

Conservation of coastal lagoons in Ghana: the traditional approach

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ABSTRACT

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The lagoons Sakumo and Djange are two of the many coastal lagoons in Ghana which provide valuable resources to the local communities and offer important roosting, nesting and feeding habitats for several thousands of birds. In the past, various rules and regulations including close seasons, sacred days and taboos based on religious beliefs and associated with lagoon fetishes protected the lagoon habitat and prevented overexploitation of the lagoon resources. The effectiveness of these traditional systems as conservation tools in modern times is examined. Most of the rules and regulations are no longer respected and the lagoon fisheries are heavily overexploited. The heavy fishing pressure has led to a reduction in the average size of the black-cheeked tilapia (*Sarotherodon melanotheron*, the blue-legged lagoon swimming crab *Callinectes latimanus* and the mollusc *Tympanotonus fuscatus* in the lagoons; e.g. 95% of the tilapia sample collected in this study was below 10 cm in length, whereas the modal size class of a sample taken in 1971 was 10–11 cm. The population density of *T. fuscatus* was also extremely low in sites where the species was heavily exploited. Tabooed species were effectively protected. The need for scientific evaluation of the traditional beliefs and taboos and provision of legal backing for the enforcement of these traditions to ensure conservation of the coastal lagoons are emphasized.

INTRODUCTION

Coastal lagoons in Ghana provide important benefits to the local communities that exist around them (Mensah, 1979; Ntiemoa-Baidu, 1991). In the past, conservation of these lagoons and the resources they provide was based on religious beliefs and superstitions associated with fetishes and enforced by taboos (e.g. Pauly, 1987). Although the taboos had no legal backing, the beliefs were strong enough to make people respect the traditions.

This paper evaluates the traditional conservation strategies associated with two coastal lagoons: Sakumo and Djange. The effectiveness of the strategies in regulating the exploitation of resources from the lagoons was assessed using population parameters of three

organisms. At Sakumo, the sizes of individual black-cheeked tilapia *Sarotherodon melanotheron*, and the blue-legged lagoon swimming crab *Callinectes latimanus* caught in this study were compared with samples taken in 1971 (Pauly, 1976; Kwei, 1978). Population densities and individual sizes of the mollusc *Tympanotonus fuscatus* from Djange where the species was tabooed, were compared with that of another coastal site where the species was heavily exploited for food.

The Sakumo lagoon is a brackish water lagoon situated on the coastal road between the cities of Accra and Tema, approximately 3 km from the Tema township. It was formerly a closed lagoon, but is presently a semi-open lagoon connected to the sea by two parallel culverts which allow exchange of water between

the lagoon and the sea. The open water lagoon covers an area of 1–3.5 km² depending on the season, with a surrounding flood plain of approximately 7 km². The lagoon and surrounding flood plain is traditionally owned by the Tema and Teshie people but is presently under the jurisdiction of the Tema Development Corporation.

The Djange lagoon is situated on the outskirts of the Great Ningo town. It is a long narrow brackish water lagoon stretching for some 3.5 km inland. In the dry season, the entrance to the sea is usually cut off by a prominent sand bar but in certain years the lagoon remains open. Local inhabitants reported that the lagoon had remained open for the past three years.

MATERIALS AND METHODS

As part of the routine monitoring of bird populations in selected coastal lagoons under the research programme of the Save the Seashore Birds Project, data were also collected on the human use of the lagoon habitats and resources. Chiefs and local people were interviewed for information on traditional beliefs, fetishes and taboos associated with the lagoons. Fishing activities of the fishermen who regularly fished for tilapias and crabs with draw nets, cast nets and crab traps were monitored during visits from November 1988 to April 1989. Catches were weighed on a top-loading balance. Tilapia and crab samples collected and transported to the laboratory were deep frozen within 1 h of collection. Individuals were later weighed on a Mettler balance and measured with callipers.

The densities of *T. fuscatus* were determined using 0.10 m² quadrats placed at 5 m intervals in areas of high density or 100.0 m² quadrats marked out with pegs in areas of low density. Individuals collected were measured in the site, using callipers and returned into the lagoon.

RESULTS

Lagoon resources

The tilapia *Sarotherodon melanotheron* was by far the most common fish species found in both the Sakumo and the Djange lagoon. At Sakumo, the species accounted for 98% (by weight) of the fishermen's catch. Other species of fish found included the horse mackerel *Caranx hippos* and the grey mullet (Mugilidae). The blue-legged lagoon swimming crab *Callinectes latimanus* was also common and was heavily exploited for food. Two species of molluscs, *Ostrea tulipa* and *Anadira senilis*, were commonly found at Djange and were exploited for food. A third species, *Tympanotonus fuscatus* was extremely abundant at Djange but the species, although heavily exploited as a food resource in other areas of Ghana, was tabooed among the people of Ningo. The species was therefore not eaten and collection from the lagoon was forbidden.

