



# Mass Engagement of the Local Communities in Mud Crab Culture in the Sundarban Area, Bangladesh: A Potential Livelihood under Threats of Climate Change

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## Abstract

This paper describes the present status and future possibilities of engagement of coastal communities in mud crab fishery. Mud crab is one of the leading fisheries products and ranked third among fisheries commodity exports from Bangladesh. Among the exported crabs, 60% is coming from the mangrove forests of the Sundarbans. The country earns about US\$ 45 million by exporting about 10,000MT of live mud crab. The coastal zone constitutes 32% of the country area and >80% coastal area is suitable for brackish water aquaculture. Though shrimp is the primary coastal aquaculture product, massive disease outbreaks threaten production and livelihoods of producers. A shift to mud crab culture thus is an opportunity for marginalized farmers to avoid the risks of shrimp farming. Crab farming could become the leading alternative livelihood option the coastal population. Additionally, while the last few coastal disasters had devastating impacts on coastal ecosystems and significantly changed livelihood patterns of coastal communities, the many areas that are still water logged can easily be converted to mud crab aquaculture. If the country can disseminate modern culture technique and can motivate local communities, the mud crab industry can flourish fast and can compete with shrimp for the highest-ranking fisheries commodity to export.

**Keywords:** Climate Change; Marginal Community; Mud Crab Culture Technique; Potential Livelihood; Sundarbans Mangrove

## Introduction

Bangladesh has 2.3 million ha coastal area covering 19 districts out of 64 (Figure 1), constituting 32% of the country's total area [1]. The country's 710 km coastline encompass 618,780 ha of mangroves with 191, 141 ha being highly suitable for mud crab culture only in the south-west zone of the country [2].

Mud crab fishing has been practiced for many years particularly in the Southeast (Chittagong, Cox's Bazar, Chokoria and Noakhali) and Southwest (Khulna, Bagherhat and Satkhira) (Figure 1). Export of mud crab started in 1977-78, and became a stable business in 1982 and presently ranks third among fish and fisheries commodity exported from Bangladesh [3]. The export of live mud crabs has increased many folds in the last decade [4]. The country earned about US\$ 45 million in 2013-14

fiscal year by exporting about 10,000MT of live mud crab mainly to Singapore, Hong Kong, China, Taiwan and Japan [5]. Among the exported crabs, about 60% are coming only from Sundarban mangrove forest. There are more than 100,000 peoples are engaged in mud crab culture in the Khulna-Satkhira region alone [6].

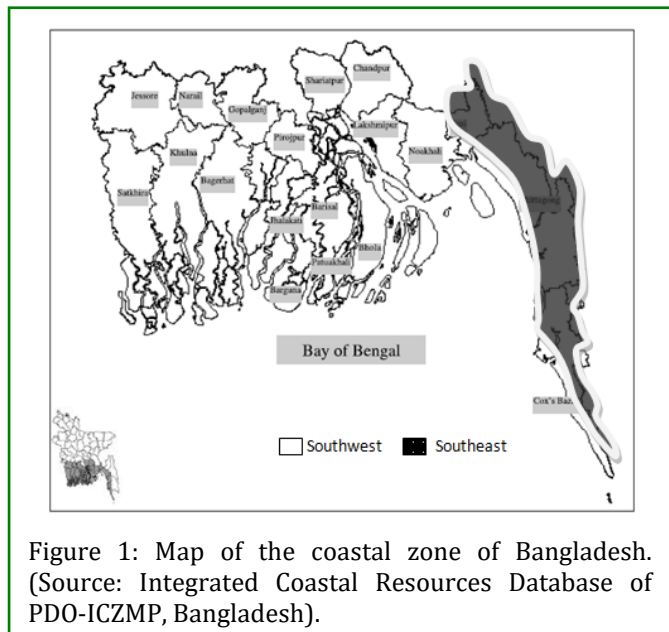


Figure 1: Map of the coastal zone of Bangladesh. (Source: Integrated Coastal Resources Database of PDO-ICZMP, Bangladesh).

