

Fisheries of the Farasan Islands (Red Sea)

W. Gladstone

Abstract

The fisheries of the Farasan Islands (Saudi Arabia, Red Sea) are described. The fishery resources are exploited by artisanal, investor and industrial sectors. The artisanal fishery consists mostly of line fishing around coral reefs and about half the fishing effort occurs within the proposed marine protected area (MPA). Activities by investor and industrial fisheries sector include line fishing, gill netting, fish trapping and demersal fish trawling. The relevant resource management issues that need to be addressed as part of a planning study for the establishment of a MPA are also presented. The major issues are: (1) the decline in the catch of the artisanal fishery; (2) by catch and habitat degradation; (3) sustainability in the collection of giant clams and pearl shells; and (4) the lack of information such as the importance of MPA to fisheries, stock assessment and catch and effort data. A significant role in the future management of the fisheries has been identified for the traditional representatives of the artisanal sector.

Introduction

The Farasan Islands (Fig. 1) are a high priority in terms of conservation and management of marine resources. Most of the marine environment is undisturbed by human activities other than fishing. There is a high diversity of marine ecosystems and the area is nationally and internationally significant for seabirds and marine mammals, and is the site for a unique annual aggregation of parrotfish (Gladstone 1996; Gladstone and Fisher *in press*). The dramatic urban, industrial and commercial development of Saudi Arabia in recent decades has led to rapid population growth, development of coastal areas, and the rise of relatively new industries, such as commercial fishing (Gladstone et al. 1999). The sea between the Farasan Islands and the coast is Saudi Arabia's major fishing ground in the Red Sea, and continued growth in fishing is expected as demand for seafood increases. If unmanaged, these factors are a potential threat to the resource sustainability, conservation status and cultural values of the Farasan Islands. In view of this, it was decided to establish a marine protected area (MPA) around the Farasan Islands. This region of the Red Sea is poorly documented and

the fisheries have not been studied in detail. More detailed studies (e.g., stock, catch and effort assessments) are planned for the future as part of a regional fisheries assessment (Gladstone et al. 1999).

The aim of this study was to gather preliminary information on fisheries activities within the proposed Farasan Islands MPA. This paper describes the types of fisheries that used the proposed MPA, the areas utilized, the intensity of usage, current issues facing the artisanal fishers and their perception of the proposed MPA.

Methods

The Farasan Islands (16°40'N and 42°00'E) are located in the southern Red Sea within the borders of the Kingdom of Saudi Arabia, 42 km offshore of the coastal city of Jizan. The proposed Farasan Islands MPA encompasses 128 islands and a total area of 3 310 km² (Fig. 1). Farasan Island (four villages), Saqid Island (four villages) and Qummah Island (one village) have a total population of 5 000. The locations of fishing grounds and camps were determined

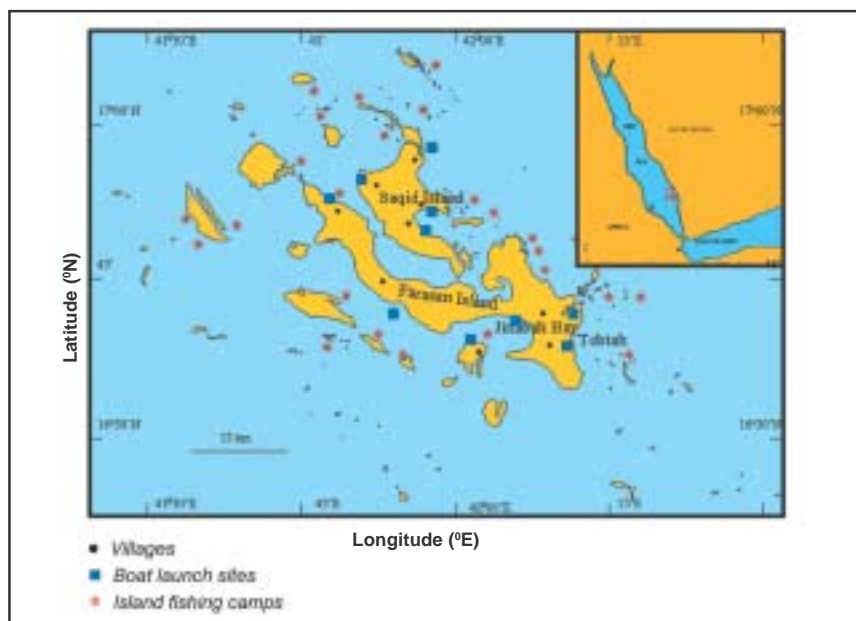


Fig. 1. The Farasan Islands. (The boundaries of the Farasan Islands Marine Protected Area encompass all islands in the figure).

