

VIRGIN ISLANDS RESOURCE MANAGEMENT COOPERATIVE

BIOSPHERE RESERVE

Research

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- #11 Boulton, R. and Clavijo, I. Utilization of the VIBR by artisanal fishermen. 37 pp.
- #12 Koester, S. Socioeconomic and cultural role of fishing and shellfishing in the VIBR. 24 pp.

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The Virgin Islands Resource Management Cooperative (VIRMC) was formed in 1982 by a Memorandum of Understanding between the following institutions: College of the Virgin Islands, Virgin Islands National Park, Virgin Islands Planning Office, West Indies Laboratory, U.S. Geological Survey - Caribbean District, Island Resources Foundation, Eastern Caribbean Natural Area Management Program, U.S. Fish and Wildlife Service, Southern Forest Experiment Station, Virgin Islands Division of Fish and Wildlife, Sea Grant Program - University of Puerto Rico, the Caribbean Fishery Management Council and the British Virgin Islands National Parks Trust.

The objectives of the cooperative are:

1. To establish a Virgin Islands Resource Management Cooperative for the purpose of providing coordinated research, extension, and educational support of programs to achieve full benefits of island forests, wildlife, water resources, the marine environment, and historic areas and their associated resources for their cultural, social, commercial, economic, and recreational utilization and enjoyment.
2. To provide for the direction and management of the Cooperative by forming an Executive Committee, comprised of one representative from each of the organizations who are parties to this agreement, which will a) elect annually a Chairman from the membership of the Executive Committee to serve for a term of one year, b) appoint an Executive Officer to a staff position to coordinate the work of the cooperative, c) appoint technical committees and project leaders, d) provide for the orderly process of development and implementation of policy, and e) foster cooperative activities and relationships among participating parties and with other agencies and institutions.
3. To coordinate and facilitate financial and other support for research on environmentally acceptable uses of forests, wildlife, the marine environment and historic areas, and their associated resources in order to provide for their better management.
4. To provide for the collective utilization of the unique attributes and resources (personnel, facilities, equipment, and other support services) of the parties as they may relate to objectives pursued under this agreement.
5. To plan for appropriate dissemination, publication, and application of research and information.

SOCIOECONOMIC AND CULTURAL ROLE OF FISHING AND
SHELLFISHING IN THE VIRGIN ISLANDS BIOSPHERE RESERVE

1986

BIOSPHERE RESERVE

RESEARCH

REPORT NO. 12

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Abstract

REPORT NO. 12

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SOCIO-ECONOMIC AND CULTURAL ROLE OF FISHING AND SHELLFISHING IN THE VIRGIN ISLANDS BIOSPHERE RESERVE AREA

This paper provides an overview of fishing in the St. John Biosphere Reserve. It focuses on resident fishermen of the island and includes some discussion of fishermen from nearby islands who exploit the resources of this environment. This study is organized into three broad topics. It begins with a description of fishing and fishermen, their methods, the role of fishing in individual economic strategies and the place of fishing in the island's culture and economy. The second topic is an examination of the local marketing of fish. Finally, this report looks at almost four decades of economic development in St. John and the effect of those developments on fishing; in particular, the relationship between the National Park Service and fishermen is examined.

St. John's integration into the American economy, the development of tourism since World War II, and the creation of the Virgin Islands National Park have brought about significant changes in the local culture and have produced both opportunities and costs for residents and resource users. Fishing has become more commercial in response to increased demand. At the same time regulations have been introduced restricting some traditional fishing techniques. Disagreements have developed between fishermen who regard fishing as a birthright and the regulatory agencies charged with protecting the environment. This study identifies some of the issues involved in this debate and suggests that by developing a more participatory management approach, the Virgin Islands Biosphere Reserve Program can lessen the division that exists between resource users and managers.

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FOREWORD

Virgin Islands National Park was designated as an International Biosphere Reserve by the United Nations Educational, Scientific and Cultural Organization (UNESCO) in June, 1976. However, the formal dedication did not take place until May, 1983. The standardized, single-page description of the area which was issued by UNESCO under the Man and the Biosphere Program, MAB Project 8, in 1976 is entirely inadequate for the purpose of meeting Biosphere Reserve Objectives.

The purpose of the present (VIRMC I) project was to provide more detailed descriptions of the Reserve's physical and biological features as well as certain aspects of human use, such as fishing and boating. Inherent in the concept of the Reserve is the belief that it is intimately related to the nearby British Virgin Islands and that it should also fit within a future multi-site Lesser Antillean Biosphere Reserve.

The following reports are included in the VIRMC I Research Series Reports.

The West Indies Laboratory (Fairleigh Dickinson University) prepared the reports for "Ecological Community Type Maps and Biological Community Descriptions for Buck Island Reef National Monument and Proposed Marine Park Sites in the British Virgin Islands," "Trends in Recreational Boating in the British Virgin Islands, A Preliminary Assessment of Impact from Human Activities on Anchorages and Development of a Monitoring Program for Safe Anchorages," "Geographic Range and Research Plan for Monitoring White Band Disease," and "Marine Ecosystems of the Lesser Antilles - Identification of Representative Sites."

The Division of Fish and Wildlife (Department of Conservation and Cultural Affairs, Government of the U.S. Virgin Islands) prepared, "Map of Fishery Habitats Within the Virgin Islands Biosphere Reserve," "Fisheries Habitat of the Virgin Islands Region of Ecological Importance to the Fishery Resources of the Virgin Islands Biosphere Reserve," "Utilization of the Virgin Islands Biosphere Reserve by Artisanal Fishermen," and "Long-Term Monitoring of Fisheries in the Virgin Islands Biosphere Reserve."

The Caribbean Research Institute (College of the Virgin Islands) prepared, "Marine Community Descriptions and Maps of Bays Within the Virgin Islands National Park/Biosphere Reserve," and "Collection of Common Organisms Within the Virgin Islands National Park/Biosphere Reserve."

The Island Resources Foundation prepared, "Assessment of Fish and Shellfish Stocks Produced in the Virgin Islands Biosphere Reserve," "Socioeconomic and Cultural Role of Fishing and Shellfishing in the Virgin Islands Biosphere Reserve Area," "Characterization of Lesser Antillean Regional Fisheries," as well as the Synopsis and Executive Summary.

Field work for the project was carried out during the period December, 1983, through October, 1984. Copies of the individual reports can be obtained from: The Virgin Islands National Park, Red Hook Headquarters, P.O. Box 7789, St. Thomas, Charlotte Amalie, VI 00801.

1. INTRODUCTION

The Virgin Island National Park has been designated by UNESCO as a biosphere reserve, a representative ecosystem of the Lesser Antillean biogeographical region. By identifying characteristic ecosystems of the earth as biosphere reserves, this program seeks to ensure their conservation, their availability for research, and their sustained use by the people who depend upon them and who are integral members of these reserves' biotic communities.