Aquaculture is probably the best option for the country to economically utilize coastal region [7,8]. Though shrimp farming is the main aquaculture practice in the country, after massive disease outbreak, mud crabs have now become a key candidate for coastal aquaculture expansion. In addition, frequent tropical cyclones and related storm surges are impacting coastal ecosystems and livelihoods. Efforts are thus being made to identify alternative culture systems, that are more resilient and contribute to income generation for local communities. This paper reviewed a range of published data and reports and is supported by observations made during field visits to Khulna and Satkhira) as well to assess the importance, present status and future possibilities to engage of local communities to mud crab fishery.

## Current Status of Mud Crab Fishery

### Trading Status

Mud crab has been an incidental product arising from the culture of shrimps and other fin fishes in ponds. When live mud crabs were first exported in 1977, farmers focused their attention to mud crab as an alternative to shrimp, which caused economic losses due to disease outbreaks. Mud crab fishermen are mostly poor, landless coastal dwellers and Hindus (83%).

Mud crab fisheries in the country is still dependent on capture and traditional fattening of crabs sourced from the wild. The main source of mud crab is the Sundarbans and contributing almost 60% of production (Figure 2). The highest harvest is from the mangroves and the tidal rivers during winter (November to January). It is reported that only within Sundarbans about 3000 crab long line operating from 3000 boats [9].

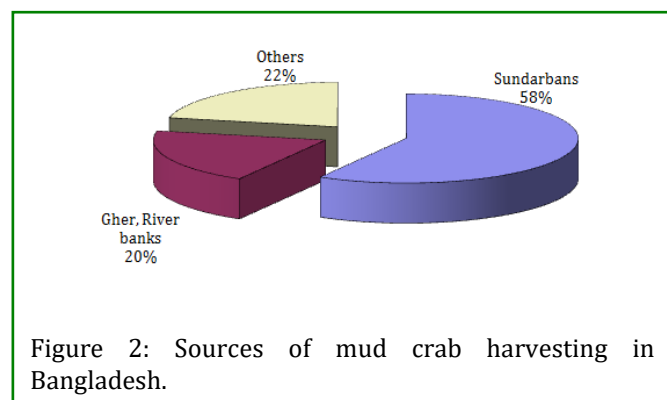


Figure 2: Sources of mud crab harvesting in Bangladesh.

According to the Department of Fisheries, the country exported about 10,000 MT of mud crabs and earned about US\$ 45 million in 2014 [5], with the major earnings (about US\$ 25 million) coming from the south-west zone only. In this south-west zone, Satkhira, Khulna and Bagherhat are the three leading crab producing districts. The earning trends reflect production variations before 2011-12 (Figure 3). The exports declined during fiscal year 2008-09 and onward due to the impacts from the massive cyclone "AILA". However, during the last two fiscal years (2012-13 and 2013-14) export earnings showed tremendous increase. Mud crabs are exported mainly to Singapore, Hong Kong, China, Taiwan and Japan. However, China is the major buyer of mud crab from Bangladesh and peak demand occurs during Chinese New Year in January-February. It is reported that nearly 96% of crab exports during the fiscal year 2011 - 12 were going to China [4].

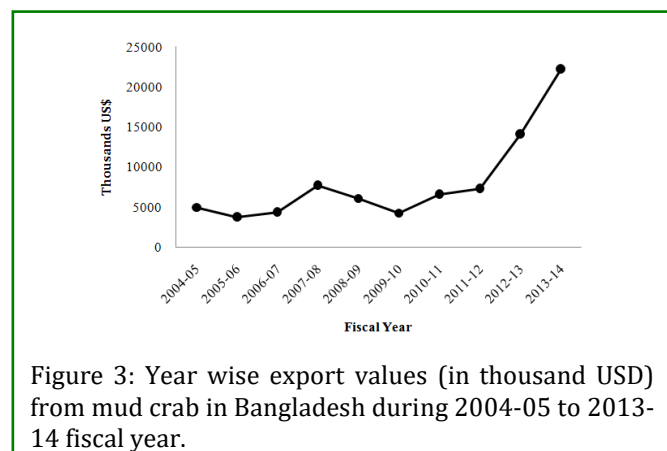


Figure 3: Year wise export values (in thousand USD) from mud crab in Bangladesh during 2004-05 to 2013-14 fiscal year.

