A LONGITUDINAL STUDY OF THE VIABILITY
OF A PARTICIPATORY RESEARCH PROCESS

TECHNICAL REPORT FOR THE
COASTAL AREA MONITORING PROJECT (CAMP)

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INTRODUCTION

Participatory research is of growing interest to the environmental management researchers and practitioners. This is primarily because participatory approaches to small scale economic development, agriculture transformation, health, and literacy have proven to be effective (Chambers et. al. 1989, Rocheleau 1994) and show promise in the environmental realm. Such approaches are just beginning to be explored in forestry (Hoskins 1991) and have proven to be particularly powerful research tools in Nicaragua (Fals-Borda 1987).

Pearl Lagoon, Nicaragua, a coastal lagoon surrounded by ten communities, is undergoing rapid cultural and ecological change (Nietschmann 1973, Vandermeer 1991). The area's four distinct ethic groups rely on the forests, fishery, and agricultural lands for their subsistence. The shift from subsistence to commercial natural resource exploitation, the introduction of agriculture techniques (e.g. cattle ranching) by immigrants, the introduction of modern technologies (e.g. gill nets, outboard motors, and chain saws), and natural disasters are having a marked affect on the area's environmental integrity (Vernooy et. al. 1991, Robinson 1991, Ryan 1992a). These rapid changes are particularly critical given that the enforcement of environmental regulations is largely non-existent in Pearl Lagoon.

The Coastal Area Monitoring Project (CAMP) was started in 1993 in order to address the concerns of the people of Pearl Lagoon for their coastal natural resources and to involve them in their assessment and management. The project's first stage was from January to June of 1993, during which Patrick Christie became integrated in the communities of Haulover and Pearl Lagoon Town and the problem identification and prioritization process of participatory research was initiated. Water monitoring was also initiated with senior level high school students. From June, 1993 to January, 1994, Patrick Christie was in the U.S., while Roberto Rigby remained in Pearl Lagoon. At this time, CAMP went into a period of quiescence. However, upon Patrick Christie's arrival in January 1994, many of the former participants in CAMP expressed an interest to restart the process. Monthly meetings and forest surveys were therefore initiated, water testing was resumed, and as the result of a grant from the International Development Research Centre a full time communal investigator from Pearl Lagoon Town was hired. It should be noted that all the activities of CAMP are identified and voluntarily carried out by members of the research group with the assistance of the CAMP staff. In November of 1994, Patrick Christie again returned to the U.S..

An analysis of CAMP allows one to investigate many interesting questions that interrelate the theoretical fields of participatory research,

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traditional knowledge, and social movement and the applied field of coastal resource management. This investigation will concern itself with one area of inquiry - the viability of the participatory research process employed by CAMP - that is relevant to all four fields. The choice questions related to the viability of this participatory research process was based on their relevance to two criteria: 1) their importance to participants in CAMP and 2) their relevance to the discourse in social movement theory.

When asked during interviews in early 1994 why CAMP had not continued in Patrick Christie's absence, (more than half) of the interviewees responded that it was due to the fact that "they were not organized well enough" or "that CAMP stopped since you (Patrick Christie) wasn't around". We will assume at this that it is likely that these participants know best why the research process was not viable at that point. But this opinion of a few of the participants in CAMP deserves following up and development.

Movement theorists (Zald 1992) that agree with resource mobilization theory might view the accumulation of resources (e.g. funds, infrastructure, research equipment, personnel) by CAMP and the ascription of resources to participants (e.g. prestige, money, influence) as fundamental to the viability of this participatory research process. On the other hand, the recent critique of resource mobilization would see other factors such as frame resonance as central to viability (Snow and Benford 1992). In order to illuminate these differences, this investigation will attempt to determine whether resource mobilization or frame resonance, or both, improves viability.

We have interest in investigating questions that are related to traditional knowledge, but given our data set, have not yet been able to identify reasonable questions to answer to date. In this case, We will maintain an inductive, exploratory stance and remain open to posing such a question to later in this research process.

In summary, this study will investigate the following questions:
1) Is the viability of the participatory research process employed in CAMP dependent on the level of organization of the research group that is involved in it? (The term "research group" refers to the approximately 30 dedicated, local participants in CAMP.)
2) Is the participatory research process employed in CAMP dependent on external presence and support?
3) Is the mobilization of resources such as funding, office space, research equipment, transportation (e.g. boat and motor) fundamental to the viability of the participatory research process employed in CAMP?
4) Which, if any, of the viable master frames or cultural frames on the Atlantic Coast of Nicaragua does the collective action frame of CAMP resonate?

This study will include two major sections - a section that investigates these rather theoretical issues and a section that includes case studies prepared by the communal investigators that presents information about the communities in which they work and the progress of their efforts. This report will not detail the results of the environmental monitoring that has taken place, since these findings are still inconclusive and in the process of analysis. Rather, the process by which this monitoring is taking place will be highlighted.

Human Dependence on the Coastal Environment- the Tropics and Pearl Lagoon

In Central America, coastal areas are the region's last frontiers and the focus of rapidly increasing populations (Olsen and Foer 1992). Olsen and Foer (1992) also comment that recent FAO estimates of 100,000 people who directly depend on fisheries for their livelihood does not include another approximately 165,000 indigenous people in Central America that depend on fishing. As stated earlier, the fisheries are viewed by local people and political leaders as the backbone of the economy and culture of the Atlantic Coast of Nicaragua (Ryan 1991, Robinson 1991, Hooker, pers. comm. 1993).

Coastal areas all around the world are under stress. Salm and Clark (1984) maintain that impacts on coastal ecosystems are widespread: industrial and agricultural pollution, siltation from eroded uplands, filling to provide sites for industry, housing, recreation, airports, and farmland, dredging to create, deepen, and improve harbors, quarrying, and the excessive cutting of mangroves for fuel. Wells (1993) also cites sedimentation, nutrient-enrichment, and over-exploitation as the three main forms of human impacts on coral reefs. Blast fishing and the use of poisons can also have a locally significant impact on coral reefs (Salvat 1987). Coastal lagoons and estuaries with their associated mangrove forests are threatened (Salm and Clark 1984).

In response to the concern for coastal ecosystems, the field of coastal resource management is rapidly growing. Networks of tropical coastal practitioners exist in the Caribbean (the Gulf and Caribbean Fisheries Institute) and Asia (the Coastal Management in Tropical Asia network). Basic research institutions also exist. The International Center for Living Aquatic Resources Management (ICLARM) is centered in the Philippines. In general, the Southeast Asian countries have been leading the way in developing innovative coastal management programs, perhaps as a result of ICLARM's presence in the region and the scientific communities concern for this region's high marine biodiversity. There are five major laboratories on the rim of the Caribbean basin - US Virgin Islands, Netherlands Antilles,

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Barbados, Panama, and Jamaica. In Central America, a number of coastal management initiatives are underway involving protected areas, watershed management, and ecotourism (Olsen and Foer 1992).

In 1992, during a preliminary brief research visit to Pearl Lagoon, Patrick Christie conducted ten informal interviews with local people about their thoughts on the environment, their concerns, and desires. The majority of the people described Pearl Lagoon as a place that has gone through many changes over time. The older people remember enormous ships moored at the mouth of the lagoon waiting for rafts of mahogany or boats filled with bananas. Schooners from Florida took thousands of sea turtles to the United States. And for the last 14 years, they talk about isolation and the terrible effects of war on their communities. However, within the last few years a renewed expectation of the possibility of economic prosperity has been growing.

Fish buyers have returned to Pearl Lagoon and three new fish processing plants will soon be in full operation. The anticipation is apparent but among some insightful individuals so is the concern for how this new wave of growth will be maintained. To these individuals, although the days of logging, bananas, and turtling were prosperous, they also left an environment that provided less opportunity for their children. They hope for economic growth, which in Pearl Lagoon invariably means the exploitation of natural resources, but they want this growth to be at a pace that does not result in the same damage to the environment as in the past. In the Pearl Lagoon basin, local people have expressed concern over the effects of mangrove cutting, overfishing, and the deforestation of river watersheds on the lagoon. Local fishers have expressed their interest in establishing a closed season for spawning fish:

> This lagoon, what we have is nothing deep and you
> could do these fish into a time. (We must) [g]ive
> these fish a time when they coming into spawn.
> (Haulover fisher)

The coastal environment is the foundation for the communities surrounding Pearl Lagoon. Concerns about the potential degradation of the lagoon and its watershed have been voiced by North American and Nicaraguan scientists, Nicaraguan government leaders, and the people of these communities. Ryan (1992a) and Olsen and Foer (1992) have highlighted the importance of coastal lagoons along the Atlantic Coast and their vulnerability to over-exploitation and degradation. A commission made up of National Assembly members visited Pearl Lagoon June, 1993, in order to receive local input into a law to regulate the commercial fishing industry off

the Atlantic Coast. Ray Hooker, a commission member, stated that "fishing is the most promising possibility for a better life on the Coast... Who (currently) gets the benefits of the fishery? The fishermen get some, but little. This law wants to improve this." A Pearl Lagoon fisher expressed his concern for the declining catches:

> In the past (I) use to be able to catch plenty of
> lobster. In the past (I) could catch 1000 pounds of
> fish in a day in one canoe. Now (I) can only catch
> 350 pounds with more gear.

People of the Pearl Lagoon basin exploit natural resources across ecological boundaries (Nietschmann 1973). Furthermore, the ecology of the Pearl Lagoon basin is inextricably related to social issues. Patrick Eaton, a local development worker, describes how *Costeños* in Pearl Lagoon relate to their environment:

> There are people that live of the forest and they live of the sea...
> So we just can't (keep) going and concentrate all our mind on
> the fisheries and forget the forest... so I think we need to have a
> joint effort.

An integrated approach to coastal resource assessment is appropriate in this context.

The people of Pearl Lagoon are concerned with their natural resources and want to see changes in management. Many people, especially during the war, left the area and traveled to Costa Rica. Upon returning, they now see many foreign fishing vessels from Costa Rica and Honduras fishing (both legally and illegally) off their coast. Barges of mahogany logs continue to come down the Patch River bound for foreign markets. People realize the value that their coastal resources have for others. People of the Coast are also beginning to demand that they begin to profit in a meaningful way from these resources. For people from these communities, the autonomy process is a struggle for control over the natural resources of the Coast. In the past, the central government bureau, MEDE-PESCA, was in charge of assessing and managing the fisheries, while MARENA was in charge of assessing and managing the forests. While many people of the Coast felt that these central government agencies were not responsive to their needs and were plainly corrupt in their deals for concessions to the coast's natural resources, these agencies have complained of lacking budgets and personnel to control illegal activities (MARENA regional director pers. comm., 1993). While MEDE-PESCA has called for increases in the number of commercial fishing permits

to foreign vessels on the grounds that fisheries resources are under-exploited (Hodgson pers. comm., 1993), the local people are concerned with declining catches and maintain that MEDE-PESCA's reports are based on outdated studies and that new studies are needed. Through the Autonomy Law passed in 1988, the Regional Council in Bluefields, which is made up of *Costeños*, is to regulate the exploitation of natural resources in coordination with central agencies.

A tradition exists in Pearl Lagoon for community management of natural resources. The approximately 10,000 hectares of land surrounding Pearl Lagoon are communally owned. Traditional fishing grounds also exist for each community (Nietschmann 1973, UN 1991). However, there have been abuses of the communal system of natural resources management. Local people from Haulover tell of how the village of Pearl Lagoon controlled the "purse" that was the money gained from the sale of timbers from communal lands belonging to both communities. They maintain that this money was used for the exclusive development of the Pearl Lagoon town's churches, roads, and schools. Likewise, the village of Tasbapaunie and Orinoco both claim rights to timber from contested communal lands. Currently, the right to manage Pearl Lagoon's resources is disputed between local leaders and national level agencies.

On the Atlantic Coast of Nicaragua attempts to sustainably manage coastal resources only began recently. The Miskito Coast Protected Area, initiated in 1990, surrounds 5000 square miles around the Miskito Cays. It is the result of coordinated efforts of the Nicaraguan Ministry of Natural Resources (MARENA), a Miskito environmental organization (Mikupia), and the University of California-Berkeley. University of Maryland and Nicaraguan scientists have been studying the reefs surrounding nearby Big and Little Corn Island with the intent of establishing a management plan for these areas.

In the Pearl Lagoon basin, a major project to sustainably develop the area's fishery has been underway since 1989 with financial assistance from *Ayuda Popular Noruega* (APN), a Norwegian non-governmental funding agency. As part of this management scheme a fishing cooperative has been established in seven of the ten communities within the Pearl Lagoon Basin -- Orinoco, Marshall Point, Brown Bank, Kakabila, Raitipura, Pearl Lagoon, and Haulover. These fishing cooperatives are the constituents of a lagoon-wide fishing union. A fish processing plant has been built in the community of Pearl Lagoon to clean and freeze fish captured by the union members. The union management has made contracts with private fish buyers with contacts in Managua for the sale of the fish in large shipments. The union plans to leverage a better price for its fish than has been the case in the past by becoming the main supplier of fish out of the lagoon. It also plans to return

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annual union dividends from the sale of fish to its members and to support community development projects.

In order to avoid the over-exploitation of the area's fishery, the Haulover Marine Laboratory was also constructed by APN. The mandate of the laboratory is to supply the necessary information to the union for the sustainable management of the lagoon and nearshore fishery (Haulover Laboratory Director, 1993, pers. comm.). Currently, two marine biologists collect data on dissolved oxygen, salinity, and temperature, in addition to data on length-frequency and catch per unit effort for lagoon fish species with gill nets. Until last year, the laboratory functioned separately from the union and the communities. Recently, the laboratory initiated a program of environmental education and community outreach. This program began as the result of demands made by the union that the laboratory become more integrated with the union and begin to share its information.

> We believe that , well, this stage was necessary to get familiarized with the people, talk with the people... We had to pass through this stage for several reason. Because well... the lab had already loose it relation with people. It was necessary to draw back again, go over again. At first they (fishers) didn't know absolutely nothing of the lab, now they know that there is a lab. That's the first step..."
>
> Haulover Marine Laboratory biologist

In January, 1994, another coastal resource management project was initiated - DIPAL - with significant Dutch bilateral financial support (2 million $US). The implementing agency for DIPAL is the newly reorganized national fisheries agency - MEDE-PESCA. The aim of DIPAL is to initiate a bio-physical monitoring system of Pearl Lagoon that will form the basis of a management plan. DIPAL also hopes to develop a system for the national and international marketing of Pearl Lagoon's fish and shrimp. At the initiation of DIPAL, the local fishing union expressed its concern that DIPAL was not listening to the local people enough.

Literature Review of Relevant Theories

The theories relevant to this investigation can be found in the discussions of sociology (participatory research and social movement theory), anthropology (traditional knowledge), and coastal resource management. We will now review these discussions.

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The Need for Alternative Social Science Paradigms

The objectives of every social investigation are different. Social science research programs lie along a spectrum that may be said to range from basic research, to applied research, to participatory research (Elden 1981, Patton 1990). Important characteristics to consider when classifying research program along this gradient are: the research goal, who are the "consumers" of the research results, the likelihood that those who supplied the data will use it, the relationship between researcher and subject, and the researcher's role. For academics, the mode of publication and standards for evaluation are also of concern.

Different research paradigms have been developed to address varying objectives. The vast majority of academic research is basic research and is concerned with the documentation of social phenomena and the development of theories. Other, more applied social researchers, hope that their research efforts will supply the information needed to solve a given social problem. They often are not, however, interested or able to be directly involved in solving a social problem. Some social researchers wish to transform a society perceived to be unjust through their own involvement with the oppressed (Fals-Borda 1987, Freire 1993).

An important issue to consider is the power differential existing between researcher and subject. When the subject of investigation is a disempowered, poor person or community and the investigator is a elite academician, it is difficult for the academician to begin to understand the reality of his or her subject while retaining his or her status of comfort. Differences in class, educational and occupational background may distort the flow of information between researcher and researched (Brown 1982). The research subject may eventually feel exploited by the academic. Indeed this sentiment may be well founded if only the academic's career, and therefore well being benefits from the research effort.

Another fundamental issue is the tendency of research methods to mystify science and keep it unattainable to the researched. If a subject of a research program is an illiterate person with little or no understanding of formal science, while a researcher is an "expert" armed with complex research tools, the potential for idealization of the researcher by the researched is high (Fals-Borda 1987). The research program is unlikely to be continued by the community once the researcher has departed (Christie et. al. 1994). In the field of resource management it is often preferable to have long term studies to monitor change over time, therefore the continuation of research efforts is important. Furthermore the likelihood of research to affect change at the local level is questionable if people do not understand the research process that ultimately led to recommendations (Hall 1982, Hoskins 1991).

Research institutes demand much from their researchers. Incentives to produce information at an rate that conforms to the standards of the trade are an important motive that shapes research agendas (Sanford 1970). As a result of these pressures, researchers may decide on their research question with little consultation with the subjects. If a person is treated as only a subject of research the potential for dehumanization of people, and therefore resentment towards the researcher, is considerable. This may especially be the case if the recommendations that come from the researcher are not considered favorable by the subject. At the very least, the subject may feel exploited by a system that cares little for his or her input in designing a research program that may affect his or her life.

The accuracy of social investigation that does not employ positivistic methods is questioned in mainstream social science. Reacting to pressures to conform to a positivistic approach in the name of scientific rigor and objectivity, social science has mimicked the highly quantitative, experimental physical science approach. This approach may not fully consider the ability of humans to manipulate their world and create elaborate social constructions (Chesler, pers. comm.). Quantitative data may be objective, rigorous, statistically significant, and reliable, but is it valid in reflecting reality?

> A research process that extracts information into a single
> set of figures may do so at the expense of oversimplifying
> the complexity and richness of human experience.
> Responses to problems offered by groups of people are not
> necessarily the same as the sum of individual responses of
> people speaking alone... The illusion of accuracy through
> numbers has been perpetuated by many of us researchers.
> (Hall 1982, p.16)

Given the complexity of social systems, it is a difficult task for researchers to accurately describe them. One of the fundamentals of modern social research - to maintain an objective opinion of your subject - has been challenged as impossible, and not even desirable (Hall 1982, Cancian and Armstead 1990, Lincoln and Guba 1985). Alternative approaches have developed in reaction to the limitations of the quantitative and positivistic research discussed above, and as a means by which researchers could become directly involved in social transformation.