Fishing is an important part of man's adaptation to the natural environment of the Lesser Antilles. It supplies locally available protein to the diet and it plays a major role in the occupational strategies of island residents. It is one of the few means of livelihood that have traditionally offered West Indians a degree of independence from the plantation.

This report examines the place of fishing in the Virgin Island biosphere reserve and the role of fishing in the economy and culture of St. John. Relying principally on information provided by local fishermen, this report outlines their use of the biosphere reserve and their observations about it. Specific points to be addressed include a description of fishermen and their methods, an examination of the marketing and distribution of locally caught fish, an overview of changes affecting fishing, and fishermen's perceptions of the ecological transformations and institutional constraints affecting fishing. This report discusses fishermen's views and concerns within the context of the biosphere reserve program, offering suggestions for the development of a biosphere reserve management strategy that actively encourages the participation of these traditional resource users.

2. THE FISHERMEN

2.1 Categories and Definitions

Fishermen are commonly categorized into three types; commercial, artisanal and recreational. Goodwin (1984:15) uses the following definitions for each of these categories :

Commercial — relatively capital intensive fisheries which provide most canned and frozen fish, as well as most fish intended for processing into fish meal and oil; require concentrated support services and are generally located in urban areas.

artisanal — labor intensive fisheries usually located in rural and coastal areas,

often overlapping with agriculture; uses low-level technology to produce fish primarily for local human consumption.

recreational —activity undertaken primarily for pleasure in which there is no expectation of profit (in fact, recreational activities typically lose money, though they may be profitable to those who provide support services).

Goodwin's definitions for commercial and artisanal emphasize technological distinctions and differences in scale rather than distinctions based on the economic motives of the fisherman. Legal definitions on the other hand, stress only whether the catch is for household consumption or sale. "Commercial fisherman means a fisherman who sells all or part of his catch" (50 CFR 640.2). This definition ignores the vast differences in technology , marketing and scale that exists between " factories at sea" and West Indians in small wooden boats using hand-lines and self made fish pots. It emphasizes only that they both sell their catch.

For the purposes of this report, it seems appropriate to follow Goodwin's definitions viewing the artisanal category not as a clearly defined class of fishermen but instead as a continuum extending from those who fish part-time and exclusively for their own households to those who regard fishing as their primary occupation and regularly sell their catch. What unites these two extremes is their small-scale, relatively simple technology, production geared toward local markets, and a high degree of control over both their means of production and their particular fishing strategies. In St. John both ends of this continuum are present. Subsistence oriented fishermen fish principally to supply their own households; their equipment is rudimentary and their effort is limited. "Commercially" oriented artisanal fishermen fish as a primary or important secondary occupation; they sell their catch. Their equipment is usually more sophisticated and often represents a substantial personal investment. Brownell and Rainey (1971) refer to these as "traditional commercial fishermen".

Further distinctions can be made among Virgin Islands artisanal fishermen by the fishing methods they employ, their island of residence and the place of fishing in their economic strategies. The majority of fishermen who use the resources of the national park reside in St. John, although an unknown number of fishermen from St. Thomas and the British Virgin Islands make use of the area as well. Estimates regarding the number of artisanal fishermen resident in St. John varied from approximately twenty five to thirty. For retired men and those with full-time wage jobs fishing is a part-time activity; for a much smaller group it is a full-time occupation.

There is only one fishing enterprise in St. John that can be regarded as a capital-intensive commercial fishing endeavor. Two former Division of Fish and Wildlife employees operate a technically sophisticated fishing vessel called the Tiburon which they dock in Cruz Bay. They fish with both vertical long lines and pots. Their enterprise is known as the Honest Fish Company. They market their catch one or two days a week in Cruz Bay selling approximately one thousand pounds per week (Boulon: personal communication). Their fishing effort takes place outside the biosphere reserve.

Recreational fishermen make extensive use of the biosphere reserve. Continentals living in St. John, St. Thomas and the British Virgin Islands all fish within and close to the National Park. Sailors on board yachts and tourists also fish within the Park. There is only one sport fishing charter operated from Cruz Bay and Caneel Bay. It specializes in "light tackle" trolling for pelagic species. Other fishing charters that frequent the biosphere reserve are operated from Red Hook, St. Thomas. Four dive boat charters operate from St. John utilizing many of the same resources of the biosphere reserve as fishermen.

2.2 Local Artisanal Methods

Artisanal fishing in St. John is characterized by a variety of techniques used to capture a wide variety of species for both subsistence and sale. The most common techniques include the use of fish pots or traps to capture reef species including lobster, and various hook and line methods to catch both pelagic and demersal fish. Scuba diving for conch and lobster is a less commonly practiced method. Large seines and turtle nets are no longer used.

2.2.1 Pot Fishing

Pot or trap fishing is a technique used by a majority of artisanal fishermen. For many fishermen it is a means of securing fish for the home; for a fewer number, it is a commercially oriented enterprise. Frequently, pot fishermen are older retired men who set between two and six pots for their household use. They sell fish only on those infrequent occasions when they have an abundance. One fisherman who is now retired stated that he has four pots which he raises once or twice a week. He explained that, "fish has become expensive, its better to see if you can catch it yourself." He believes that many people in St. John set pots exclusively for home use. With his limited effort he sometimes does not even catch enough for his household. He caught enough to sell only once in the first four months of this year; he made fifteen dollars. Another retired St. John resident fisherman explained his pot fishing strategy the same way:

"I go out once a week, sometimes twice a week. Now I fish just for my family not for making money; it is only my pleasure. If I get twelve or fifteen pounds of fish, I ain't going out for another eight days."

Some of these older retired artisanal fishermen might equally be categorized as recreational. Their fishing effort is occasional, rarely for sale and although the catch is certainly eaten by themselves and their families they do not depend on it. They often described their fishing activity as their "hobby" or "pleasure." As one fishermen stated, "I fish to amuse myself and to eat." Artisanal fishermen who emphasize hook and line methods often have a few pots that they maintain for home use. Some continentals also also set fish pots; their effort is geared toward subsistence.

There are some commercially oriented fishermen who specialize in pot fishing. Four men regularly sell pot fish in Cruz Bay. Two of these fishermen work together setting approximately one hundred pots. They are from St. Thomas but set their pots off St. John's east coast. They go to sea three days a week raising and setting a third of their pots each day. On the day I went to sea with them we proceeded to the channel between the east end of St. John and Norman Island. Except for two pots which we raised less than two hundred yards off St. John's northeast coast, all of the pots were more than a mile off shore from St. John. They told me that they move their pots to new locations once or twice a month depending on the quantity of the catch on a given bank. Their income varies from as much as two hundred dollars a day to less than two hundred dollars each a week.