by aerial and boat surveys and interviews with fishers. Differences in the level of use of particular reefs were quantified by inspection of Coast Guard records of all trips made by artisanal fishers from two launch sites. Species caught were determined by inspection of catches during fishing or clearing of nets and when the catch was being landed at the markets, as well as by diving on fish traps. Artisanal fishers and pearl divers were interviewed at sea, in fishing camps, at fish markets, and in their homes for information on income, perceived conflicts, and traditional management.

Results

Artisanal Fishing

At the time of the study there were 381 artisanal fishers, aged 22-75 years and representing about 20% of the male workforce. All artisanal fishers were Saudi nationals and all worked solely as fishers. There were 442 licensed fishing boats, of which 396 were factory-made fiberglass boats (mostly 5-8 m length) powered by outboard motors and 46 were traditional, hand-built wooden boats. Fishing trips began from launch sites throughout the Farasan Islands, usually near the fishers' village (Fig. 1). Fishers worked around the islands and reefs within the vicinity of their launch site for 1-6 days, living in island camps. There was a Coast Guard camp at the larger villages where fishers reported prior to their departure and again upon their return.

A significant amount of fishing effort occurred within the boundaries of the proposed MPA and some reefs were fished more intensively than others. An average of about five fishing trips per day were made from the Jinabah Bay launch site, whereas an average of one and a half fishing trips per day were made from the

Table 1. Fish species caught in the artisanal fishery of the Farasan Islands.

Class Chondrichthyes (sharks and rays)
Family Carcharinidae
<i>Carcharhinus</i> , <i>C. melanopterus</i>
Class Osteichthyes (bony fishes)
Family Belontiidae
<i>Tylosurus choram</i>
Family Chanidae
<i>Chanos chanos</i>
Family Serranidae
<i>Aethaloperca rogae</i> , <i>Cephalopholis hemistiktos</i> , <i>C. miniata</i> , <i>C. oligosticta</i> , <i>Epinephelus areolatus</i> , <i>E. fuscoguttatus</i> (*), <i>E. summana</i> (*), <i>Plectropomus maculatus</i> , <i>P. truncatus</i> , <i>Variola louti</i>
Family Carangidae
<i>Carangoides bajad</i> , <i>Caranx melampygus</i> , <i>C. sexfasciatus</i> , <i>Gnathanodon speciosus</i> , <i>Rachycentron canadus</i> , <i>Scomberoides commersonianus</i> , <i>Seriola dumerili</i>
Family Scombridae
<i>Euthynnus affinis</i> , <i>Gymnosarda unicolor</i> , <i>Scomberomorus commerson</i>
Family Lutjanidae
<i>Lutjanus bohar</i> , <i>L. kasmira</i> , <i>L. gibbus</i> , <i>L. ehrenbergi</i> , <i>L. sebae</i> , <i>Pristipomoides typus</i>
Family Haemulidae
<i>Plectorhynchus flavomaculatus</i> , <i>P. gaterinus</i>
Family Lethrinidae
<i>Lethrinus lentjan</i> (*), <i>L. mahsena</i> (*), <i>L. microdon</i> (*), <i>L. nebulosus</i>
Family Ehippidae
<i>Platax orbicularis</i>
Family Gerreidae
<i>Gerres argyreus</i> (*), <i>G. oyena</i> (*)
Family Mugilidae
<i>Crenimugil crenilabis</i> (*), <i>Oedalechilus labiosus</i> (*)
Family Sphyraenidae
<i>Sphyraena barracuda</i>
Family Labridae
<i>Epipulus insidiator</i>
Family Scaridae
<i>Hipposcarus harid</i> (*), <i>Scarus ferrugineus</i> (*), <i>S. ghobban</i>
Family Siganidae
<i>Siganus rivulatus</i> (*)
Family Platycephalidae
<i>Platycephalus</i> sp.
(*) species also caught by industrial fisheries.

