

Development and Diversification : Sustainability Strategies for a Costa Rican Fishing Cooperative

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ABSTRACT

"Successful" fishery development can be defined as the simultaneous achievement of ecological, socioeconomic, community and institutional sustainability. This paper incorporates these sustainability elements within an integrated framework, which is applied in a case study of Puerto Thiel, a fishing community in the Gulf of Nicoya on Costa Rica's Pacific coast. The economic performance of the local fishing cooperative is analysed, and experiences with economic diversification are reviewed. We highlight the importance, especially in heavily exploited fisheries, of policies that simultaneously pursue development (to increase local socioeconomic and community fishery benefits within resource limitations) and economic diversification (to lessen the impact of fishery management restrictions by creating non-fishery employment alternatives).

1. INTRODUCTION

Why have fishery development efforts experienced at best a mixed record of success ? Contrary to the perceptions of some development agencies, failures in fishery development can be traced not to the intractability of fishery problems themselves, but rather to overly-narrow approaches that have been used in tackling these problems. This paper attempts to formulate and to apply an integrated view of fishery development, situated within a modern context of sustainability.

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In the following section, a conceptual framework of sustainable fishery development is developed. This is applied in sections 3, 4 and 5 to an examination of development, diversification and sustainability options for Puerto Thiel, in Costa Rica's Gulf of Nicoya. In section 3, the relevant fishery environment, fishing approaches, and recent economic history are described. Section 4 analyses the performance of the community's fishing cooperative, while in section 5, we examine experiences in non-fishery economic diversification. Finally, a number of conclusions are presented in section 6.

2. SUSTAINABLE FISHERY DEVELOPMENT

Thanks to the Brundtland Commission (WCED 1987), it has become increasingly clear that, whatever other objectives are pursued in the economy, the goal of "sustainable development" must be paramount. In the fishery context, this implies that policy proposals must be judged primarily on their contribution to fishery sustainability. But what exactly constitutes a "sustainable fishery"? This section presents an integrated bio-socio-economic perspective, addressing in particular the key links between diversification and sustainability.

2.1 *The Idea of Sustainability*

In broad terms, sustainable development involves the simultaneous pursuit of: (a) ecological, (b) socioeconomic, (c) community and (d) institutional sustainability. These criteria can be portrayed within a "Sustainability Triangle" framework (Charles 1994):

- i) Ecological Sustainability...ensuring that the capacity and quality of the relevant ecosystem, and of each species therein, are maintained or enhanced over time.
- ii) Socioeconomic Sustainability... ensuring that (a) net benefits are as great as possible and as well distributed as possible amongst participants, and (b) viability is maintained within both the local and the global economy.
- iii) Community Sustainability... to maintain or enhance the social, cultural and economic welfare of communities -- both those dependent on the fishery and those affected indirectly by the fishery.
- iv) Institutional Sustainability...ensuring that institutional structures (including financing and administrative capabilities) are sufficient to maintain fishery management and development measures in the long term.

Fishery development policy can be viewed as sustainable ONLY IF it enhances, or at least maintains, each of the above components over time. This requires an integrated process of "sustainability assessment", in place of narrow uni-disciplinary measures of success such as economic efficiency.

2.2 *Economic Diversification and Sustainability*

The fisheries of developing regions typically face a trio of key problems; over-exploited stocks, an over-extended fleet, and a lack of alternative employment outside the fishery. In addressing these, the late economist Ian Smith (1981) expressed well a fundamental but oft-neglected reality: to be just, feasible and effective, policies cannot be restricted to resolving one or two of these problems alone. This key point, an insightful forerunner to multi-faceted concepts of "sustainable development", extends the conclusion of modern fishery economics that "bio-economic" management is needed to tackle even apparently biological problems. In other words, simple attempts to promote biological sustainability may reduce economic sustainability.

This realization, and the subsequent emphasis on "bio-economic" management, led to frequent promotion of policies to reduce the number of fishers through so-called "rationalization". However, one of Smith's key contributions was to point out that such a "release of labour" from the fishery may well be a social bad, except in rare cases where a high-employment economy is waiting to absorb labour for productive uses. He noted that in the absence of non-fishery economic alternatives, rationalization may (a) impose inhumane and hence nonsustainable impacts on those dependent

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on the fishery, or (b) fail to be feasible politically, due to negative community-level effects or (c) fail from a practical perspective, since fishers without other options will do anything, legally or illegally, to maintain their livelihood. Hence, "bio-socio-economic" policies are required, to enhance ecological and economic sustainability while also incorporating community sustainability. These considerations will be examined further in the following case study.