Participatory research is one such alternative research paradigm and is based on the tenet that the participants in research should be actively involved with the outside researcher in the planning and implementation of a research exercise (Cancian and Armstead 1990, Hall 1982). Hence the subject-object barrier of positivist research is breached, with the intent of supporting the empowerment of participants and to support an exchange of

information between researcher and participant that will benefit both. Researcher and researched work together to develop a two-way sharing of knowledge (Maguire 1987). Participatory researchers value the local knowledge of people, but are aware of the dangers of romanticizing this knowledge (Lather 1986, Fals-Borda 1987, Thrupp 1989). Local knowledge combined with the specialized knowledge of the outside researcher is considered by advocates of participatory research to be more potent than either knowledge alone in understanding reality (Hall 1982, Chambers 1992). Furthermore, control of the research program is shared by all those involved. Considering that participatory research relies on participants to identify the issue to be researched, it tends to be applied to solving real-life problems (Chambers 1992). Participatory research refutes a strictly positivist approach that leads to the development of knowledge through what has been deemed "elitist research" of interest and understandable only to a handful of "experts" (Freire 1993, Fals-Borda 1987). Through this process it is hoped that consciousness raising will take place among participants when the sources of oppression are identified (Freire 1993, Fals-Borda 1987, Vio Grossi 1981). It should be kept in mind that the definition of participatory research is evolving and the subject of debate (Brown and Tandon 1983, Chesler and Israel pers. comm. 1993). One of the objectives of this research will be to explore the meaning and usefulness of participatory research within the context of natural resources management.

Gradients exist on a number of issues relevant to participatory research. The level and timing of participation is one such gradient. The level of control by participants over a research program is another. Furthermore, the expectations for social transformation, whether this be on a micro or macro scale, political or material, differs among practitioners of participatory research. Some research programs are guided by Marxist theory that encourages the challenging of the ruling class (Vio Grossi 1981), while other programs have objectives that do not challenge existing class or power structures (FAO 1990). Of relevance to academic participatory researchers is the gradient between academic research and community activism (Sanford 1970).

In a rural setting in a developing country, where the vast majority of people depend on natural resources to meet their needs, participatory research may frequently involve natural resource management issues. Considering the traditional use of participatory research to address non-natural resource issues, while keeping in mind the effect of natural resource problems on rural people, we maintain that another gradient exists as to whether a program is primarily social science or natural science oriented. In other words, participatory research is no longer only in the domain of the social scientist, but also the environmental scientist and development agent whose interests may be ecological and social (Hoskins 1991, Chambers 1983, Burke 1993).

Roots of Participatory Research

The historic roots of participatory research are diverse. Participatory research grew from three traditions: 1) the North American tradition concerned with industrial labor conditions in the 1970s (Heaney et. al. 1993), 2) the tradition concerned with the development of an alternative paradigm for development in the Third World (Freire 1993, Fals-Borda 1987, Burke 1993, Chambers 1983), and 3) the adult education tradition centered principally in Scandinavia (Elden 1981). Some researchers tend to emphasize the importance of the developing world intellectual tradition as the historic basis for participatory research (Cancian and Amstead 1990, Maguire 1987).

A number of participatory research centers and networks have played critical roles in the development of both theory and practice. The Highlander Center in the southern U.S., the Participatory Research Network in Toronto, and the Society for Participatory Research in Asia are examples of such institutions.

The 1980s have seen an increasing acceptance of participatory research, especially in the fields of health, agriculture, and forestry. Some development and research agencies working in the Third World have embraced participation. Certain revolutionary countries, such as Nicaragua, based their health and literacy programs on Freirian methods. Considering the widespread failure of technology diffusion for over a quarter of century (West 1984), participation is seen as a means of reversing the ever deepening economic gap between Northern and Southern countries and addressing environmental degradation (Burke 1993, Chambers 1983). The Forest, Trees and People Program of the Food and Agriculture Organization (FAO) is an example of this trend. Whether programs such as this one are merely using local participation as a justification for new programs that "mine" local knowledge, while never intending to transfer control of development programs has yet to be seen, but the concern exists (Fals-Borda and Rahman 1991).

Stages and Guidelines in Participatory Research

Approaches to the implementation of participatory research differ, largely as a result of the political orientation of research participants and the local conditions under which the research is carried out. Nonetheless a certain level of agreement exists. Cancian and Armstead (1990) state that:

> participatory research ideally begins with becoming oriented to a
> community, then proceeds to dialogues with groups of people to

clarify community problems and to raise consciousness, and
finally culminates in collective research and political action.

Maguire (1987) agrees to a large extent with this definition of the phases
of participatory research, but emphasizes the importance "to link participants'
individual interpretations of problems to the broader context, including the
structural conditions of social reality." Vio Grossi (1981) points out the
escalating, cyclic nature of this process, whereby participants passing through
these phases of the participatory research process "will create new conditions
at the material level and the level of the consciousness which, in turn, will
allow the initiation of a new cycle, this time at a higher level."

Table 1 outlines a series of guidelines presented by Hall (1982) that have
resulted from the efforts of various participatory researchers.

Table 1. Guidelines for participatory research.

1. A research project -- both process and results -- can be of *immediate and direct benefit* to a community (as opposed to serving merely as the basis of an academic paper or obscure policy analysis).
2. A research process should *involve the community* in the entire research project, from the formulation of the problem and the interpretation of the findings to planning corrective action based upon them.
3. The research process should be seen as a part of a *total educational experience* which serves to determine community needs, and to increase awareness of problems and commitment to solutions within the community.
4. Research should be viewed as a *dialectic process*, a dialogue over time, and not a static picture of reality at one point in time.
5. The object of research, like the object of education, *should be the liberation of human creative potential and the mobilization of human resources* for the solution of social problems.
6. Research has *ideological implications*.

(Hall 1982)

The implications of accepting these guidelines is fundamentally opposed to
the current ways in which academic research is currently practiced and
therefore it is not widely accepted. Nonetheless, there is a historical basis for
this research approach that has grown from radically different traditions.
There is also a growing network of academics and resource managers,
amongst other fields, that are turning to this approach.

The Limitations of Participatory Research

Participatory research is a slow process, but its output can be satisfying to all participants if expectations are realistic. Cancian and Armstead (1990: 26) maintain that some sustained changes can be accomplished if an

> "organized community group with a clear problem has emerged before the onset of the participatory research project...If there is no group... then the project should be judged a success if local networks are strengthened and collective problems begin to be defined."

It seems likely that any program that attempts to change the status quo will be challenged by the existing power structure. However, Vio Grossi (1981) maintains that the internal contradictory interests within the dominant sector can be exploited to allow for room to maneuver and make changes.

The difficulty and limitations of participatory research have been recognized. Cancian and Armstead (1990) remind us that other research approaches would be more appropriate when investigating historic events in the distant past or secretive organizations. Maguire's (1987) analysis of the limitations of participatory research is probably the most extensive, with Table 2 presenting the principal ones.

Table 2: Principal limitations of participatory research according to Maguire (1987)

1) Overstating the effectiveness of this approach to create "the revolution"
2) Passivity of the people involved
3) Extreme demands placed on the outside researcher
4) Difficulty in transferring control when the project is initiated by the outsider
5) Difficulty in identifying the "oppressed" in a community or establish contact with them since they rarely form groups
6) The use of participatory research by the powerful to enhance their own power base
7) The need for people to require both the will and means to participate and act collectively
8) The difficulties encountered while accepting outside aid
9) The time constraint for both outside researchers and local people

A number of these limitations (numbers 6 and 8) are related to the implicit goal of participatory research to change power structure and not to support the powerful. Others are difficulties that are invariably encountered when working with disempowered people (numbers 2, 5, 7). And finally others are related to the demands on both researchers and participants if social change is the goal (numbers 3, 9). In the case of Pearl Lagoon, the effects of historic paternalistic development projects has also lowered some people's interest in self-help projects.

Brown (1982) points out the ambiguities of participatory research being related to 1) the nature of its objectives, 2) the relations between participants and researchers, 3) the choice of methods and technologies, and 4) the outcomes of participatory research activities. The first of these ambiguities relates to the tension between basic and participatory research, as to whether research is for the sake of developing knowledge without the intent to affect change or is for supporting social change. It is important to point out that the activities of a participatory research project are to be determined under the joint control of researchers and participants. Also the choice of methods and technologies may be largely dictated by the culture within which one is working. Ambiguity concerning the outcome of research is of significant importance to researchers working in politically volatile areas, such as the Atlantic Coast of Nicaragua, where to challenge existing power structures could have potentially tragic results for participants.

An important consideration, particularly for academics, is the seeming lack of rigor of a participatory approach. Lather (1986) supports action oriented research, but calls for a more rigorous research approaches. To address this issue, it may be necessary for academic participatory researchers to consider a variety of research methodologies. Some participatory researchers remind us that this is only one research approach that is probably not appropriate for all situations (Elden 1981, Cancian and Armstead, 1990). Brown (1982) states that participatory researchers should keep the doors open to other social science research techniques (i.e.. surveys) for two reasons: to neutralize their contributions to an undesired status quo, and to utilize them where possible for participatory research objectives. Hugentobler et. al. (1992) have shown that the evaluation of action research with rigorous methods is possible and yields valuable results.

In addition to these limitations identified in the literature, this approach may be considered inappropriate for researchers from oppressor countries working in oppressed countries, where justified deep-seated resentment and skepticism are present. Furthermore, unstable political situations may not allow for the development of this relatively slow process, when people's basic needs are not being met and where the psychological effects of violence are deep.

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Finally, considering the potential for co-optation of this research approach to serve the desires of established hierarchies, such as those that exist in academic institutions, corporations, and government research institutions, the recent popularity of participatory research is welcomed by some and criticized by other "pure participatory researchers". Cancian and Armstead (1990) warns of co-optation by academia that will lead to bland, apolitical research, but also of the danger in insisting that all participatory research that engage in radical political action which would alienate many potential new comers to this research approach. They maintain that less time should be spent discussing what is "real" participatory research and more time actually trying to conduct and refine it.

These considerations raise the question of the viability of the participatory research process overall. To date, no studies have been published that are based on an in-depth, longitudinal study of the viability of the process. Researchers have covered in a superficial manner the barriers or ambiguities faced in a participatory research process. They have commented on why certain participatory research projects seem to continue while others stop. This study plans to contribute to the academic inquiry into participatory research by relating the question of viability to the relevant theory of social movements.

Alternative Development and Resource Management Methods

Participation of local people in the process of project development and implementation has become a major trend in development and resource management fields. As a result of the overall failure of top-down development paradigm, development experts have called for the increased participation in development projects (West 1984, Chambers 1992, Chambers 1983, Burke 1993, Fals-Borda 1984).

Agricultural research was one of the first disciplines to use a participatory approach that bridges the social and physical sciences (Chambers 1992, Hoskins 1991). The Farmer First approach as compared to the more traditional diffusion model approach of technology transfer has been the subject of valuable research by important research agencies such as CATIE in Central America (Nelson 1993, Chambers 1983, Chambers et. al. 1989, Fals-Borda 1984).

In the related fields of natural resource management and environmental conservation, participation has become a buzz word. Marilyn Hoskins, the Senior Community Forestry Officer for the Food and Agriculture Organization (FAO), has applauded the recent growth of participatory forestry methods. The FAO has established the Forest, Trees and People program which is largely based on a participatory approach referred to

as PAME -- participatory assessment, monitoring and evaluation. This methodology is related to other rural appraisal methods such as rapid rural appraisal, but has attempted to increase the ownership and control by local people in relation to outside experts and seems to be oriented primarily towards agro-forestry issues (Chambers 1992).

The use of participatory research methods in the fields of coastal resource or fisheries management is not as wide spread (White, pers. comm. 1993). In Southeast Asia, where community-based coastal resource management is at a highly evolved state (Wells 1993), participatory approaches to research are just beginning to enter the discourse, and methods have yet to be developed (Castillo and Rivera 1991). On the eastern seaboard of the US citizens are involved in monitoring coastal ponds and tidal pools. A University of Rhode Island/USAID project calls for the initiation of a participatory process in the implementation of its agenda for coastal ecosystems management in Central America:

> Working at the community level makes a highly
> participatory approach to both planning and
> implementation feasible and presents opportunities
> for linking planning and implementation through
> an overtly, iterative process whereby all participants
> learn from tangible experience.
> (Olsen and Foer 1992)

To date, a network or methodology for implementing participative coastal assessment does not exist at a level comparable to that of agriculture or agroforestry assessment.

Assessment: the First Step Towards Management

Assessment of the environment and people related to it is usually the first stage in a coastal resource management project (Salm and Clark 1984). Information is a prerequisite in order to effectively understand the manner in which the environment is being used and how this can be maintained or altered in order to successfully reach the objective of a resource management project. Normally, this information is both biological and sociological. Economic analysis of the effects of a management project is also used by some resource management projects (Wells 1993).

The call to protect coastal resources such as coral reefs is usually heard first from concerned experts. In an article from a coastal manager's network newsletter titled "Experts Discuss Condition of World's Coral Reefs - Declare 1996 as the Year of the Coral Reef" (Samarrai 1993) the declining health of

reefs around the globe is announced as it has been many times before. The article states that "the researchers concluded that a significant increase in scientific effort will be needed to provide the information necessary to manage fragile reef ecosystems." The article also states that "the scientists face a daunting problem of obtaining information from a wide variety of sources such as dive shops, marine park managers and fisheries agencies around the world, in addition to collating information from standard scientific publications in dozens of languages." No mention is made of obtaining information from local fishers.

Tools of Assessment

Typically, the assessment of a coastal area is the responsibility of a coastal expert. Visual survey methods whether above water or below are well developed (Salm and Clark 1984, Carpenter 1977). Transect or quadrate methods are commonly used because they provide relatively accurate data that allows for monitoring of an environment over time.

Techniques for the assessment of impacts from coastal development have also been developed for coastal managers (Carpenter and Maragos 1989). These techniques for conducting an Environmental Impact Assessment (EIA) tend to be rather technical considering the complexity of possible effects of any coastal development scheme. The method for conducting an EIA rely on a variety of forms of data collection and presentation: qualitative, quantitative, geographic information system (GIS), economic, and risk assessment.

Special attention has been given to the development of methods for fisheries assessment. A variety of techniques for the assessment of tropical, multi-species fisheries are available (Munro and McWilliams 1985, Roedel and Saila, 1980, Pauly 1983). These methods rely on sophisticated quantitative and fishery science skills.

Dahl (1981) has developed a method to qualitatively assess the condition of a coral reef intended to involve sport divers and naturalists in the monitoring of reefs. The approach is based on traditional reef assessment methods such as transects and plots but does not require precise measurement. Visual data is collected and is categorized into qualitative categories that give an general idea if a reef is in excellent, good, fair, or poor condition.

Socio-economic and environmental knowledge surveys are common methods to assess the relationship of people with their environment and the potential disruption of a community by a coastal management project.

Planning and Management : the Response to Assessment

In response to well founded concerns, coastal resource management practitioners have tried to develop methods for the sustainable use of coastal resources. The establishment of protected areas is one of the most common coastal resource management strategies, especially in the tropics (White et. al. 1994, Alcala 1988). One approach, based on phases of information gathering and planning activities, to assess and establish a protected area is described in Salm and Clark (1984). The distinct phases are connected in a logical manner and have feedback channels of information through monitoring and evaluation. Typically an interdisciplinary team of experts are involved in this process. At all points in the process Salm and Clark (1984: 49) recognize the importance of public participation:

> The active interest of citizens in planning, establishing, managing, and continuously monitoring marine protected areas is fundamental to the long-range success of the programme. The public should be involved as early as possible... One means of encouraging public participation at all levels is to take it into account explicitly in the legislation and, whenever possible, to specify the stages in the programme when the public should participate.

Recently, the term "integrated coastal resource management" has come into use. In general, the Southeast Asia countries are the most advanced in the development of integrated coastal management methods and programs in the tropics (Wells 1993). With this approach, projects have been established throughout that region "with an emphasis on integrating sociological, economic and environmental information at the community level and thus generating recommendations for local control of marine resources, in a 'bottom-up' approach" (Wells 1993). The community-based approach has resulted in tangible changes in the local management of coastal resources through the establishment of marine sanctuaries, regulation of fishing gears, and closed seasons. These programs have been successful in the Philippines in reversing trends of declining fish catches around small island communities (Alcala 1988, White and Savina 1987, Christie and White in press).

Trends in Coastal Assessment and Management

A number of trends in coastal assessment may be highlighted. We maintain that these trends tend towards the integration of knowledge, the participation of local people, applied research, and the validation of local knowledge systems.

First, integration of a wide variety of types of information is now viewed as necessary for effective assessment. Progressive programs are linking information within disciplines (i.e.. terrestrial with aquatic ecological information) and between disciplines (i.e.. ecology with sociology) (Wells 1993). Olsen and Foer (1992) call for an approach in Central America that considers the interrelationships of such problems as water quality, estuarine fisheries, and coastal land use. There seems to be a consensus among coastal managers and researchers that coastal problems, like most environmental problems, are the result of combined social and ecological imbalances, that require a integrated approach of assessment.

The trends in coastal management follow the trends in assessment. Salm and Clark (1984) suggest an integrated approach when they state that planning and management must consider the effects of pollution, flooding, siltation, and uncontrolled land uses on coastal protected areas.

The innovators of tropical coastal resource management are calling for a community-based approach, especially in those instances when no central government agency is responsible for coastal zone management or where communication is poor between government departments (Deguit 1989, Wells 1993). The community-based approach usually involves environmental education, an assessment of the coastal environment by specialists, and the development of a coastal resource management plan as a joint effort between local people and outside experts (White et. al. 1994, Christie et. al. 1990). The Windward Coast Project on the Atlantic Coast of Central America relies on a grassroots approach and is described by its proponents as "the world's first large coastal protected area that is locally designed and managed" (project description). This is not to say that this approach has replaced more centralized approaches to coastal zone management, which may be more effective when establishing large protected areas or when central government agencies are responsive to coastal issues. It may be appropriate to view the possibilities as lying along a continuum with the community-based approach and the centralized approach to management at either end with a variety of potential approaches between. Some effective programs work from both the "top-down" and the "bottom-up" simultaneously (Lowry and Sadacharan 1993). Nonetheless, the community-based approach is a relatively new and important approach to coastal area management.

