Crab Bank Implementation: Case Study of the Blue Swimming Crab Bank in Prachuap Khiri Khan Province, Thailand

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ABSTRACT

In Prachuap Khiri Khan province, Thailand, fishers observed that the blue swimming crab resources had rapidly declined due to overfishing, especially in the areas of Ao Noi Bay, Prachuap Khiri Khan Bay, Klongwan Beach and Baan Krut Beach. The crab bank is a sustainable crab conservation project set-up in a fishing village for a pilot scheme on marine resources conservation. The objectives of this study were to clarify the changes in the blue swimming crab yield after the crab bank implementation, determine the participation level of fishers in the crab bank activity, and appraise the economic considerations for guidelines on the long-term implementation of the crab bank and for the improvement of subsequent projects to be undertaken in these areas. The study revealed that the juvenile crab yield in the study areas increased after the crab bank had been in operation for 4-8 months. The participation of fishers in the crab bank at the Baan Krut fishing village was at a high level, but the crab bank at the Ao Noi, Ta Monglai and Klongwan fishing villages were at a low level. After 8 months of crab bank operation, the crab banks at the Ta Monglai and Baan Krut fishing villages were still active but the crab banks at the Ao Noi and Klongwan fishing villages were closed temporarily because participation of fishers was at a very low level and there was a lack of subsidy for the operating expenses and maintenance of the crab bank. The study concluded that the success of a crab bank project is primarily dependent on the local communities and thus it is recommended that the local government should use all means available to encourage higher program participation by the fishers (e.g. promotional activities) and to support maintenance of the crab bank.

Keywords: crab bank, natural crab resources conservation, Prachuap Khiri Khan province

INTRODUCTION

The blue swimming crab, *Portunus pelagicus*, a commercially important species, is distributed throughout the coastal waters of the tropical regions of the western Indian Ocean and the Eastern Pacific. In Thailand, blue swimming crab is caught in the Andaman Sea and the Gulf of Thailand. Due to overfishing, the production of crab from sea

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fisheries has shown a downward trend in Thailand since 1999. For example, the production of blue swimming crab dropped from 29,500 t in 2004 to 22,800 t in 2010 (Department of Fisheries, 2012). Therefore, natural crab resource conservation is believed to be a way to increase the productivity of wild stock and the sustainability of coastal fisheries management.

The crab bank is a sustainable crab conservation project that involved a fishing village in a pilot scheme for marine resources conservation. The community later decided to become an ecotourism village, incorporating traditional fishing and mangrove planting tours (Ekmaharaj, 2006). The crab bank system, which was first implemented in Pakklong, Pathew district, Chumphon province, Thailand by ICRM-PD (Integrated Coastal Resources Management in Pathew District by the Southeast Asian Fisheries Development Centre-SEAFDEC), was a scheme to conserve crab resources. This system was initiated in 2002 by the crab bank group of ICRM-PD. It was established by the community as part of their efforts toward coastal resource management. The fishers deposited any berried female crabs they caught in cages maintained by the program until the females had spawned. After spawning, the crabs were sold by weight in local markets with the proceeds proportionately shared: 50% of the sales was returned to the fishers who provided the berried crab, 30% was allocated for cage maintenance, 10% for crab feed, and 10% for the operating expenses of the crab bank. In 2005, the Bang Saphan Bay Pilot Project (BSBPP) in Bang Saphan Bay, Prachuap Khiri Khan province, also introduced the crab bank system following the ICRM-PD model, by constructing cages to hold berried female crabs. After a few attempts, however, the system was discontinued due to problems encountered, such as in daily feeding, maintenance of cages, and unfavorable sea conditions as the coastline of Bang Saphan was very much exposed to the open sea. BSBPP adopted the batch system using hatching tanks where berried female crabs were kept in plastic tanks (50-100 L) until spawning, after which the crab larvae were transferred to the sea (Suanratanachai *et al*., 2010). The successful experience from both types of crab bank activities has served as a model for other coastal provinces in Thailand and even in other countries, as well as in promoting a learning process for many students and researchers (Etoh, 2007; Suppanirun, 2007, 2008).

The blue swimming crab resource in Prachuap Khiri Khan province is an important source of income for small-scale fishers. Recently, the small-scale fishers observed that the blue swimming crab resources were rapidly declining. Thus, the crab bank system was developed and introduced as an activity of the ICRM-PD and BSBPP to increase and enhance the amount of crab recruitment. The objectives of this study were: to clarify the changes in the blue swimming crab yield after the crab bank program implementation; to determine the participation level of fishers; and to appraise the economic considerations of the crab bank. The promotion of the implementation of the crab bank has also enhanced the awareness of the local fishers of the need to manage their crab resources to improve their livelihoods.

