

A SURVEY ON THE DIVERSITY OF FRESHWATER CRABS IN SOME WETLAND ECOSYSTEMS OF BANGLADESH

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ABSTRACT

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A survey was conducted in some wetland ecosystems located at the two Upazillas namely Shibalaya and Harirampur in Manikgonj District of Bangladesh during the period from January 2004 to January 2005 with a view to assess the status of freshwater crab resources in the area. The study was made on species diversity including its taxonomic position, morphometric and meristic characteristics, habits and habitat, distribution, and economic importance. A total of five species of crabs were recorded from the area namely, *Sartoriana spinigera* (Wood-Mason, 1871), *Lobothelphusa wood-masoni* (Rathbun, 1905), *Acanthopotamon martensi* (Wood Mason, 1875), *Pyxidognathus fluviatilis* Alcock, 1900, and *Austrotelphusa transversa* (von Martens, 1868). First three are belonging to the family Potamidae Ortmann, 1896 and the last two belong to the family Grapsidae Macleay, 1838 and Parathelphusidae Bott, 1970 respectively. *Austrotelphusa transversa* and *Pyxidognathus fluviatilis* are newly recorded species of freshwater crabs for the first time in Bangladesh. Among the recorded species, *Sartoriana spinigera* and *Acanthopotamon martensi* were found to be common but the rest three were uncommon.

Key words: Diversity, freshwater crabs, wetland ecosystems

INTRODUCTION

Crabs are the most advanced members of the phylum Arthropoda. True crabs belonging to the suborder brachyura of order Decapoda under class Crustacea and show the greatest size range of all arthropods. Brachyuran crabs reach their greatest diversity in tropical and temperate regions of the world. Freshwater crabs of Bangladesh are true crabs can be distinguished from the false crabs by not having 5th pair of pereopods totally or partly concealed beneath the carapace, the antennae were always placed between the inner margin of orbit and the fused pterygostomial region with endostome (R.W. Ingle, 1983). Bangladesh has got diverse freshwater habitat and ecosystem. Crabs are found in almost aquatic ecosystem. Crabs are an important exportable fishery items and hidden resources of Bangladesh (Ahmed, 1991). They are a good source of food to different communities of the people as well as play an important role in the food chain of aquatic ecosystem. Now a days, crabs play a significant role in the fishery wealth of many nations (Chhapgar, 1991). Shafi and Quddus (1982) carried out a survey on the crabs and reported 11 marine species and 4 freshwater species of crabs from Bangladesh. Chowdhury and Hafizuddin (1991) recorded 10 species of crabs in coastal waters of Bangladesh. Siddique and Zafar (2002) reported 13 marine and 3 freshwater species of crabs from Chakaria Sundarban area of Bangladesh. However little is known about the crab resources in our country particularly is true for the freshwater crabs. So the few studies which have done on freshwater crabs are very much limited to few areas while most parts of the country remain unsurveyed. This is why, a survey on the diversity of crab resources from the various parts of the country is necessary to prepare a full inventory of the species and for management program of crab resources in Bangladesh. Therefore the present investigation is made to survey the present status and diversity of freshwater crabs in some wetland ecosystem of Manikgong District including their morphometric, meristic and some ecological and economic aspects. It is hoped that the present study would greatly contribute to assess the status of crab resources of the respective area with a view to help in preparation of a crab resource management action plan for Bangladesh.

MATERIALS AND METHOD

Samples were collected from the different floodplain ecosystems namely Arua Beel, Gopinathpur Beel, Bahadurpur Beel, and its surrounding areas (Pond, Ditches, Canal, Paddy field) and the river, Ichamoti river of Harirampur and Shibaloy Upazilla of Manikgong District. The field survey was carried out from January 5, 2004 to January 15, 2005. The crabs were sampled from a statistically valid number of randomly selected sites of above mentioned water bodies rather than surveying the entire water body. Sampling was made once in a month. It took about 3 days to complete all the spot each time. About 120 specimens of 5 species were chosen for morphometric and meristic study. Crabs were collected from fisher's catches by Moijal, Duary, Bher-jal and Icha-chai (Collapsible bamboo trap). Specimens were usually preserved in 5-10% formalin in plastic container then carried to the Fisheries Laboratory of Department of Zoology, University of Dhaka. Crabs were