Second, public participation in assessment is an increasingly important trend. New networks of coastal practitioners interested in rapid appraisal methods similar to those of the Forest, Trees and People network of the FAO are being established (CMTA newsletter 1993). For the long term monitoring of coastal environments Olsen and Foer (1992) maintain that "careful consideration should be given to programs underway in the United States

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that involve school teachers, private citizens, and local officials in the monitoring process." However, participative coastal zone appraisal methods are not as well advanced as those currently used in tropical forestry, agroforestry, and agriculture (Castillo and Rivera 1991, White, pers. comm. 1993).

Participation is also an important trend in coastal resource management. Olsen and Foer (1992) call for the "creation of cadres of people who can practice transdisciplinary and participatory resource management... and could produce professionals throughout the region (Central America) prepared and committed to improve the management of coastal ecosystems." For the training of these cadres "experiential, adult learning approaches should be used, which emphasize participatory, interactive processes which build upon the participants own experiences and education."

Third, assessment techniques are being applied with the intention of affecting change in resource management. That is, as the coastal environments of the world are under increasing pressures and people's concerns have grown in conjunction, applied research that is supportive of changing how we use our resources is becoming more common and well supported with funding. Coral reef scientists concerned with the global declining health of reefs are changing their research focus.

> We have decided that we can no longer simply do science as usual, but we need to dramatically increase the attention we give to management of coral reefs. (Samarrai 1993)

A final, although not as widely accepted, trend in this field is the increasing recognition of the importance of local and traditional knowledge and the need for appropriate methods to access this information.

> Recently, in fact, the study and preservation of traditional indigenous knowledge progressed in one dizzying leap from being the focus of a small, albeit fast-growing fraternity of social and biological researchers to a media-certified public issue, courtesy of a cover story in Time Magazine (September 23, 1991). (Johannes 1993b)

Although traditional knowledge of indigenous peoples may not exist in every location due to either the overwhelming effects of non-indigenous knowledge or the absence of indigenous people, the local knowledge of fishers should be considered as valuable in the assessment of coastal ecosystems as it is becoming in agricultural systems (Thrupp 1989, Nelson 1993). Such an approach will provide a coastal manager with a local

perspective that will augment an information base on a coastal ecosystem and will prepare them for potentially sensitive issues that should be addressed through management. Researchers in the field have called for appropriate methods that are flexible and sensitive to local realities when trying to access local knowledge. Surveys may not be the appropriate means in all cases, since they may not conform to the type of knowledge that fishers have and may be too rigid to allow for in-the-field changes (Johannes 1993).

Indigenous peoples' traditional ecological knowledge and management systems (TEKMS) are the subject of increasing attention (Johannes 1993b). Johannes (1993b) maintains that percentage-wise cultures are disappearing today much faster than species, while traditional ecological knowledge is disappearing even faster. In humankind's efforts to stem environmental destruction, he maintains that indigenous knowledge can save a lot of time in establishing sound management plans. Traditional management of coastal ecosystems has been particularly well documented in the Pacific Islands (Johannes 1981). Wells (1993) maintains that there are few documented cases of traditional management systems for coral reefs in Asia. On the Atlantic coast of Nicaragua, Nietschmann (1973) describes local Miskito means of managing their coastal environment, especially coastal agricultural plots.

Johannes (1989) and other interested in the traditional knowledge have encouraged resource assessment and management programs to consider the potency of a research approach that combines traditional and scientific knowledge. However, there are few such examples of this sort of hybrid research.

In the field of coastal resource assessment and management, there are few, if any, detailed studies of the type of participatory process used by CAMP. While project evaluations have been conducted on similar projects, they are usually done after the completion of a project and usually focus on what the project accomplished. While this is valuable, it does not address in detail more complicated question of why or why not people chose to become involved and what are the factors that determine project viability during and after external support.

Social Movement Theory

Social movement theory has much to offer for the analysis of participatory research efforts. Consideration of this field's theory provides a theoretical framework for the analysis of the viability of the participatory research process employed by CAMP. The debate surrounding resource mobilization theory versus social psychology theory is at the heart of the

question - why would someone choose to become involved in a participatory research process? The resource mobilization theorist would emphasize the resources accrued to a participant. While the social psychologist theorist may emphasize the importance of solidarity, collective identity, social networks, and collective action frame resonance. Recently, there has been more interest in melding the two theoretical camps (Snow and Benford 1992, Friedman and McAdam 1992), an approach that this study will utilize. This unification is justified given our observations in the field and the memorable comments of participants that it is *both* the resources and the feelings associated with belonging to a group that motivates participation.

Social psychology theories have particular relevance to the first question of this investigation that is concerned with the importance of the level of organization to viability. The formation of the collective identity - "that identity or status that attaches to the individual by virtue of his or her participation in movement activities" (Friedman and McAdam 1992: 168) - is a key motivation, as is solidarity, behind becoming organized and taking action. The organizational form that a group develops seems to be closely related to their ideologies and identities (Feree 1992). Gamson (1992) maintains that much of the organizing is done through informal interactions and encounters within a group. The viability of a movement may be related to its relation to traditional forms of organization such as kinship (McCarthy and Wolfson 1992).

Patrick Christie's presence as an outsider, which is the focus of question #2, is related to the discussions within social psychology theory that stress the value of self reliance for viability (Oliver and Marwell 1992). Whether action technologies are held only by experts or are available to everyone has profound implications for the potential of these technologies to sustain movements. The type of movement one is trying to develop therefore largely determines what is the appropriate role of the mobilizer.

The mobilization and organization of resources, the focus of question #3, is seen as key to movement viability to resource mobilization theorists (Zald 1992). However, social psychological explanations acknowledge the importance of resources (Tarrow 1992). These analyses certainly correspond to the concerns of CAMP participants over the resources available or not available to support their efforts. One means of gaining access to such resources is through the co-optation of other, established institutions as highlighted by McCarthy and Wolfson (1992). The access to resources seems to have important implications for the viability of CAMP.

The analytic use of the collective action frame, "the emergent action-oriented sets of beliefs and meanings that inspire and legitimate social movement activities and campaigns" (Snow and Bedford 1992), currently plays a central role in the analysis of social movements (Tarrow 1992). The

resonance of a movement's collective action frames have particular relation to the question of viability. Whether the participatory research process of CAMP resonates with the culture or other social movement frames on the Atlantic Coast of Nicaragua may largely determine its viability. The beliefs and meanings implied by participatory research may be significantly constrained by technocratic frames that emphasize the preeminence of technology and expertise over traditional knowledge and participation. Furthermore, the rise of competing frames such as neo-liberalism subsequent to the 1990 elections in Nicaragua may render potential master frames such as participatory democracy impotent and therefore erode the viability of CAMP.

The methods used by this study agrees with the interest among social movement theorists in the study of actual cases studies over time (Tarrow 1992). This study will be able to contribute a case that uses social movement theory in the context of an international resource assessment and management program. The employment of social movement theory will allow for a analysis of the viability of the participatory research process that will potentially add new dimensions to the participatory research and social movement discourses.

Theoretical Frame of the Investigation

The theoretical frame that will be employed to investigate the viability of the participatory process employed by CAMP places the theory of participatory research at its center. While participatory research may explain *how* CAMP has proceeded, *what* CAMP has done in the field (e.g. water testing, forest surveys, etc.) is better explained by looking to the logic behind coastal resource assessment and management. One of the fundamental theoretical underpinnings to participatory research in rural communities on natural resources is that farmers and fishers who are engaged daily with their environments have developed a relevant and accurate base of traditional knowledge. Studies in traditional knowledge may shed light on the reasons why people have developed certain types of knowledge that may be revealed during their participation in CAMP. In order to answer the question of whether the participatory research process employed by CAMP is viable, it will be necessary to relate the findings of this study to theories proposed to explain the viability of social movements. Within social movement theory this investigation will combine the theories of resource mobilization and social psychology who view social process as more central to viability.

Research questions and hypotheses

An almost endless variety of research questions surrounds the general concern of viability of a participatory research process. In order to narrow the field, dozens of questions were rated based on six criteria (in descending order of importance to the authors):

1) relevancy to the discourses surrounding participatory research, social movement theory, traditional knowledge, and coastal resource management;
2) relevancy to the improvement of CAMP;
3) "answerability" and tractability;
4) quality and quantity of data related to the question;
5) the potential of the question to tie together the various fields related to this inquiry;
and 6) the relevancy of the question to the mission of the implementing agency - the Center for the Investigation and Documentation of the Atlantic Coast (CIDCA) - and the funding agency - the International Development Research Centre (IDRC).

Once a subset of questions was chosen the field was narrowed to the four final questions by considering their inter-relatedness, their ability to illuminate critical debates in the participatory research and social movement discourses, and their ability to maintain a balance between inductive and deductive investigation.

As a result of this process, the following questions and hypotheses related to the viability will be investigated. But before considering these questions and hypotheses, it will be necessary to clarify what is meant by the "viability of the participatory research process employed by CAMP". Viability will be defined as the capability of achieving success, as defined by the research group and CAMP staff members, and continued effectiveness. Therefore efficacy and sustainability are the key components of viability as defined. This investigation will employ Cancian and Armstead's description of participatory research as presented in the "stages and guidelines of participatory research" section of this document.

Question #1) Is the viability of the participatory research process employed in CAMP dependent on the level of organization of the research group that is involved in it? The term "research group" refers to the approximately 30 local participants in CAMP. This question was chosen because it was the most commonly given response to the question "why did the research process stop while Patrick Christie was away from Pearl Lagoon from June, 1993 to January, 1994?" It is also very relevant to many social psychology theories concerned with what sustains a social movement.

Given this body of theory and the general sentiment of the research group, we will hypothesize that the viability of the participatory research is dependent on the level of organization of the research group. The level of organization will be operationalized as presence of elected officials, the ability to call regular meetings and set goals, the level of clarity of responsibilities among leaders and research group members, and the definition of a collective identity.

Question #2) Is the participatory research process employed in CAMP dependent on an outsider's presence and support? In this instance, we are particularly interested in investigating Patrick Christie's role in this project given the general concern in the literature of participatory research and social movement theory as to the dependency of projects on outsiders. In a sense, Roberto Rigby, who is a *Costeno* from Bluefields, may be perceived by some community members as an outsider. But this perception is not consistent for all and probably not as great a concern for development practitioners, and therefore will not be investigated in as great a detail. We will be investigating the implications of Patrick Christie's presence and involvement in CAMP from the period January to June 1993 and January to November 1994 and the implications of Patrick Christie's absence in the intervening periods up to July, 1995. We will consider Patrick Christie's role as an administrator, organizer, and researcher.

Based on our previous experience with development projects and the accounts of other participatory research programs (Maguire 1987), we will hypothesize that the participatory research process employed by CAMP is not dependent on Patrick Christie's presence. The process may go into periods of quiescence that correlate with Patrick Christie's absence, but that the process will not completely stop in his absence. We also predict that the process will become less dependent on Patrick Christie's presence as research group member interest increases, their control of research techniques improves, and the outsider consciously facilitates the transference of responsibilities and control to research group members.

Research questions #3 and #4 reflect the debate in social movement theory surrounding the relative importance of resource mobilization versus social psychology. It is our preliminary stance that social movements are sustained by a variety of factors of which available resources, social alliances, frame resonance and personal motivations are fundamental. In order to investigate what we see as two of the most plausible positions related to this matter, questions #3 and #4 address aspects of resource mobilization and social psychology theory (e.g. frame resonance).

Question #3) Is the mobilization of resources such as funding, meeting space, research equipment, means of transportation (e.g. boat and motor) fundamental to the viability of the participatory research process employed in CAMP? This question was suggested by conversations with CAMP staff and research group participants when they identified the limitation of CAMP's resources as potential barriers to its viability.

Given the findings of resource mobilization theorists and the sentiments of staff and research group members, we will hypothesize that basic resources, in this case funding, meeting space, research equipment, and means of transportation are needed for a participatory research process to

remain viable. This question will necessitate investigated on two levels - the short term and the long term. This is because certain resources may be more necessary are different times in the project cycle. For example, it is likely that initial funds (in this case from IDRC) may be necessary "to get the ball rolling", to purchase research equipment, to purchase a boat, and to hire full time staff in the short term. But that after these initial resources are gather and as the research group becomes more self-sufficient (and therefore less reliant on staff), funds may not be as necessary for viability. In fact, an over-reliance on such external resources can often be to the detriment of a participatory research process by fostering dependency (Maguire 1987) and can consume too great a share of the energies of participants.

It should be noted that while questions #1, #2, and #3 are deductive in nature, question #4 is inductive. This mixture of inductive and deductive research approaches was intentional and is a potential strength (Patton 1991). Since this was not an issue directly covered by interview guides, we prefer to remain open for the determination of which frames are raised most frequently in relation to CAMP. It is possible that as more is determined about the nature of frames relevant to the people of Pearl Lagoon and CAMP, that question #4 will evolve into a deductive question.

Question 4) With which if any of the viable master frames or cultural frames on the Atlantic Coast of Nicaragua does the collective action frame of CAMP resonate? A logical follow up question would be whether this resonance improves the viability of the participatory research process? Given the findings of Snow and Benford (1992), we would hypothesize that resonance of frames would improve the viability of CAMP.

Design of Study

In general terms, this investigation may best be described as a naturalistic inquiry. Lincoln and Guba (1985: 39-43) describe fourteen characteristics of naturalistic inquiry, the seven most salient for the purposes of this study being its emphasis on 1) conducting research in the natural setting, 2) employing principally (although not exclusively) qualitative methods over quantitative, 3) electing to use purposive sampling as opposed to random sampling, 4) preferring to have the theory emerge from (be grounded in) the data, 5) allowing the research design to emerge while in the field, 6) relying on a case study reporting mode, and 7) favoring "to interpret data in a idiographically (in terms of the particulars of the case) rather than nomothetically (in terms of lawlike generalizations)". Patton (1990: 42) describes qualitative evaluation and research as naturalistic given that the nature of a "human interventions are often quite comprehensive, variable, and anything but static treatments.... This, of course, creates considerable difficulty for experimental designs that need specifiable, unchanging

treatments to relate to specifiable, predetermined outcomes." This strength of this approaches is its ability to illuminate the complexities of the setting and process. It however makes it difficult to determine causality. Nonetheless, a naturalistic inquiry has different phases in which the researcher moves from the "discovery mode" to the "verification mode".

Other, practical considerations also enter into the decision to use naturalistic inquiry. Manipulations to study the viability of a participatory research process would nearly be impossible to set up in the field. That we are involved in both the implementation and evaluation of CAMP also precludes the objectivity necessary for a pure hypothetico-deductive research design.

For all the above reasons, this investigation will be a naturalistic inquiry into the viability of the participatory research process employed by CAMP. It will study the process through the project cycle. As a heuristic tool, the investigation of the implication of Patrick Christie's presence or absence may be part of a quasi-experimental design. Patrick Christie's absence acting as the treatment in a interrupted time-series design (Judd et. al. 113). But this design is flawed by the fact that the ratio between Patrick Christie's absence and presence is not constant over time and the fact that CAMP and its participants are always changing over time.

Method

This research project will employ a longitudinal multi-method approach. We have identified five basic methods to employ for this investigation: participant observation, semi-structured interviews, informal interviews, focus group interviews, and the recording of personal insights into a journal.

In March, 1994, Patrick Christie interviewed seven (approximately 25%) of the 1993 CAMP participants before we began that year's field work. These interviewees were selected purposively as key informants (Patton 1990) based on their gender, level of activity in CAMP (active, inactive), differences in age (adult, youth), and differences in occupation (student, farmer, fisher). The interview (Appendix A) focused on: 1) whether and why or why not CAMP activities continued between June, 1993 and January, 1994 (when Patrick Christie was in the U.S.), 2) the direction that CAMP should take, and 3) whether an evaluation program for CAMP should be initiated. The type of interview conducted was a standardized, open-ended interview, in which questions were written out prior to the interview. The interview questions were pretested with Roberto Rigby, a native Creole-English speaker. Our first two interviewees were asked if any wording from the interview was confusing and minor changes were made to the interview guide based on these suggestions. Related interviews was conducted in October of 1994

(Appendix B) and June of 1995 that focused on participant attitudes towards CAMP, the direction that CAMP should take, and whether participants think that activities will continue during Patrick Christie's absence. As many of the same interviewees were used for the interviews as was possible.

Similarly, in 1994 Patrick Christie conducted before and after semi-structured focus group interviews (Kumar 1987) of students involved in the water monitoring component of CAMP (Appendix C). These interviews used an interview guide, that was flexible in order that the interview was less formal. In our experience, young students are very intimidated by foreigners asking formal questions. This interview focused on the student's background and future plans, their interest in the environment, their interest in water monitoring, their motivations for getting involved, and their confidence in their ability to affect change in their community.

Patrick Christie also interviewed water monitoring participants from 1993 who volunteered in 1994 to train the new student participants (Appendix D). Their interview focused on their future plans, their motivations for participating as trainers, the impact that the program had on them the previous year, and their ideas for improving the program. The general results of all interviews conducted was presented to the interviewees this year during group meetings. The reaction of interviewees during this feedback was noted. All of these interviews were tape recorded. Until now, only the parts of the above interviews from 1993 and 1994 directly relevant to viability of the participatory research process employed by CAMP have been transcribed and coded. Interviews from 1995 are presently being transcribed.

Throughout the course of this research we conducted informal conversational interviews as well as used participant observation techniques in order to understand project participant perspectives on the program. This technique allowed for a relaxed exchange of information between the interviewer and the interviewee. We have identified male and female key informants for gathering information about CAMP. As theoretical ideas were raised by the coding of data in the field, we went to these key informants for further information.

