

This issue of *Fishbyte* is the first of four to be published in 1996 for which the two of us will share editorship, to ease the transition to 1997, when the older of us will end his involvement with *Fishbyte* (except perhaps as a contributing author!).

A mix of articles is contained in this issue, ranging from the detailed, quantitative contribution of Palomares et al., to the general (and highly readable) overview/synthesis articles of P. Murray and J. Wanink. The article of P. Murray, which provides an overview of St. Lucia, (West Indies) fisheries, is indicative of the "wider" and multidisciplinary system view necessary for successful fisheries management (a theme we shall repeatedly go back to in subsequent issues of *Fishbyte*). The article of Palomares et al., on the length-weight relationship of fishes from the Volta River in Ghana, caps the

statistical treatment of an earlier contribution. (*Fishbyte* 18(1):36-38. J. Wanink synthesizes ecological information explaining the "success" of the cyprinid *Rastrineobola argentea* after the Nile perch introduction in Lake Victoria.

Individually informative and indicative of widely applicable approaches, these articles moreover collectively reflect the depth and range of the analytic, synthesis and communication skills we routinely must bring to bear in our work as fisheries scientists. We cap this issue with the regular news items, and reviews of two books on the shelf fisheries resources of Cuba and the Yucatan (Mexico), see p. 53.

Since 1996 will be a year of transition, we would appreciate receiving your comments on how you think the *Fishbyte* section of *Naga* could be improved. *D. Pauly and G. Silvestre*

The Fisheries of St. Lucia, West Indies

Peter A. Murray

Abstract

An overview of the fisheries of St. Lucia using currently available information is presented. The fisheries is entirely artisanal, characterized by relatively simple and inexpensive gears and boats. The 2 100 fishers (who land roughly 750 t per year of fish) appear socially and economically marginalized and beset by low occupational mobility. The status of the major species groups they exploit are briefly discussed, and initial indications of overfishing are noted. Consideration of both resource and resource-user situations in management of the island's fisheries is emphasized.

Overview

St. Lucia is a 684-km² volcanic island located midway along the Lesser Antilles island chain which serves as the eastern boundary of the Caribbean Sea (Fig. 1). The fisheries of this island state are considered artisanal in terms of the technologies employed in fishing, the scale of production and organization of the markets (McGoodwin 1984).

There are 538 fishing vessels (George 1994) which make up the fleet and 2 100 fishers (Department of Fisheries, St. Lucia, unpublished data). Sixty-five percent of vessels in the fleet are open canoes (5-8 m in length), and 21% are open wooden "transom" boats (3-8 m long). Primary source of propulsion is the outboard engine with horsepower ranging from 15 h.p. (in the case of the smallest "transom" vessels) to 85 h.p. The canoes are of the traditional Carib dugout construction with plank *gunwales* (Murray et al. 1988). Fourteen percent of the fleet is made up of fiberglass pirogues (Anon. 1994). Although some individual boats may be used for a specific fishery: canoes, transoms and pirogues (Fig. 2) may be involved in any fishery (Table 1).

There are 28 sites on the island where significant quantities of fish are landed. Eight of the major fish landing sites are the homes of fishers cooperatives. These organizations serve as the primary conduit for a government subsidy, through a duty refund on petrol and engine oil, pursuant to the Fishing Industry (Assistance) Act of 1972. This Act also provides for duty free concessions on imported vessels, gear, tackle, and other inputs to the fishing industry purchased by fishers and their cooperatives.

Table 1. Boat type versus fishery type for St. Lucia (Murray et al. 1988).

Fishery type	Boat type				
	Canoe	Pirogue	Transom	Whaler	Launch
Shallow demersal					
traps	X	X	X		X
lines	X	X	X		X
Deep demersal					
traps	X	X			X
lines	X	X	X		X
Pelagics					
troll	X	X	X	X	
long line	X	X			
Conch					
dive	X	X	X		
Lobster					
dive					
trap	X	X	X		X
Seine	X	X	X		
Sea urchins	X		X		
Blackfish				X	

The Resource Users

A 1993 study (George 1994) indicated that 73% of St. Lucian fishers are full-time. It has been suggested (Murray et al. 1992) that most of the part-time fishers, when not employed in the fishing industry, are involved in the banana industry. Tabor (1990) suggests that, in fact, all part-time fishers have farming as their employment alternative. Vaughn Charles (pers. comm.) has noted that at the two major commercial ports of Castries and Vieux Fort (Fig. 1), part-time fishers also take employment as stevedores. Most of this alternate employment takes place, for