Two other St. John fishermen pot fish for sale. They do not set as many pots as the two illustrated above. It is unknown to what degree other fishermen from St. Thomas and the British Virgin Islands set pots within the biosphere reserve. St. John fishermen indicated that they know of fishermen from other nearby islands who occasionally fish around St. John's coast. A National Park Service ranger stated that he sometimes comes across both British Virgin Islands and St. Thomas fishermen raising pots within the reserve.

2.2.2 Hook and Line Fishing

Hook and line fishing is the other most frequently practiced artisanal fishing method in St. John. Fishermen rely primarily on two methods known locally as hard banking and float fishing. Hard banking refers to bottom fishing over banks with chum. The chum, usually made up of mashed crab or fry, is mixed with sand and released on the bottom of the bank to attract bottom feeding species. Lines baited with crab or other fresh bait are then dropped to the bottom. Snappers, grunts, grouper, hinds and porgies are the most

commonly caught fish using this technique. Float fishing is used over banks to catch surface feeding species. Chum made up of fry or sprats is released into the water to attract the fish, then several lines with a series of hooks baited with fry are thrown into the current. Species caught using this technique include: yellow tail snapper, blue runners, albacore, bonito, dolphin and kingfish.

The same bank can be used for both line techniques. Generally, a fisherman has several preferred banks scattered over the insular shelf. Fishermen indicated they had banks close to St. John and as far away as the Tobago Cays. Some fishermen stated that they had banks which they use only at night. One aspect of float fishing which is only practiced by a few St. John fishermen is called "raising a bank." This technique involves the repeated dumping of chum over a favored bank to attract and condition the fish. Once the fisherman is convinced that the bank has been prepared he begins fishing it.

Several fishermen implied that "to be a true fisherman you have to have a spot prepared and fish all the time." Using this criteria they estimated that there are eight to ten local men who raise banks and hook and line fish on a regular basis. They claimed that in the past there were more fishermen who fit this category but that full time employment prevents men from devoting the necessary time to these techniques. They suggested that raising a bank and line fishing requires knowledge and skill that can only be attained by a total commitment. Only a few men continue to raise banks; not only is it time consuming, but often the effort is wasted due to other fishermen fishing it.

2.2.3 Other Artisanal Techniques

Trolling is a method seldom used by artisanal fishermen. They explained that it is simply too expensive and regard it as a recreational fishing technique. The constant use of gasoline makes it prohibitive. One local St. John fisherman who operates the only local sport fishing charter explained that he trolls only because tourists pay his expenses. It is no longer possible to gather lobster or conch in any quantity by free diving. Scuba diving has become the only reliable means for obtaining conch around St. John and is also used for catching lobster. Some local St. John fishermen scuba dive; one of them stated that he dives no more than six times a month. Two continentals residing on boats in Cruz Bay also scuba dive for conch and lobster to sell. Only cast-nets for bait fish and small seines under twenty feet in length are still used within the biosphere reserve. In the past, beach seines, purse seines and gill nets were used to catch pelagic species migrating along the coast.

2.2.4 Seasons and the Lunar Cycle

While the availability of some species is seasonal, local fishermen indicated that it is the tourist "season" that is of most significance; this is when the demand for fish is greatest and their fishing effort most intense. Seasonality is most pronounced among some pelagic species. Since fishermen are not dependent upon these species, shifts in their occurrence have only a minimal impact on fishing strategies. Lunar phases are much more significant to artisanal fishermen. As one explained, "You have to follow the moon to get fish." Pot fishermen from St. John believe the quantity of their catch is largely determined by the moon's position. Line fishermen decide whether or not to fish and what kind of fishing to do depending upon the moon. Bait fish availability appears to be particularly sensitive to the lunar cycle; fishermen suggested that the best time to catch fry is around the full moon. Olsen suggests that lunar phases affect almost all artisanal fishing methods in the Virgin Islands. With regard to line fishing he states:

Fishing for yellowtails (*Ocyurus chrysurus*) is done during the full moon when the tidal current will spread the chum and attract the fish. Kingfish travel to the east as the moon proceeds from new to full and to the west from full to new. They, like most line fish, bite as the moon is rising and setting (1977:2).

3. MARKETING

3.1 Supply and Demand

The demand for fish in St. John is consistently greater than its supply. This condition is most pronounced during the peak of the tourist season, but is characteristic of the local market year round. Restaurant owners stated that they sometimes can not get fish. At the conclusion of our interview, a restaurant owner asked me to remind a particular fisherman that he needed fish. On a few occasions I observed fishermen turning customers away without fish. One Coral Bay resident explained that, "If you know a fisherman coming back you may get a pound or two but not every day. You have to live off chicken or pork chops or something else." Both local fishermen and residents told me that it was sometimes necessary to go to the fish market in St. Thomas.

Older fishermen claimed that in the past the local demand for fish was more easily satisfied. They suggested the supply is more limited now because fewer men are fishing and many only fish part-time. Other reasons advanced to explain the inadequate supply included adverse environmental change and the curtailment of several traditional fishing methods. Another likely factor affecting supply and demand is the ever increasing number of tourists. Some fishermen no longer supply the local market concentrating instead on supplying the lucrative tourist industry.

Due to the somewhat different tastes of locals and continentals, two distinct markets for fish can be distinguished in St. John. While the demand for lobster, conch, some snappers and jacks is similar among both groups, fishermen expressed the view that in general, locals prefer pot fish while continentals desire species caught using line techniques.

Much of the local demand is met by fishermen from the British Virgin Islands and St. Thomas. British Virgin Island fishermen sell their catch in St. John through middlemen. The Sundance II ferry imports pot fish from Tortola to St. John two days a week selling the catch to the tourist industry on one day and to local consumers every Saturday. Two St. Thomas fishermen are the largest suppliers of pot fish to the St. John market selling their catch in Cruz Bay two or three days every week.

Resident St. John fishermen also set pots. Older retired men who continue to fish favor this relatively easy method for meeting their household's needs. The younger St. John fishermen I interviewed, combine pot fishing with line fishing. They emphasize line fishing in their strategies because they frequently catch large quantities which they can sell to restaurants and to the Caneel Bay resort. They prefer selling to the tourist industry because they can sell in volume. " You don't have to work selling fish. If I catch three hundred pounds I will sell to Caneel because they'll take it all." It's common for these fishermen to market their catch with a phone call.

Most fishermen have regular customers. Commercially oriented pot fishermen take orders from customers and often return from sea with portions of the catch already sorted into plastic bags. A local fisherman explained how he distributes his catch within a well developed network.