Another important component of this evaluation was the tape recording of all CAMP meetings. Relevant parts of these recordings were transcribed and coded using grounded theory methods. It is our opinion that by now participants feel comfortable critiquing CAMP and the act of tape recording these meetings does not affect their expression too greatly. We feel that these recordings will help minimize the bias to record only certain events or statements during a meeting.

An ongoing activity has been the weekly entry of personal reflections into a journal by Patrick Christie. This journal has not only acted as a

catharsis, but also acted as an important source of information about his perspective on this process and our involvement in these communities.

We have included in our analysis documents from CAMP and other related projects such as proposals and meeting agendas.

The method of data analysis that this investigation employs is referred to as grounded theory (Strauss and Corbin 1990: 23). As implied by the name, the grounded theory approach of data analysis strives to develop theory "that is inductively derived from the study of the phenomena that it represents... One does not begin with a theory, then prove it. Rather, one begins with an area of study and what is relevant to that area is allowed to emerge."

The grounded theory procedure employed are the following. Data is carefully read and phenomena are underlined and given a label (e.g. inter-community tensions, level of participation in CAMP, community dependence on experts, etc.). The conceptualization of the data is the first step in grounded theory analysis:

> By breaking down and conceptualizing we mean taking apart an observation, a sentence, a paragraph, and giving each discreet incident, idea, or event, a name, something that stands for or represents a phenomena (Strauss and Corbin 1990: p. 63)

The labels and the associated information are referred to as concepts. These concepts evolved during this analysis and some concepts are either split into smaller groupings or joined with others during the process. Some information from field notes is also double-coded, meaning that it is placed into two or more concept groupings. These concepts are then recorded as a computer document. During this process hundreds of conceptual labels are developed. In order to organize the data, related concepts are then gathered into categories. Double coded information is indicative of many of the inter-relationships between concepts, and therefore aided the categorization process. During the coding process, theoretical memos are written that reflect ideas that come to mind of the researcher doing the coding.

Critique of Methods

For at least a decade, the participation by local people has been identified as a key element in coastal resource management. This has lead to the development of various initiatives in community based resource management. Though these approaches has seemingly proven their efficacy, there are questions surrounding their viability. Most of the efforts fail or those that seem to succeed at first may eventually stop.

The factors that limit the viability of these attempts at participatory coastal resource assessment and management have been identified in a very general sense usually through end-of-project evaluations. The systematic collection of data with a variety of methods during the evolution of the participatory research process is unique. This study can therefore provide valuable information to a variety of people - the community of Pearl Lagoon, researchers in participatory research, and practitioners of coastal resource management.

This research project will employ a longitudinal multi-method approach for two reasons. First, approaching the same question from a variety of angles with a variety of methods, or triangulating, increases construct validity (Hugentobler et. al. 1992, Patton 1990, Judd et. al 1991). Method triangulation is considered necessary by many researchers given the complexity of causal relations that are part of most social phenomena.

> ... no single method ever adequately solves the
> problem of rival causal factors... Because each
> method reveals different aspects of empirical
> reality, multiple methods of observation must be
> employed. This is termed triangulation. (Denzin
> 1978: 28)

Second, studies that use more than one method of data collection can avoid the error inherent to each particular method through cross-validity data checks (Patton 1990). Triangulation is particularly valuable, given that most investigations of participatory or action research processes are often single cases in which it is not realistically possible to employ a control group (Hugentobler et. al. 1992).

Triangulation is recommendable but it has its limitations. It tends to be expensive and time consuming (Judd et. al. 1991, Patton, 1990). Hugentobler et. al. (1992) point out that this approach can lead to an overabundance of data and tension between research and intervention goals.

Longitudinal studies have the advantage over point-in-time studies for following a process or trend as it evolves over time. This allows one to investigate phenomena such as program viability that have a time component. The extension of the study also can improve its internal validity by allowing the investigator to assess threats such as maturation, testing effects, and historic events as rival explanations to an observation (Judd et. al. 1991)

The investigation of the viability of a participatory research process is challenging in many regards. One of the most challenging is the

development of a convincing analysis of data that is collected in a natural setting that can be useful in other settings. While Lincoln and Guba warn of using naturalistic inquiry to make broad generalizations, Judd et. al. (1991: 272) point out that studying natural behaviors in natural settings may lead to improved external validity, because subjects will not shape their behavior to take account of being studied. Improved construct validity may be achieved because unobtrusively observed data are likely to reflect the desired construct to a greater extent than questionnaire or other responses obtained for obvious research purposes, which might be more subject to response bias.

Other sources of bias also threatens the internal validity of this study. As the initiators of CAMP and subsequently having been involved in a technical, administrative, and organizing capacity, it is apparent that our desires that this program succeeds in reaching its goals is a potential source of bias in the assessment of CAMP. And as Maguire (1987) has pointed out, it is very easy to become over committed when involved in implementation and research.

Biases related to sampling may also be present. The fact that we have learned a great deal as this research has progressed is of personal benefit, but may also affect the quality of the data over time. The fact that we are personal friends of many of CAMP's participants may also have affects on the accuracy of the data collected during interviews.

Recently, CAMP was affected by the initiation of DIPAL, a large, well funded coastal management project. This historic event will certainly be a consideration in the analysis of the viability of CAMP. While some may consider this a confounding factor, the flexibility of naturalistic inquiry allows for the analysis of such significant changes that may have invalidated a controlled experimental design.

Finally, it should be realized that only certain people in a community will become involved in as demanding a process as CAMP. Therefore bias for selection may limit the potential of the ability to make generalities about the appropriateness of this process to address other concerns in other communities.

This initial description of the investigation into the viability of the participatory research process employed by CAMP has presented the relevant discussions in the literature, the questions and hypotheses that will be investigated, and the methods that will be used. The reader should realize that as a naturalistic inquiry, it is likely that the hypotheses presented are not testable in the formal sense, rather they are seen as directive hypotheses that will evolve during the analysis of the data.

THE GEOGRAPHY, DEMOGRAPHICS AND SOCIO-ECONOMICS OF NICARAGUA

The geography, demographics, and socio-economics are the basis for this investigation of natural resource utilization in Pearl Lagoon, Nicaragua. Preparing such a study is challenging for two reasons. First, and lamentably, detailed information about Nicaragua is largely unavailable. And, second, but remarkably, Nicaragua is a particularly diverse place both biologically and socially.

This study will present the available information for Nicaragua as a whole, the Atlantic Coast, and finally, Pearl Lagoon, the site of this investigation.

Nicaragua

The Pacific and Atlantic Coasts of Nicaragua are notably distinct ecological and culturally. The vast majority of the people on the Pacific Coast are Spanish speaking *Mestizos*. The lowlands of the Pacific were primarily dry, deciduous forest and now are largely agricultural. Cattle ranching has always played a significant role on the Pacific lowlands of post-conquest Nicaragua (Perez-Brignoli 1989). Dividing the Pacific lowlands from the Atlantic lowlands is a ridge of mountains that are oriented north to south. The Atlantic lowlands are divided into two autonomous regions, the RAAS (*Region Autonoma del Atlantica Sur*) and the RAAN (*Region Autonoma del Atlantica Norte*). The Chontales highlands define the western border of the RAAS (Figure 1). The RAAS and RAAN are divided by the Rio Grande de Matagalpa. The only overland route to the RAAS is by road and boat via the *Rio Escondido* to Bluefields (Figure 2). Moving to the east along this route towards the Caribbean Sea, the first major ecosystem encountered in the RAAS may be characterized ecologically as a mosaic of lowland tropical forest with various forms of agriculture interspersed throughout. Along the Atlantic Coast are found eight large lagoons and bays, three of which are in the RAAS.

RAAN

NICARAGUA

Caribbean
Sea

Rio
Escondido   RAAS

Pacific
Ocean

Managua

Lake
Nicaragua

Bluefields

Area of
Hurricane Damage
500,000 ha

N
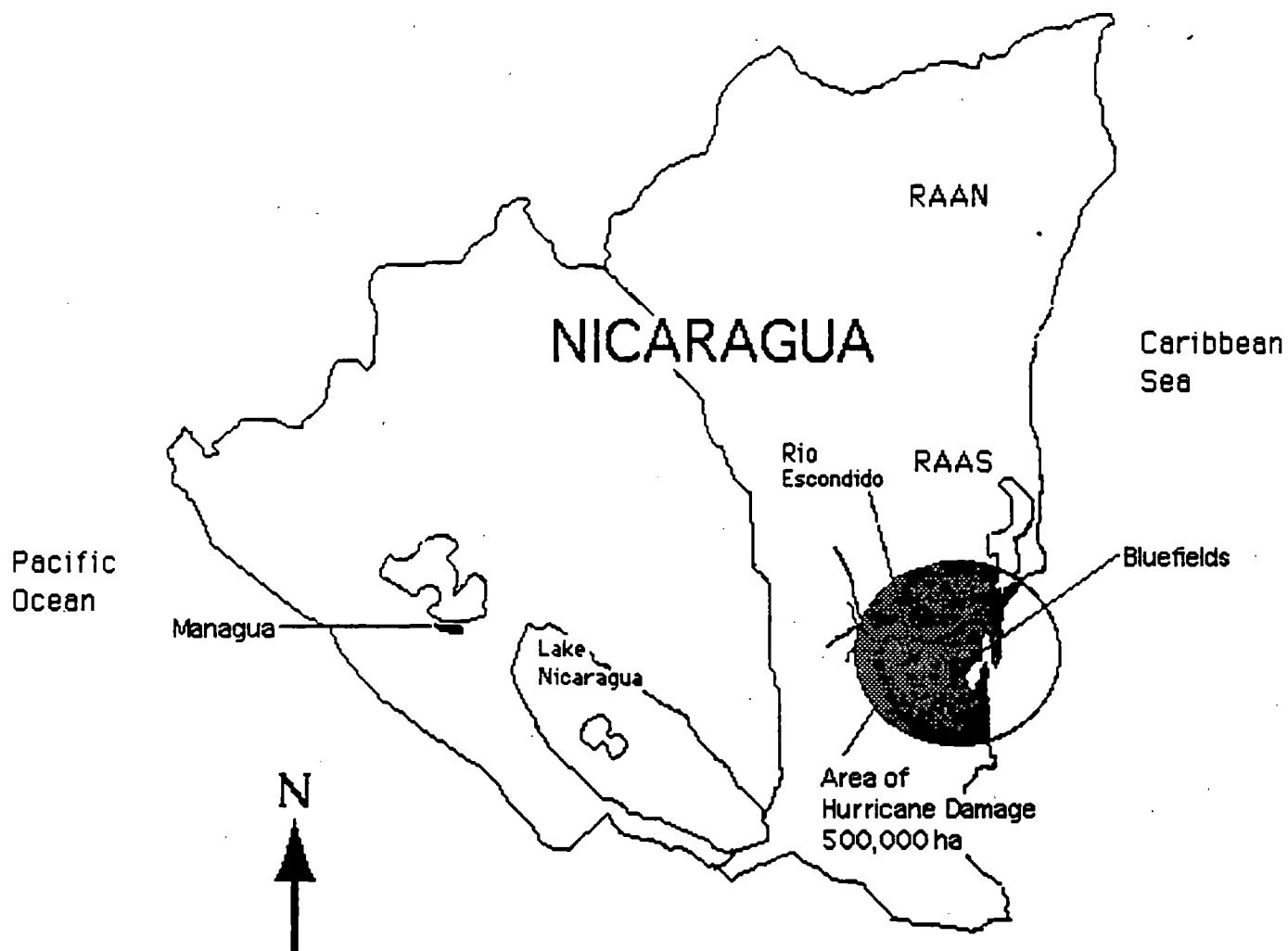
Figure 1. Map of Nicaragua.
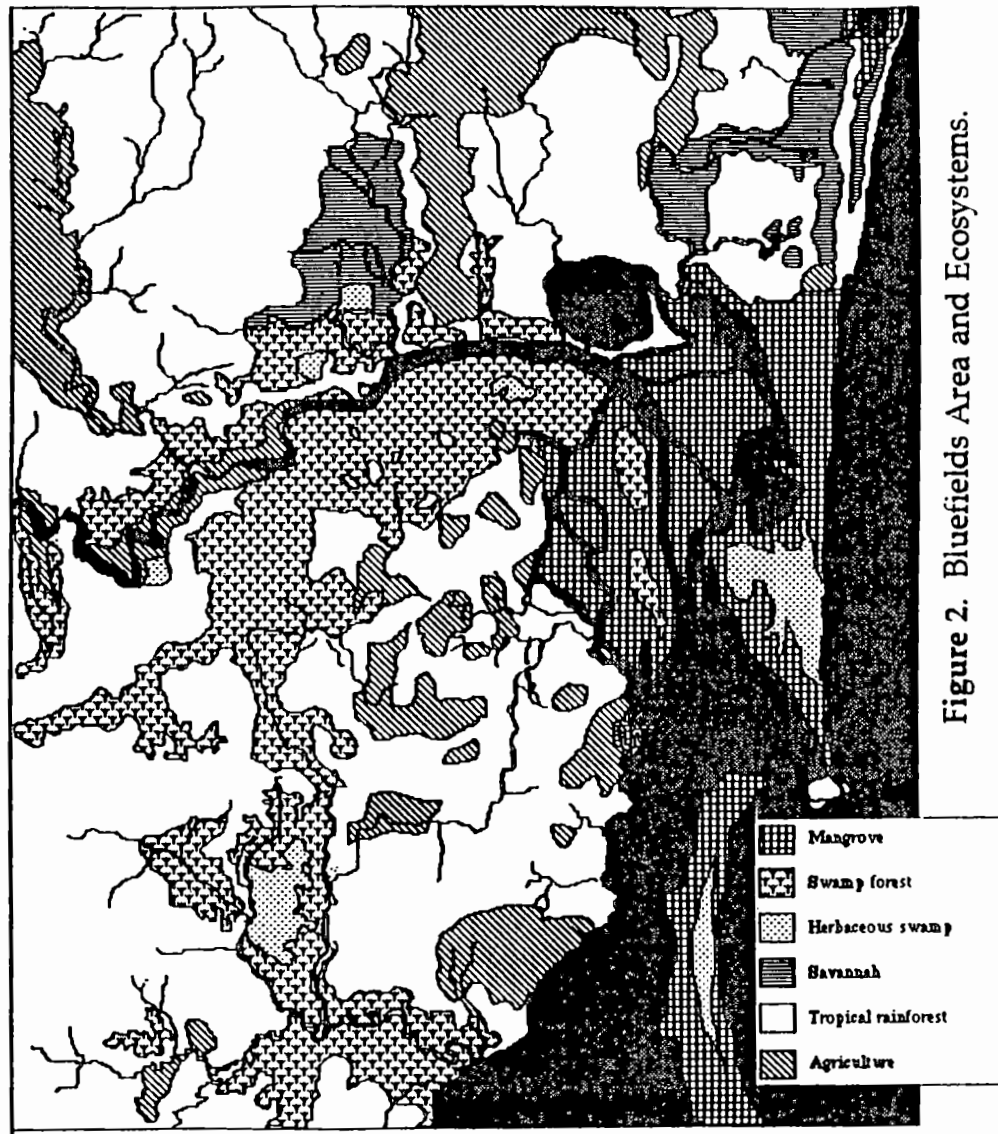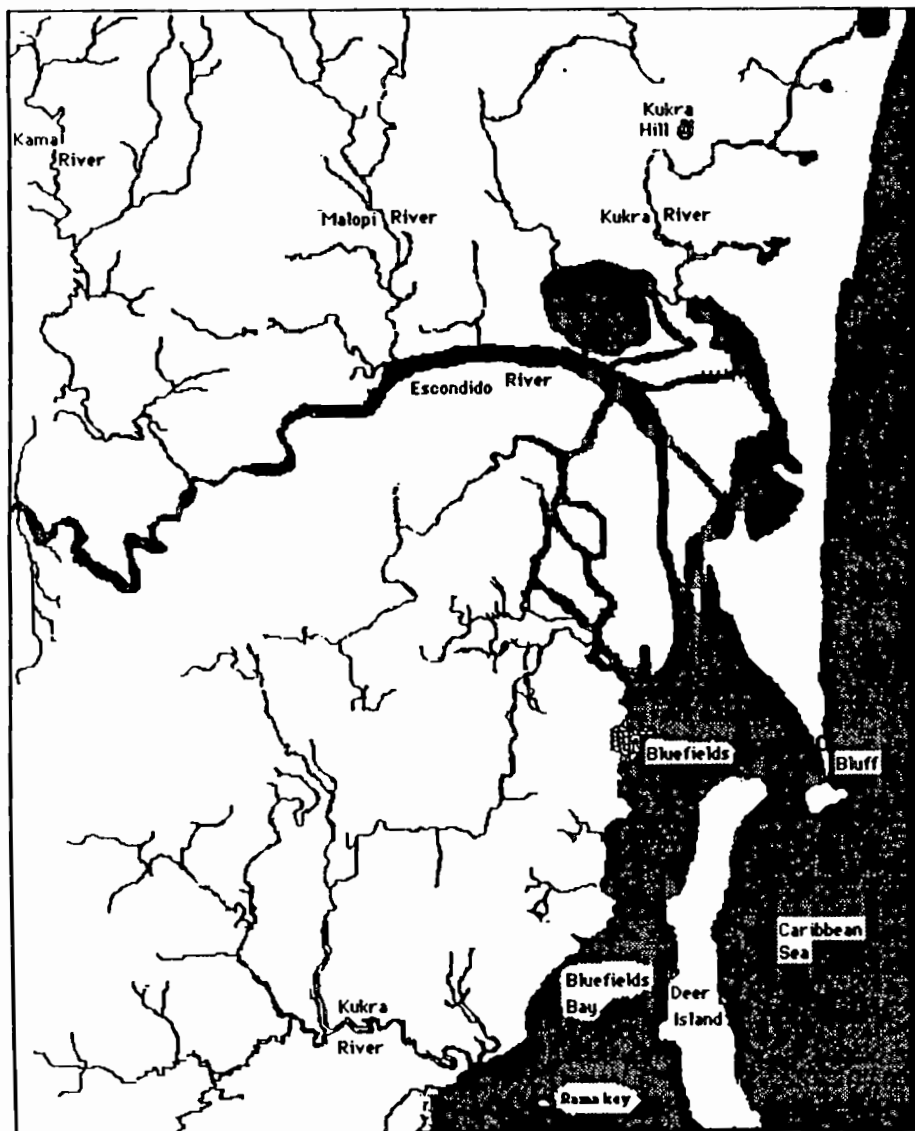
Figure 2. Bluefields Area and Ecosystems.