identified as follows with the help of key of Shafi and Quddus (1982), Chowdhury and Hafizuddin (1991), Siddique and Zafor (2002) and using secondary data. All morphometric and meristic measurement were taken by using normal scale and Vernier Slide Calipers. Color and presence or absence of setae noted in live condition, carapace length, breadth depth, were measured by using slide calipers but cheliped and periopod length by plastic made scale. The surface of carapace, appendages, carinae, setae, abdomen, mouthparts, antennae, antennules were observed by magnifying glass and also with the microscope when needed. The biological aspects including habit, habitat, distribution and status of identified crabs were studied using primary and secondary data from various sources.

RESULTS AND DISCUSSION

Five species belonging to five different genera under three families recorded from present study are as follows:

Family- Potamidae Ortmann, 1896

1. *Sartoriana spinigera* (Wood-Mason, 1871)

Materials examined: 20 males and 15 females.

Measurement: *Male:* Carapace length (Cl): 32-41mm; mean \pm SD: 38.5 \pm 2.42. Carapace breadth (Cb): 42-51mm; mean \pm SD: 46.5 \pm 4.57 Carapace depth (Cd):18-25mm, mean \pm SD: 21 \pm 2.02. Cheliped length (mean): major 90mm and minor 75mm; Pereiopod length (mean): 60, 75, 70 and 62mm for 2nd, 3rd, 4th and 5th pereiopod respectively. Weight (W) 32-43g, mean \pm SD: 40 \pm 3.27.

Female: Cl: 28-39mm; mean \pm SD: 36 \pm 2.58. Cb: 40-52mm; mean \pm SD: 46 \pm 4.19. Cd: 21-25mm; mean \pm SD: 24 \pm 1.17. Cheliped length (mean): major-75mm and minor-65 mm; Pereiopod length (mean): 60, 74, 69 and 61mm for 2nd, 3rd, 4th and 5th pereiopod respectively. W: 25-32g; mean \pm SD: 28.36 \pm 2.32.



Figure. *Sartoriana spinigera*; a) Male (dorsal view), b) Female (ventral view)

Morphometric Characteristics: Carapace broad, robust, deep, gently convex, smooth and almost polished. H-shaped gastric groove present; free edge sharp and slightly concave; antero-lateral margin curved, sharp and entire or crenulate faintly prominent with acute epibranchial spine at its far back. Orbits small, broad and outer angle prominent, with a wide antennal gap and devoid of large spines. Lateral epibranchial teeth and the front very close to each other. Chelipeds unequal in both sexes, with spines near the distal end of the merus; propodus of cheliped broad, stout but not compressed.; dactylus longer than palm; inner angle of carpus strong, stout and sharp pointed; legs stout with strong dactyls longer than the propodites;. No setae or carinae present on dorsal surface but epibranchial and mesobranchial swollen. Eye moderate in size and the outer margin of eye with U to V shaped incision. **Colour:** variable; dorsal surface of carapace and cheliped reddish-brown, ventral surface of carapace light yellowish but periopod and ventral surface of cheliped light-brown. Dorsal surface with minute patches of brown spot and poorly ridged. Dorsal surface of carpus and outer margin of propodus and dactylus with brown spot and sometimes minutely tuberculate (Deb, 1999; Nandi and Pramanik, 1994).

Habits: Nocturnal and omnivorous; eats remains of other crabs, molluscs, insects, vegetation and detritus materials. Actually predator upon small aquatic animals. Starts to populate at the beginning of the rainy reason when water remains turbid. Lays eggs at the end of spring. In times of drought, the females carry eggs and newly hatched juveniles until there is enough moisture for them to move on to the next stage of their development. To escape from the dry season they construct burrow in clay soil closer to the water level, which

they seal with mud.