I have customers if I have enough to sell. The lady at the Sputnik will take five pounds. People would take more than I can catch. I don't have a car and no money to drive fish around to people. I'll give to a friend or two for their breakfast or sell to my relatives, or if I only catch a little I'll give it. I give to other fishermen too if they don't have because I know if they catch, I'll get fish.

Local consumers attempt to minimize the characteristic uncertainty of the local St. John market by establishing a steady arrangement with a fishermen and buying in quantity and refrigerating it.

3.2. Ciguatera

Ciguatera poisoning is caused by eating fish containing the ciguatera toxin. Its occurrence around St. John is well documented (Brownell and Rainey, 1971). Fishermen indicated that the threat of ciguatera affects both the marketing of locally caught fish and their own consumption habits. Although ciguatera is generally linked to the demersal food change (Brownell and Rainey, 1971) two older retired fishermen expressed their hesitancy to eat "floating fish" and particularly kingfish because of the risk of ciguatera poisoning. One of these fishermen had been poisoned and he explained that, "they say the kingfish poison you because he ate sea man of war". Both of these fishermen said that this is one reason they prefer pot fish. While raising pots with two St. Thomas fishermen, I observed them discard a yellow fin grouper. They explained that they could not sell it because it causes ciguatera. These two incidences demonstrate that one problem facing fishermen and consumers is in trying to predict which fish are most likely to cause ciguatera. From the fishermen I spoke with it seemed that such decisions were based on a combination of personal experience and the accumulated knowledge of local residents and the scientific community.

3.3 Fishing and Marketing Between the U.S. and British Virgin Islands

While examining the marketing of fish in St. John, I came across fishermen from Jost Van Dyke and St. Thomas. All of them explained that St. John is "where the market is." They also fish along St. John's coast, primarily with fish pots. They explained that in the past, more fishermen came to St. John to fish, particularly with nets. St. John fishermen use the resources of these other islands as well. They claim that lobster, conch and whelks are more abundant in the British Virgin Islands. Frequently, line fishermen go to Jost Van Dyke and Peter Island for bait and to line fish the banks around the Tobago Cays. All Virgin Island fishermen maximize their fishing effort by utilizing resources throughout the island chain. Political distinctions between islands do not deter this tradition. In 1979, the governments of the United States and Great Britain ensured the integrity of this traditional fishing pattern by signing the Reciprocal Fisheries Agreement. This agreement assures artisanal and commercial fishermen of both the U.S. Virgin Islands and the British Virgin Islands continued access at their current levels and with existing patterns to the exclusive fishery zones of both territories. Fishermen, National Park Service personnel and the British Virgin Islands Fisheries officer all acknowledged this inter-island fishing strategy; none of them regarded it as detrimental. The scope of this Virgin Island fishing pattern is unknown.

4. FORTY YEARS OF TRANSITION

The rapid growth of St. John's tourist industry since World War II was acknowledged by older informants as a standard time frame for distinguishing separate stages in the island's social and economic history. With the advent of tourism, St. John's economy became more dependent upon, and more an extension of the United States economy. The island's traditional subsistence economy gradually diminished due to a combination of new opportunities for making a living and new pressures on resources necessary to maintain the traditional way of life. Land value increased and its use changed. As new tourist related enterprises developed, wage jobs supplanted more characteristic multiple occupational strategies common to the Eastern Caribbean (Boyer, 1983; McElroy and de Albuquerque, 1983; Posner, et al, 1981).

Older informants explained that before the influx of tourists and the creation of the park, "those who couldn't make a living on the land made their living on the sea." They explained that regardless of which of these two basic economic adaptations a man followed, more often than not he provided his household's basic necessities. An older informant who now makes his living driving a taxi bus forty to sixty hours a week told me

that before the park, it was common for a man to set his own fish pots, tend his own garden and raise his own livestock, " but this is very hard work, its easier just to have a job."

The increasing availability of wage jobs accompanying the tourist boom and the creation of the national park has changed fishing from a primary occupation of many St. John men to an important part-time and secondary means of livelihood. All of the full-time fishermen I met in St. John resided in Tortola or St. Thomas. Local St. John fishermen who are not retired have other full-time wage jobs or other employment skills. They fish on weekends, holidays and at night. If the moon is favorable and the fish are biting some of them will take a day off from their steady jobs. Line fishermen indicated that even with this time constraint they can frequently make more money fishing in a month than from their salary, but whenever I asked these residents of St. John what they did for work, they always responded with, "I am a fisherman." They never mentioned their wage jobs first; an indication of the place of fishing in their individual occupational strategies and in the way they see themselves. Combining fishing with full-time employment permits fishermen to supplement steady wages with a less certain but often well paying second income. Steady employment provides the security of a regular pay check and in some cases retirement and medical benefits. Fishing provides a lucrative but uncertain supplementary source of income.

The uncertainty inherent in fishing as a way of life has been exacerbated in the case of St. John's fishermen. The Virgin Islands' transition from an agrarian subsistence based economy to an open economy that currently depends on more than one million tourists annually has had an enormous impact on St. John's long term residents. Accompanying this transition has been the accelerated use of St. John's resources and the introduction of a Federal agency to manage much of the island environment. Fishermen identified a series of problems that they associate with this on-going period of flux. These problems are of two general types; ecological and institutional. Ecological concerns are those changes fishermen have observed in the environment directly affecting fishing. Institutional problems are those that have developed between these traditional resource users and the federal and local government agencies charged with protecting the environment. These agencies include the National Park Service and, the Bureau of Environmental Enforcement, a division within the Department of Conservation and Cultural Affairs of the Government of the U.S. Virgin Islands. Included in this category are the regulatory and enforcement policies of these agencies, and the perceptions of agency personnel and fishermen toward each other.

4.1 Development and Ecological Change

The pace and scale of environmental change has increased dramatically in the Caribbean over the last twenty years. Frequently, it occurs as an adjunct of economic development. The consequences of these environmental changes are often felt by traditional resource users (Koester, 1983, 1984; Towle, 1984). St. John's fishermen are no exception; they have observed numerous ecological changes affecting their way of life.

In the recent past, the turtles that frequent several of the island's grassy bottomed bays were caught with nets. Fishermen mentioned Maho, Hawksnest, Francis and Lameshur bays as being traditional places to catch turtle. Both small purse seines and beach seines were regularly cast at Brown Bay, Leinster Bay, Francis Bay and Mary Point. Even fishermen in their early twenties claimed to remember when conch and lobster were available at several locations around the island by free diving. One older informant claimed that in the 1940s he would occasionally gather whelks to feed his pigs. The island's reefs provided innumerable places to set fish pots close to shore. As part of their overall subsistence strategy fishermen grazed their livestock on what is now national park land. They also gathered resources for making fishing equipment including material for fish pots. All of these traditional aspects of artisanal fishing in St. John have been drastically curtailed or eliminated during the past twenty years, a consequence of the continuing and rapid change that has beset this island.