Large quantities of shell were exploited from the shores of Sakumo lagoon for the building industry and as a source of calcium in animal feed. Typha growing along the edges of the freshwater end of the lagoon were also heavily exploited for mats and thatch for roofing. At Djange, the mangroves growing in the flood plain were heavily exploited for firewood.

Both lagoons supported significant populations of sea- and shorebirds. Sakumo lagoon is the fourth most important site for water birds along the Ghana coast with a record of 58 species. The site is most productive during the period October–December when peak counts of over 3500 waders, 4000 terns and 700 herons have been recorded (Ntiamoah-Baidu, 1991). Djange lagoon holds small populations of waders, herons and terns. A total of 35 species have been recorded with maximum counts of 2600 waders, 2200 terns, 250 herons and 200 gulls recorded in April. Most of the bird species, particularly herons were regularly hunted.

Traditional conservation strategies

It was found that a number of traditional beliefs and taboos were associated with both the Sakumo and Djange lagoons.

Sakumo Lagoon

The Sakumo lagoon was regarded as a fetish by the local community and it had a Fetish Priest, the Sakumo Wulomo and a Priestess Naa Yoo Wulomo. The Black heron *Egretta ardesiaca* was considered a sacred bird associated with the lagoon fetish and its capture or killing was forbidden. Rules and taboos associated with the lagoon included:

- prohibition of the use of draw nets and other nets of mesh size below 2.5 cm;
- prohibition of fishing from daybreak to 12 noon on Fridays (which was considered a sacred day for the lagoon fetish);
- a closed season for fishing from October/November to end of March/early April. Crab collection was not affected by these rules.

The beginning of the closed season was determined by the status of the lagoon fish stocks. The closure was instituted when the fishermen felt that the stocks were becoming depleted. The closing ceremony involved the pouring of libation and insertion of a coconut branch at the entrance of the shrine as a symbol for the closure.

The opening of the season was, however, linked with the annual Kpledjoo festival of the Tema people, which takes place in early April. The opening normally took place 1–2 weeks before the festival. The ceremony involved the pouring of libation, followed by the casting of a net by the Fetish Priest. The fish caught by this net were smoked and used together with palm oil and maize flour to prepare a dish which was sprinkled on the banks of the lagoon to declare it open. The opening ceremony was a big event which attracted fishermen from neighbouring villages and others from as far as Ada and Keta to join the fishing activity which followed.

The rules were enforced by the local community. A fine of C5000 plus one sheep could be imposed on offenders, and in the case of the use of prohibited nets, the nets were confiscated. The rules and taboos, however, had no legal backing and were regularly disregarded by a large number of fishermen.

Djange Lagoon

The Djange Lagoon was also a fetish – a female fetish. The lagoon was owned by the Ningo community and the Paramount Chief of Ningo was the custodian. A Chief Fetish Priest performed the traditional rites and also acted as the custodian in the absence of the Paramount Chief. Rules, regulations and taboos associated with the lagoon included:

- prohibition of fishing on Mondays which was the sacred day for the lagoon;
- prohibition of collection or removal of the mollusc *Tympanotonus fuscatus* from the lagoon;
- prohibition of the use of poles or sticks in the lagoon;
- prohibition of crossing of the lagoon with a vehicle;
- prohibition of entering the lagoon with footwear, and gold earrings;
- prohibition of women from entering the lagoon during menstruation;
- prohibition of frying of fish, collected from the lagoon, in oil (fish may be smoked or boiled);
- prohibition of the use of draw nets;
- a closed season lasting for a period of three weeks after the lagoon opens into the sea.

Although these taboos were not written, it was claimed that they were known to every native of Ningo. Fines for breaking the taboos ranged from a bottle of schnapps, 12 yards of white cloth, and two white fowls, to one cow plus the other items listed depending on the seriousness of the offence and whether the offender was a native who should know the rules or a stranger. Here also the taboos had no legal backing. If offenders refused to pay the fines,

the elders would call him and advise him of the possible outcome. If he is adamant, they could only pour libation and hand him over to the gods who, they believed, would deal with him. It was believed that people have died as a result of breaking the taboos and refusing to pay the requisite fines to pacify the lagoon god. The elders expressed regret that the traditional beliefs were gradually breaking down, and feared the possible outcome that would result from annoying the gods.

Effectiveness of rules and taboos in regulating the exploitation of the lagoon resources

Fishing intensity

Fishing (including crab collecting) was undertaken every day in Sakumo lagoon; even during the closed season and on prohibited days. It was carried out throughout the day and sometimes at night, but peak numbers of fishermen were recorded between 09:00 and 12:00 h. The fishermen came from surrounding communities (Tema, Sakumono, Nungua, Teshie, Accra). They were either full-time fishermen or had jobs elsewhere and fished part-time, especially at weekends.