3. THE GULF OF NICOYA AND PUERTO THIEL

The Gulf of Nicoya, on Costa Rica's Pacific coast, is the country's principal artisanal fishing area (Fig. 1). For physical, biological and management reasons, its area of 1500 Km² is divided into two parts, the "outer zone" and "inner zone" (Carranza 1985); it is the latter, dominated by coastal mangroves and small-scale fishing, that is the focus here. Shallow throughout and protected from the open sea, the inner Gulf provides a favorable environment for mangroves, which represent a crucial coastal habitat in many tropical regions. In the Gulf, mangroves cover 112 km (42.6 %) of the coastline and 15,174 ha of coastal area (Solórzano et al., 1991).

3.1 The Gulf of Nicoya Fishery

Historically, the principal economic activity in the internal part of the Gulf was a traditional artisanal fishery, using longlines and gillnets to harvest a variety of fish stocks. This open access fishery experienced relatively low profitability, and required little in the way of government management efforts.

The situation changed dramatically in the early 1980s, with the introduction of a modified gillnet technology for catching white shrimp (genus *Penaeus*). These shrimp stocks rapidly became the most desired catches for fishers, although there remains commercial interest in a variety of finfishes, such as corvina (croaker), red snapper and snook, as well as the bivalve "pianguas" (genus *Anadara*), which grows on the roots of certain mangroves (genus *Rhizophora*).

Without changing the small-scale nature of the fishery, the shrimp harvest led to increased profitability, and (as would be expected in a relatively open access fishery) an increased migration of people from other areas to fish in the Gulf. In fact the number of licensed fishers grew from approximately 2000 in the early 1980s to reach almost 3000 today, while approximately 3000 more fish illegally without licenses. The capital stock of boats fishing in the Gulf has also increased dramatically (Figure 2). The number of small "botes" increased steadily since the mid 1970s, while the number of larger "pangas" grew rapidly between 1984 and 1988, reflecting a process of technological change in the fishery. In the late 1980s, this expansion began to slow, and was largely halted in 1989-90 by a ban on new boats in the area.

The rapid transformation in the fishery took place in the absence of adequate planning, so that by 1985 a substantial decline in the catches of shrimp was being felt. This led to what is still the major conservation management tool in the inner Gulf region, a 3-month closed season on shrimp harvesting between May and July each year. As well, other regulations have been implemented in the Gulf, including a limitation on gillnet mesh size (Herrera and Valerín, 1992).

3.2 Puerto Thiel

Puerto Thiel is a small fishing community located on the northwest side of the Gulf. From the final years of the 19th century to the mid-1950s, it was a port for coastal trade, but has gradually transformed into a fishing community as water travel gave way to road transportation. Today the roughly 160 permanent residents depend largely on the fishery for their livelihood. Surrounded by coastal mangroves and two large cattle ranches, there are few nearby agricultural opportunities. However, despite a widespread lack of agricultural experience, current economic difficulties have led to seasonal migrations of Thiel residents to work in coffee and sugarcane harvesting in interior zones of the country.

3.3 The CoopeThiel Fishing Cooperative

"CoopeThiel" was formed in 1984, began operating fully in 1986, and currently has a membership of 23. The cooperative's principal operation is a fish handling and storage centre, with offices, fish receiving space, cold storage and an ice machine. This facility provides important social benefits both to members and to other local fishers, being the community's sole year-round fish buying site.

CoopeThiel also maintains a fishing fleet of 10 wooden outboard-motor boats, averaging 6m in length. This fleet comprises a third of the community's vessels, but just one-sixth of those fishing from Thiel during the main shrimp harvesting months, when seasonal fishers and their roughly 30 vessels arrive from other locations. Shrimp gillnets are the principal fishing technology used by Thiel fishers, except in the closed season for shrimp, when rudimentary long-lines and large-mesh gillnets transform the fishery into a more selective activity targeting exclusively on fishes.

CoopeThiel's economic performance has been generally acceptable to its members. Although dividends have never been paid, it is recognized that members of the cooperative obtain sufficient to provide a minimal standard of living for their families. However, faced with increased concern over the state of Gulf of Nicoya fish stocks, future cooperative finances, and the general socioeconomic welfare of the membership, the cooperative has expressed an interest in (a) better understanding its recent economic record in the fishery, and (b) pursuing innovative ideas to diversify its economic activity. Results to date in each of these areas will be described in the following sections.

