

SPATIAL AND SIZE DISTRIBUTION OF GIANT CLAMS IN THE KARIMUNJAWA ISLANDS, INDONESIA.

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ABSTRACT

This study assessed the spatial distribution and size structure of giant clams in the Karimunjawa Islands. Most clams being in groups of 2 to 6 animals. The majority of the clams found were under 16 cm long, indicating that they were in a juvenile stage.

INTRODUCTION

The Karimunjawa Islands form a small archipelago in the Java Sea approximately 72 km north of Jepara (Central Java). Historically, giant clams have been an important component of the shallow water ecosystem of these islands. Although the islands lie within the zoo-geographical range of all species of giant clams, only five species were found there. These species are *Tridacna squamosa*, *T. maxima*, *T. crocea*, *Hippopus hippopus* and *H. porcellanus*. *T. gigas* has been present as evident by the occurrence of its shells, but none were found alive.

In the past two decades populations of giant clams appear declining throughout the Indo Pacific region from west Sumatra to east of Vanuatu (Panggabean 1991). The reason of this decline may be that giant clams have been extensively exploited for food and use in manufacturing of roofing tiles. Although they are protected, giant clams are still being used. At present the status of giant clams in Indonesia is poorly documented.

The aim of this research was to assess the spatial distribution and size structure of exploited populations of species of giant clams in several coral reefs of the Karimunjawa Islands.

MATERIALS AND METHODS

Surveys were conducted in April 1994 at Genting Island, Seruni Island and Sambangan Island. At each survey site, 5-m wide transects extending from the edge of the beach out to a distance of 275 m were completed (as recommended by Loya 1978; Green 1979). Our transects were 1,375 m².

At Seruni and Sambangan Islands four transects perpendicular to the shore were established. The transects were positioned on the north (transect A), east (transect B), south (transect C) and west (transect D) sides of the islands. Due to high wave action at Genting Island three transects perpendicular to the shore were established on the east side of the island. At this site transects are labeled C1, C2 and C3.

All giant clams found were identified to species level. At each transect, samples were obtained with 5 x 5 m quadrats laid down contiguous to each other. For each clam the position and distance from the center point of the quadrat was determined. The shell length (cm) of each individual was recorded.

RESULTS

The location along the transects and group size for each species and island are indicated below. The size frequency distributions at the stations from each island were practically identical. Only major differences among stations are pointed out here. Size structures are also indicated below.

Genting Island

Tridacna maxima

In station C1 animals were found mostly in two large patches located at 20 to 75 m and 120 to 170 m from shore. Within each of these two patches animals were mostly in groups of 2 to 4. Most clams in station C2 were solitary. In station C3, Clams were at 200-210 m and 250-275 m from shore. Within each of these patches we found mostly groups of 2 to 5 animals. Most *T. maxima* individuals fell in the 9-12 cm and to

a lesser extent in the 5-8 cm size classes. The only difference among stations was that in station C3 there were relatively more clams in the smallest size class.

Tridacna crocea

In station C1 most animals were in one patch located between 50 to 85 m from shore. Here clams were for the most part in groups of 2 to 4. In station C3, we found only 2 groups of 2 and 3 clams here. All other animals (5) were solitary.

All *T. crocea* clams but one were less than 12 cm long. The only larger animal found was in the 13-16 size class. In station C3 most animals fell in the first two size classes.

Hippopus hippopus

In the whole island there were only 14 clams belonging to *H. hippopus*, 13 of them in station C1 and 1 in station C3. Eight of the 14 clams were 3 to 20-cm long. The remainders were from 25 to 36 cm, only 2 being in the largest size class. All clams in station C1 were at 145-150 m from shore. There were 2 groups of 6 and 7 animals.

Seruni Island

Tridacna maxima

Most individuals in stations A and B were in one big patch at 30 to 130 m from shore. In station A, 30 % of the clams were solitary and the rest occurred in groups of 2 to 5. In station B clams were in groups of 2 to 6. In station C there were only 2 animals. The other two stations sampled had too few animals (3 between the two).

The *T. maxima* population had animals ranging from 4 to 20 cm length, most of them being in the 5-8 and 9-12 cm size classes. Only one clam was in the 17-20 cm size class.

Tridacna crocea

T. crocea clams in stations A and B were at 50-125 m distance from shore. Beside a few solitary clams, we found here large groups ranging from 2 to 8 animals each. Clams in stations C and D were in the deepest half of the transects. 56 % of the clams in these two populations were solitary. The rest were in groups of 2 and 3. The majority of the animals fell in the smallest size class. None was longer than 12 cm.

Hippopus porcelanus

H. porcelanus was found only in station D. Since the number of animals was so low (2) their spatial distribution is uncertain. These two clams were in the size classes 17-20 and 21-24 cm.

Sambangan Island

Tridacna maxima

T. maxima was only in station C. The only 5 animals found were located in one patch at 100 m from shore in one group. The clams fell in the 5-8 and 9-12 cm size classes.

Tridacna crocea

In station A, *T. crocea* clams were at 50-120 m from shore while in station D they extend from 120-170 m from shore. In both stations most animals were apart from each other. In station B we found only 2 groups of 4 clams each located between 50 m and 55 m from shore. In station C, most clams were at 110-205 m. Here there were single clams and 4 groups of 2 to 5 individuals. All clams were in the three smallest size classes.

DISCUSSION AND CONCLUSIONS

Most clams were found in groups of 2 to 6. Giant clams were located between 20-275 m from shore showing no greater concentration at any particular distance from shore. All studied populations comprised few animals particularly the *H. porcelanus* population. *T. squamosa* was absent in all stations and islands but they are present in neighbouring islands (pers. obs.). *Tridacna maxima* and *T. crocea* were the most abundant species in all three islands, 80 % of all clams being *T. crocea*. Their relative abundance suggests that *T. maxima* and *T. crocea* may escape fishing pressure because of their small sizes (below).

Ninety two percent of all giant clams (all species considered) in Karimunjawa Islands are small, not exceeding 16 cm long. Most of the larger animals belonged to *Hippopus hippopus*. The mature spawning stage of *Tridacna maxima* ranges between 15-20 cm length, and *T. crocea* mature stage is at most 15 cm long (Pearson 1977). *Hippopus hippopus* reaches maturity at 24 cm (Romimohtarto & Sutomo 1988/ citing Stephenson 1924). The size of the mature

Hippopus porcelanus is possibly approximately of the same size as *Hippopus hippopus* (Solis *et al.* 1988). If the size of the mature stages of our species are the same as those reported in the literature, our study suggested that about 90% of the clams in the three islands were in the juvenile stage at the time of this study. Spawning stages may be a rare occurrence.

If the giant clam populations have declined, the low number of clams found, their patchy distribution over a large area, and perhaps their early developmental stages, suggested that these populations are in danger of going to extinction. Effective protection to allow more animals to reach spawning stage may be needed.

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