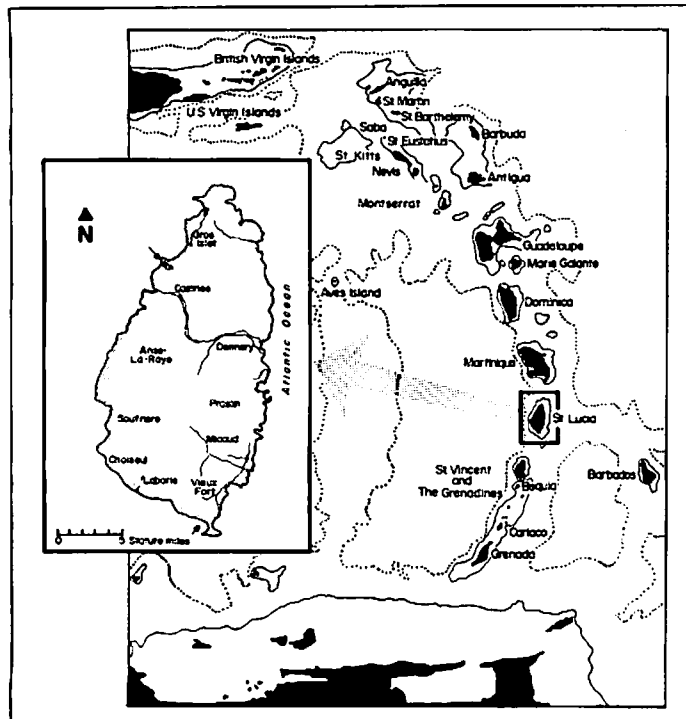


Fig. 1. St. Lucia in the Eastern Caribbean region. Thin solid lines represent the 100-m depth contour and island shelves, while dotted lines represent the 1000 m contour.

most part-time fishers, during the “low” or “snapper” fishing season, at which time the frequency of fishing excursions decreases.

McGoodwin (1984) found that fishing experience among the fishers averaged 15 years, with a range of one to 44 years. A low level of mobility out of the sector is supported by the fact that by 1989, the average length of time spent as a fisher was 22 years (Murray and d’Auvergne, 1994). George (1994) notes that 83% of St. Lucian fishers were operating for more than 10 years, 41% of the fishers were 45 years of age and older, and only 6% of the fishers were under 25 years of age. These suggest a low rate of influx into the industry.

The fishers in St. Lucia tend towards conservatism, preferring to adhere to old and tried (and also possibly tired) methods. It has been suggested by Murray and Charles (1991) that such attitudes have affected potential landings of at least one important St. Lucian fish species. This may also not augur well for the introduction of new management regimes. The overall conservatism may be related to the age distribution of the fishers.

Murray and d’Auvergne (1994) noted that 55% of the primary participants in the St. Lucian fishing industry during 1989 worked at

sea but did not own fishing boats, while 65% of the fishers were not members of cooperatives. George’s 1993 study estimates these figures at 41% and 57%, respectively (George 1994). Further, membership in a cooperative was found to be correlated to ownership of a fishing boat (Murray and d’Auvergne 1994). Both Gardner (1975) and McGoodwin (1984) have noted that one of the reasons for this non-involvement is the opinion that they are solely for boat owners.

Thus, as stated by Murray and d’Auvergne (1994):

...the relationship between boat ownership and whether or not a fisherman is a member of a cooperative is based on the fact that ... the major benefit provided to members of fishermen’s cooperatives is a duty refund on fuel used for fishing. Since the boat owner is responsible for the purchase of fuel, he is entitled to the full refund. Other incentives to the industry such as rebates on the import duty on fishing gear, given to cooperative members, also accrue to the boat owner. The average non-boat-owning fisher, therefore, does not see the cooperative as being able to provide him with any real benefits.

McGoodwin (1984) found that the typical fisher household consisted of six members, two of whom were adults involved in the industry and three of whom are dependent children. Murray and d’Auvergne (1994) suggest that fishers had an average of four dependents; not necessarily children alone.

Murray and d’Auvergne (1994) have noted that only 32% of fishers are legally married, while McGoodwin (1984) mentions that “marriage among fishing peoples is typically free union, or common-law”; thus the unmarried fishers noted by Murray and d’Auvergne (1994) probably include a large number of free unions and common-law marriages. McGoodwin (1984) suggests that marriage is a rather unstable institution among St. Lucia’s fishing peoples, particularly in the early stages, with subsequent abandonment of wives and children being fairly common. This might not appear to be in keeping with the fact that nearly all of St. Lucia’s fishing peoples are Roman Catholic, with 70% of respondents stating that the Church and religion are important in people’s lives. Possibly related to the lack of “success” of the institution of marriage among St. Lucian fishers, is the fact that in response to McGoodwin’s query as to what makes a fisherman’s life “happy”, the second largest number of respondents cited “personal independence” and “freedom of the life-style” (McGoodwin 1984).