Habitat: Lives on the bottom of water bodies and abundant in shallow water bodies such as paddy fields, beels, canal, ponds, etc during summer; rarely occurs in river.

Distribution: It is widely distributed in all over Bangladesh. Elsewhere: India, Sri Lanka, and Myanmar.

Economic importance: Locally fished for human and aquaculture feed. Rural people used them as fried food and as the medicine of Asthma diseases. Nowadays, also used in poultry feed and as a fertilizer (Shafi and Quddus, 1982).

Ecological role: It plays an important ecological role in maintaining the aquatic ecosystem, especially by scavenging, predated and hunting aquatic organisms.

Status: common.

2. *Lobothelphusa wood-masoni* (Rathbun, 1905)

Materials examined: 12 males and 10 females.

Measurement: Male: Carapace length (Cl): 25-35mm; mean \pm SD: 31 \pm 2.96. Carapace breadth (Cb): 38-44mm; mean \pm SD: 41 \pm 2.35. Carapace depth (Cd): 19-22mm; mean \pm SD: 20 \pm 1.39. Cheliped length (mean): major 70mm and minor 68mm. Pereiopod length (mean): 57, 65, 64 and 54mm for 2nd, 3rd, 4th and 5th pereiopod respectively. Weight (W) 21-27g, mean \pm SD: 24 \pm 2.40.

Female: Cl: 27-33.5mm; mean \pm SD: 30 \pm 2.55. Cb: 38-44mm; mean \pm SD: 40 \pm 2.02. Cd:17-25mm; mean \pm SD: 21 \pm 2.53. Cheliped length (mean): major-72mm and minor-70 mm. Pereiopod length (mean): 58, 67, 66 and 55mm for 2nd, 3rd, 4th and 5th pereiopod respectively. W: 32-43g; mean \pm SD: 40 \pm 4.15.

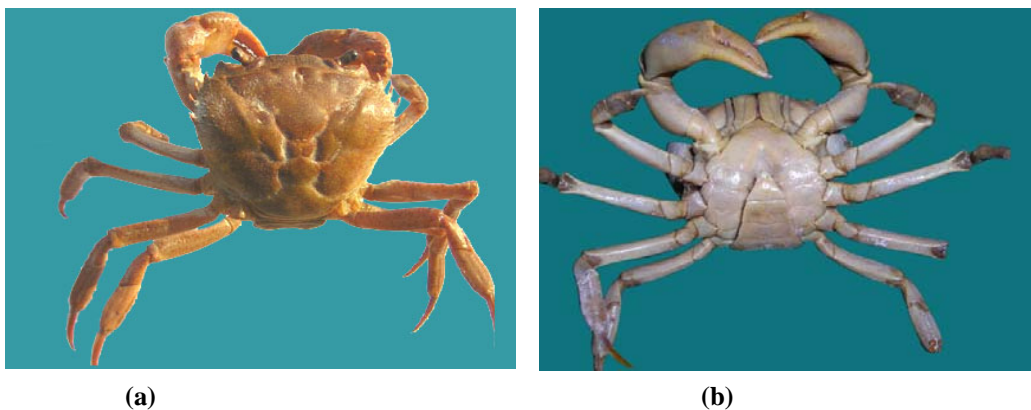


Figure. *Lobothelphusa wood-masoni*; a) Male (dorsal view), b) Male (ventral view)

Morphometric Characteristics: Carapace hexagonal, broader than long, convex, dorsal surface uneven; frontal region robust. Anterior and anteo-lateral margin minutely granular; many short oblique wrinkles on posterolateral margins; distinct cervical groove. Outer epibranchial, mesobranchial and metabranchial region with obliquely placed carinae. Orbits broader, lower edge crenulated and separated from the anterolateral sides of carapace. H-shaped gastric groove on dorsal surface of carapace; regulose epigastric crests well advance of the sharp post orbital crests. Eyes moderate in size, outer margin of eye with U to V shaped incision. Chelipeds equal, slender and shorter than legs and carpus rough at upper edge. A sub-terminal spine on upper border of arm, strong spine at inner angle of carpus; fingers slender, longer than palm. Pereiopod long, thin, and laterally compressed. Dactylus long and styliform with spinules (Deb, 1999). **Colour:** dorsal surface of carapace and cheliped brownish to grey, with deep brown spot; dorsal of pereiopod light brownish. Ventral surface of cheliped, pereiopod, and carapace lighter in adult but yellowish-light in young.