Fishing intensity was lowest during the closed season (October–March). The maximum number of fishermen recorded at any one time during that period was 30. Fishing was most intensive during the first few weeks after the ban on fishing was lifted. The maximum number of fishermen recorded at any one time

during this period was 310. The fishermen fished for 1–5 h each day and worked singly or in groups of 4–12. The tilapia catch ranged from 1.0 to 6.1 kg per man h⁻¹ (Table 1).

Lagoon fishery was minimal at Djange where most of the fishermen concentrated on marine fishing and only fished in the lagoon on Tuesdays when fishing in the sea was prohibited; or during the marine fish lean season. The maximum number of fishermen recorded at any one time during the period of study was 18. The prohibition of fishing on Mondays and use of draw nets were strictly observed.

Size composition and population densities of some marine organisms

The body lengths of the sample of tilapia caught with draw nets from Sakumo ranged from 2.8 to 12.1 cm with a mean of 7.08 cm (Fig. 1). Figure 2 shows the size composition of the sample of lagoon crabs collected from Sakumo in November 1988. The carapace width ranged from 1.5 to 6.5 cm. The size composition of *T. fuscatus* collected from Djange (where the species was tabooed) is compared with that of a sample collected from another coastal site, Muni lagoon, near Winneba (where the species was heavily exploited for food) in Fig. 3. The body lengths of the Djange sample ranged from 2.47 to 5.60 cm while those of the Muni sample were 1.53–3.97 cm (t for difference between the mean lengths of individuals from the two sites = 13.55,

TABLE 1

Sakumo lagoon fisheries

Fishery	Method	No. of groups/ fishermen	Mean time (h) (range)	Catch (kg per man hr ⁻¹)	Value (C kg ⁻¹)	Daily earning per person (C) ¹
Tilapia	Cast net	7	3.5 (3–4)	2.90	165.00	1675
	Draw net	5	3.2 (1–5)	2.24	165.00	1183
Crab	Traps ²	5	2.3 (0.5–3)	0.51	421.00	494

¹C350.00 = U.S.\$ 1.

²Mean number of net traps per fisherman = 23.2.

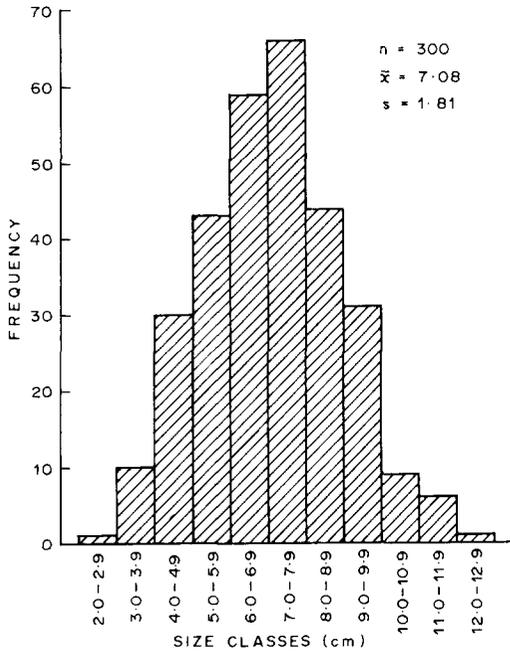


Fig. 1. Size composition of *Sarotherodon melanotheron* from Sakumo lagoon.

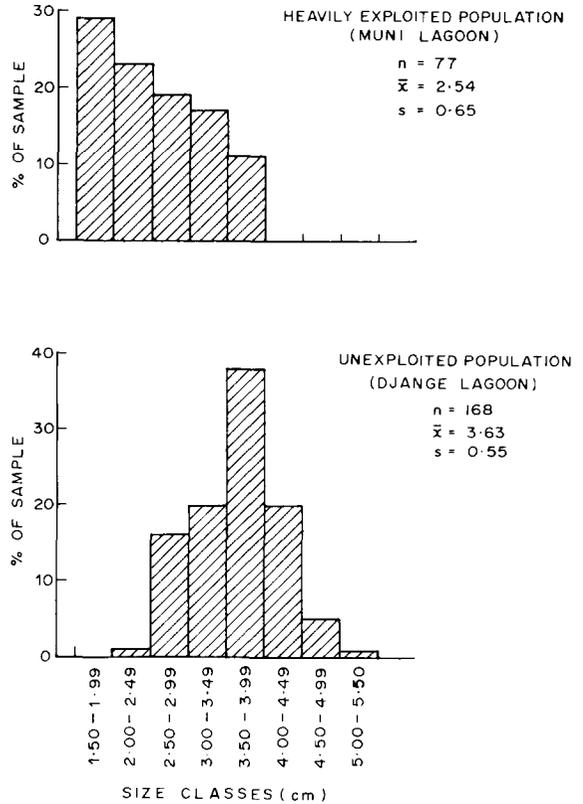


Fig. 3. Size composition of *Tympanotonus fuscatus* from a heavily exploited population (Muni lagoon) and an unexploited population (Djange lagoon).