MATERIALS AND METHODS

Study area

The study was conducted in the crab bank communities in the coastal area of Prachuap Khiri Khan province, Thailand, from February to October 2012. Four fishing villages were selected, namely, Ao Noi fishing village in Ao Noi Bay (11°51′ N, 99°49′ E), Ta Monglai fishing village in Prachuap Khiri Khan Bay (11°50′ N, 99°49′ E), Klongwan fishing village in Klongwan Beach (11°44′ N, 99°47′ E) and Baan Krut fishing village in Baan Krut Beach (11°21′ N, 99°34′ E) (Fig. 1).

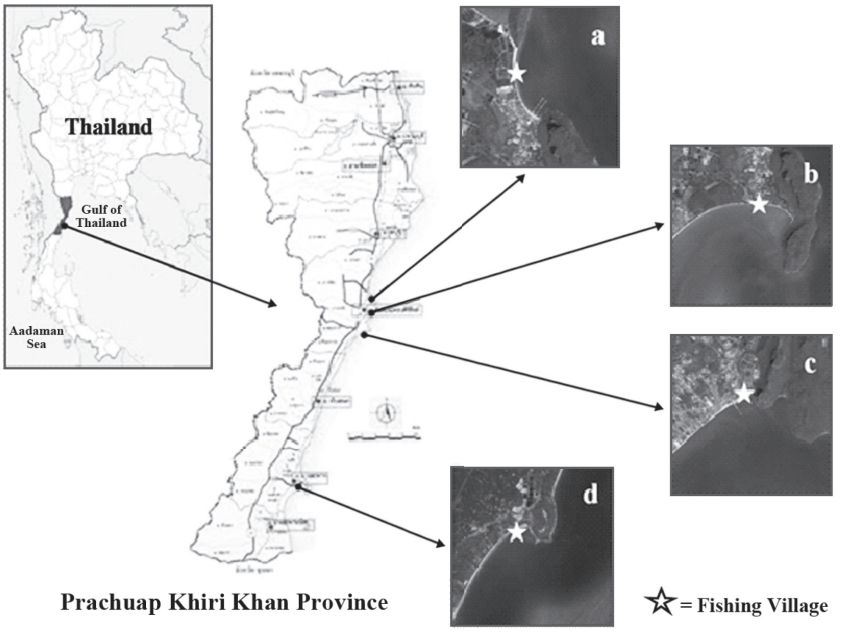

Figure 1. Study area of crab bank communities in Prachuap Khiri Khan province, Thailand, showing the location of the fishing villages, namely, (a) Ao Noi, (b) Ta Monglai, (c) Klongwan and (d) Baan Krut.

Crab Bank Program process

The crab bank system applied in the fishing villages in this study followed the ICRM-PD and BSBPP models (Suanratanachai *et al*., 2010) and was supported by the Social and Environment Development Department, of the Government Savings Bank, Thailand, under the program of the 99th Anniversary of the Government Savings Bank with 99 Communities of Blue Swimming Crab Bank Project (GSB-CB project).

The fishers deposited the berried female crabs they caught in cages (ICRM-PD model) or in the hatchery (BSBPP model) maintained by the program until the crabs had spawned. After spawning, the female crabs were sold in local markets and crab larvae were released to the sea (Fig. 2).