Habits: Nocturnal and omnivorous and feeds on remains of other crabs, molluscs, insects, vegetation and detritus materials. They start to populate at the beginning of the rainy season when water remains turbid and then a large number of juvenile are found. Before breeding, moulting occurs when their body colour becomes glossy.

Habitat: Found on the bottom of a water body and abundant in shallow water bodies, such as paddy fields,

beels, canals, etc. during summer. Construct burrow closer to water level in clay soil to escape from the dry season. The humid air trapped inside the burrows that give crabs enough moisture to survive until the wet weather returns.

Distribution: Scatteredly distributed all over Bangladesh, but commonly found in estuaries of Chakaria Sundarban areas. Also found in India, Sri Lanka and Myanmar.

Economic importance: Some tribal people eat it on a very small scale and used as a medicine of asthma. Now a days, it is also used in poultry feed.

Ecological role: Contributes to the food chain in the aquatic ecosystem by scavenging, predated and hunting aquatic organism.

Status: Common.

3. *Acanthopotamon martensi* (Wood Mason, 1875)

Materials examined: 15 males and 20 females.

Measurement: *Male:* Carapace length (Cl): 25-31mm; mean \pm SD: 26.5 \pm 1.60. Carapace breadth (Cb): 31-35mm; mean \pm SD: 32.5 \pm 1.32. Carapace depth (Cd): 19-22mm; mean \pm SD: 20 \pm 1.02. Cheliped length (mean): major 59mm and minor 48.5mm. Pereiopod length (mean): 49, 58, 52 and 42mm for 2nd, 3rd, 4th and 5th pereiopod respectively. Weight (W) 15-22g, mean \pm SD: 18 \pm 2.32.

Female: Cl: 24-30mm; mean \pm SD: 26.5 \pm 1.60. Cb: 32-36mm; mean \pm SD: 35 \pm 1.0. Cd: 15-22mm; mean \pm SD: 20 \pm 1.86. Cheliped length (mean): major 55mm and minor 52mm. Pereiopod length (mean): 48, 58, 52 and 41mm for 2nd, 3rd, 4th and 5th pereiopod respectively. W: 15-21g; mean \pm SD: 17 \pm 1.40.

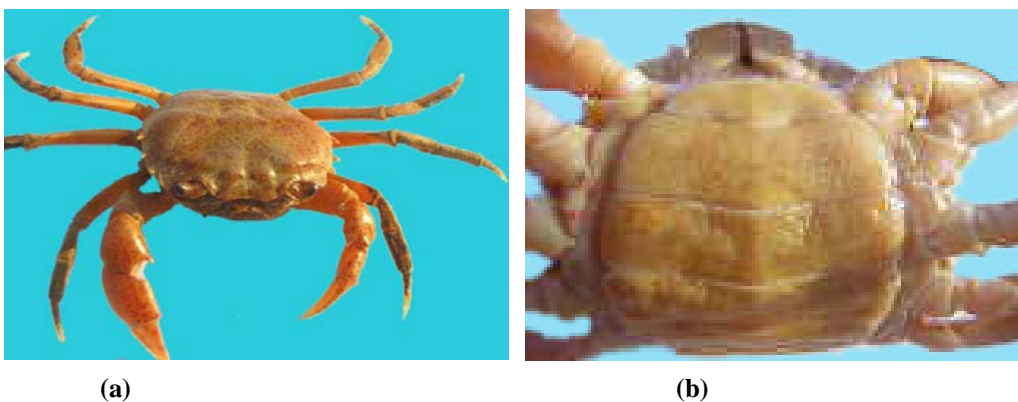


Figure. *Acanthopotamon martensi*; a) Male (dorsal view), b) Female (ventral view)