4. COOPETHIEL : AN ECONOMIC ANALYSIS

CoopeThiel maintains full records of its fish buying and selling activities, records which were made available for analysis to the Fishing Community Extension Program of Costa Rica's Universidad Nacional. The results reported here are based on almost 3000 landings receipts representing payments to fishers for harvests obtained through approximately 6000 days of fishing over the 3-year period from April 1988 to March 1991. Using this primary data, which also includes information on fishing costs (for gasoline, ice, cooperative service fees, etc.) it has been possible to obtain a rare detailed view of fisher activities in the Gulf.

It should be noted here that, unless stated otherwise, all catches, costs and incomes are on a "per day" basis, and all monetary figures are given in real terms, in January 1988 colones (US\$1 = 85 colones approximately). Inflation of 200 % occurred over the period 1988-1991, so that 1 colón in March 1991 was equivalent to 0.54 colones in January 1988.

4.1 Fishing Income and Costs.

Together, Figures 3 and 4 give a year-by-year view of average daily costs and earnings. Fig. 3 summarizes the key sources of fisher income by species groups (known as "First", "Second", "Cola" and "Bolillo", with the highest price being paid for large "First" class). Fig. 4 shows the proportions of total gross income allocated amongst the various fishing costs and to the fisher's net income.

Fig. 3 indicates that landed values were highest in 1988-89, with 1989-90 being particularly poor and 1990-91 slightly better. However, to fully understand these results, we must note that from historical data, pre-1988 catches appear to have been at least as high as that for year 1 of our study. Hence in reality the 3-year period shown in Fig. 3 depicts a major change in the state of the fishery from what appears to have been shrimp "resource mining" pre-1988 to the present lower level of combined shrimp and fish harvesting.

Two further points should be noted in Figure 3. First, while shrimp catches clearly provide the dominant source of income overall, finfish catches have come to represent nearly 50 % of total income. This reflects an increasing difficulty in locating sufficient shrimp stocks, together with a general increase in fish prices. Second, a notable concern from the conservation perspective is the apparent trend within the "1st class" category toward the harvest of smaller fish.

We turn next to Fig. 4, which indicates the breakdown of average daily gross income into net income and the various cost components -- gasoline, ice, cooperative fees, and other costs. It should be noted that any given sales receipt issued by the cooperative may or may not include any of these costs, depending on whether the fisher in question chose to buy supplies from the cooperative, and whether he or she rented one of the cooperative's boats. The cooperative fee, set at 25 % of landed value, is levied only in the latter case ; this fee can be viewed as a proxy for maintenance and capital costs. To provide as accurate a picture as possible of actual costs and earnings, Fig. 4 is based only on those landings receipts in which a rental fee as well as costs for gasoline and ice were paid.

Fig. 4 shows that costs on average form approximately 40 % of a fisher's gross income. Of these costs, gasoline and cooperative fees dominate. It can also be seen that gasoline constitutes an increasing fraction of total costs, while the reverse is true for cooperative rental fees. (This appears to be due to the fact that in 1990-91, in contrast to earlier years, the cooperative did not consistently collect its fee of 25 % of landed value.)

Trends in gross income for this set of fishers differ somewhat from the combined average shown in Fig. 3, being slightly lower in the first year and significantly higher in the third. Since those fishers included in this set tend to be most closely associated with the cooperative, this result may be due to an increase in the relative quality of those attracted to the cooperative over time.

The daily net income (in January 1988 values) ranges between approximately 500 and 1000 colones. If we assume an average of 15 fishing days per month (allowing for lost time due to heavy rains, high and low tides, and repairs, as well as the "satisficing" effect described below), this amounts to a monthly net income of between 7,500 and 15,000 colones (US\$88-176). This range can be compared with official poverty levels (in January 1988 colones) of 22,200 (US\$261), 11,500 (severe poverty : US\$135) and 7,500 (extreme poverty : US\$88).

4.2 Variability in Catches and Incomes

Figure 5 shows the average daily catches of shrimp and finfish, month-by-month between February 1988 and March 1991. It is clear that artisanal fishing in the Gulf of Nicoya is highly cyclical in nature. Shrimp harvesting occurs for nine months of the year, being particularly successful between December and February. During the closed season for shrimp in May-July, fish catches tend to reach their peaks, due to the change in gear to longlines and larger mesh sizes (although fish by-catches have also been significant during the shrimp season, especially in 1990-1991).