The Resources

St. Lucia’s fishing year (Fig. 3) can be considered as being made of two seasons: a “high” season occurs from November to July when significant landings of migratory pelagics are made as a result of both increased availability and increased fishing effort for those species; and, the “low” season making up the remainder of the year, characterized by significant landings of bank demersals. Fishers have claimed that ocean currents during the “high” season militate against cost-effective targeting of bank demersals in the south of the island, where largest catches of these species are to be found. However, Murray and Charles (1991) have suggested that it is the preferential targeting of the migratory pelagics that have resulted in the apparent seasonality of bank demersal catches of which the queen snapper (*Etelis oculatus* Val.) constitutes the major part. Shallow shelf and reef demersals are targeted and landed throughout the year.

During the period 1989-1993 an estimated annual average of

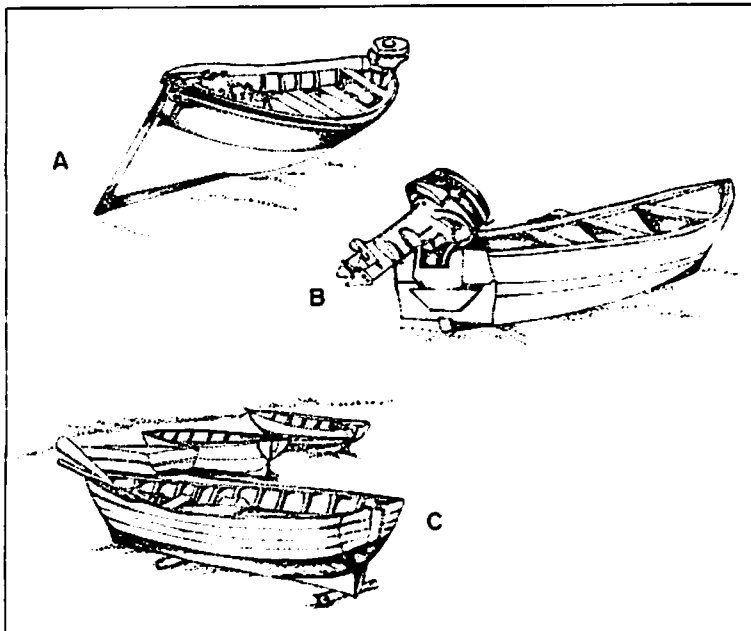


Fig. 2. Craft of St. Lucia (A) the traditional canoe, (B) a wooden pirogue; (C) basic open wooden boats with transom (after Mahon and Mahon 1990).

750 t of fish were landed by St. Lucian fishers (Anon. 1994). The trend noted in 1993 is that the offshore pelagics constitute 69% of the estimated annual landings of 1 115 t for that year. These pelagic species include the dolphinfish (*Coryphaena hippurus*), wahoo (*Acanthocybium solandri*), tunas (*Thunnus* spp.), *Katsuwonus pelamis*, *Sarda sarda*, mackerels (*Scomberomorus* spp.) and flying fish (*Hirundichthys affinis*). Studies by Oxenford (1985) have suggested that the regional dolphinfish fishery is a fairly healthy one. The work of Murray and Sarvay (1987) and Murray and Nichols (1990) may suggest a similar situation for the wahoo, although there may be some significant sampling bias in the data used (Neilson et al. in press; c.f. also Murray and Joseph, in press). Catch-per-unit effort of the species captured during the "high" season ranges from 23-50 kilograms per fishing excursion (Towle and Towle 1988).

During the 1987 "low" season, 97% of the snappers landed at Vieux Fort were *E. oculatus*, 2.0% were *Lutjanus vivanus*, 0.5% were *L. mahogani*, 0.3% were *L. synagris*, and 0.3% were *L. apodus* (Murray 1989). Indications are that this fishery is also fairly healthy (Murray and Moore 1992), and that there is potential for significant landings even during the "high" season (Murray and Charles 1991).

Catch per unit of effort for the species targeted during the "low" season ranges from 4.5-13.6 kg per fishing excursion (Towle and Towle 1988) and appears to be declining with increasing effort (Murray 1985). The species targeted during this period include both reef fishes and bank species, with the latter appearing to be only lightly exploited (c.f. Murray and Moore 1992).

St. Lucia has, all year-round, an islandwide fishery for reef demersal species, which intensifies with the coming of the "low" season. There are also beach seine and gillnet fisheries concentrated on the island's west coast. These fisheries target mainly the coastal pelagics, including the coads (*Selar* spp. and *Decapturus* spp.) and sardines (*Sardinella* spp.). Murray (1985) has suggested that fishing effort for the demersal and coastal pelagic fisheries may be above the level at which maximum sustainable yield is achieved. Walters et al. (1990), however, place a

caveat on this conclusion, pointing out that it may be that not all species targeted by these multispecies fisheries are at present being overfished. Towle and Towle (1988) noted a decline in catch-per-unit effort from 1945 to 1969 in the beach seine fishery which was offset by a doubling of the number of seines in operation, suggesting "a classic scenario of overexploited fisheries".