Morphometric Characteristics: Squarish carapace convex, surface smooth but uneven except some fin ripples near the postero-lateral edge; front robust; H-shaped gastric grooves on carapace. Outer epibranchial, meso and metabranchial regions with obliquely placed carinae. Antero-lateral sides of carapace equal to the well defined posterolateral sides and armed with three spines, other than the blunt, angular, outer orbital angle (Deb, 1999). Protogastric, epibranchial, metabranchial, metagastric and cardiac slightly swollen externally. Eye stock moderate. Outer margin of orbit 'U' to 'V' shaped incision. 6th abdominal joint of male twice as broad as long. Carpal process acute and large moderately. Outer margin of the carpus with two lobes. Pereiopod long, thin, and laterally compressed. Dactylus long and styliform; dorsal and ventral margin of dactylus with spinules. Cheliped markedly unequal in both sexes, surface usually smooth; upper distal corner of arm with spine, inner corner of wrist present. Palp shorter than the fingers; slender leg with hairy three distal joints. **Colour:** dorsal surface of carapace and cheliped greenish to grey; ventral surface of cheliped, pereiopod, and carapace light-brown; abdomen lighter.

Habits: Nocturnal and omnivorous and feed on remains of other crabs, molluscs, insects, vegetation and detritus materials. Actually, predator for small aquatic animals. They start to populate at the beginning of the rainy season when water remains turbid and then a large number of juvenile are found. Before breeding

moulting occurs when their body colour becomes glossy. After that they increase in length up to December. During the winter they become slightly darker in colour.

Habitat: They live on the bottom of a water body and abundant in shallow water bodies, such as beels, canals, etc during the summer. To escape from the dry season they construct burrows in clay soil, which they seal with mud. They create burrow closer to water level. The humid air trapped inside the burrows give crabs enough moisture to survive until the wet weather returns.

Distribution: Widely distributed in Bangladesh. Found in some freshwater habitats, such as rivers, beels, canals, lakes, etc. Besides it also found in different freshwater habitats in India, Myanmar. This species also commonly found in estuaries of Chakaria Sundarban area (Siddiqui and Zafar, 2002).

Economic importance: No commercial value in Bangladesh yet. Locally fished for human and aquaculture feed. Rural people used them as food. Some predatory animals, such as fish, birds, mongoose, etc feed on it. Nowadays, also used in poultry industries and as a fertilizer (Shafi and Quddus, 1982)

Ecological role: It plays an important ecological role in maintaining the balance in aquatic ecosystem, especially by scavenging, predated and hunting aquatic organism.

Status: Common.

Family- Grapsidae MacLeay, 1838

4. *Pyxidognathus fluviatilis* Alcock, 1900

Materials examined: 8 males and 7 females.

Measurement: Male: Carapace length (Cl): 17-26mm; mean \pm SD: 21.5 \pm 4.5. Carapace breadth (Cb): 20-30mm; mean \pm SD: 26 \pm 5. Carapace depth (Cd):9.5-15mm; mean \pm SD: 12.32 \pm 2.74. Cheliped length (mean): major and minor 34.8 mm; Periopod length (mean) 25, 28.6, 30.5 and 23.4mm for 2nd, 3rd, 4th and 5th periopod respectively. Weight (W) 12-16g, mean \pm SD: 14.05 \pm 2.17.

Female: Cl: 16.2-25.5mm; mean \pm SD: 20.9 \pm 4.75. Cb: 19.7-29mm; mean \pm SD: 25.2 \pm 4.65. Cd: 8-16mm; mean \pm SD: 12 \pm 4. Cheliped length (mean): major 32.5, minor 27 mm; Periopod length (mean) 23.5, 26, 30 and 23mm for 2nd, 3rd, 4th and 5th periopod respectively. W: 12-15g; mean \pm SD: 13.3 \pm 1.5.