Artisanal fishermen have observed a decline in the numbers of some marine species. In particular, they mentioned the scarcity of bait fish and shellfish. They often linked the depletion of these resources to over-exploitation and environmental misuse which they associated with tourism. Tourism has increased the demand for conch and lobster. As these species' commercial value has increased so has their exploitation.

We just wanted enough to feed our families. Now the whelks are a special dish. We used to take the big ones. Now they even take the small ones; there is no meat in them. We were accustomed to going to any beach, pick as many whelks as we wanted, and then the whelk picking became so commercial they was picking up whelks to sell every day; they had no chance to grow.

*whelk picking
practiced in
1940s*

Another informant said he could remember gathering whelks to bait his fish pots, "Now you can't find whelks to eat." Two older fishermen claimed that before lobster was in great demand no one bothered taking small ones or females with eggs; practices they feel occur even though they are illegal (50 CFR 640.21 and .22).

According to these local St. John fishermen, tourism not only increased the demand for local resources it also opened up the environment to new kinds of exploitation and abuse.

As tourists came fishing became more commercial. Then tourists came with snorkles and flippers, and they go and pick up what they want. The tourists break down the corals. They take the man's home; he has to go somewhere else to live.

Fishermen also cited the introduction of these non-traditional fishing techniques and technology as directly contributing to the depletion of marine resources.

*no
spelling
1/1/84*

Years ago you could get anything before everybody had flippers, spear guns and tanks. When it was harder to operate the fish had a chance and you had a chance. There were more fish, more conch, more lobster and more whelks.

One fishermen suggested that refrigeration encouraged people to catch more than they could use. He believed that even though people salted fish in the past they usually only took what they could consume in a short time.

Fishermen argued that the increased use of St. John's marine environment has led to an increase in the number of fish pots that are lost or stolen. They complained that boat propellers cut or drag their float lines; "These white captains, they don't look out for no fish pots." Another fisherman added that theft is a major problem; he claimed that people raise his pots and take his fish and that sometimes they take the pot as well. He explained that to protect them, "you must sleep with them." He added that the increase in pot loss had prompted some fishermen to abandon this method altogether. "Its too much trouble, if you ain't a slave to it you ain't got a fish pot."

Fishermen have witnessed a decrease in bait fish and some reef fish. One claimed that he no longer finds some species of reef fish in his pots. Two fish that he mentioned were Red tail and Stop light parrot fish. He claimed that they have become scarce over the last sixteen years. The disappearance of sea urchins during the first four months of 1984 has alarmed many fishermen. They were unsure why this has occurred but seem to think it is due to some kind of chemical pollution in the water. The decrease in bait fish is of concern to all artisanal fishermen; their absence is a major constraint on fishing.

Fresh bait is necessary for line fishing techniques. Frys and sprats are preferred for making chum and for line bait. As one fisherman stated, "if you don't get this kind of bait for yellowtail, hardnose and bonito you don't catch nothing." Frys and sprats are also used to bait pots, but alternative sources of bait are available for this purpose. One fisherman explained that during the early years of the park frys and sprats were readily available, especially on the east end and at northside bays. Gradually this has changed.

Every month after the moon makes first quarter always the minnows and sprats came, but it don't happen any more. Now maybe you see them two or three days before the moon is full, but by two days after she's full, they're gone.

Fishermen advanced several possible reasons for this decline. The steady increase in shipping, ferry traffic and pleasure boats in St. John water was the most frequent explanation. One fisherman said that the bait fish started moving away in 1946, the same time that engines began to replace sails and tourist boat traffic increased. Fishermen felt that the increase in boat traffic and use of engines scare the fish away. They also think that the fish can not tolerate the amount of oil being discharged into the water. Tourists swimming into schools of bait fish and leaving traces of suntan oils in the water were also mentioned as reasons why bait fish have become scarce. Two fishermen explained that many times when they do have days off from their wage jobs they are unable to go to sea for lack of bait. "That's why we don't take fishing as a full time job, because the bait is hard to get."

A restriction on the use of nets has adversely affected the availability of bait fish. Fishermen used to obtain bait from large seines and ballyhoo nets; the regulation limiting the maximum length of nets to twenty feet (36 CFR 7.74) has prevented their continued use. One fisherman explained that the ballyhoo net, a gill net used to surround ballyhoo (half-beak) was a common net fishing technique before the regulation and, was an important means for obtaining bait. Fishermen explained that the areas around St. John where these nets can still be used are inferior to those inside the park. As a result, the use of these nets is infrequent and can no longer be relied upon as a source of bait. Instead, fishermen now use small nets and cast-nets to obtain bait. They claimed that they often go to the British Virgin Islands for bait. One fisherman summarized the general attitude of fishermen about the decline in bait fish saying that, "After the people started coming the fish started moving out."

Fishermen have begin moving out as well. They indicated that as a result of the many changes affecting fishing around St. John it has become necessary to fish further away. The increase in resource users, the relative scarcity of some species and the regulations controlling fishing in the national park have forced fishermen to seek new areas to fish. At the same time, tourism has stimulated the demand for fish encouraging fishermen to fish in deeper water. Technological improvements have made it easier for fishermen to exploit these more distant resources. Improved methods of refrigeration and outboard engines in excess of one hundred horsepower enable fishermen to travel further.

4.2 Artisanal Fishing and Regulation

Since the inception of the Virgin Islands National Park, artisanal fishermen have witnessed the imposition of regulations restricting their traditional fishing methods and use of some marine resources. Regulations most frequently mentioned by local fishermen include:

1. Possession limits on conch, lobsters, and whelks with in the VINP, Title 36 CFR 7.74 (e)(3)(4).
2. As part of the Endangered Species Act of 1973, turtles can not be caught, (16 USC 1531).
3. A prohibition on spear fishing with in the VINP, Title 36 CFR 7.74 (e)(2). Although not a traditional technique, this method was used by some artisanal fishermen.
4. Trunk Bay is closed to all fishing methods, Title 36 CFR 7.74 (e)(5).
5. Net fishing has been cutailed, Title 36 CFR 7.74 (e)(3). Only nets twenty feet in length or less can be used inside the VINP boundaries.

In addition, some fishermen argued that prohibitions on the use of firearms with in the park, the grazing of livestock on park land, and the gathering of resources from the park restricted certain traditional subsistence pursuits.

Most fishermen seemed to equate the responsibility for these regulations and the accompanying restrictions they imposed with the National Park Service. The park service is the most visible government agency in St. John, and park rangers seem to be the most visible enforcers of these regulations.