## Culture Status

Historically mud crab was an incidental product from the culture of shrimp, prawn, milkfish and other fin fishes. Farmers unintentionally introduce any small size crabs to their fattening/other shrimp and fish culture ponds.

In Bangladesh, fattening of mud crabs in earthen ponds started in the early 1990-1995 in Chakaria (Coxsazar), Rampal (Bagherhat), Munshigonj (Satkhira) and Paikgacha (Khulna) region [10]. In Bagherhat (one of the pioneer crab producing district), there now are about 1400 crab ponds in which about 4000 MT crab were fattened in 2014 [6]. However, this practice reported little success. New to the country is mud crab fattening in cages though it has been practiced in the Philippines, Indonesia, Malaysia and other south-east Asian countries [11]. Recently crab fattening in cages started in Rampal (Bagherhat), Munshigonj (Satkhira) and Paikgacha (Khulna) area. The practice is limited to some farmers and still in an experimental stage. Mud crab fattening in pens is the most recent method introduced for research purposes in the Sundarbans area. In 2012, an experiment was conducted on the feasibility of fattening in pen in Kalapara, Patuakhali, Pathorghata and Barguna area by Khulna University. Some research was done on improving fattening practices in ponds, as well as introducing new culture techniques such as culture of mud crabs in cages and pens in mangrove areas. However, these were limited to research only and not yet been disseminated to coastal communities.

## Future Potentialities

### Potential Utilization of Coastal Waters

Bangladesh has vast coastal area (2.3 million ha) and about 710 km of coastline. The coastal zone constitutes 32% of the country area [1]. Due to the geographical position and climatic condition, the coastal area of the country is known as one of the most productive areas of the world. One of the unique features of the coastal areas is the influence of the mangrove forests, which support a high number of fishes and other commercially important aquatic organisms. Bangladesh has 60017 sq km mangrove forests. More than >80% of the coastal area is suitable for brackish water aquaculture. It is reported that more area is suitable for mud crab culture than shrimp culture in south-west coast region. About 191,141 ha are highly suitable for crab culture in south-west zone of the country alone [12]. Thus, there is huge scope of the country to engage these areas under mud crab aquaculture. It is noticed that only in one decimal (40.46 m<sup>2</sup> or 0.01 acre) area, it is possible to produce 300kg crab in each year [6].

## Engagement Potential of a Large and Growing Population

Though there is no exact data on the number of people engaged in crab fishing and trading, it is estimated that about 0.3 million people throughout the coastal area are directly or indirectly engaged for their livelihood, with as 0.1 million reported from the southwest region alone [6]. These people are engaged with mud crab harvest, transport, export and other associated activities. 28% of the country's population is living in coastal areas, which is expected to grow to a total population of 0.8 Million 2050 [13]. It is noticed that the increase of coastal mud crab export earnings in last five years was higher than the earnings from shrimp (Figure 4). This indicates the potential for the growing coastal population to expand the engagement in this growing sector.

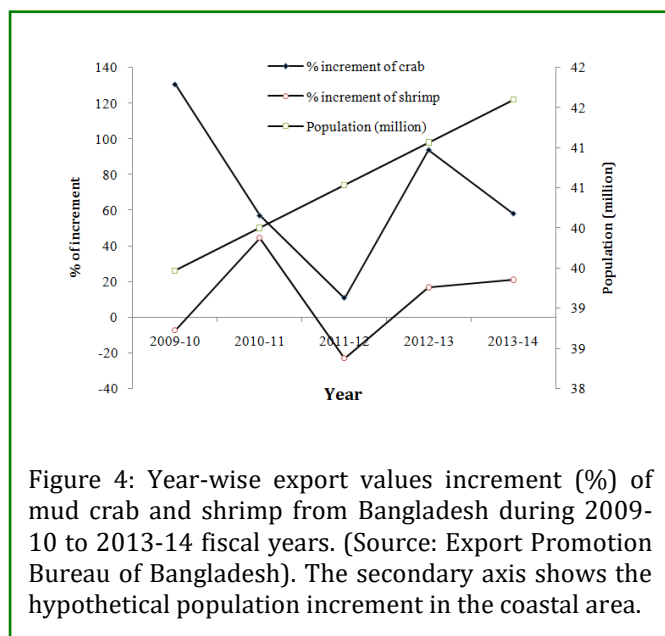


Figure 4: Year-wise export values increment (%) of mud crab and shrimp from Bangladesh during 2009-10 to 2013-14 fiscal years. (Source: Export Promotion Bureau of Bangladesh). The secondary axis shows the hypothetical population increment in the coastal area.