(a)



(b)

Figure. *Pyxidognathus fluviatilis*; a) Male (dorsal view), b) Male (ventral view)

Morphometric Characteristics: Carapace sub-oval, smooth, deep, strongly convex in longitudinal and transverse direction, H- shaped mark in the middle. Anterolateral borders of carapace hardly arched and cut into 3 prominent teeth; three terminal joints of legs more compressed and posterior border of merus of legs with a single spine. Lower border of orbit, inner border of arm and wrist being denticulate; second pair of legs longest while the fourth pair shortest. (Gosh, 1995; Gosh, 1999). In male, both chelipeds are equal but in female left one larger than the right. Propodus broad not compressed in both the sex, long, thin and laterally compressed; upper and lower margin of propodus and dactylus are setose. Dorsal and ventral margin of dactylus with spinules. Dactylus long and styliform. **Colour:** dorsal surface of carapace and cheliped deep-red; ventral surface with light yellowish sculpture; pereopods also reddish in colour. **Size:** in male, carapace length about 17-26 mm and width about 20-30 mm; in female about 16.2-25.5mm and 19.7-29 mm respectively.

Habits: Omnivorous; feed on wafers, algae wafers, shrimp, frozen bloodworms and mosquito larvae, even vegetables. Molting is a very stressful period for this crab and it may die under the stress.

Habitat: Lives in hole or submerged sticks. Occurs in rivers, beels, and canals. Also found in brackish water and hill streams.

Distribution: A newly recorded species for the first time in Bangladesh; collected from hill streams of Himchari in Cox's Bazar and some freshwater ecosystem of Manikgonj. Also occurs in India.

Economic Importance: Not commercially important in Bangladesh but occasionally feed by duck. Some tribal people also take it as food.

Ecological role: Contribute to the food chain of aquatic ecosystem as an omnivore.

Status: Uncommon.

Family- Parathelphusidae Bott, 1970

5. *Austrotelphusa transversa* (von Martens, 1868)

Materials examined: 8 males and 7 females.

Measurement: Male: Carapace length (Cl): 30-35mm; mean \pm SD: 32.5 \pm 1.73. Carapace breadth (Cb): 38-43mm; mean \pm SD: 40 \pm 2. Carapace depth (Cd):19-22mm, mean \pm SD: 21 \pm 1.11. Cheliped length (mean): major and minor 50mm. Pereiopod length (mean): 41, 47, 46.5 and 40mm for 2nd, 3rd, 4th and 5th pereiopod respectively. Weight (W):18-22g, mean \pm SD: 19.81 \pm 1.19.

Female: Cl: 28-32mm; mean \pm SD: 30.5 \pm 1.49. Cb: 35-39mm; mean \pm SD: 37 \pm 1.28. Cd: 18-21mm; mean \pm SD: 20 \pm 1.04. Cheliped length (mean): major and minor 48 mm. Pereiopod length (mean) 40, 45, 44.5 and 38mm for 2nd, 3rd, 4th and 5th pereiopod respectively. W: 16-20g; mean \pm SD: 18.36 \pm 1.25.



(a) (b)
Figure. *Austrotelphusa transversa*; a) Male (dorsal view), b) Male (ventral view)

Morphometric characteristics: Carapace subovate, noticeably swollen, gastro-cardiac groove distinct; epigastric and postorbital cristae sharp. No setae or carinae. Outer epibranchial, meta- and mesobranchial region with faint, obliquely placed carinae. H-shaped gastric groove near the center of carapace. Antero- and posterolateral margins well demarcated; anterolateral margin usually prominently convex and lateral margins without prominent epibranchial teeth. A flat but faint projection below orbital spine. Eye socket and eye stock moderate in size. Outer margin of orbit U to V -shaped. Cheliped equal in both sexes; moderately long, broad, swollen, not compressed but robust and stout. Carpal process acute and moderately large. Outer margin of carpus with two lobes. Pereiopod long, thin and laterally compressed. Third pereiopod larger than rest of the three and merus and dactylus of third larger than all other. Fifth pereiopod shorter than all other. Upper and lower margin of propodus, dactylus are setose. Dorsal and ventral margin of dactylus with spinules. Dactylus long and styliform. Epigastric crest present. Abdomen with seven free segments, male abdomen sub-triangular to distinctly inverted T-shaped with last 3-4 segments very narrow and in particular the distal segments are broader and less elongated. Male first gonopod well chitinous with terminal and sub-terminal segments; second gonopod relatively short, rarely longer than half length of first gonopod. Mandibular palp 3-segmented,