Tobtah launch site. Combining fishing trips from both launch sites, the most frequently fished reefs in the vicinity of these launch sites were those around Solubah Island, Domsok Island and Ra's Shida, with visitation rates of 1.4, 1.1 and 0.8 trips/day, respectively. All other locations within the proposed MPA in the vicinity of these launch sites were only fished on 1-4 occasions during the month. About 76% of fishing trips

from the Jinabah Bay launch site and 59% from the Tobtah launch site were to destinations within the proposed MPA. This depiction of the significance of reefs within the proposed MPA for the artisanal fishery is probably representative because the Jinabah Bay and Tobtah launch sites accounted for 23% of all fishing boats, and the numbers of potential fishing sites were about evenly distributed around the Farasan

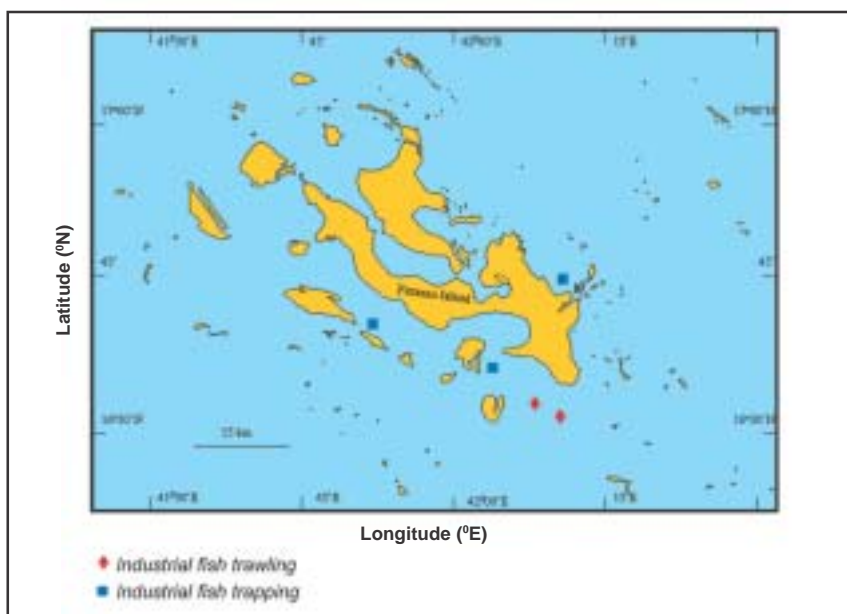


Fig. 2. Activities in the Farasan Islands Marine Protected Areas.

Islands.

A total of 42 species of fish were noted during the study (Table 1), with emperors (Family Lethrinidae) being the favored catch. The most common technique for catching reef fishes was line fishing by a single fisher from a boat. The fishers claimed they no longer hunted dugong or turtle, and no evidence contrary to this was observed. Typically, artisanal fishers reported they were paid approximately 500 Saudi Riyals (SR) (about US\$ 133) for their catch after 3-4 days fishing.

A single person within each village, translated from Arabic as the 'chief fisherman', was the focus for all fishing activities. There were six chief fishermen and each was a respected person in the village, the best fisher, and a source of much local information about fishing. Chief fishermen performed duties on behalf of the artisanal fishers that were recognized by relevant government authorities, such as representing them in any dealings with the Fisheries and Coast Guard, approving and submitting applications for fishing licenses, and signing letters written by fishers to the Coast Guard and

government. Traditional management practiced in the Farasan Islands involved the practice of rotating fishing grounds. When catches declined from a reef, the artisanal fishers stopped fishing there for up to three months and concentrated their efforts on another reef. This activity was coordinated by the chief fishermen.

Pearl shells (*Pinctada radiata*) were collected at only one location in summer, Rogbain Island (Fig. 2), by a group of four divers. Mounds of discarded pearl shells are very common along the shorelines of most

of the Farasan Islands, indicating that pearling was a significant local industry in the past. Underwater observations indicated that large numbers of *P. radiata* were still present in the shallow waters around Rogbain Island. Current activities of this fishery are probably sustainable, owing to the small number and age (50-60 years) of participants and the absence of new divers.

Clams (*Tridacna maxima*) were abundant on shallow reef tops on many reefs. At the time of this survey, clam tissues were being harvested from shallow reefs in the Kharij As Sailah and Kharij Al Qabr areas (Fig. 2). They are for sale in Farasan village for SR1 each (about US\$ 0.27). Surveys of this collection revealed that a significant number of clams were collected. Living clams were picked from the reef by breaking the surrounding coral, removing the living tissue, and discarding the empty shell at the same site. The open spaces created by collectors smashing the coral were invaded by zooanthids, which appeared to limit the re-growth of the surrounding corals. Although clam collection occurred only in a few locations, it reduced local stocks and destroyed the surrounding coral. The long-term sustainability of this activity needs to be assessed in more detail.



