that it is prohibited to catch crabs of less than 9 cm in size.

Stage 3. Preparation of earthen pond for SMCF practice.

From the focus group discussion, local wisdom SMCF farmers prepared the earthen pond by themselves and their families. Their earthen pond is at the back of the house. The earthen ponds were selected by having free-flowing brackish water into the pond before carrying out the cultural management of the SMCF practice. Mostly, farmers prefer to build a rectangular earthen pond with a size of ½ to 1 rai in length and with a depth of 150 cm. The ponds were cleaned and dried for 10 to 15 days and sterilized by broadcasting and using agricultural lime on it for 7 days. After 7 days, the pond was filled with brackish water to start the cultivation process. After a year of operation, the pond was cleared and cleaned again following the same process.

The preparation of an earthen pond is an improvement of the existing ones, following the different preliminary processes that confirm the findings of the study by Tiensongratsamee and Pratumchat (2002), which stated that an appropriate place for serrated mud crab earthen ponds should be close to the sea or with brackish waters with soils of clay or sandy loam.

During the preparation of the pond, their family members will learn and discuss with them during the preparation of the earthen pond. If they have some problems with the preparation of the earthen pond, the family members will share ideas to solve the problem. At some point

they will have an innovation in their family that will be different from the other families; for example, normally the crab will escape from the pond by digging. The old material of the ancestor that they used for being a barrier to the crab was a wooden slab positioned inwardly to cover the fence. Members of the Dahla Sangdo family noticed that the material did not work. However, some crabs still escaped from the pond. Then they came up with the idea of "putting a black plastic sheet that covers the bottom of the pond to block the crab" (Dahla, personal communication, July 17, 2014), which is different from the Hleemangsa Usaman family that uses the old car tires (Usaman, personal communication, August 7, 2014)

Stage 4. Releasing juvenile serrated mud crabs into the earthen pond for fattening.

From the focus group discussion, local wisdom SMCF farmers explained and demonstrated to their families about the size, species sorting, and release of crabs into the earthen pond. The criteria of species sorting used are based on the characteristics of serrated mud crabs as follows: 1) deep black in colour; 2) big crab paddle-legs; 3) bigger chelate pairs compared to other local crabs; 4) bigger body size than other local crabs; and 5) the carapace is broader and has the same or exhibits a single colour.

On the other hand, the size sorting of juvenile serrated mud crabs aims to prevent cannibalism – the bigger ones eat the smaller crabs during culture period. However, this is properly addressed during the harvest period, where farmers rely on size sorting and appropriate adoption of local wisdom. As observed, crab farmers such as those over 70 years old measured the crab size using a nipa palm leaf to tie the crab. However, the practice of tying is not popular at present.

It is worth noting that the separation of crabs by sex is not popular these days due to the distinction and classification ability of local farmers. The stocking density of juvenile serrated mud crabs should not be more than 1,500 crabs per ½ rai pond to avoid overcrowding and prevent high crab density. The juveniles are released at any time, but not during the mid-day, where it is normally at high temperature to ensure a high survival rate. In the initial stage, the juveniles do not feed on small fish, but dig into holes to hide. 3-4 days after release, the juvenile crab should be fed with the chopped fish trash. These claims were also noted and studied by Wareekul (1962) who point out that 800 marine crabs were cultivated in an 800 square meter earthen pond for 60 days and 672 crabs were caught at the end of the experiment.

Stage 5. Fattening and management practice of serrated mud crabs.

From the focus group discussion, local wisdom SMCF farmers will demonstrate and tell family members to feed the crabs, including irrigation and drainage water in the ponds for sanitation. Among the local wisdom SMCF farmers, they will also share experiences on the prevention of crabs from natural enemies.

Chopped fish are mainly fed to the crabs, such as trash fish, drum fish, short mackerel, trevally, tuna, etc., which grow by catching serrated mud crab in stage 1 or are bought at 10-15 baht/kg from the local fish markets. The amount of feed depends on the number of juvenile crabs at stocking density (1,000 juvenile crabs per 10-15 kg of feed). In the initial stage, the fish are chopped into two pieces and placed into the crab pond for 3-4 days per feeding. The time for feeding depends on the convenience of the crab farmer. Crabs are usually fed at night or immediately after sunset. This is the activity of the SMCF family.

In relation to feeding, pond sanitation and management, marine water or brackish water must be supplied to the crab pond at an appropriate level of 50 cm per day or 70 cm in summer in order to reduce the increasing temperature. The earthen pond must not have too much fresh water to avoid difficulties in crab molting, which leads to slow growth. Although the members of the family will help the farmer, the farmer still needs to check the water level in general. Aside from these, water circulation in the crab pond eliminates the accumulated feed that could be wasted. Shade is provided around the pond to reduce stress during the growing period. Management, including epidemic prevention or disease control, relies on natural means. However, the prevention of natural enemies such as monkeys, water monitors, snakes and other predators is done manually with the use of firecrackers, shooting arrow, fence repair, etc. Members of the local wisdom SMCF families will help each other to observe and find a way to protect the

crabs. Then, at least one family member remained vigilant in the pond all day all night.