Map labels (left panel):
Kama River
Malopi River
Kukra Hill
Kukra River
Escondido River
Bluefields
Bluff
Caribbean Sea
Bluefields Bay
Deer Island
Kukra River
Rama key

Legend (right panel):
Mangrove
Swamp forest
Herbaceous swamp
Savannah
Tropical rainforest
Agriculture

N

5 Km.

Nicaragua is the largest country in Central America, but has the lowest population density (Table 3). The demographic information for the country is very limited given that the data from the 1995 census is not yet available and the last official census was in 1979. In 1979, nearly 2 million people lived in the country. With a 3.3 % population growth rate, the 1995 population is estimated to be 4,552, 511 or more than double the 1979 level. The population growth rate for Nicaragua is a full percentile higher than the overall rate for Central America.

Table 3. Area, Population and Density of Nicaragua

Area (sq. km)[1]	130,000
Population (census of 20 April, 1979)[2]	
Males	921,543
Females	956,409
Total	1,877,952
Population (estimates at mid-year)	
1990[2]	3,871,000
1991[2]	3,999,000
1992[3]	4,130,000
1995[4]	4,552,511
Density (per sq. km) at mid-1992[1]	31.8
Annual rate of increase (1985-91)[2]	3.3
Annual rate of increase for Central America[4]	2.3

1   World Bank 1994
2   Europa 1994
2   World Bank estimates 1992 population as 3.9 million
3   Estimate based on 3.3 % growth rate
4   United Nations 1994

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The population structure of Nicaragua is typical for rapidly growing populations (Table 4). Forty-six percent of the population is less than fifteen years of age. The population is nearly equally distributed between males and females, with slightly more males.

Table 4. Population by age, sex 1989

	Total	Male	Female
All ages	3,745,031	1,876,192	1,868,839
-1	143,237	73,079	70,158
1-4	530,429	270,150	260,279
5-9	570,796	290,112	280,684
10-14	479,624	243,397	236,227
15-19	408,688	206,746	201,942
20-24	341,100	170,964	170,136
25-29	281,808	140,306	141,502
30-34	231,270	114,260	116,910
35-39	187,618	92,232	95,386,
40-44	137,728	67,985	69,743
45-49	108,614	53,376	55,238
50-54	90,610	44,275	46,335
55-59	73,857	35,338	38,519
60-64	59,637	28,100	31,537
65-69	43,807	20,568	23,239
70-74	28,493	13,192	15,301
75-79	28,493	13,192	15,301
80-84	27,748	12,075	15,673
85+	27,748	12,075	15,673

(United Nations 1992)

Live birth and death rates are similar for Nicaragua and Honduras, and significantly different than for Costa Rica (Table 5). High birth and death rates correspond to lower GNP per capita for Nicaragua and Honduras than Costa Rica (see below). The "total fertility rate is the average number of children that would be born alive to a hypothetical cohort of women if, throughout their reproductive years, the age-specific fertility rates for a specified year remained unchanged" (United Nations 1994: 139).

Table 5. Vital Statistics for Nicaragua, Honduras, and Costa Rica

	Nicaragua	Honduras	Costa Rica
Live birth rate (0/000)	41.8	39.8	27.4
Death rate (0/000)	8.0	8.1	3.8
Natural Increase[1]	33.8	31.7	23.6
Total fertility rate	5.5[2]	5.9[3]	3.2[4]

1   live birth rate minus death rate   (United Nations 1994)
2   1985-90 data
3   1981 data
4   1990 data

FINANCES

Nicaragua has always been plagued with financial difficulties, however recently the situation has deteriorated even further.   In 1992, Nicaragua was classified by the World Bank as a "middle-income economy" but by 1994 was reclassified as a "low-income economy" when it slipped from the 83rd to the 22nd poorest country in the world in terms of gross national product per capita (Table 6). GNP per capita has declined in real terms by 7.8% per year (Europa 1994).

Table 6. Gross national product per capita world rank

GNP per capita world rank	
1992	83
1993	30
1994	22

(World Bank 1992, World Bank 1993, World Bank 1994)

Gross domestic product (Table 7), "the measure of total output of goods and services for final use produced by residents and non-residents"(World Bank 1994: 232), has fluctuated over the years with an overall negative growth rate from 1980-1992 of 1.7% and an overall decline of 19.9% from 1983 to 1991 (World Bank 1994).

Table 7. Gross Domestic Product of Nicaragua

	1983	1984	1985	1986	1987	1988	1989	1990	1991
At constant 1990 prices[1]	288	284	272	270	268	238	232	233	232
Percent change/year	4.6	-2.1	-4.2	-2.0	-0.8	-11.2	-4.4	0.6	-0.4

1   Millions of cordoba oro

Gross national product (GNP) "measures the total domestic and foreign value added claimed by residents. It comprises gross domestic product (GDP) plus net factor income from abroad, which is the income residents receive from abroad for factor services (labor and capital) less similar payments made to nonresidents who contribute to the domestic economy" (World Bank 1994: 231). GNP per capita in Nicaragua (Table 8) is on the decline, decreasing by more than half from 1983 to 1994.

Table 8. Gross national product (GNP) per capita

	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
GNP per capita (US$)	810^1	790^1	760^1	760^1	810^1	-	-	-	-	410^2	460^3	340^4

1   reported in terms of 1987 US $ (World Bank 1992)
2   reported in terms of 1990-92 US $ (1994)
3   reported in terms of 1991 US $ (World bank 1993)
4   reported in terms of 1992 US $ (World bank 1994)

The Nicaraguan government is heavily dependent on development assistance (Table 9). In 1991, foreign development assistance constituted the equivalent of 64% of the national budget[1] and the equivalent of 47.6% of the GNP. After the electoral defeat of the Sandinista government in 1990, United States development assistance to Nicaragua sharply increased. However, the withholding of development aid has been used to influence national internal affairs. In 1992, Senator Jessie Helms was able to suspend $116 million in U.S. aid "on the grounds that Nicaragua had failed to compensate U.S. citizens for land expropriated under the Sandinista regime" (Europa 1994: 2202). This has lead to the forced implementation of a severe austerity plans in the country. As part of the austerity program, the lifting of price controls of basic commodities, the curtailing of public health and education subsidies, and the general difficult change from a planned economy to a market driven economy has resulted in a dramatic increase in the cost of living.

_____

[1] National buget figures (Europa 1994), which did not include development assistance, were converted to $US (1$US=5 gold cordobas in 1991). Development assistance and the national budget were then pooled in order to calculate the relative contribution of development assistance to Nicaragua.

Table 9. Development assistance and the national budget for Nicaragua

	1989	1990	1991	1992
Development assistance[1]	225	320	826	-
Development assistance per capita	-	-	219.0	-
Development assistance as percentage of GNP[2]	-	-	47.6	-
Natl. Budget[3]	-	252.6	2,307.6	2,428.4
Cost of living[4]	-	369,400	10,499,800	13,917,400

1   Millions $US (World Bank 1994)
2   World Bank 1994
3   Millions cordobas oro (Europa 1994)
4   Consumer price index for Managua. Bases: 1988=100 (Europa 1994)

Inflation became a severe problem in the late 1980s (Table 10). The annual rate of inflation averaged 2,533.8% in 1985-92, and peaked at 35,000% in 1988. In 1988, the currency was devalued by 1000 old cordobas equivalent to 1 new cordoba. Although inflation continues at a much lower annual rate today (25.9% in 1993) than in the 1980s (Europa 1994), the relative value of the cordobas to US dollars decreased by approximately 10% in 1994 (pers. obs.).

Table 10. Inflation

	1970-80	1980-1992
Average annual rate of inflation (%)	12.8	656.2

(World Bank 1994)

Nicaragua's foreign debt will be playing an increasingly important role in national affairs (Table 11). Nicaragua has the highest per capita debt in the world at $2781.5 per person. In comparison, Honduras has a debt of $714 per person. While only approximately 11% of the national budget or 12.6% of the value of exports was used in 1992 to service external debt, the servicing of debt will surely become greater since the debt to the U.S. controlled institutions such as the World Bank has only recently been incurred.

The net present value of the present value of Nicaragua's debt was 3161.7% greater than its exports in 1992. The total debt service as a percentage of exports relates repayment and interest payment of debt to export levels and

is considered "one of the several conventional measures used to assess a country's ability to service debt" (World Bank 1994: 241). Nicaragua's total debt service as a percent of exports is roughly average for the low-income economies in 1992.

Table 11. Debt and servicing

Total external debt (million $US)	
1980	2,192
1992	11,126
Net present value of total external debt as percent of exports	
1989	2,558.6
1992	3,161.7
Total debt service as percent of exports	
1980	22.3
1992	26.5
Interest payments as percent of exports	
1980	13.4
1992	12.6

(World Bank 1994)

HEALTH

Health conditions, other than those related to combat, significantly improved during the revolution. Government health expenditures (14.6% of total government expenditures) exceeded military expenditures (11.0 %) in 1980 (World bank 1994). An important feature of the health policy in the 1980 was the formation and deployment of "health brigades" made up of young volunteers into remote areas of the country such as Pearl Lagoon. In addition, many new doctors were trained abroad in the Soviet Union and Cuba which resulted in a decrease in the population per physician and probably contributed to the decrease in infant mortality from 1970 to 1992 (Table 12). Nicaragua's life expectancy at birth is second highest, while percent of low birthweight babies is average for the "low-income economies". Life expectancy is slightly higher for females than males. Recently, there has been a general trend in Nicaragua towards the privatization of health care. The effect of this policy change is unknown, however many citizens already complain of rising health costs.

Table 12. Health conditions in Nicaragua.

Life expectancy at birth	
Male 1970	52
Male 1992	65
Female 1970	55
Female 1992	69
Population per physician	
1970	2150
1990	1460
Low birthweight babies (%) 1990	15
Infant mortality rate	
1970	106
1992	56
Under-5 mortality rate, 1992 (per 1000 live births)	
Male	68
Female	75

(World Bank 1994)

EDUCATION

Education became a priority under the Sandinista government, with education comprising 13.1% of total government expenditures in 1987 (Europa 1994). Primary education is officially compulsory and begins at the age of seven. Secondary education begins at 13 years of age and lasts 5 years. Primary school enrollment increased significantly from 65% to 75% of the total age group from 1965 to 1991 (World Bank 1994). Primary and secondary education are officially free of charge since the revolution, although recently schools have been collecting a registration fee of $1 per month per student to cover gaps in government support for teaching materials (pers. obs.).

Enrollment is almost equal among females and males, with slightly more females (Table 12).

Table 12.   Educational institutions, teachers and students

	Institutions	Teachers	Students		
			Males	Females	Total
Preprimary[1]	978	2,075	33.443	35,214	68,657
Primary	4,402	18,646	331,830	342,215	674,045
Secondary general	n.a.	4,132	81,605	95,220	176,825
Secondary teacher training	n.a.	181	500	1,954	2,454
Secondary vocational	n.a.	677	7,033	8,299	15,332
University	n.a.	2,180	14,165	15,615	29,780

(Europa 1994)

1   1990 figure

Agriculture production

Nicaragua is a largely dependent on its agriculture production providing 30.7% of the GDP (including forestry and fishing), a greater percentage than any other country in Latin America, and employing an estimated 35.4% of the economically active population in 1992 (Europa 1994, World Bank 1994). Coffee is the most important foreign exchange earning crop, comprising 20.8% of export earnings in 1992 (Table 13). Bananas, cotton, and sugar are also important cash crops. Most coffee and cotton are produced in the interior of the country. Agricultural GDP has decreased by an average of 2.2% annually (Europa 1994). This is likely the result of the U.S blockade that was imposed in 1985 and the current economic crisis.

Table 13. Agricultural exports (Millions $US)

	1990	1991	1992[1]
Coffee	71.0	36.2	45.3
Bananas	27.1	28.7	10.0
Meat	56.9	37.5	40.8
Sugar	38.6	31.3	19.1
Cotton	37.2	44.4	26.2
Seafood	8.7	12.9	15.5
Total	330.5	274.9	217.5

(Europa 1994)

1   Preliminary data

Rice, maize, and beans are the most important food crops. Tubers, such as cassava, are of greater importance in the tropical lowland ecosystem of the Atlantic Coast.

Table 14. Agriculture production of principal crops (thousand metric tons)

	1990	1991	1992
Rice (Paddy)	121	119	158
Maize	293	199	231
Sorghum	74	71	74
Cassava (Manioc)	69	70	71
Dry Beans	71	72	79
Cottonseed	37	40	36
Cotton (lint)	23	30	26
Tomatoes	30	31	31
Oranges	66	68	68
Pineapple	42	43	43
Bananas	110	133	135
Plantains	64	63	64
Sugar Cane	2392	2747	2563
Coffee (green)	28	47	45

(Europa 1994)

Nicaraguan livestock production is roughly equivalent to Panama (Table 15). Cattle plays an central role in the agriculture of the Pacific Coast and is increasing in importance on the Atlantic Coast as immigrants arrive. Cattle production is often preferred by farmers on the Atlantic Coast due to the guaranteed market for the product.

Table 15. Livestock (thousand head)

	1985	1986	1987	1988	1989	1990	1991	1992
Nicaragua								
Cattle	2369	2110	1885	1700	1800	1680	1600	1673
Pigs	745	750	749	700	680	690	695	700
Horses	263	260	255	250	250	250	250	250
Panama								
Cattle	1447	1430	1410	1423	1417	1388	1399	1400
Pigs	745	750	749	700	680	690	695	700
Horses	263	260	255	250	250	250	250	250

(United Nations 1994)

Fertilizer consumption and tractors in use in Nicaragua is relatively low in comparison with Panama (Tables 16 and 17).

Table 16. Potash fertilizer consumption (thousand metric tons)

	1987/88	1988/89	1989/90	1990/91	1991/92
Nicaragua	2.9	5.0	5.8	2.1	2.0
Panama	11.9	10.3	10.9	11.9	5.1

(United Nations 1994)

Table 17. Tractors in use

	1985	1986	1987	1988	1989	1990	1991
Nicaragua	2430	2450	2480	2500	2550	2600	2650
Panama	5270	5240	5200	5160	5120	5090	5047

(United Nations 1994)

LABOR

The role of labor changed dramatically in the 1980s in Nicaragua. The Sandinista government supported the formation of labor unions and agriculture cooperatives throughout the country. The level of female employment in manufacturing, however, has only increased slightly (Table 18)

Table 18. Female manufacturing employment

Year	Female share of labor force (%)
1970	20
1992	26

(World Bank 1994)

Wages per hour have increased overall (Table 19), but as a result of inflation have decreased in buying power.

Table 19. Wages per hour (cordobas oro)

Year	Wages per hour
1989	5.8
1990	5.9
1991	4.7
1992	8.0

(Europa 1994)

NATURAL RESOURCE UTILIZATION

The rate of deforestation was lower in the 1980s than present, probably as the result of two factors. First, the war seems to have prevented commercial harvesting on a scale previously practiced (Robinson 1991). Although the war destroyed great areas of forest and agriculture lands, the

overall effect seems to have been one of preventing the commercial exploitation of forests and fisheries. An alternative explanation, is that the Sandinista government's policies that focused on land reform and other social justice promoting activities (e.g. education and health) which are currently being repealed, had a profound affect on natural resource utilization (Vandermeer 1991). Surprisingly, for 1988 Costa Rica's rate of deforestation was nearly three times that of Nicaragua (7.6 percent in Costa Rica versus 2.7 percent in Nicaragua). Vandermeer maintains that social equity rather than superficially important, yet high profile, conservation programs is more likely to result in sustainable development, or at least decreased rates of deforestation. This argument does not address directly the relative importance of war or government policies in explaining rates of deforestation, but it does suggest that social equity and sustainable use of natural resources are correlated.

Although the exact information is unavailable, the overall rate of deforestation in Nicaragua has probably increased since 1990, given that a number of logging concessions have been granted and the war has ended. Nicaragua's annual rate of deforestation from 1981 to 1990 of total forest area (1.7% of total area) was comparable to Honduras (2.0% of total area) (Table 20).

Nicaragua has significantly increased the number of protected areas. In 1991, eleven protected areas covered 3.6 thousand square kilometers of land, or 2.8% of the total land area. In 1992, the number of protected areas increased from 11 to 21, covering 9.5 thousand square kilometers, or 7.3% of total land area.

Table 20. Forests and protected areas

Total area of natural forest (thousand sq. km.)	
1980	73
1990	60
Annual deforestation of natural forest area, 1981-90	
thousand sq. km.	1.2
percent of total area	1.7
Nationally protected areas, 1993	
Thousand sq. km.	9.5
Number	21
As percent of total area	7.3

(World Bank 1994)

The exploitation of timber resources has gradually increased for the past decade (Table 21). This trend is likely to continue while external markets penetrate Nicaragua and as long as the resource is available. Wood

production in the country is largely for fuel wood. Charcoal is still a commonly used in major cities (pers. obs.).

Fish production decreased in the mid-1980s, but has again risen. The contribution of crustacean, especially lobster, has played an important role in the Atlantic Coast economy. This trend is also likely to continue as long as the resource remains intact, although signs of overproduction are already becoming apparent (Ryan 1992 a).

Table 21. Timber and fish production

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
Total round-wood[1]	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1	4.2
Saw logs								0.830	0.830	0.830
Industrial wood								0.05	0.05	0.05
fuel wood								3.092	3.197	3.302
Total fish[2]	5.0	4.5	4.3	4.2	2.5	5.0	4.7	4.6	3.1	5.7
Fishes								2.1	1.3	2.5
Crustacean								2.5	1.8	3.2

1   Million cubic meters   (United Nations 1994 and Europa 1994)
2   Thousand metric tons

URBANIZATION

The migration to the cities is a trend throughout the world, although the rate in Nicaragua has slowed somewhat in comparison to the 1970s (Table 22). It is unknown what effect this is having on the productive capacity of the agriculture sector or the role of women in the productive sector. It is likely that women are playing an increasingly important role in providing family income especially in the informal sector (Boserup 1971).