Artisanal fishers of the Farasan Islands

Investor Fishing

The investor fishing sector consisted of 161 fishers (106 Saudi nationals and 55 foreigners) employed by nine local business people (the ‘investors’). Investors had obtained an interest-free government loan to buy and equip their fishing boats. Compared with the artisanal fishery, the boats were larger (not less than 10 m), had bigger engines (at least twin 75 hp), and had crews of 2-4 men who often lived on the boat. They fished with gill nets or hook and line or both. Employed fishers fished in the same locations and caught the same species as artisanal fishers. They also fished reefs that were deeper and further offshore than those frequented by the artisanal sector, and consequently caught additional species including lutjanids (such as *Lutjanus bohar*, *L. gibbus*, *L. sebae*,

Pristopomoides typus) and lethrinids (such as *Lethrinus nebulosus* and *L. elongatus*).

Industrial Fishing

Industrial fishing was undertaken by a single company, Saudi Fisheries, of which the government was the majority shareholder. Its operations involved demersal fish trawling, gill netting and fish trapping. Demersal fish trawling mostly occurred in the deeper shelf waters of the Red Sea and was only recorded twice (based on positions recorded in skippers’ logs) in 12 months within the proposed MPA (Fig. 2). Gill netting and fish trapping were done from a fleet of 17 fiberglass boats based in Jizan that taken daily to the Farasan Islands. Each boat had a crew of three foreign workers who were employed by Saudi Fisheries on two year

contracts and were paid a flat rate for their catch of SR 3-4/kg (about US\$ 0.93/kg). Surveys within the proposed MPA boundaries revealed that these boats concentrated their fishing activities on the shallow reef flats. However, it was not possible to determine the significance of the proposed MPA for this fishery. The largest component of the catch (Table 1) was rabbitfish (*Siganus rivulatus*, Family Siganidae). Fish traps, called *gargoor*, were introduced to the area by foreign fishers in the industrial sector and were deployed in several locations throughout the proposed MPA (Fig. 2). Traps were not historically used by artisanal fishers in the area and had not been adopted by them since their introduction. The industrial fishers deployed traps in the areas fished by artisanal fishers and caught similar species (Table 1), as well as non-commercial species, including angelfishes (Family Pomacanthidae), butterflyfish (Family Chaetodontidae), and surgeonfish (Family Acanthuridae).

Discussion

This study identified a number of issues that need to be addressed and studied in more detail in planning the management of the proposed MPA. Artisanal fishers reported that catches, sizes of fish, and income from fishing had all declined in recent years, and that more time was needed and larger areas covered to catch the same number of fish as in the past. The artisanal fishers claimed that the ease of gaining government loans had led to an increase in the size of the investor fishery and that foreigners did not follow the traditional system of rotating reefs nor felt any responsibility for maintaining the resources. Although the number of artisanal fishers had increased from 195 in 1976/1977 (Sanders and Morgan 1989) to 381 in 1993, the

Table 2. A preliminary list of species that are found in the fish nursery habitats within the Farasan Islands Marine Protected Areas.

Nursery habitat	Month	Taxa utilizing nursery
Mangroves	October	<i>Herklostichys quadrimaculatus</i> , <i>Gerres oyena</i>
	November	<i>Atherinomorus lacunosus</i> , <i>Lutjanus ehrenbergi</i> , <i>Gerres oyena</i>
	January	<i>Lutjanus ehrenbergi</i> , <i>Gerres oyena</i> , unidentified mugilids
	February	<i>Lutjanus ehrenbergi</i> , <i>Gerres oyena</i>
	April	<i>Acanthopagrus bifasciatus</i> , <i>Atherinomorus lacunosus</i> , <i>Lutjanus ehrenbergi</i> , <i>Gerres oyena</i> , <i>Sargassum</i>
Patch reefs	November	<i>Lutjanus ehrenbergi</i> , unidentified lethrinids
	December	<i>Lutjanus ehrenbergi</i> , <i>Gerres oyena</i> , <i>Scarus ferrugineus</i> , <i>Acanthurus nigricans</i> , <i>Siganus rivulatus</i>
Beaches	December	<i>Atherinomorus lacunosus</i> , <i>Gerres oyena</i>
	January	<i>Gerres oyena</i> , unidentified mugilids
	February	<i>Atherinomorus lacunosus</i> , <i>Gerres oyena</i>
	March	<i>Gerres oyena</i>
Reef flat	November	<i>Lutjanus ehrenbergi</i> , <i>Gerres oyena</i>
	December	<i>Lutjanus ehrenbergi</i> , <i>Gerres oyena</i> , <i>Acanthurus nigricans</i> , <i>Siganus rivulatus</i>
	January	<i>Lutjanus ehrenbergi</i> , <i>Gerres oyena</i> , <i>Acanthurus nigricans</i>
	February	Unidentified lethrinids, unidentified mugilids, <i>Siganus rivulatus</i>
	April	<i>Lutjanus ehrenbergi</i> , unidentified lethrinids, <i>Gerres oyena</i> , <i>Siganus rivulatus</i>
Winter-inundated areas	January	<i>Atherinomorus lacunosus</i> , <i>Gerres oyena</i> , unidentified mugilids
	February	Unidentified mugilids
Seagrass	September	Unidentified lethrinids
	November	<i>Lutjanus ehrenbergi</i> , <i>Gerres oyena</i>
	January	Unidentified lethrinids
	February	<i>Lutjanus ehrenbergi</i> , unidentified lethrinids, <i>Gerres oyena</i> , <i>Siganus rivulatus</i>
	March	<i>Siganus rivulatus</i>
	April	Unidentified lethrinids, unidentified siganids