Furthermore, the growth performance of serrated mud crabs is done by placing a square bamboo crab trap with fish bait into the crab pond. This aims to catch the crabs for regular monitoring in measuring marketable sizes. Meanwhile, big crabs are harvested for the market. Sometimes, marketable crabs are computed based on the estimated feeding volume that became part of the local wisdom and innovation made by SMC farmers.

The duration of the growing period is dependent on the purpose of the cultivation process. Normally, the crab culture is classified into 4 time periods: 1) 15-30 days with 1-2 molting times; 2) 31-45 days with 2-3 molting times; 3) 46-60 days with 3-4 molting times; and 4) 61 days and above with more than 4 times of molting. These culture periods were observed and practiced by farmers to ensure proper crab growth and development. Accordingly, the farmers pointed out that the serrated mud crab farmers prefer the 31-45 days of crab culture most because the crabs sizes are even the most ideal for marketing. This is consistent with Rattanachot et al. (2006) who stated that serrated mud crabs of 1-4 crabs per kg have an unfirmed body and less meat, with high water content. It was suggested that it needs to be fattened for at least 20-30 days to obtain a better meat quality.

Stage 6. Harvesting of marketable serrated mud crabs.

From the focus group discussion, local wisdom SMCF farmers will demonstrate and explain the harvesting of marketable serrated mud crab to their children and family members. Their children enjoy catching crabs and learning from their parents quickly. They are skilled at catching and wrapping crabs.

After preparing all the equipment/materials, the crab farmers catch the crabs using a square bamboo crab trap with 1-2 preys inside. It is then placed into the pond for 30-40 min; if air bubbles come out from the bamboo crab trap, the crabs will be trapped and caught. Furthermore, the bamboo crab trap should be placed out of the earthen pond; sort the crabs by sex and size and pack the crabs ready for the market. A study conducted by Praipanapong and Yongwanichsret (1991) showed that the culture of small marine crabs grow into bigger sizes depending on sex. As noted, male marine crabs grow faster than female crabs, but are heavier based on an experiment of 800 small crabs released into an earthen pond of 800 square meters and cultured for 77 days. It was suggested that crab farmers should sort the crabs based on sex and size before selling it to obtain good price and better income.

The harvested crabs are tied with Nipa palm leaves turned lengthwise to wrap the chelates of the crabs tightly. Also, other crab farmers use local materials to reduce expenses. The wrapping crabs with Nipa palm leaves are widely taught by farmers. Children can rope a crab since they were young. It then became a program for local school. There has been a competition of wrapping crabs with Nipa palm for several years. The technique and method of crab wrapping with Nipa leaves in La-ngu district is different from the other.

Stage7. Marketing fattened serrated mud crabs.

From the focus group discussion, local wisdom SMCF farmers will demonstrate and explain about marketing of fattened serrated mud crabs for their families. They also educated their children to realize the value of local wisdom in SMCF practice.

> "….Our local wisdom SMCF ponds are just like a savings bank. When we do not have money, we can go to the pond to sell our crabs. So we have to help each other and keep our pond…"

This is a common sentence that most local wisdom SMCF farmers tell their children. Normally, crab farmers will sell live crabs immediately after harvest. The live serrated mud crabs are kept for 1-2 days before selling them. There are 3 types of buyer attributes: 1) Retail buyers are individuals from the village or community who buy the serrated mud crab directly from farmers' produce, which is considered as the most convenient, 2) Monopoly buyers or "contract farming". These buyers provide the crab preys and fuel for the boats used during the culture period, and 3) Buyers who order in advance. These are the buyers who order cooked serrated mud crabs in advance and are willing to pay for cooking services.

The results show that there are buyers who monopolize by paying higher prices and are

willing to pay local farmers in advance the needed resources such as preys and fuel during the production of the serrated mud crab. This scheme is similar to the contract farming practice, where the roles of buyers influence the price of the good. This confirms the findings of Tiensongratsamee and Pratunchat (2002), who claim that retail buyers play important roles in sustaining local crab price in the form of a patronage system between crab farmers and retail buyers. In this process, confidence building was observed on the crab farmer when selling his produce. However, it is risky to be offered a low price for serrated mud crabs.

Suggestions

The following suggestions are shared by the researchers:

1. Concerned agencies like agricultural extension should promote the practice of serrated mud carb fattening in accordance with local wisdoms. Specifically, the seven stages of serrated mud crab fattening practice could be adopted in the preparation of an action training manual to be shared and disseminated to interested persons.

2. Concerned agencies related to local culture in Satun Province should note and keep records of the results of this study including the collection, of local wisdom in written form and narrative records for future and new generations. It is believed that these local wisdom is important for managing the mangrove forest area and other occupations in La-ngu District, Satun Province.

3. Concerned agencies should conduct surveys, promote, and support people having empty earthen ponds for serrated mud crab culture and encourage them to rent to others interested in venturing into the crab culture. This will support families who have inherited the local wisdom, but are no longer interested in SMCF practice in the mangrove forest area of La-ngu District, Satun Province.

Conclusions

Indigenous knowledge related to the serrated mud crab fattening practices in the mangrove forest area of La-ngu District, Satun Province can be highlighted with the importance of local wisdom vis-à-vis local livelihoods. It could be a source of alternative and additional income for the local population. As such, these should be further identified, collected/documented in various forms and disseminated through knowledge exchange among practitioners, local people and the future generation.

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