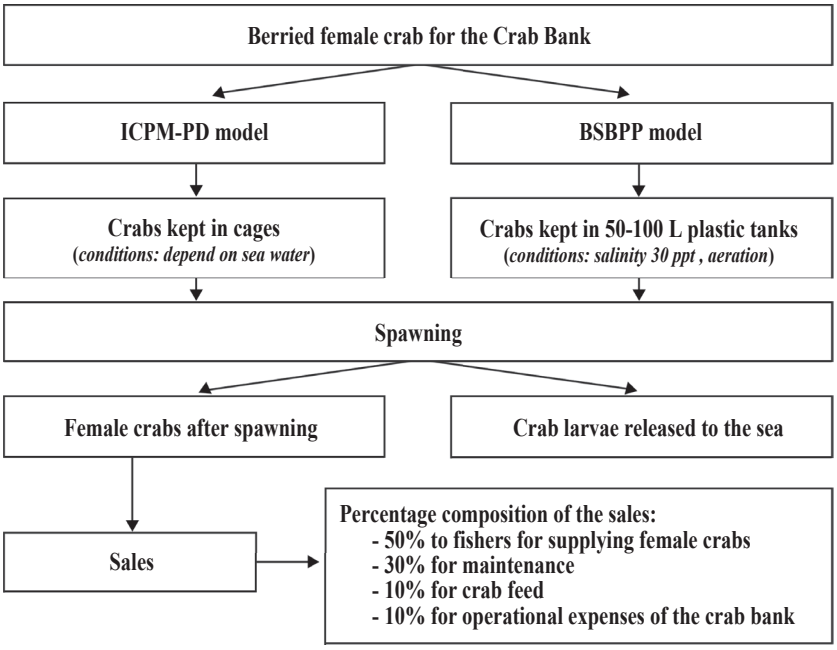

Figure 2. Process of crab bank program in fishing villages of Prachuap Khiri Khan province, Thailand, following the ICRM-PD and BSBPP models.

Data collection

The evaluation of the outcomes of the GSB-CB project used qualitative research methods e.g. surveys from internal sectors in the organization and individual external evaluators, including focus group and in depth interview methods. The purpose of the evaluation was to gather information and draw conclusion on the effects of the project on the people in the community. This information would then be applied to analyze and improve successive projects.

The small-scale fishers were interviewed through a prepared questionnaire about 1 month (February 2012) before the crab bank implementation and then again about 4 months (June 2012) and 8 months (October 2012) after implementation to clarify the changes in the blue swimming crab yield and the participation levels in the operation, evaluation and monitoring by the small-scale fishers in the crab bank program. Economic considerations were also included.

Data management

Quantitative and qualitative data were entered into the computer using Microsoft Excel. Data analysis was done using descriptive statistics such as the mean and percentages to interpret the data.

RESULTS AND DISCUSSION

The crab banks in the four fishing villages of Ao Noi (ICRM-PD model), Ta Monglai (BSBPP model), Klongwan (BSBPP model) and Baan Krut (BSBPP model) were initiated by the GSB-CB project (Fig. 3).

(a) Crab bank in Ao Noi fishing village, Ao Noi Bay

(b) Crab bank in Ta Monglai fishing village, Prachuap Khiri Khan Bay

(c) Crab bank in Klongwan fishing village, Klongwan Beach

(d) Crab bank in Baan Krut fishing village, Baan Krut Beach

Figure 3. Crab bank establishment in Prachuap Khiri Khan province, Thailand

The study found that the small-scale fishers in these areas used multiple types of gear and targeted many species. The main types of gear were: crab gill nets, fish gill nets, shrimp gill nets and collapsible crab traps. Small-scale fishing activities took place within 5-10 km of the shore. The crab bank process began with the collection from fishers of berried female crabs. After the female crabs had released their eggs, the females were then sold and the income from the sale was used for the maintenance of the crab bank and other facilities.

The present study showed that in the 4-8 months after crab bank implementation, a majority of the respondents reported that the production of crab (juvenile crabs) at Ao Noi Bay, Prachuap Khiri Khan Bay, Klongwan Beach and Baan Krut Beach had increased. This result was similar to that reported after the implementation of a crab bank in other areas. For example, in Chumphon, Chon Buri and Phetchaburi provinces, Thailand, after one year of crab bank implementation, more than 60% of the members interviewed reported an increase in their crab catch, mainly in juvenile and immature crabs (Suppanirun, 2007; Phoonsawat *et al*., 2008; Suanratanachai *et al*., 2010).

After 4 months of the crab bank operation, there was a progressive change of attitude among the local people participating in community-based fisheries resource management. However, participation in the operation, evaluation and monitoring of fishers in the crab banks in the fishing villages of Ao Noi, Ta Monglai and Klongwan were at a low level (*Source: Field survey*). In contrast, the participation rate in the crab bank in Baan Krut fishing village was at a high level because the responsible teams consisting of fishers and members of the community committees were assigned to maintain the crab bank and to return the females to their owners or to market the crabs after the females had released their zoea. Furthermore, these teams educated and provided advice to other interested stakeholders supported by municipal officers (*Source: Field survey*).