majority of artisanal fishers interviewed did not believe that this growth, or improvements in their own equipment, had contributed to the decline in catches. Developing a sustainable artisanal fishery will be a priority in the management of the proposed Farasan Islands MPA in order to maintain the economic livelihood of the Farasan Islanders, to diversify the national economic base and to maintain socio-cultural identity. Artisanal fishers expressed support for the concept of an MPA as a tool for sustaining fisheries, as long as there were limited restrictions on their own activities and stricter controls of the investor and industrial fisheries.

Potential issues associated with industrial fisheries within the proposed MPA include by-catch and habitat damage from gill netting and fish trapping, and a lack of stock assessment and catch-effort data. The industrial fishers set their gill nets in the shallow reef flat areas that occupy a large area of the MPA and are used as nursery grounds by some species of fish. The artisanal fishers recognized this activity as a potential problem from their knowledge of the significance of this habitat for juvenile fishes. Table 2 presents a preliminary list of species using the fish nursery habitats in Farasan Islands MPA. Management of the activities of the industrial sector within the proposed MPA could involve limitations on the areas they fish through zoning. Although there are large areas of alternative fishing grounds outside the MPA, restrictions on this fishery could be constrained by government-ownership and conflicting management priorities between the National Commission for Wildlife Conservation and Development (responsible for managing protected areas) and the Ministry for Agriculture and Water (responsible for fisheries management).

All artisanal fishers in the Farasan Islands were Saudi nationals. However, most of the fishing in the investor and industrial sectors is now done by foreign employees. The strong sense of custodianship expressed by the Farasan artisanal fishers could be utilized in the management of the proposed MPA, e.g., as employed or voluntary marine rangers and in public education programs. Management will benefit from the direct involvement of chief fishermen (e.g., as stakeholder representatives on a consultative committee) because of their knowledge of the local marine environment, local customs and politics, their esteemed position amongst artisanal fishers, and for communication between the management and the community. This is especially critical because of the size of the proposed MPA and the associated difficulties in enforcement of restrictions, as well as the decline in financial support for conservation in Saudi Arabia associated with declining oil prices. The level of participation of the artisanal sector in planning the MPA will determine their support for it and hence its future success.

In summary, this study identified the following issues for the management of the proposed MPA: declines in catches by the artisanal fishery, by-catch and habitat damage from gill netting and fish trapping, lack of stock assessments and catch-effort data for all fisheries, lack of information on the significance of the MPA for industrial gill netting and the sustainability of clam collecting, and lack of detailed information on the socio-economic significance of fishing activities. Additional research and monitoring are required to provide this information. It is, therefore, necessary to adopt a precautionary approach in planning of the MPA until such information is

available.

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W. Gladstone is with the *National Commission for Wildlife Conservation and Development, PO Box 61681, Riyadh 11575, Kingdom of Saudi Arabia*. His current address is *Sustainable Resource Management and Coastal Ecology Unit, School of Science and Technology, University of Newcastle, Central Coast Campus, PO Box 127, Ourimbah NSW 2258, Australia*. E-mail: wgladsto@mail.newcastle.edu.au; Tel: 61 2 4348 4123; Fax: 61 2 4348 4145.