terminal segment clearly bilobed, although one lobe slightly smaller than other. Antennae and antennules moderate. *Colour*: dorsal surface of carapace and cheliped are greenish-yellow but outer surface of cheliped light-brown. Ventral surface of cheliped, pereopod and carapace yellowish-brown. Dorsal surface pale pink with red, smooth with minute patches of brown spot; abdomen light coloured.; dorsal surface of carpus, propodus and proximal margin of merus with reddish brown (in young) or brown spot. *Size*: in male carapace length about 30-35mm and width about 38-43mm but in female about 28-32mm and 35-39mm respectively.

Habits: Omnivore; construct burrows in clay soils in the banks of freshwater rivers and creeks, swamps, farm dams and drainage channels in the dry season if their habitat dries up. Able to tolerate a loss of almost half of its body water. During extensive periods of drought for up to 6 years or more, they can plug their burrows with earth and enter a dormant metabolic state, which allows them to live off fat stored in their tissues. Around late October to early November, females lay between 100 and 350 large eggs. The eggs are carried under her body and will hatch around December. The eggs do not hatch as larvae but as miniature crabs. Once hatched, the baby crabs also enter an arrested state of development - covered in a thin film of water under the mother's abdomen (Hawking *et al.* 2006).

Habitat: Found on freshwater bodies such as rivers, swamps, beels, canals, etc and occasionally, farm dams and paddy fields during summer.

Distribution: A newly recorded crab species for the first time in Manikgonj area of Bangladesh. Mostly occurs in Western Australia. Also reported from India, Myanmar and Thailand.

Economic Importance: Not commercially important in Bangladesh.

Ecological role: It plays an important ecological role in aquatic ecosystem as a scavenging omnivore.

Status: Uncommon.

Therefore, five species of crabs recorded from the present study are *S. spinigera* (Wood-Mason, 1871), *L. wood-masoni* (Rathbun, 1905), *A. martensi* (Wood Mason, 1875), *A. transversa* (Martens, 1868) and *P. fluviatilis*. Shafi and Quddus (1982) recorded four freshwater species of crabs from Bangladesh namely *A. martensi*, *L. wood-masoni*, *S. spinigera* and *S. lamellifrons*. Siddiqui and Zafor (2002) also reported three freshwater species of crabs from the Chakaria Sundarban area which were *A. martensi* (Wood Mason, 1875), *L. wood-masoni*, *S. lamellifrons*. So *A. transversa* (Martens, 1868) and *P. fluviatilis* are newly recorded for the first time from Bangladesh. This result indicates the rich diversity of freshwater crabs of Bangladesh. If the survey is undertaken throughout the country, it is hoped that more species can be recorded that will enrich our crab resources. The relative abundance of the recorded species was not equal across the habitat types sampled. *S. spinigera* was found to be most abundant species. Similar comments were made by Shafi and Quddus (1982) & Siddiqui and Zafor (2002). Crabs were found to be more abundant in the autumn season than the summer due to the expansion of water bodies during summer, when the crabs remain dispersed. Freshwater crabs inhabit diverse types of micro-habitat. The present study also revealed that the crabs were available in all micro habitats like beels, canals ponds etc than river. This is probably due to fact that the crabs are mainly detritus feeder and the detritus are abundant in shallow floodplain where water is comparatively stagnant.

It is evident from the present study that the diversified freshwater crabs plays a significant role in the food chain of respective ecosystem as well as contributes to consumption of local people. More extensive research work would be taken up on freshwater crabs all over the country to assess their status and for their significant role in our socio-economic life and in the food chain of aquatic ecosystems.

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