Fig. 6 displays the variability in average net income per fishing day across all fishers involved with the cooperative, for the year 1990-1991. While some fishers show a zero net income (indicating that they did not fish, or did not sell to the cooperative, in that particular year), most average between 100 and 1000 colones per trip, and a few obtained very high average returns. This skewed distribution (around an average of 800 colones or US\$9.40 per day) is typical of many fisheries. However, it is somewhat lessened here by an important behavioral factor : fishers in Puerto Thiel tend to make their operational decisions on a satisficing basis, in which fishing activity is oriented toward catching "sufficient". This behaviour has significant implications for the pursuit of sustainability, tending as it does to level out the fisher income distribution, thereby easing pressure on the resource and reducing conflict within the community.

5. ECONOMIC DIVERSIFICATION

Costa Rica's coastal zone provides an excellent example of the need to combine fishery management and regulation with efforts at economic diversification. Coastal inhabitants are in general among Costa Rica's poorest, receiving relatively little government aid and having relatively few employment alternatives. Pressure on the fishery as "employer of last resort" is enormous.

In an effort to deal with some of the problems facing Pacific fishing communities, the Fishing Community Extension Program of Costa Rica's Universidad Nacional has worked in cooperation with the Canadian nongovernmental organization "Desjardins Society for International Development", in a series of economic diversification projects :

i) The fishing community of Tárcoles is located in the outer part of the Gulf of Nicoya. Its fishery cooperative, which obtains most of its income from selling fresh seafood for export, obtained assistance in forming a small supermarket in the community. One of the fundamental goals of the supermarket has been to provide an employment option for local women. Indeed, the original idea was formulated by female cooperative members, who now administer the store.

ii) In Chacarita, a heavily-populated neighbourhood on the edge of Puntarenas city, the local cooperative is involved in deep-sea fishing, but wishes to diversify its economic base. The cooperative worked with the university and the Desjardins Society to develop a supermarket for the community, which is currently run by the directors of the cooperative.

iii) Nosara is located on the Pacific coast of Costa Rica's Guanacaste province. As in Tárcoles, emphasis in the diversification work was placed on working with the local fishing cooperative to provide employment for women, in this case in a bakery to be run by female members of the cooperative. However, this was never completed due to a variety of problems, ranging from discouragement following the cooperative's failure to develop a deepsea fishing operation, to an earthquake that partially destroyed the bakery during its construction.

iv) As noted earlier, the fourth economic diversification project is located in Puerto Thiel, and reflects the cooperative's desire to develop alternative economic activity which would not affect the fishers' principal activity of fishing and which would provide paid work to those women who wish to diversify from traditional domestic work and child-care.

The diversification project chosen -- one which clearly involved a major departure from the traditional fishing activity of CoopeThiel -- was the development of a tree nursery. This project appeared promising given government encouragement for reforestation in the region, the project's forecast profitability, and its potential to provide formal employment to women in the community. Accordingly, 2.5 ha of land near Puerto Thiel were purchased, on which a small covered workspace with suitable infrastructure was constructed, providing a potential annual production of 185,000 young trees, comprised of commercially viable species such as teak and pochote (genus *Bombacopsis*).

Production levels in the first year of operation were below expectations, due to low survival rates of the trees, and a lack of sufficient training in managing silvicultural activity. Nevertheless, the project is proceeding for a second year of operation, with increasing levels of training and some success in securing wider markets. Hence, the tree nursery continues to provide an alternative source of employment, while demonstrating to Thiel residents the possibility of developing further economic alternatives. The project may also assist in relieving pressure on the fishers to increase their harvesting effort in an attempt to maintain incomes as stock levels decline.

6. DISCUSSION

We have suggested that the key objective of fisheries development and management must be the achievement of broad-based sustainability within the fishery system. This idea of fishery "sustainability" has been explored from two perspectives: (1) a conceptual bio-socio-economic framework based on a "Sustainability Triangle" paradigm, and (2) a specific case study relating the ongoing search for sustainability in a Costa Rican fishing community, Puerto Thiel. We have highlighted a view of sustainable development as a multi-faceted process involving the simultaneous pursuit of ecological, socioeconomic, community and institutional sustainability.