Table 22. Urbanization

Urban Population as % of total population	
1970	47
1992	61
Urban Population average annual growth rate (%)	
1970-80	4.4
1980-92	3.9

(World Bank 1994)

INFRASTRUCTURE

The increasingly impoverished state of Nicaragua is reflected in its poorly developed infrastructure (Table 23). The infrastructure that existed was heavily damaged by the war, and what remained has been ignored out deference to more urgent affairs. Less than half of the households had electricity in 1984. The power systems in use are very inefficient.

Access to clean water, a prerequisite for improved health is available to only 55% of the population. In 1994, an epidemic of cholera broke out that affected hundreds of people.

Table 23. Infrastructure

Households with electricity (% of total) 1984	41
Power systems loss (% of total output) 1990	20
Population with access to safe water (% of total) 1990	55

(World Bank 1994)

The Atlantic Coast: the Underdeveloped Portion of Nicaragua

The general impression that people from the Pacific Coast of Nicaragua have of the Atlantic Coast is that it is largely uninhabited, very poor, uncivilized, and that *Costeños* are generally unwelcoming. In our experience, the first two of the four impressions are at least partly accurate. The last two are largely due to ignorance.

In a country that is rapidly slipping into abject poverty, the Atlantic Coast provides a paradox. On one hand, the poverty of the vast majority of *Costeños* is apparent. Many people are recent immigrants, that left their homes in the interior with little and are barely surviving on the Atlantic Coast. Many are drawn by the dream of relatively accessible land. And while the land is available, it is of generally poor in quality and is extremely remote. On the other hand, while the vast majority of immigrants are some of the poorest of Nicaragua, others make rich profits from the marine resources, such as lobster and shrimp, and the hardwood timbers that are of high value. One fisher that we spoke with started with a dug-out canoe and is now the owner of his own 30' lobster fishing vessel and makes over $US 100,000 per year. The Atlantic Coast is one of the few frontiers of Central America.

Geography of the Atlantic Coast

The Atlantic Coast is a mosaic of savanna, rain forest, agriculture systems, swamps, rivers, lagoons, and coral islands. The dominant terrestrial ecosystems of the RAAN are savanna and rain forest. Off the RAAN's shores are located the Miskito Cays, a group of small coral islands. The Rio Coco defines the border between Nicaragua and Honduras. A single road reaches from the interior to the mining town Suina, still 75 kilometers from the coast. Most people arrive to Puerto Cabezas, the capital of the RAAN, by airplane or boat.

The RAAS is largely rain forest and swamps. Bluefields is the capital. A number of large rivers and coastal lagoons provide resources and transportation. Roads do not exist, although a road is under construction that will connect Bluefields to the interior. Both increased agricultural activities and the powerful Hurricane Joan have disturbed much of the forest in the RAAS in recent years. In 1988, Hurricane Joan felled 80% of the trees in a 500,000 hectare area with Bluefields approximately in its center (Yih et. al. 1991). To the north of Bluefields approximately 30 kilometers, one finds large, open areas of pine savannah near Pearl Lagoon, which are the southernmost extent of this ecosystem in the world (Parsons 1955). Along the rivers large areas of swamp and mangrove forests exist. A network of rivers drain this wide lowland area with large estuaries and coastal lagoons at their mouths.

Demographics and Socio-Economics of the Atlantic Coast

Mestizos, the ethnic group that is a mix of indigenous and Spanish peoples, comprised the vast majority of the 1981 population (Table 24). This is largely the result of the eastward migration of peasants after their displacement for cotton and cattle production that started in the early 1950s (CIDCA 1987). This migration was both "spontaneous" and supported by official government relocation programs. "In 1963 alone, 3,000 families were moved to the newly founded town of Nueva Guinea" (CIDCA 1987: 25).

Nonetheless, the Atlantic Coast still maintains a feeling of culture distinctiveness from the rest of Nicaragua. English and indigenous languages are widely used. Linguistically, the Miskito, Sumo, and Rama all belong to the South America Macrochibcha family (Perez-Brignoli 1989). The Miskito, the second largest ethnic group on the Coast, are a mixture of Amer-Indians and black slaves. Starting on the 17th century, they allied themselves with the British colonists of the Coast and, as a result, were able to dominate the other, less powerful indigenous groups. "Through conquest, assimilation of outsiders, and natural demographic growth, the Miskito population and

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territorial domain expanded steadily" as far as Honduras and Panama (CIDCA 1987: 17).

Creoles are descendants of African slaves, brought in the 17th and 18th centuries to work in sugar and indigo plantations, and West Indies labor, brought to work for North American interests in the 19th century. Major centers of Creoles are Bluefields, Corn Island, Pearl Lagoon, and Puerto Cabezas.

Sumo are the second largest indigenous group. Their population is spread throughout the forested northern Atlantic Coast mostly in isolated communities. Post-European contact Sumu history is largely one of dominance by the Miskito and disease and have subsequently undergone continuous depopulation.

Rama are the smallest indigenous group that probably migrated from the south in the 18th century. They are now concentrated on a small island, Rama Cay, in Bluefields Bay and in other small communities in south east Nicaragua.

The final ethnic group, the Caribs or Garifona, is an immigrant group that arrived from Honduras in the late 1800s. A mixture of the Amer-Indian people originally located in St. Vincent Island and African slaves, they were marooned on the Barrier Islands of Honduras by the British after revolting. Attracted by wage labor positions in Nicaragua and displaced by political conflict in Honduras, communities were established in Pearl Lagoon in the 1870s.

Table 24.   Estimated Populations by Ethnic Group, Atlantic Coast of Nicaragua for 1981

Ethnic Group	Population	Percent of Total
Rama	650	0.23
Sumo	4851	1.7
Miskito	66,994	23.7
Creole	25,723	9.1
Caribs	1,487	0.5
Mestizos	182,377	64.6
Total	282,082	
Est. 1992 population[1]	416,040	
Percent of est. 1992 national population	10.1%	

(CIDCA 1987)

1   calculated using the 1981 estimates and an annual growth rate of 3.5%

The cultural hierarchy between ethnic groups on the Atlantic Coast is well documented (CIDCA 1987). The Miskito domination of the Atlantic Coast as a result of their affiliation with the British colonists lasted into the 19th century. In the mid-1800s and into the early 1900s, the Creole population dominated positions as administrators and educators, especially in Bluefields. They were subsequently and are currently being displaced by the *Mestizo* population.

The current cultural hierarchy is reflected in the ethnic makeup of labor in a sugar mill in the southern Atlantic Coast (Table 25).

Table 25. Ethnic Hierarchy in Kukra Hill Sugar Mill

	Miskito n=386	Creoles n=114	Mestizos n=178	Totals n=678
Administration	0%	10%	15%	38
Skilled labor	5%	20%	29%	78
Unskilled labor	15%	69%	27%	149
Field labor	80%	0%	30%	413

(Hale and Yih 1984)

Although Mestizos are rising in the social class structure, the Creoles still maintain their firm position in the middle class in Bluefields (Table 26).

Table 26.   Social Class Structure Ethnic Groups within Economically
Active Population, Bluefields, Nicaragua

Sector	Creole % n=106	Mestizo % n=183	Miskito % n=8	Total % n=297
Unemployed	7	3	0	5
Lower	32	50	62	44
Middle	53	33	38	40
Upper	8	14	0	11

(CIDCA 1987)

Lower class= Salaried workers for both private and state-owned enterprises and small-scale vendors
Middle class= Professionals, civil servants, artisans, small producers, receivers of remittances as a principal source of income.
Upper class= Top state officials, large producers.

As one might expect given the colonial history of the Atlantic Coast, the religious denominations are distinct from the largely Catholic interior (Table 27). German and British missionaries brought Moravian and Anglican traditions respectively. Today, Catholicism, brought by immigrants, and Evangelism brought by missionaries, are on the rise.

Table 27.   Religions of Ethnic Groups in Bluefields, Nicaragua

Religion	Creole (n=142)	Mestizos (n=206)	Miskito (n=8)
	%	%	%
Catholic	11	80	38
Anglican	19	1	0
Moravian	49	0	50
Baptist	9	2	0
Adventist	4	3	12
Evangelical	2	5	0
Other	6	9	0
Total	100	100	100

(CIDCA 1987)

The war in the 1980s was particularly intense on the Coast. After nearly a decade of struggle to bring the Coast into the revolution, the Sandinistas began a campaign of negotiation and consultation with the leaders and communities of the Coast. The result of that dialogue was the Autonomy Law of 1988, which granted the Atlantic Coast regions control over their internal affairs and control over the management of the Coast's natural resources. Locally elected regional councils were established to administer the new regions of the Coast, the RAAN and RAAS.

The ecological and social transformation that is taking place throughout the RAAS is also affecting Pearl Lagoon, albeit at a slower pace. Now that a decade of war has ended the economy of Pearl Lagoon, based largely on the exploitation of natural resources is booming.
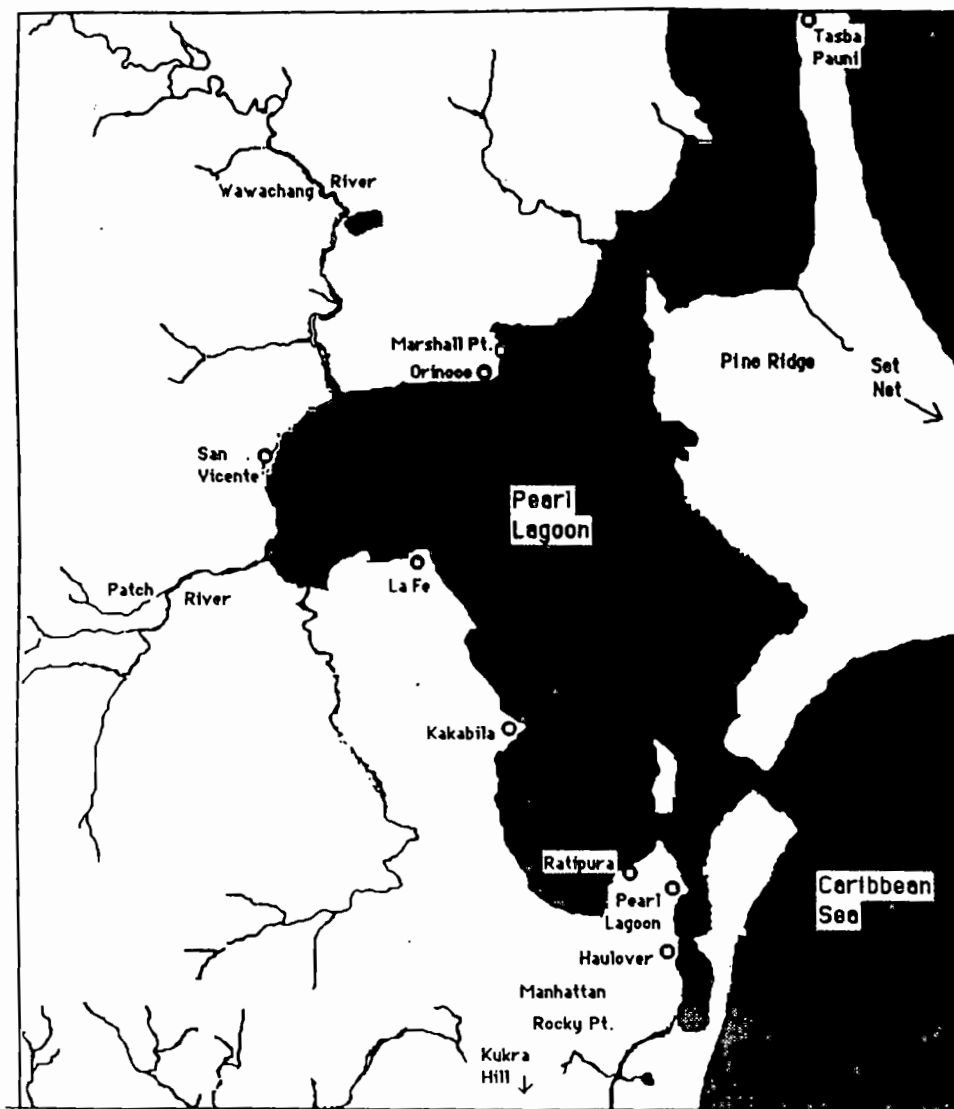
PEARL LAGOON

Geography of Pearl Lagoon

Pearl Lagoon (Figure 3) is a brackish water ecosystem fed by four large rivers with an 300 meter opening to the Caribbean Sea. Pearl Lagoon was formed 16,000 years ago when low lying areas were inundated by the rising sea levels (Ryan 1992). Along the shores of the lagoon are large areas of intact mangrove forest. Offshore, the Nicaragua platform, the widest ocean platform in Central America, is composed of vast seagrass beds and coral reefs. The Pearl Cays approximately 10 kilometers offshore are surrounded with coral reefs. The terrestrial ecosystems surrounding the lagoon are largely lowland rain forest and swamp forest. Approximately the southern 25% of the lagoon was severely affected by Hurricane Joan. The whole area has been exploited for mahogany and other valuable hardwoods, although large areas of intact rain forest exist. Agriculture areas, largely for subsistence, are concentrated near communities. Growing immigrant communities are located on the Wawashang and Patchy Rivers.

The terrain surrounding Pearl Lagoon town and Haulover, the principal sites of this study, is varied. Across the lagoon to the east, is a thin strip of mangroves and beach front with some agriculture, separating the lagoon from the Caribbean Sea. A canal from Bluefields Bay entering the lagoon to the south was constructed by the U.S. Army Corps of Engineers in the 1950 and 1960s. Immediately to the west of these communities is a strip of pine savannah that extends to the south along the canal and is approximately 3 kilometers wide, east to west. Within this savannah, one finds small rivers and marshes. Further to the west is Isik Creek, where the vegetation changes abruptly from pine savannah to lowland rain forest. Rocky Point and Manhattan, the communal agriculture lands of Pearl Lagoon town and Haulover respectively, are two kilometers west of Isik Creek. In general, the terrain is very flat, with the exception of low hills and ravines in Rocky Point and Manhattan. Approximately 12 kilometers to the southwest from Haulover is Kukra Hill, a larger mixed Creole and Mestizo community. Northwest of Rocky Point is what, according to local people, is the remaining area of lowland rain forest.
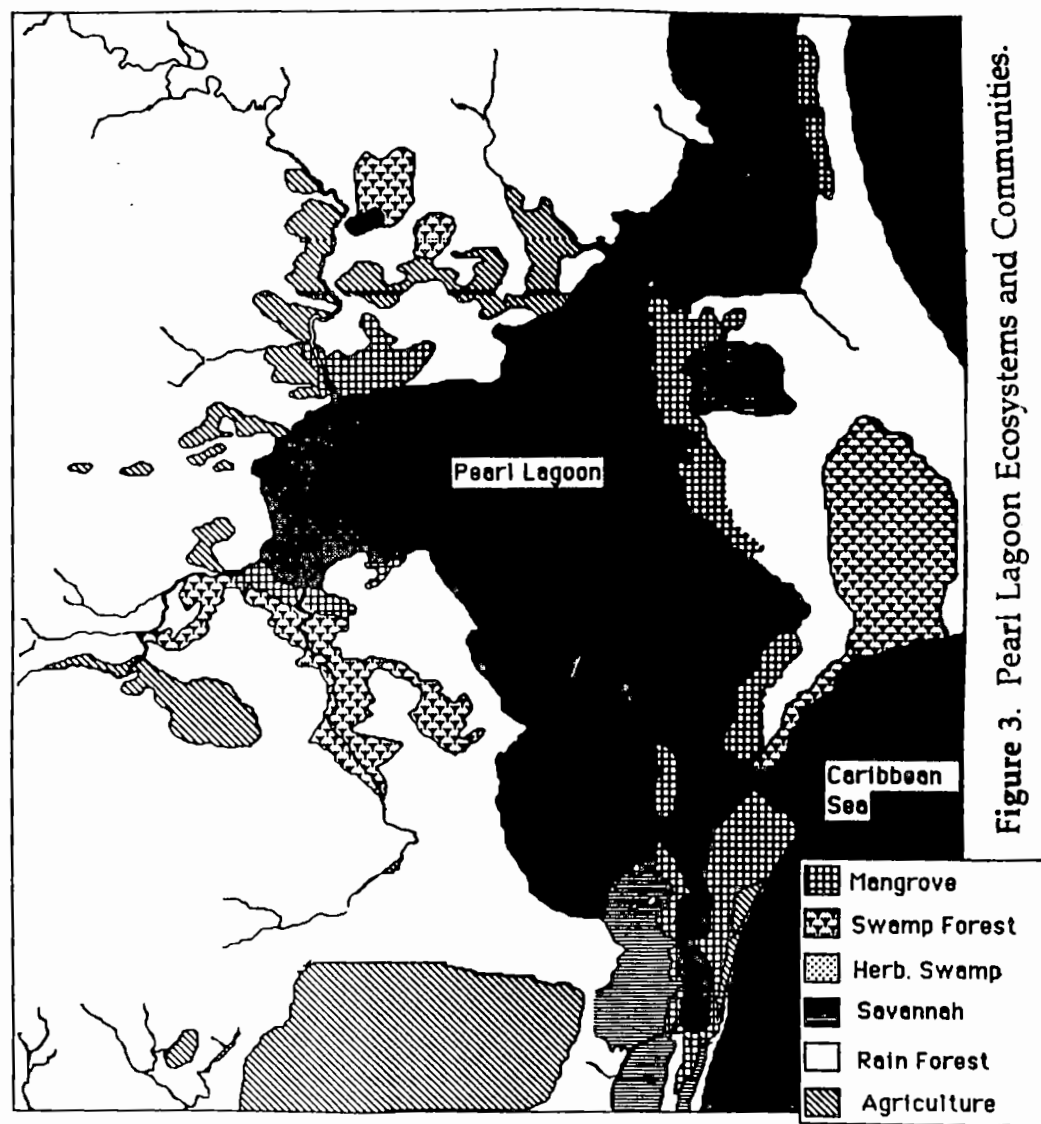
Socio-economics and Demographics of Pearl Lagoon

The whole Pearl Lagoon basin is one political unit with the municipal center in Pearl Lagoon town. Haulover, Raitipura, Kakabila, and Tasbapaunie are Miskito communities, although Haulover has been Creolized to a large extent, due to proximity to Pearl Lagoon town. Pearl Lagoon town, and Marshall Point are Creole communities. Orinoco, Square Point, and La Fe are Garifona. The land surrounding Pearl Lagoon is owned communally, with each community having hunting, fishing, and agriculture rights for an area (UN 1991). Each settlement is definable as a community due to the linguistic, economic, or cultural continuity as compared to neighboring communities, however this is not to say that communities do not influence one another culturally or politically.