While the islandwide status of stocks of the spiny lobster (*Panulirus argus*) is not fully known, this species has been considered to be exploited at or beyond maximum sustainable levels in most countries of the region (Towle and Towle 1988). However, preliminary investigations of landings on the southeast coast of the island suggest that the present exploitation rate for this important species (at least for that stock) may not be posing a threat to the fishery (Murray and Jennings-Clark 1994).

The queen conch, *Strombus gigas*, is classified as "economically threatened" by the IUCN (Towle and Towle 1988), and are also considered to be exploited at or beyond the maximum sustainable yield regionally. Notwithstanding this, Nichols and Jennings-Clark (1991) have suggested that current exploitation does not pose a serious threat to the sustainability of local populations. This apparent contradiction is indicative of a need for further research related to the fishery for this species.

Overfishing of sea eggs (sea urchins [*Tripneustes ventricosus*]) is thought to have contributed to a sharp decline in population size following hurricane Allen in 1980 (Towle and Towle 1988), but some recovery has been noticed in recent years. George and Joseph (in press) have indicated that the community-based management approach recently instituted for that species augurs well for the continued sustainability of this resource.

Discussion

It must be remembered that fishery management, more often than not, tends in situations like those experienced in St. Lucia to necessitate a reduction in fishing effort, eventually involving the retirement of fishers and the assets related to fishing (Panayotou 1982). Implementing this type of management strategy may be constrained by a number of social considerations. Fisheries management and development affect and involve the fishers, and so it becomes necessary to: (a) consider their values, motivations and attitudes towards the strategy being used; and (b)

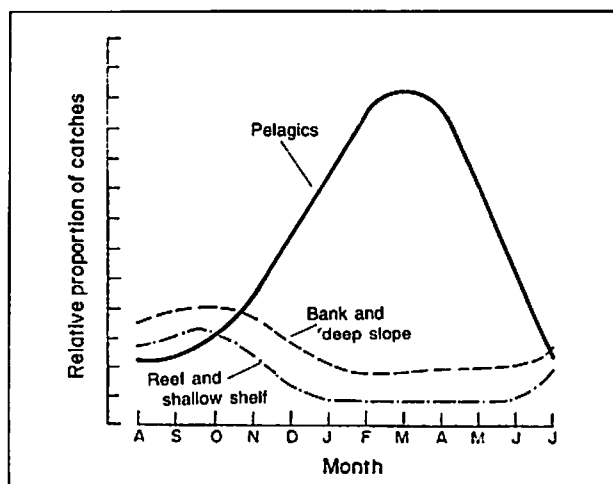


Fig. 3. Diagrammatic representation of seasonality of St. Lucia fisheries.

examine the distribution of benefits from the strategy, between fishers and nonfishers, and among fishers themselves in light of their relative socioeconomic conditions. It must be remembered that the introduction of high-risk, high-return fishing technologies can fail if the fishers happen, either by culture or necessity, to be risk-averse.

It should be recalled that, especially at subsistence levels of living, food security is far more significant than a high but uncertain return.

McGoodwin (1984) points out that St. Lucian fishers possess "characteristically low self-esteem (both as peoples, and in their esteem for their occupation), ... mirroring the esteem which the larger society confers upon them." Fisheries development may be obstructed by the low social status of fishing relative to other occupations in St. Lucia, in the same way it can be obstructed by the lack of education and skills to master the required technology for improved methods of fishing (Panayotou 1982).

The lack of occupational mobility observed in 1984 (McGoodwin 1984), 1989 (Murray and d'Auvergne 1994), and 1993 (George 1994) can be viewed in light of the suggestion by Panayotou (1982) that fishers will stay in a fishery as long as they earn an income at least as high as the opportunity cost of their labor or capital. The fact that by 1989 the average fishers had been in this occupation for 22 years, could be the result of long isolation, low formal education, advanced age, preference for the life-style, cultural mores, frozen assets, indebtedness, or simply the lack of knowledge and opportunities. The consequence of this immobility is that fishers may be remaining in the occupation even though they are earning less than their opportunity costs, i.e., the opportunity cost of fishing may, effectively, be considered to be zero. Such a situation may conceivably (for St. Lucia's reef and nearshore fisheries) result in what has been referred to as "Malthusian" overfishing (Pauly 1988; 1994), with fishers putting short-term gain ahead of future benefit. This is said to be "reflective of nothing but the logical result of declining catch per effort" (Pauly 1988). The occasional use of dynamite on the north-east coast of the island, by "sunday fishers" who are more often than not unemployed or inadequately employed, and the continued (though illegal) use of trammel nets, may be indicative of the beginnings of Malthusian overfishing.

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