What fishery development policy measures are most compatible with the need for fishery sustainability? In the most common but most difficult context of heavily exploited fisheries -- where the challenge is to improve ecological sustainability through resource rehabilitation, while simultaneously maintaining or improving socioeconomic and community welfare, a dual focus on development and diversification may be optimal, emphasizing:

- i) development approaches within the fishery which seek to maximize the benefits flowing directly to fishers, including encouragement of fishing behaviour (such as "satisficing") that tends to have a lower resource impact, a focus on fish sales to local cooperatives rather than to outside buyers, and measures to increase the value added from the harvest -- by improved handling as well as the development of ancillary fishery-related services in the communities affected,
- ii) economic diversification outside the fishery sector, to maintain socioeconomic and community sustainability in the face of conservation-oriented management restrictions being implemented within the sector.

Supplementing this "development and diversification" strategy, the Puerto Thiel experience suggests that sustainable fishery development may well be enhanced by an emphasis on integrated policy designed and implemented at the "micro" (community) as well as the "macro" (industry) level. Such approaches are relatively unstudied -- the interdisciplinary research required for their full implementation presents many interesting challenges to practitioners of fishery economics.

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FIG. 1.
COSTA RICA AND THE GULF OF NICOYA.

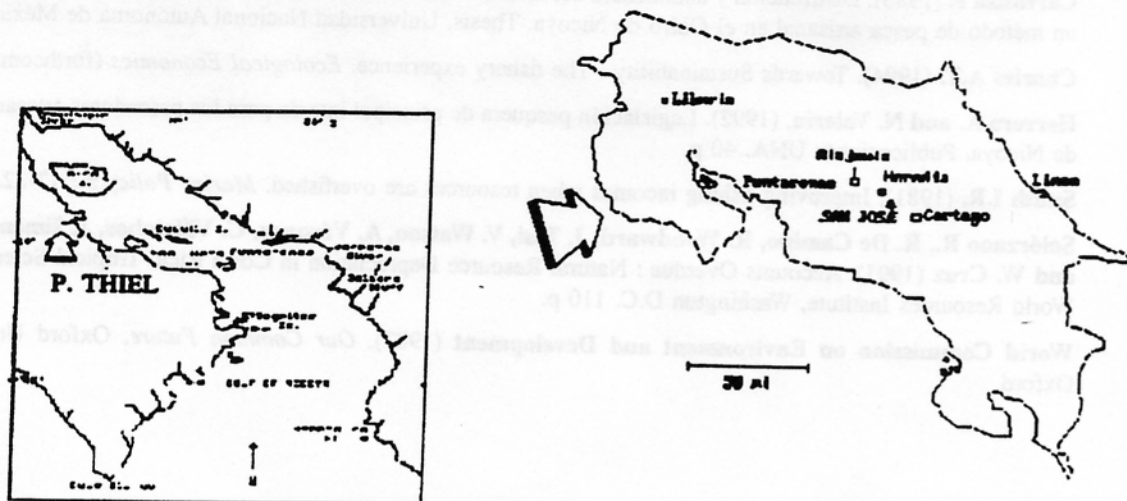


FIG. 2.
THE GULF OF NICOYA FISHING FLEET, 1970-1989.

Artisanal Fishing Boats in the Gulf of Nicoya

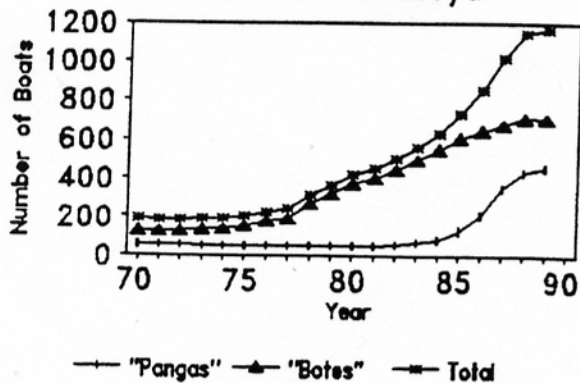


FIG. 3.
AVERAGE DAILY INCOME, BY SPECIES GROUP AND YEAR, FOR ALL FISHERS SELLING TO THE COOPETHIEL COOPERATIVE.