The majority of Pearl Lagoon's population is in three communities - Pearl Lagoon Town, Tasbapaunie, and Orinoco (Table 28). The ratio between male and female is almost equal, with slightly more men. The rate of population growth in Pearl Lagoon is unknown, but has been estimated as 3% annually (CIDCA 1987). This may be a conservative estimate given the continuous migration of settlers from the Pacific coast to this area and the repatriation of families displaced by the war.

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Figure 3. Pearl Lagoon Ecosystems and Communities.

Left map labels:

Tasba Pauni

Wawachang River

Marshall Pt.

Orinoco

Pine Ridge

Set Net

San Vicente

Pearl Lagoon

Patch River

La Fe

Kakabila

Caribbean Sea

Ratipura

Pearl Lagoon

Haulover

Manhattan

Rocky Pt.

Kukra Hill

SCALE

N

5 Km.

Right map labels:

Pearl Lagoon

Caribbean Sea

N

5 Km.

Mangrove

Swamp Forest

Herb. Swamp

Savannah

Rain Forest

Agriculture

Table 28. Population by Community, Pearl Lagoon

Community	Men	Women	Total	Percentage of Total
Awas	47	38	85	1.6
Brown Bank	74	64	138	2.6
Wawashang	130	129	259	5.0
Kakabila	144	122	266	5.1
La Fe	122	136	258	5.0
Pearl Lagoon town	683	774	1457	28.0
Marshall Pt	122	132	254	4.9
Orinoco	395	429	824	15.8
Pueblo Nuevo	96	105	201	3.9
Raitipura	78	77	155	3.0
San Vicente (Square Point)	74	68	142	2.7
Set Net	44	50	94	1.8
Tasbapaunie	539	537	1076	20.7
Totals	2548 (49%)	2661 (51%)	5209	

(*Accion-Medica Cristiana* 1992)

The vast majority of people from the Pearl Lagoon communities rely on farming or fishing for food and money. The United Nations (1991) reports that the average income of fishers differs between communities. Communities such as Tasbapaunie, Orinoco, and Pearl Lagoon town, which have a high number of commercial fishing operations, have annual incomes for individual fishers ranging from $3,500 to 5,000 (US $). The average income in Haulover, where fishing operations are mostly small scale, is only $1,500 to 3,000. In general, although little disposable income is available, the people in the communities surrounding Pearl Lagoon seem to have met their most basic needs such as primary and secondary education, food, and shelter. The only secondary school is located in Pearl Lagoon town. Primary schools are located in all communities.

Less socio-economic information is available for farming families. Often, farming is largely a subsistence activity in the Pearl Lagoon basin. Transportation expenses involved in transporting goods to commercial centers such as Bluefields is prohibitive. Since most people have access to land for farming, local markets in each community are very limited.

Although not formally researched, the majority of families seem to be self reliant for both fish and vegetable foods. Either individuals are generalist

that both farm and fish, or members of the same family specialize in farming or fishing and share their production.

Cultural factors play an important role in determining the occupation of Pearl Lagoon people. Creoles and Miskito have been characterized as the fishers of the Coast, although the other ethnic groups also fish (UN 1991). It is unclear whether this generalization is due to the fact that there are more Creoles and Miskito living in the coastal areas or whether it is a function of history or cultural preferences. Nonetheless, in areas such as in Pearl Lagoon basin, where fishing is the main economic activity, Miskito and Creoles make up 48.4 and 28.8 % of the population respectively, while the Mestizo population is only 1.9% (UN 1991).

There also seems to be a cultural component to defining the role of women in farming and fishing. Women are active in fishing in the Garifona community of Orinoco, while in Creole and Miskito communities women play a relatively minor role in the fishery (White 1993, Gordon 1991). Some local people maintain that this is largely a result of the histories of the Garifona, whose men and women were forced to work side-by-side due to the hardships they faced being displaced from St. Vincent to the Atlantic Coast of Central America. Miskito women from the community of Kakabila and Mestizo women from Rocky Point and Manhattan are integrally involved in farming, whereas Creole women from Haulover and Pearl Lagoon town seem to be less involved (Barbee, unpublished data, 1993). Local people consider religious teachings to be important factors in the discouragement of participation of women in fishing and farming in Haulover and Pearl Lagoon town.

Two factors, the recent war and the current economic crisis, are without a doubt, important forces affecting the lives of all people from Pearl Lagoon. The Sandinistas were received with varying degrees of acceptance on the Atlantic Coast, largely due to U.S. intervention that heightened the historic, inter-ethnic tensions between indigenous groups, such as the Miskito, and the Mestizos from the Pacific Coast (CIDCA 1987). Some local people also maintain that some Sandinista leaders were racist in their treatment of *Costeños* (Suho. pers. comm., 1993).

During the 1980s, the United States supported the "Contra War" with military equipment and finances despite international condemnation. The Miskito made up the large percentage of the contra forces. In small communities such as Haulover and Pearl Lagoon town, dozens of young men and women were killed.

Inter-community political rivalries in Pearl Lagoon are deep and historically founded. Haulover and Pearl Lagoon town have had a long standing land dispute for Rocky Point. Haulover residents generally feel that

Pearl Lagoon town has monopolized and manipulated the political system in order to allow their town to grow at the expense of Haulover. Haulover and Tasbapaunie were largely "contra" and fought "in the bush". Orinoco was largely supportive of the Sandinista government and Pearl Lagoon town was also considered pro-Sandinista, although in the 1990 election the vast majority voted against the Sandinistas. The other, smaller communities seemed to have remained relatively neutral, attempting to avoid direct involvement in the war.

War atrocities were committed on both sides of the war. It is reputed that "boys in the bush" threw hand grenades in a Sandinista-supporting home in Pearl Lagoon town, killing a mother and children. Contras from Haulover surrounded a Pearl Lagoon town pro-Sandinista house and opened fire. Sandinistas supposedly jailed contra supporters without charges or trial. In spite of all of these incidents, a process of reconciliation has begun since the end of the war in 1990. The same man whose home was fired upon in Pearl Lagoon town is now an agricultural extentionist to Haulover. He maintains that it took a few years to feel safe in Haulover, but now he visits regularly to assist people in the management of their home gardens.

The economic crisis is particularly acute on the Coast. Most people are involved in the informal sector of the economy. In Pearl Lagoon, despite the relative affluence of those with retail or fishing businesses, the majority of people manage to survive largely on a subsistence level, with occasional inputs of cash from fishing or remittances from relatives in the United States.

Formal and Informal Social Organizations of Pearl Lagoon

The town of Pearl Lagoon is the center of social, political, and economic organization in the Pearl Lagoon basin. Since most economic activity takes place here, its influence is felt throughout the ten communities surrounding the lagoon. The current mayor, whose office is in Pearl Lagoon town, was appointed by the UNO government following the 1990 elections. The mayor and his assistants play a key role in decisions affecting natural resource use in the lagoon area. Concessions for logging, building permits for fish processing plants, and taxes are all controlled by the mayor. The fact that the current mayor was not elected, but rather was a political appointee after the elections, and is reputed to be corrupt is a volatile issue in the communities.

Formal and informal organizations play an important role in the lives of people in Pearl Lagoon. The most important political organization in each community is the communal council. Representatives of most major

organizations such as the school, the fisher's union, the various churches, and the sports committee are represented on this council.

Churches play a critical role in the social lives of most people from the Coast. Religious holidays and weekly days of worship are observed by most people. The most important churches are: the Moravian, the Baptist, the Seventh Day Adventists, and the Anglican. Churches also participate in community development. The Moravian Church has its own development agency, *Centro Inter-Eclesial de Estudios Teológicos y Sociales* (CIEETS), that is active in agricultural development.

Development agencies also play an important role in the Pearl Lagoon communities. Currently, five organizations are active in the area: *Consejo de Iglesias Evangélicas Pro-Alianza Denominación* (CEPAD), *Acción Médica Cristiana* , *Ayuda Popular Noruega* (APN), *Ministerio de Economia and Pesceria* (MEDE-PESCA), and *Centro de Investigaciones y Documentacion de la Costa Atlantica* (CIDCA) . CEPAD is active in encouraging the construction and use of dry toilets and agricultural development. *Acción Médica Cristiana* is involved in immunization, clean water campaigns, and medical treatment at the local health center. APN is the financier and overseer of the Haulover Marine Laboratory, the fisher's union, and the ice making plant located in Pearl Lagoon town. MEDE-PESCA is the implementing agency for a large fisheries development project - DIPAL. CIDCA is the implementing agency for the participatory research project, CAMP, the subject of this investigation.

The laboratory/fishing union/ice making plant project is one of the most significant development attempts in Pearl Lagoon basin. Largely due to the expense of fishing gear and the general poverty of fishers, six cooperatives were formed in the Pearl Lagoon basin to pool financial and labor resources (UN 1991). Cooperatives were established in Orinoco, Brown Bank, Kakabila, Raitipura, Pearl Lagoon town, and Haulover. Each of these cooperatives are considered members of a larger fishing union and have representatives present during union meetings. In Pearl Lagoon, 368 people belong to fishing cooperatives, 632 are independent, and 50 are commercial fishers. According to the United Nations (1991), the number of members in the cooperatives has been dropping from 1978 to 1988 due to the crisis situation caused by the war and the hurricane. The relative disinterest of the UNO government compared to the Sandinista government for labor organizing may have further weakened the union since 1990. However, the recent acquisition of the ice making plant in the town of Pearl Lagoon by the fishing union may positively affect the level of interest in membership.

Farmer's cooperatives exist in Rocky Point and Manhattan, the agricultural lands belonging to Pearl Lagoon town and Haulover, respectively. However, these cooperatives have not been functioning for many years.

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In conclusion, the demographic and socio-economic situation in Nicaragua are changing rapidly. The population is growing rapidly and moving to the urban centers and the Atlantic Coast. Many improvements in health and education made in the 1980s are under threat of severe austerity programs. The economy is in crisis. The conditions on the Atlantic Coast are even worse, however a recent increase in the exploitation of natural resources has improved the situation, at least in the short term.

RESULTS AND DISCUSSION

The intent of this study has been to develop an understanding of the viability of the participatory research process employed by CAMP. In order to approach this subject, we have developed four research questions of relevance to participatory research and social movement theory. The results of this study agree to a certain degree with the hypotheses that were originally offered, however addition relevant information has developed and new lines of inquiry have been raised.

Brief overview of CAMP's activities

Before addressing the results to the individual questions, we will present a brief overview of some of the most relevant CAMP activities that took place from 1993 to 1995. We will discuss what took place with CAMP in Patrick Christie's absence from June, 1993 to January, 1994 and November, 1994 to May 1995. The data is more detailed for the years 1993 and 1994 than for 1995 since we already had the opportunity to analyze the results from the earlier years.

In 1993, six meetings were held that had relevance to CAMP. The first four (5/6/93, 5/13/93, 5/20/93, and 6/2/93) focused on the first stage of participatory research - problem identification. Two additional meetings (6/8/93 and 6/16/93) focused on a related issue, the input from CAMP participants into a nationwide process concerned with the passage of a fisheries law (the Hooker Fisheries Law) that would regulate fishing on the Atlantic Coast. The most significant outcome of the first four meetings was the identification of the lack of regulations of coastal resource exploitation as the principal problem in the minds of participants. The subsequent meetings were a logical outgrowth of the problem identification phase, although these meetings were in reaction to a initiative from central government officials to involve local communities in the process of reviewing a draft of the legislation prior to voting in the National Assembly rather than a self-initiated action.

In addition to the work on the fisheries law, water monitoring was established with the fifth year of the Pearl Lagoon Institute in 1993. This activity, described in detail by Christie (1993), was a program in which students with the use of water testing kits monitored the water quality of Mos Mos Creek. This creek is 0.5 kilometer west of Haulover and is the source of water to the ice making plant that supplies fishers and local households. The students and their teacher, Mary Brighton, decided to monitor Mos Mos because of its relevance to the health of Pearl Lagoon Town and Haulover, especially since cholera and diarrhea are widespread in Nicaragua. The most

significant results of this research was that the water was significantly contaminated with fecal matter (600 fecal coliform/100 ml or 60 times the World Health Organization's allowable limit). The teacher and students had decided to continue the testing in Patrick Christie's absence in order to determine the effects of the rainy season on the results. Prior to Patrick Christie's departure, CAMP participants said that they would continue the work towards a management plan for Pearl Lagoon's coastal resources.

Table 29 presents the results of interview questions concerning the continuation of four activities from June, 1993 to January 1994. Water monitoring, work on the management plan, and regular CAMP meetings stopped after Patrick Christie's departure. The work on the Hooker fishery law continued, but only those who directly participated in the meetings with the National Assembly delegation were aware that this work had continued and what were the outcome of these meetings. Upon Patrick Christie's return in January, 1994, people were still interested in continuing the work with CAMP. Interest was strongest in the water monitoring, while interest in the management plan was less certain. Unfortunately, the interest in continuing CAMP meetings was not formally assessed at this time.

Table 29. Continuation of Activities from June, 1993 to January, 1994 (n=6)

Activity	Number of persons said activity continued	Number of persons said activity stopped	Number of persons said they did not know	Number of persons said there is interest	Number of persons said there is no interest
Water Monitoring	0	5	1	5	1
Fishery Law	3	1	2	-	-
Management Plan	1	4	1	3	3
CAMP meetings	0	5	-	-	-

In 1994, CAMP meetings resumed and seven meetings were held between April and November. Water testing of Mos Mos also resumed with new fourth and fifth year students with trainers drawn from the 1993 program participants. A wide variety of other activities were started including forest surveys, flyer posting, environmental education programs, outreach to other communities, and meetings with local leaders.

Following Patrick Christie's departure in November, 1994, CAMP activities continued for approximately three months. Two monthly meetings and one environmental educational outing were held. A social event held in a nearby pine woods was held in order to interest other community members

in CAMP. Water testing was unsuccessfully attempted. The testing was planned and actions to gather the equipment were taken. An expensive piece of equipment for testing fecal coliform that is owned by a local NGO was not made available, however. At the beginning of 1994, the CAMP staff was assured that funds for CAMP would arrive shortly. As a result, two communal investigators, to work in the other communities surrounding the lagoon, were contracted to work with CAMP, Ray Garth and Bonifacio Gonzalez. Funding for CAMP was delayed both between Canada and Managua and between Managua and the project site and did not arrive to the project site until May of 1995. Kenneth Fox, the project's original communal investigator, worked for three months without salary, but in March of 1995 he decided to leave the project to return to farming in order to support his family. Bonifacio and Ray continued to work without their salaries, however in a limited capacity. Therefore, on a formal level, CAMP stopped again as with Patrick Christie's earlier absence as in 1994. However, it should be kept in mind that the interest of the participants continued as did small, but significant, actions.

In May of 1995, Patrick Christie returned to Pearl Lagoon. Upon his return, the project co-coordinators consulted with the communal investigators and community participants about their interest in continuing CAMP. Unanimous interested was expressed and this interest was the impetus for renewed activity. The arrival of funds for CAMP to the project site at this time, allowed Kenneth Fox to return to the project. It allowed for the communal investigators to renew community activities as well. Patrick Christie again left Nicaragua in July, 1995.

One significant example of community action relates to the APN laboratory. Just prior to Patrick Christie's departure, the financiers of the laboratory, APN, made an evaluation of their work in the area and initiated a process to find a implementing agency for the laboratory. The CAMP community participants made a request independent from the CAMP co-coordinators to APN to turn over the laboratory and its funds ($40,000 per year) to CIDCA for the use of CAMP. They insisted that the laboratory equipment not be removed from the area, one of the options that was being considered. Their request was granted in July, 1995.

Analysis of the Organizational Level of CAMP

All people interviewed in April, 1994 identified the lack of organization, as operationalized earlier (p. 31), as a limiting factor in the viability of CAMP. In response to an inquiry into why the CAMP had stopped between June, 1993 and January, 1994, an active member identified the lack of organizing efforts in 1993 as a important weakness.

I feel as if we didn't do any real organizing...Just
leave it at that. And so no one feel themselves
responsible. I feel like that was a mistake.
                                        Edwin Morris 4/19/94

Table 30 presents the activities that were necessary to organize CAMP
meetings for 1993 and 1994 and who was responsible for each activity. This
information clearly demonstrates the lack of at least three of the
operationalizations of organized in 1993 - the presence of elected officials, the
ability to set goals, and clarity of responsibilities among leaders and research
members.   At this initial phase of CAMP, we played central roles in the
calling of meetings, the making of invitations, the setting of agendas, and the
facilitation of meetings. This is common in most projects, especially those
initiated by outsiders. A final planning meeting prior to Patrick Christie's
departure in 1993 would possibly have helped in determining responsibility
for activities.

Table 31 demonstrates, that although the level of organization in the
research group was low, that a surprising amount of work was accomplished.
A variety of environmental problems were discussed and one, the lack of
regulation, was identified as the priority for future work of CAMP.   In the
end of May, 1993, members of the CAMP research group were approached by
members of the National Assembly to participate in the analysis of the
Hooker Fishery Law. This activity then became the focus of the rest of the
1993 work. The research group organized a large meeting in June during
which the Hooker law was analyzed and a smaller work group was elected to
prepare a report for the National Assembly delegation that arrived in later in
June.