After 8 months of crab bank operation, the crab banks in Ta Monglai fishing village and Baan Krut fishing village were still running but the crab bank in Ao Noi fishing village and Klongwan fishing village had closed temporarily because participation in the operations by fishers was at a very low level, and there was a lack of subsidization for the operating expenses and maintenance of the crab bank (*Source: Field survey*) (Table 1). It is suggested that local government offices should encourage the fishers to use all means to engage higher program participation, as was reported by Suppanirun (2007) and Suanratanachai *et al*. (2010). In addition, Thiammueang *et al*. (2012) reported that ways to improve the crab bank project implementation may be to encourage cooperation and be more explicit about the benefits of the project. For example, giving small rewards like a team T-shirt to project members may help promote participation in the crab bank project.

Table 1. Comparison of implementation of the crab bank in the four fishing villages.

Crab bank operation	Ao Noi Fishing Village	Ta Monglai Fishing Village	Klongwan Fishing Village	Baan Krut Fishing Village
Crab bank systems	ICRM-PD model	BSBPP model	BSBPP model	BSBPP model
After 4 months				
- Operation status	yes	yes	yes	yes
- No. of respondents	25	19	20	51
- Participation of fishers	low (36.0%)	low (31.5%)	low (35.0%)	high (68.6%)
- Income for fisher members	sale of crabs after hatching	sale of crabs after hatching	sale of crabs after hatching	sale of crabs after hatching
- Operating expenses and maintenance of the crab bank	sale of crabs after hatching and financial support	sale of crabs after hatching and financial support	sale of crabs after hatching and financial support	sale of crabs after hatching and financial support
- Institutional support	GSB-CB project	GSB-CB project	GSB-CB project	GSB-CB project and local municipality
After 8 months				
- Operation status	no	yes	no	yes
- No. of respondents	8	28	12	37
- Participation of fishers	very low (12.5%)	midium (46.4%)	very low (16.6%)	high (72.9%)
- Income for fisher members	-	sale of crabs after hatching	-	sale of crabs after hatching
- Operating expenses and maintenance of the crab bank	-	sale of crabs after hatching	-	sale of crabs after hatching and financial support
- Institutional support	-	-	-	local municipality

Note: participation levels used are: very low (≤ 20%), low (21-40%), medium (41-60%), high (61-80%) and very high (≥ 81%).

In the current study, the crab bank activity in Prachuap Khiri Khan province was welcomed by the local fishers as it contributed to the increase in the number of juvenile crabs in Ao Noi Bay, Prachuap Khiri Khan Bay, Klongwan Beach and Baan Krut Beach. An assessment of the crab yield was also undertaken to evaluate the impact of the project on the blue swimming crab population. However, there have been no scientific surveys conducted in the project area prior to project implementation, which could serve as baseline data for assessment. Thus, information from the fishers in the four communities has been valuable in the assessment of the crab stocks. There has been a similar report on the Blue Swimming Crab Conservation (Crab Condominium) Project in Chonburi Province by Suanratanachai *et al*., (2010). However, more extensive study is necessary to evaluate the impact of the project in the study area in terms of increases in the blue swimming crab population or the catch per unit effort (CPUE) of crab.

In 2002, crab bank development was strongly promoted in Thailand by SEAFDEC and a local NGO which revitalized the crab bank approach in Chumphon province. Since 2002, several crab banks have been established in the coastal provinces of Thailand including Chon Buri, Ranong, Phang Nga, Phetchaburi, Trang provinces (Jöhl, 2013). Crab bank projects have been important not only in Thailand but also in other countries in Southeast Asia, such as the ICRM-SV project in Sihanoukville, Cambodia, the ICRM-PL project in Pulau Langkawi, Malaysia (Etoh, 2007), and the BSBPP projects in Kampot and Kep, Cambodia (Anonymous, 2009). Sopanha *et al*. (2012) reported that the ICRM project and the BSBPP project could serve as the basis for any country wishing to promote the crab bank system for the protection and conservation of their respective crab resources as well as the enhancement of the livelihoods of the poor fishers and increasing their incomes, thus ultimately achieving poverty alleviation and food security in the fishing communities.

CONCLUSION

This study showed that there are advantages and disadvantages in crab bank implementation in each area. The success of a crab bank project is primarily dependent on the participation of local communities. In addition, for long-term crab bank implementation and improvement in successive projects, local government officers should encourage fishers using all available means (e.g. promotional activities) to commit to higher program participation and to support crab bank maintenance.

Finally, the sense of ownership and responsibility and the commitment of the various stakeholders, especially local communities and government officers, are keys to successful and sustainable crab resource conservation. In addition, more research is needed to assess the impacts of crab banks, with a particular focus on the long -term sustainability of crab bank projects and improvements in technical issues.

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