The effects of these regulations have been substantial. Methods common a few years ago and still practiced in the British Virgin Islands are now absent in St. John. Although catching turtle was not an important commercial fishing activity, it was an integral part of local subsistence efforts and a traditional part of peoples' diets. "We had a certain time we could catch turtle now we can't catch turtle at all." Some fishermen felt this ban was unnecessary and one made the point that, "you can't catch turtle, but the same turtle can go from here to Tortola and they can catch it." For this fisherman it seems illogical that he is prohibited from using a resource that nearby fishermen exploit freely.

Fishermen estimated that twenty years ago there were four or six seines owned by resident St. John fishermen and used on a regular basis. These seines were both beach and small purse seines. Fishermen from Frenchtown, St. Thomas, also came to cast their seines along St. John's coast and its abundant sandy beaches. Bonito, jacks and bait fish were the primary species caught with seines. Large seines and gill nets are no longer allowed in the park; even if they were allowed, fishermen explained that all the boats and people would make it difficult to cast them.

A recent National Park Service regulation that prohibits leaving a boat unattended more than twenty-four hours in the park seemed unreasonable to some fishermen. An older retired fisherman who anchors his boat in a bay by his home, recently had his boat untied from a tree (his standard method for mooring it) and retied to a log by a park service ranger. A note was left explaining that in the future he could not tie his boat to a tree or leave it unattended. He told me that he had been tying his boat in this fashion for years and he could not understand why it now presented a problem. A park employee agreed that this particular instance was regrettable. He explained that the purpose of this regulation is to discourage yacht owners from mooring in the park for extended stays and is not meant to interfere with local fishermen.

Regulations forbidding firearms in the park, disallowing livestock to graze in the park, and the ban on the gathering of resources from the park are all viewed by some fishermen as unreasonable infringements on traditional aspects of their subsistence strategies. "If they catch you with a firearm they make you pay a fine but now they're carrying them; it can't be so." Older fishermen stated that in the past they hunted goat and pigs in what is now the park. Now they are only allowed to hunt in the park if they get a permit and they are only permitted to use dogs not guns. Keeping livestock is a traditional part of rural Caribbean household economic strategies. In addition to providing meat and milk, livestock are an easily exchanged commodity in times of need.

For older fishermen who lived a significant part of their lives in a more subsistence oriented economy, the grazing of livestock on forested land and the gathering of raw materials are regarded as a legitimate claims: " Now you can't even cut sticks for fish pots in the park."

The regulation limiting the possession of conch in park waters is currently being tested in a case before the District Court of the Virgin Islands; *The United States of America vs. Jason Dalmida and Terrance Brady*, case number 830130. On April 9, 1983 these two resident St. John fishermen were issued a citation for conch poaching in the park. A ranger found them on the beach cleaning over one hundred conch shells. The regulation they were charged with violating is found in Title 36 C.F.R. 7.74(e)(4):

Species of mollusks commonly known as whelks and conchs may be taken by hand. No person shall take more than two conchs or one gallon of whelks, or both, per day, or have in possession more than two days limit.

This regulation is designed to discourage local fishermen and others from exploiting these locally depleted species for their commercial value.

The defendants have argued that the above regulation is invalid because it interferes with their customary use of the environment. Specifically, the defense has argued that by limiting the possession of conch within the park and not the actual taking of conch the regulation goes too far. Since fishermen have the right to land their boats within the park they should not be prosecuted for simple possession; their catch may well have been from outside the park's boundary. The prosecution maintains that if the law stipulated only the taking of conch as being illegal it would be too difficult to enforce.

As of April, 1984, this case had not yet been resolved.

For some St. John fishermen this case symbolizes their on-going conflict with what they regard as over-regulation. For them, the underlying issue is whether or not they have the right to continue using their environment in their traditional ways, a right they feel has been breached by government restrictions. Fishermen resent what they view as the National Park Service's emphasis on regulation and enforcement. One fisherman indicated that this policy orientation began in the last ten or twelve years with the regulations prohibiting the catching of turtle and the ban on seining. He described relations between locals and the Virgin Island National Park as more "like one big family" until these regulations were imposed. This resentment toward regulation and enforcement was reiterated by many fishermen. As the following quote demonstrates, some fishermen seemed to equate many restrictive regulations with the park service:

"Before the park you could do what you wanted. Now you need a certificate to build a house; you have to have a permit to do everything, long ago it was not so." Another fisherman said, "They won't let you seine, they tell you they own the water; I don't know what kind of law that is." A retired fisherman explained, "Its no pleasure with the sea at all. You can't throw a turtle net, you can't throw a seine. If fish is boiling up in the bay you can't throw a seine around them. Drastic laws for living boy, drastic laws for living."

Fishermen were also critical of "new rangers telling locals what to do." A few suggested this as a reason for what they considered to be the lack of continuity in park policy. Others suggested that the park service had failed to communicate new regulations and the purpose for them. "They come and give you orders; they don't explain nothing to you." Another fisherman stated, "They're not giving you an alternative, nothing else, its just don't do it. All the fishermen know is the don'ts."

4.3 Conclusions

"I feel the same way the Indians felt," was how one fisherman expressed the cumulative effect of regulations and the other changes that have disrupted St. John's fishing tradition. Fishing has been a traditional occupation in his family for at least five generations. Other fishermen proudly made this same point. A fisherman who has a white collar occupation explained his love for fishing by telling me that, "my family has always had a fondness for the sea." Several fishermen explained that there are only about thirty fishermen in St. John because fishing requires so much knowledge, and it can only be adequately passed down from father to son. They view regulations limiting this integral part of their traditional way of life as a direct threat to their culture: "They're fooling around with the native culture of fishing and they'll probably wipe the whole thing out." For these men fishing is more than a contribution to their economic strategies or a pleasure to be enjoyed; it is an essential element of their culture, their history, and their own identity.

Some fishermen prefaced their remarks with statements that illustrated both the benefits of the park and their particular difficulty with it. "I think the national park is really nice but they've got to leave the fisherman alone." An older retired fisherman summarized his view of the park's costs and benefits by saying , "They was trying to be good in a way, but it turned out bad in another way. Its hampered people accustomed to living off things from the sea." Fishermen frequently made suggestions for solving the differences between themselves and the park. They suggested that the National Park Service could be more responsive, that they could show they are willing to work with fishermen. One fisherman proposed that regulations should be more flexible so that they

could reflect changes in the local economy. He advocated making seining seasonal instead of banning it altogether. He also recommended that instead of so much emphasis on enforcement, the park service could put more effort into finding out why there are no more sea urchins and why the fish are slowly moving away. "They could teach us to fish in deep water, it would help us and take the burden off the national park." Another fisherman suggested the park could help find a way to detect ciguatera.