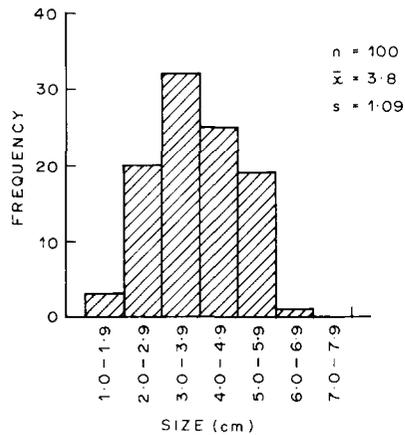


Fig. 2. Size composition of *Callinectes latimanus* from Sakumo lagoon.

$P < 0.005$, $df = 243$). The species occurred in densities of $172.3-326.2 \text{ m}^{-2}$ at Djange (depending on distance from the edge in the lagoon) as compared with $0.002-0.040 \text{ m}^{-2}$ in the open water at Muni and 46.7 m^{-2} in the Sesuvium beds along the edges of the lagoon.

DISCUSSION

There is no doubt that the coastal lagoons in Ghana provide valuable resources to the local communities. With a fishing effort of $3.5 \text{ man hours day}^{-1}$, the average income from the lagoon fisheries during the peak season was 3-4 times higher than the minimum government wage of C480 for an 8-h working day (C350 = U.S.\$ 1). The average daily income from crab collection was also twice as much as the government minimum wage. There is therefore a need to manage these coastal lagoons and the resources they provide to ensure sustainable benefits to the people.

The study clearly shows that the traditional beliefs and associated taboos can be effective tools for conservation if they are respected. Unfortunately these beliefs have either broken

down or are gradually breaking down. Fishing activities continued in Sakumo every day irrespective of the prohibitions of sacred days and closed seasons; and draw nets of varying mesh sizes were regularly used.

Factors which were believed to contribute to the breakdown of the traditional beliefs included the introduction of christianity, western influence and education, as well as immigration of people from other ethnic groups who neither believed nor respected the local fetishes and taboos. The result is that most of the rules and regulations associated with the beliefs are ignored and the lagoon resources are heavily exploited, leading to a reduction in individual size and abundance of some lagoon organisms.

Pauly (1976) reports a maximum body length of 19.0 cm and a modal size class of 10–11 cm for a sample of 1605 tilapia collected from Sakumo lagoon in 1971. Of the tilapia collected in the present study, 95% were below 10 cm in body length. The carapace widths of a sample of 626 *Callinectes latimanus* collected by Kwei from the same lagoon in November 1971 (Kwei, 1978) ranged from 1.50 to 9.99 cm, with 97% of the sample above 3.0 cm, as compared with 77% in the present study. The differences in sizes of both the tilapia and the lagoon crabs collected at the different periods (1971 and 1988/89) are statistically significant (χ^2 test, $P < 0.005$). The same trend is observed when the size composition of *T. fuscatus* from the unexploited population is compared with that from a heavily exploited population. In all the three cases, the heavy exploitation pressure prevents individuals from attaining the maximum size possible for the species in a particular environment; resulting in a population structure with many individuals below the average size.

Tabooed species were most abundant in the areas where their collection was forbidden. The

Black heron is most common in Sakumo lagoon where it was considered sacred, and Sakumo often holds the entire population of Black herons along the Ghana coast (Ntiamoa-Baidu, 1991). Whereas the Djange lagoon was literally teeming with *T. fuscatus*, the species was very sparsely distributed at Muni lagoon where it was heavily exploited for food. The data on *T. fuscatus* clearly illustrates how effective the traditional beliefs and taboos can be as tools for species protection; but they also illustrate the danger of under-utilization of a resource as a result of traditional prohibitions.

Obviously, there is a need for detailed scientific study of the traditional beliefs and taboos associated with coastal lagoons, to evaluate their effectiveness as conservation tools. Once this is done, it should be possible to strengthen and promote the enforcement of the more effective traditions through the provision of modern legal backing. Such legal systems, based on the local people's traditional beliefs would be more likely to receive the local people's support and participation, to ensure the rational use of coastal lagoon resources and prevent overexploitation.

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