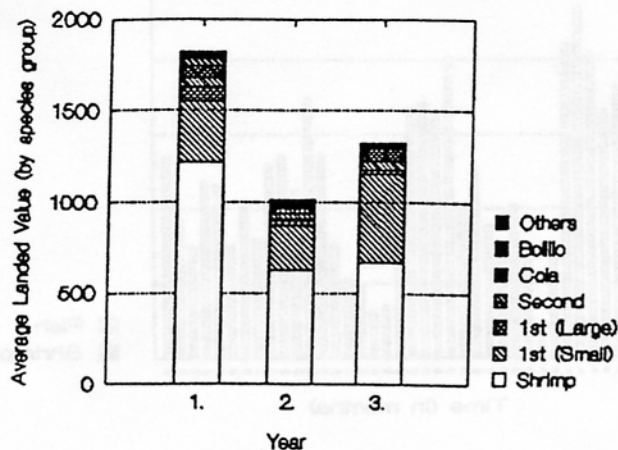


FIG. 4.
AVERAGE DAILY FISHING COSTS AND NET INCOME BY YEAR, FOR FISHERS RENTING BOATS FROM COOPETHIEL AND PAYING OPERATING EXPENSES TO THE COOPERATIVE.

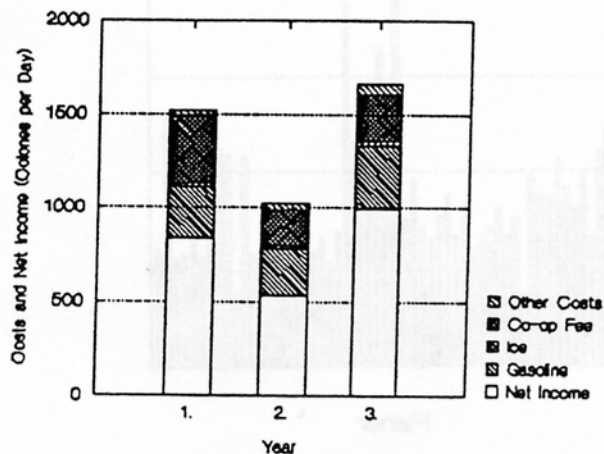


FIG. 5.
CYCLIC NATURE OF AVERAGE DAILY SHRIMP AND FISH HARVESTS, SHOWN MONTH-BY-MONTH OVER THE PERIOD 1988-1991.

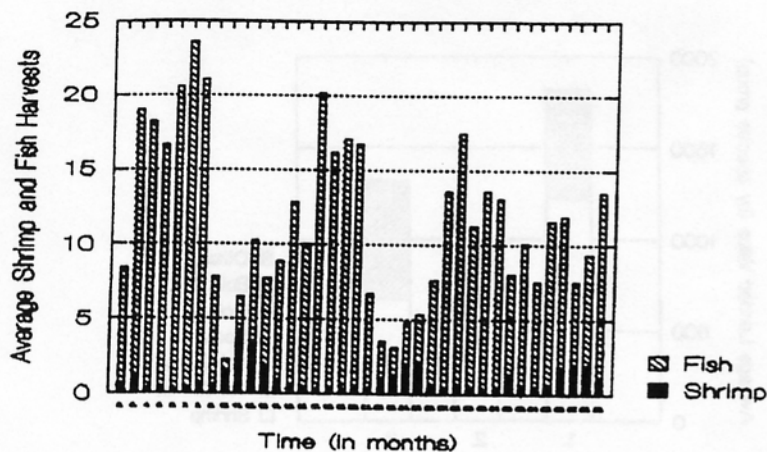
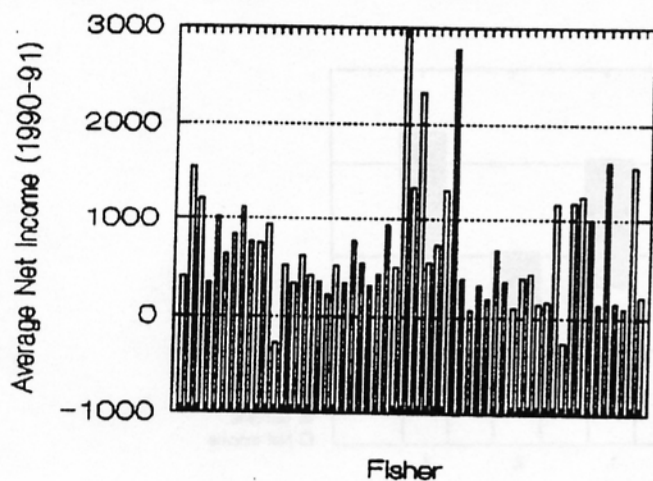


FIG. 6.
VARIABILITY IN AVERAGE DAILY NET INCOME AMONGST FISHERS SELLING TO COOPETHIEL, FOR THE YEAR 1990-1991.



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TOME II

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