## Potential of using Shrimp Culture Area

Shrimp is the primary coastal aquaculture product and contributes a major proportion of the total export earnings. However, it also is one of the most destructive forms of using mangrove areas. Also, shrimp is more susceptible to disease than mud crab making it riskier [12]. Additional risk factors are the comparatively high investment needs in terms of capital and land. In contrast, mud crab culture, requires minimum capital and area and thus has a lower risk. During a field visit to Khulna, Satkhira and Bagherhat region, it was noticed that during last few years many farmers started crab culture due to its profitability as compared to farming. There are 60,000 hectares of shrimp farms [14] which have the potential to engage simultaneously with mud crab cage culture. The

local farmers believe that mud crab can surpass shrimp production within a couple of years, if the government extends support to them on similar levels provided to shrimp production.

### Dissemination Potential of Modern Culture System

The culture of mud crab in pens or cages is limited or just conducted for research. In open water body (river/canal) or coastal inundated area, locally made cage or pen can easily be installed to culture mud crab. Modern culture systems such as large-scale single compartment cage need to be promoted [7]. In suspended cage culture, thousands of crabs can be stocked in an ordinary pond which may use simultaneously for culturing other species [11]. Recently, Bangladesh Fisheries Research Forum (BFRF) and DFID supported a project with some local NGOs to disseminate the technology of fattening in cages, community mobilization and capacity building to about 1000 households [15]. Some project on suspended soft-shell crab cultures have been implemented in Cox'sbazar and Sathkhira [15]. These pilot initiatives should be scaled up and disseminated across the coastal region of the country [7].

### Potential Livelihood under Threats of Climate Change

The impacts of climate change, specifically sea level rise and the increasing frequency of extreme weather events such as tropical cyclones, pose severe threats to Bangladesh and its coastal population. On an average, Bangladesh is hit by a severe tropical cyclone every 3 three years, [16] and the fourth assessment report (AR4) of the IPCC indicates that the future tropical cyclones, storm surges and its related saline water flood will be more severe in the coast of Bangladesh due to climate change [17].

After cyclone AILA, long term water logging of saline water occurred in some parts of coastal area specifically in Khulna, Tala and Satkhira Districts. While these areas are not suitable for shrimp culture [7], they can easily be taken under mud crab pen culture, offering coastal populations new ways to generate additional income.

### Constraints of Mass Engagement

Community believes and culture is the main constraint for the expansion of mud crab fishery. The Muslim majority of the population believes that any kind of engagement in mud crab harvesting, trading and off course consuming is bad for them. Thus, it is noticed that mud crab traders are mostly (83%) Hindu and other minority communities.

However, realizing the economic potential, more and more young Muslim people are now engaging in the mud crab business. Another constraint is the lack of technical skills and knowledge of modern culture practices and post-harvest handling. People are not aware of the modern cage and pen culture systems. Locally made cage and pen could easily be adopted in the coastal area particularly those affected by cyclone AILA affected area [7]. While soft-shell culture technique is a common practice in many South-Asian countries, in Bangladesh, it is still in a very early stage.

### Conclusion

Climate Change is expected to have severe impacts on coastal ecosystems and populations, leading to massive coastline changes and affecting livelihoods of millions of people. The long-term water logging is one of the key effects which might be taken under aquaculture to make source of livelihood of the community. Within this context of climate change, mud crab would have the greatest potential for coastal aquaculture. If the country can introduce and disseminate modern culture technique (cage and soft-shell culture) and can motivate coastal communities to crab culture especially to Muslim community, the mud crab industry can flourish fast and can compete with shrimp for the highest-ranking fisheries commodity for export in the country.

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