As previously mentioned, a majority of the fishermen I spoke with expressed concern over the decline in certain marine species; in particular, they mentioned whelk, lobster, conch, sea urchins and various species of bait fish. Generally, they regarded the decrease in these species as a consequence of both the increase in the number of people utilizing the resources of St. John, and the introduction of new technology that has increased the efficiency of catching fish. Fishermen's explanations revealed an awareness that over-fishing has contributed to the depletion of some marine resources; one fisherman admitted to me that he had "mixed feelings about seining." He believed that "times had changed," and that this technique might be detrimental judging the present status of the resource. Considering the dissatisfaction expressed by some fishermen regarding over-regulation and what they feel is an exclusionist attitude on the part of the park toward artisanal fishermen, it is not surprising that they did not address the problem of over-fishing to the same degree that they spoke out against over-regulation.

Although residents of St. John have obviously benefited from the tourist industry and the national park, they have also had to pay a number of costs. Many of these costs can be calculated in the loss of traditional subsistence pursuits and in the alteration of many others. The discontent expressed by St. John's artisanal fishermen toward the National Park Service's regulatory and enforcement roles appears in part a reaction to over thirty years of sweeping cultural and economic change. Fishermen have seen their traditional economy replaced by an open, single industry-dependent economy, they have witnessed a Federal agency take control of a major portion of their environment, and they have observed multitudes of outsiders come to exploit its recreational potential while their own subsistence oriented uses have been reduced.

5. SUMMARY

Artisanal fishing has been and continues to be an important component of many men's overall economic strategies. For some households it remains a major source of income, for many others it is a means of subsistence. Its contribution to the diet of both residents and visitors is substantial. Although modified by changes accompanying the development of the tourist industry and Virgin Island National Park, artisanal fishing has persisted. Ecological and regulatory problems that have emerged during this time have become major concerns for these fishermen.

6. DISCUSSION

The MAB guidelines outlined by Gregg (1983) advocate the participation of the entire biosphere reserve community (managers and users) as a requirement for achieving the goals of the biosphere reserve program. The profile of artisanal fishing presented in this report suggests the need for developing a management strategy that embraces this participatory policy and actively encourages the involvement of fishermen who utilize and live in the Virgin Islands biosphere reserve. The inclusion of local fishermen in all levels of planning, management and research will help assure the biosphere's success by:

1. The knowledge and expertise that fishermen will contribute to it.
2. The opportunity their participation will give themselves and other members of the management community to develop management strategies and plans for the reserve's maintenance and protection and, to discuss mutual concerns and voice grievances.

As demonstrated by their comments and suggestions included in this report, local fishermen possess an ecological awareness that is founded upon generations of experience. They have a collective knowledge and temporal overview of the biosphere reserve that extends back before the park's existence. Their success as fishermen depends upon this intimate understanding of the biosphere reserve environment; it constitutes a local resource that has yet to be tapped. Fishermen's astute observations could provide an unparalleled system of environmental monitoring. Both Geoghegan (1983) and Goodwin (1984) cite successful examples of local fishermen, scientists and administrators working together to manage the resources of their environment.

Geoghegan points out that the involvement of fishermen at these levels of management not only takes advantage of their extensive knowledge, but also fosters a spirit of cooperation that can be carried over into other areas of management. Such a cooperative effort might lead to greater flexibility in composing management policies. Likewise, by becoming integral members of the management community, local fishermen may themselves implement conservation strategies and forms of self-regulation thus lessening the need for enforcement. In addition, Geoghegan (1983:8) mentions that this kind of participation becomes an educational experience for all involved providing participants with a more complete view of the "complex inter-relationships of man and environment." The benefits of this last point, and of improving communication in general, can be demonstrated by the comments of fishermen regarding their dismay over the sudden disappearance of sea urchins and the suggestion that the park service could find ways to detect ciguatera. The disappearance of sea urchins is apparently caused by a virus, and operates as a natural population control. And, researchers have been attempting to find a reliable method of ciguatera detection for decades (Boulon, personal communication). Unfortunately, many of St. John's fishermen are unaware of this important information; a more participatory management strategy could be an effective way to change this.

Whether formally structured or based on more informal networks, the involvement of local fishermen in the planning and management of the biosphere reserve will provide these local resource users with the opportunity to contribute to policies that directly effect them. The conflict that has developed between fishermen and the Virgin Island National Park demonstrates the urgent need for greater participation and communication between different members of the biosphere reserve community. It appears that a large part of this current conflict stems from the almost complete exclusion of fishermen from any meaningful role in the national park. This exclusion serves no one's interests. It fosters antagonism, alienates fishermen from their own environment and reinforces the park service's need to stress enforcement at the expense of other less costly, less confrontational and potentially more beneficial tasks.

National Park Service personnel explained that the park does not have any specified policy for working with local fishermen or for communicating management plans or regulations to them. They were aware of fishermen's dissatisfaction; one employee summarized local fishermen's image of the park service as, "one of a restrictive land use agency." This same informant stated that he believed local fishermen's use of the park to be an asset for the park rather than a problem. Another employee explained that the relative lack of interaction with local fishermen on the part

of the National Park Service is due to the fact that artisanal fishermen do not pose a serious threat to the park, and that most of the park service's day to day effort is taken up by the multitudes of short-term visitors. All park service informants admitted that much of the interaction that does occur between fishermen and themselves is confrontational. A ranger explained that this situation is due in part to the park service's mission of protecting an environment that receives more and more use every year; as a consequence, more and more man hours are devoted to short-term environmental protection which often translates as enforcement. The outcome of this predicament is that much of the national park personnel's contact with fishermen takes on a policing function rather than more positive cooperative efforts.

This confrontational relationship will continue as long as this dichotomy between resource managers and resource users exists. The present situation seems to prompt traditional resource users to view the park service as a regulatory agency determined to restrict artisanal fishing; while at the same time, it conditions park personnel to view local fishermen as one more group to contend with in their mission to protect the park's resources. The solution to this problem goes well beyond simply improving public relations. In order to build a cooperative relationship, a management structure based on participation rather than exclusion, and a management policy extending decision making power and planning to include traditional resource users and residents must be implemented.

Finally, without the active participation of local fishermen the biosphere reserve program will not fulfill its expectations. Unless fishermen believe that the program is serious about wanting their involvement and is responsive to their concerns they will resist it. One informant told me about a stock assessment program involving tagged fish. He said that if a fisherman caught one of these fish he was to turn it in and receive some nominal payment for it. He added sarcastically, that if he caught one of these fish he would eat it. His response to this government sponsored study illustrates in a small individual way what happens when people feel left out of the planning and decision making process.

It is the conclusion of this report that by designing and implementing a management strategy fostering the participation of local traditional resource users in all phases of the biosphere reserve program we can help assure not only its success but also its usefulness. The people whose lives are most tied to this environment have the best reason of all for protecting it and possess a shared knowledge invaluable for constructing programs that will ensure such protection.

Appendix 1. Methodology

From March 18 through March 31, 1984, I conducted the fieldwork phase of Subtask 2.5. The majority of this time was spent meeting with fishermen who use the resources of the biosphere reserve. The brief time allocated for field work restricted the investigation almost entirely to artisanal fishermen residing in St. John and those from other islands who sell their fish in St. John. In all sixteen fishermen were interviewed. Thirteen of these were residents of St. John. Two were from St. Thomas, but fished around St. John and sold their catch at Cruz Bay. The other fisherman was from Tortolla and was interviewed there. Two fishermen were current employees of the national park; two others were retired from the park service. In all, three of the St. John resident fishermen were retired; the other ten all had other jobs besides fishing. The two St. Thomas fishermen and the fisherman from Tortolla fished full-time.

Seven current or former management level employees of various government agencies were interviewed. They included; three employees of the Virgin Islands National Park, the fisheries officer for the British Virgin Islands government, one current and one former employee of the Division of Fish and Wildlife of the DCCA, and an official representative of the U.S. Virgin Islands government. Other management personnel were contacted by phone but were unable to meet with me during my brief stay.

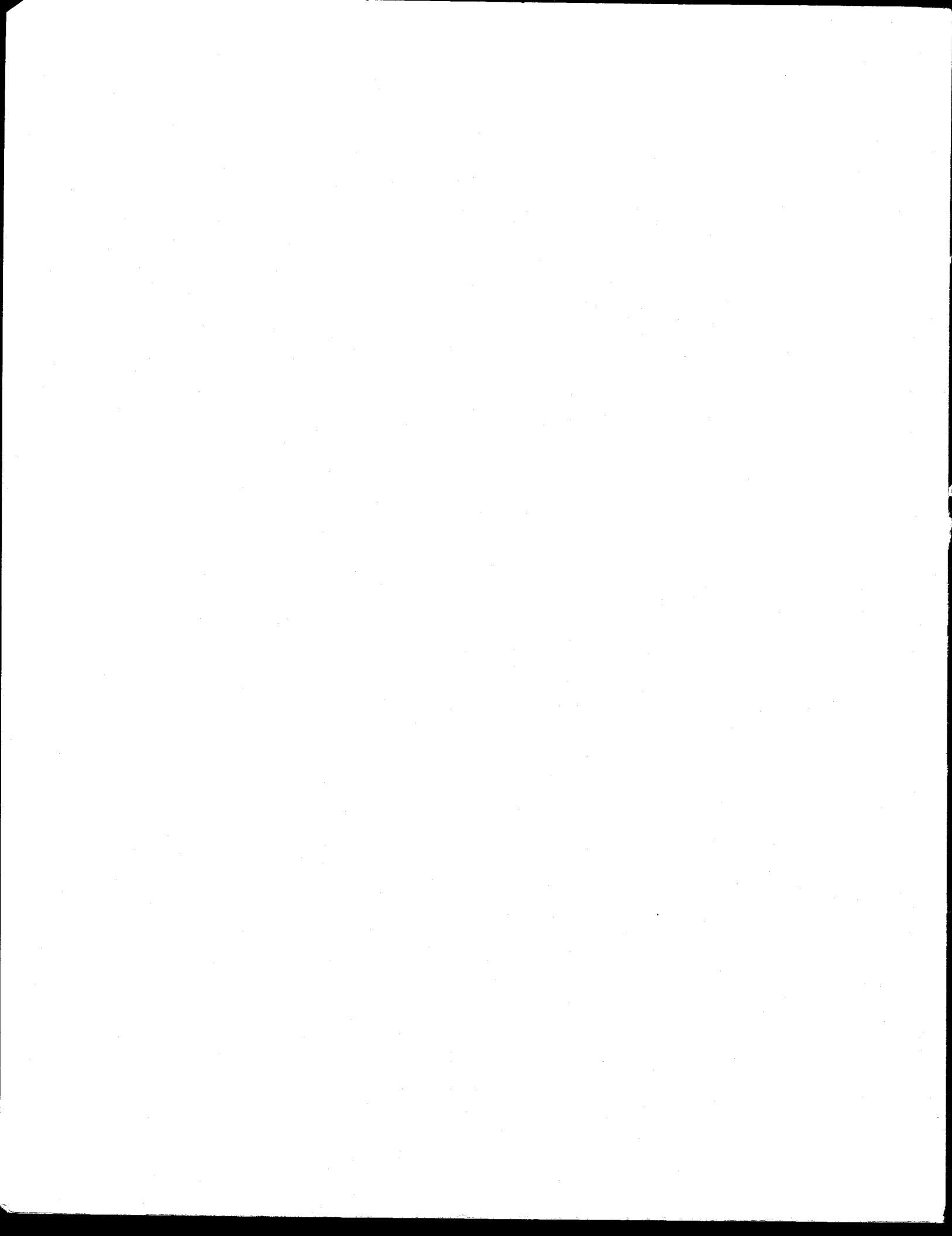
Less formal interviews were conducted with two restaurant operators, the skipper of a ferry carrying fish imported from Tortolla to sell in St. John and a number of local consumers who were interviewed while buying and cleaning their fish at the Customs House in Cruz Bay.

Some interviews were extensive and carried out over several days while one was as brief as a taxi bus ride from Cinnamon Bay to Cruz Bay. The data presented here and the conclusions drawn are based entirely on these interviews and my observations. Clearly this report is not to be regarded as an in-depth description of Virgin Island fishing. It is rather an outline, providing basic information and reporting areas of concern. If this report accomplishes these two objectives it will elicit far more questions than it answers.

Interviews with fishermen focused on the following topics: their individual economic strategies, the fishing methods they employ, the degree to which they rely on fishing for subsistence and income, how they market their catch and changes they have witnessed affecting fishing.

In order to maintain the confidentiality of my informants, quotes and information given are identified only by an individual's status; no names are used. I have made liberal use of quotes. I have come to the conclusion that informants are often more concise and to the point than the anthropologist who attempts to interpret them.

Throughout this report I use phrases like, "with the advent of the tourist boom," "in the recent past," or "before the park." These phrases are not meant to be ambiguous. In some cases it is not possible to be more specific and in many instances these phrases are used because they are the time frames suggested by informants. The influx of tourists which began in the 1940s and the creation of the park in 1956 were major events in the lives of St. John residents. These events were often alluded to in conversation and used to anchor certain changes within a temporal framework. It is not possible to pinpoint when whelks became too dear for baiting fish pots or when the last sizeable quantity of conch were gathered free diving. The date that a previously little known federal agency took control of over fifty per cent of the island's land mass and a substantial part of its coastal waters and introduced new opportunities for employment is well within the reach of most memories however. For the purpose of this report, it is helpful to regard as a given that the last forty years of St. John's history has been a period of intense and rapid transition.



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