Table 30. Evaluation of CAMP meetings.

Activity	5/6/93	5/13/93	5/20/93	6/2/93	6/8/93	6/16/93	4/20/94	5/3/94	7/1/94	7/12/94	8/2/94	9/6/94	10/6/94[2]	11/1/94
Who called meeting	Patrick and Roberto	Patrick and Roberto	Participants in 5/13/93 meeting	Participants in 5/20/93 meeting	Participants in 6/2/93 meeting	National Assembly delegation	Patrick and Roberto	Participants in 4/20/94 meeting	Chris and Patrick	Participants in 7/1/94 meeting	Regular monthly meeting	Regular monthly meeting	Rescheduled regular meeting	Regular monthly meeting
Who made invitations	Patrick and Roberto	Patrick, Roberto, Samuel, Marnie	Marnie	Fishing union	no invitations	?	Patrick and Roberto	Marnie,	Chris and Patrick	Chris and Marnie	Chris	Marnie	Kenneth and Marnie ?	Chris
Who made the agenda	Patrick and Roberto	Patrick and Roberto	Patrick and Marnie	Patrick with Samuel	Participants in meeting	National Assembly members	Patrick and Roberto	Patrick with input at start of meeting	Patrick and Chris	Set at start of meeting by participants	Marnie, Chris, Patrick, Kenneth	Chris, Marnie, Luiz, Kenneth, and Patrick	?	Marnie, Chris, Patrick, Kenneth
Who facilitated the meeting	Patrick and Roberto	Patrick	Patrick	Patrick, Samuel	Roberto	Ray Hooker	No one	Patrick	Samuel	No one	Marnie, Kenneth	Marnie	?	Marnie, Kenneth
Number of invited	18	15	21	38	7	?	12	18	21	24 (8 women)	25 (10 women)	25 (10 women)	21 (unknown number of women)	40 (unknown number of women)
Attendance [1]	14 (4 women)	6 (4 women)	12 (4 women)	24 (8 women)	8 (2 women)	?	6 (2 women)	13, (3 women)	12 (4 women)	11 (4 women)	12 (5 women)	8 (3 women)	10 (6 women)	17 (6 women)
Participation	4 actively participate, 3 participate moderately[4]	2 actively participate	3 actively participate	Wide participation[3]	3 actively participate	4 actively participate	Wide participation, students show their interest	5 actively participate	Active participation by 6 men and 1 women	Active participation by 4 men and 2 women	Active participation by 3 men and 2 women	Active participation from 1 man and 1 women	?	Active participation from 5 men and 3 women

1 Of community members
2 Researcher was not present at meeting
3 Small group format improved participation
4 Active participation was defined as two or more interventions, and moderate participation as 1-2 interventions during a meeting.

Table 31. Evaluation of CAMP meetings' intended goals and accomplished activities.

Activity	5/6/93	5/13/93	5/20/93	6/2/93	6/8/93	6/16/93	4/20/94	5/3/94	7/1/94	7/12/94	8/2/94	9/6/94	10/6/9[2]	11/1/94
Intended principal outcome	Identification of natural resource problems	Ranking of problems	Discussion of relation of aquatic and terrestrial environments, ranking of problems	Discussion of historic basis for current environmental situation, analyze the environmental problems and prescribe possible solutions, review Hooker fishery law	Draft of report for National Assembly delegation on Hooker Fisheries Law	Input into Hooker fishery law	Year plan, discuss making agreement with DIPAL	Monthly plan, discuss relation with DIPAL	Feedback forestry research data, elect steering committee, set regular meeting time, make monthly work plan, select communal investigator	Elect directive board, set regular meeting time	Make monthly plan	Evaluate process and activities to date set research expedition date	?	Report on activities, discuss interview results, steering committee election, presentation on management plan, make monthly plan
Actual Principal Outcome	Identification of environmental problems relevant to farmers and fishers, discussion of issues	Due to low turn out group decides who to invite to next meeting and agrees to invite them	Rank problems, lack of regulation of natural resource identified as greatest problem	Discuss historic context of environmental situation, review Hooker fishery law, election or seven-person working group to make recommendations to Hooker Fishery Law	Analyzed results of 6/2/93 meeting, discussion of relation between Autonomy and resource management	Meet with delegation and give input into Hooker Fishery Law	Reaffirm commitment to CAMP	Decide to initiate forestry work*, discuss management plan, decide on people for forest research group, decide not to make convenio with DIPAL for the time being	Feedback forest research results, elect a provisional steering committee, plan for forestry research expedition, vote for selection of communal investigator, plan outreach trip to Raitipura*	Chose regular monthly meeting time, discuss types of organizations, decide to organize in "grass-roots" manner, feed back outreach trip to Raitipura, participant describes water testing program, plan trip to Kakabila and Raitipura*	Made monthly plan: set up visit to mayor*, flyer*, house to house visit, 2 research trips*, drums for oil, radio message water testing, minstrel, form sub groups to oversee each activity, estimate cost of activities	Evaluate process and activities to date, plan forest expedition*	Made monthly plan: water monitoring*, start mangrove inventory, expedition to Pine Ridge	Presentation on management plan by Patrick, interview results presented by Patrick, plan for signs*, radio message, tree planting*, slide show*, form group for outreach, informal election of two additional steering committee members

* Planned activities that were accomplished.

Although, the organization structure of the research group of CAMP was weak in 1993, a collective identity did begin to emerge as people realized their common problems.

> We learned that there is a relation between fishiners and farmers. They, themselves, realized that they have problems in common that they can solve.
>
> (Mary Brighton 5/28/93)

This sense of common identity carried into 1994, at which time the CAMP participants decided to continue their efforts, but to do so in a more organized manner. In July, members of the research group decided to elect a steering committee, whose responsibilities it would be to invite people to meetings, to set the agenda, and to assist in meeting facilitation. The group also decided that having a regular monthly meeting would improve attendance to meetings. An important additional development in CAMP at that time was the hiring of the full-time communal investigator, Kenneth Fox, who would be responsible for field activities. From that point forward, as the steering committee assumed its duties, the organizational quality of the CAMP research group improved significantly.

A number of related characteristics of the meetings is worth noting. While the level of organization improved, the attendance at meetings did not. In fact, the ratio between number of attended to number of invited dropped slightly from 60% in 1993, to 53% in 1994 for four meetings with comparable number of invitations were sent. The overall attendance rate for the two years was 54%. Although it is difficult to quantify, the level of participation was significantly better in 1994 than 1993, it was clear that previously silent members had become vocal. Women comprised only 34% of the people attending meetings in 1993, and 37% in 1994. Women also participated less than men in the meetings. The relative lack of women's attendance and participation is of concern to the field workers, and while discussed with research group members on a number of instances, their concern does not seem to be as great. Women are rarely viewed as leaders in Haulover and Pearl Lagoon Town, a stereotype that may more effectively be addressed by incremental changes than by a discussion initiated by a foreign male.

The research group's ability to set goals and carry them out significantly improved in 1994. In 1993, although goals were reached, it should be kept in mind that many goals at that phase of the project were set by outsiders (Patrick Christie, Roberto Rigby, and National Assembly delegation) rather than research group members. In 1994, the research group became quite ambitious in the setting of its monthly goals. One member actually expressed

concern that too much was being attempted at once. One-half of the activities that were planned, such as research trips, flyer making, etc., were actually accomplished on time. A number of outdoor research activities were rescheduled due to inclement weather. Other, such as the radio message, were not possible for logistical and funding reasons.

The 1994 research group is an unusual organization for Pearl Lagoon in two manners - form and composition. The group is non-hierarchical and heterogeneous. Prior to electing a steering committee, the group discussed different types of organization structures and decided on a "grassroots" model because of negative experiences in the past in which leaders either corrupted projects or members became overly reliant on the leader. While the steering committee performs many of the necessary organization functions, all planning decisions are made jointly. The form of the organization may reflect its ideology as discussed by Feree (1992), however member ideology this is also heterogeneous. One of the most prominent participants in the steering committee is an elderly Sandinista. Other members are not as overtly political, while others are active in different political movements. The overall orientation, however, seems to be towards equality and the realization of *Costeño* self-governance. The composition of the research group is an interesting mix of age groups (elders and youth), professions (teachers, fishing union leaders, farmers, fishers), religions and genders. The composition at every meeting is different, but it is always heterogeneous. Due to a delay in funding support, most of the financial support for the project in 1994 was through Patrick Christie's Fulbright fellowship. Due to this unfortunate delay and the fact that personal funds were used, most of the financial decisions for the project were made by Patrick Christie in consultation with research group members.

The overall improvement in the organizational level of the research group is reflected in the evaluation of CAMP by it's members.

> We weren't clear about each one's role. Now we
> are more clear. So, I think CAMP will
> continue...the organization is much stronger. That
> is the main thing.
> Johnny McManus (10/23/94)

Clearly, the improved levels of organization were not enough to fully sustain CAMP activities through the financial crisis in 1995. And while the organizational strength has improved, there is still room for improvement. Kenneth Fox, the communal investigator, has commented that he feels as though CAMP needs an overall plan and that the project has the tendency to wander from issue to issue. This is most certainly the case if CAMP is to be compared with either a traditional development project or a traditional research program in which goals and activities are centrally planned. The

participatory research process is necessarily more flexible and, while CAMP operates within the bounds of coastal resource management, it needs to place the development of planning skills by local people before the staff's urge to plan things for people in the name of orderly progress.

The organizing process employed by research group members is predictably less formal than might be practiced by its staff. For example, the election of the steering committee was very informal. The focus is on one-to-one contacts between participants and potential participants of CAMP (Gamson 1994).

In conclusion, there was a general, guarded optimism that the research group was well enough organized to continue the work after Patrick Christie's departure. The quiescence of CAMP in 1993 and the optimism in 1994 tends to support our hypothesis that the participatory research process depends at least partly on the level of organization of the research group. The quiescence of the project in 1995, however, seems to indicated that other factors have greater importance than the level of organization for the viability of the process.

An Analysis of Dependency

The dependence of development, resource management, and participatory research projects on outside assistance is of central concern (Burkey 1993, Maguire 1987). The ideal situation is one in which local people assess their own problems and addresses them without depending on outside peoples or funds. Unfortunately, this is rarely the case. In many developing nations, the struggle to survive may preclude the most disempowered from taking action. In the context of natural resource management, the spread of change may be so rapid as to make traditional forms of resource management seem weak (Shiva 1989). Elites that may benefit from resource extraction may try to stifle movements in lowering levels of resource exploitation.

Small coastal communities throughout the tropics are going through rapid changes as their fisheries are being commercialized, technology is changing, and governments are being pressured to produce much needed foreign exchange with valuable marine commodities. This is most certainly the context of the Atlantic Coast of Nicaragua. Pearl Lagoon is going through a period of rapid conversion from a largely subsistence to export oriented economy. In this context, we maintain that the presence of an outsider with a perspective that includes the experiences of other countries, may be valuable in working with local people to plan for the rational and sustainable exploitation of their natural resources. Of course, this person's presence is dependent on the willing acceptance of the host community. From the onset, the outsiders success is largely dependent on his/her acceptance by the community.

In the context of a resource management project, there is a great potential for the fostering of dependency of local people on the outsider. The presence of the outsider oftentimes translates directly into resources for local people. The knowledge and skills of the outsider can be seen as a resource in itself.

> Patrick: How can I help...?
> Samuel: Your experience with management plans
> can be of a big assistance. You can help with
> preparing documents. (You) [s]hould make contact
> with outside support agencies for international aid.
> (6/13/93)

In the course of these two years of research, Patrick Christie's role in CAMP has been described as: advisor, original organizer of the research group, educator, guide, "motivater", administrator, and biologist. While some of this titles imply greater control than others, all reflect special skills and a certain level of prestige.

In 1993, the project co-coordinators were very active in the calling, agenda setting, and facilitating of all but the final meetings. This is an uncomfortable situation for the participatory researcher. On the one hand, people express an interest in the matter at hand, in this case coastal resource management, while on the other hand, people are either unwilling or unable to get the process started without your help. On the one hand, local people feel that the only way to get people to attend a meeting is if the invitation comes from a prestigious outsider, while on the other hand, doing so will probably lead to unreasonable expectations and dependency. The thoughtful outsider is always going through a process of self-evaluation that, hopefully, will minimize dependency (Burkey 1992).

One of the most effect, yet most challenging, means of avoiding dependency is to concentrate one's efforts on the *process* of development rather than the *products*. In line with this philosophy is the value placed on the development of human resources. To this end, CAMP hired Kenneth Fox, a local Pearl Lagoon farmer with development experience with a foreign development non-government agency, CEPAD. Participants in the research group selected Kenneth for the communal investigator position and have subsequently expressed there satisfaction with that decision. In agreement with our hypothesis, the continuation of research tasks during a one-month (September, 1994) absence by the project co-coordinators was made possible since Kenneth and the students involved felt comfortable with the forest survey methods that CAMP is employing.

Nonetheless, while Kenneth and the other communal investigators have taken on valuable roles in terms of working with the steering committees in the accomplishment of its tasks, certain tasks remained the project co-coordinators' responsibility. The administrative tasks that required interacting with the CIDCA Managua office for the securing of the foreign funds for CAMP was mainly Patrick Christie's responsibility. This may be due to the fact that Patrick Christie played an important role in the preparing of the original grant proposal. It also may have to do with the expectation on the part of CIDCA to have foreigner as the head of this project, a common scenario for CIDCA. During Patrick Christie's absence in 1995, Roberto Rigby took over this task, however he encountered many difficulties in carrying out his responsibilities. One possible explanation for Roberto Rigby's experience may be the strong cultural barriers that lie between the Mestizo of the Pacific Coast and Creole/Indigenous people of the Atlantic Coast. A foreigner more easily transcends such barriers, although other cultural barriers exist.

In any case, the dependency of a participatory research process that has largely been initiated by an outsiders with the agreement of local people is apt to be greater at the initial stages than at the later stages, given that the outsider is conscientiously passing on his responsibilities to willing people (Maguire 1987). This seems to be supported in the results of this study. The steering committee has taken over many of the responsibilities necessary to organize a meeting (Table 30). In addition fewer participants in the research group felt that CAMP would stop if Patrick Christie left in October, 1994 than April, 1994 (Table 32). Although the project stopped to a great extent in Patrick Christie's absence due to lacking funds, the feeling that people have the desire and belief that they can carry through this process is significant.

Table 32. Likelihood of continuation of activities without Patrick Christie (n=5)

Month of Interview	Number of persons said CAMP would stop if Patrick Christie left	Number who said that CAMP would continue if Patrick Christie left
April 1994	4	1
October 1994	1	4

Ultimately, many organized responsibilities have been passed to an individual that is receiving a salary from a one year grant, therefore the potential for dependency on someone who may shortly leave their responsibilities is considerable. If Kenneth Fox is seen merely as a replacement for Patrick Christie or Roberto Rigby than the level of dependency of CAMP on either outsiders, or locals who are motivated at least partially by a salary, is likely to negatively affect the viability of the participatory research process. This is how at least a few people perceive Kenneth's position. One research group member referred to Kenneth as an

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"assistant to the co-coordinators", while another assigned him a position of seemingly greater status - "coordinator of community work." Whether people have simply shifted their dependence onto Kenneth is not clear, however it is significant that Kenneth is a local person with literacy campaign experience and has gone through a participatory research training program that stressed self-reliant development.

Also, it should be kept in mind that viewing dependency as merely a one-way relationship is misleading. In every community, individuals exist that see change as a mutually supportive process that does not view the outsider's skills and resources as any more important than the communities' resources.

> And what helping you a lot is that the community
> involved in give you support. This is what giving a
> push.
>
> (Johnny McManus 10/23/94)

While this may be the case, one should also not be deluded into thinking that the potentially negative effects of dependency are equally harmful for the outsider who may return home at will and the community.

Nonetheless, the participants in CAMP from Haulover and Pearl Lagoon have begun to take matters into their own hands. By requesting, without the persuasion of the co-coordinators, that the laboratory and APN support be passed to CAMP, they are looking for means by which they will be able to avoid dependence on outsiders, or at least make a contribution to the project that is at least as great as any made by the coordinators. Although, ultimately, they will still be dependent on CIDCA, financiers, and the coordinators, it will be a case of mutual dependence among the various actors. Given the nature of the goals of CAMP - to assess the area's natural resources and develop a management plan - which are activities that cost a significant amount of funds and resources in most cases, a certain level of dependency on financiers and outsiders will probably be inevitable. The analysis of this dependency on funds needs to be expanded. This is the nature of the following analysis and will be a continued component of this study.

So far, the analysis of viability has concentrated on the roles of people and level of organization, which is very much a part of the social psychology school of thought. Another important component of viability, the accruement of resources, is suggested by both the literature and the common sense of anyone with experience in project development.

Resource Mobilization

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Given the economic crisis and post-war chaos that Nicaragua is currently going through, the overriding consideration when considering resource mobilization is the general instability and hardship that people must face on a regular basis on the Atlantic Coast. This hardship sets the stage for any development, resource management, or research project. Given this fact, it is logical that people are attracted to well funded projects that have plenty of resources.

> Groups with money continue, those without go
> down.
>> (5/14/93 Albert Downs, Pearl Lagoon Town)

> Some people are only interested if you could give
> them some money.
>> (6/25/94 Jimmy Bryant, Haulover)

> I don't want to say, the money in this thing. I don't
> really want to say it. When they see this man, like a
> man who could get them money, would attend this
> meeting more. I don't know, (if it's) 'cause of this
> revolution, the contra...
> (6/30/94 Steve Temple, Pearl Lagoon youth)

Poverty, coupled with a history of paternalistic development in which political favors were purchased through hand-out projects, has bred a culture of dependency in Pearl Lagoon. Currently, at least seven development agencies have projects in the Pearl Lagoon basin. Every community has a relationship with at least one of these organizations. Unless a person on the edge of survival can gain something financially valuable through his/her participation in a project time spent participating may be an expensive luxury. When asked why people have stopped participating in CAMP, the most common responses have been:

> Because of the economical situation.
>> (Mary Brighton, 10/19/94)

> ...people are busy. They have to harvest their food.
> The economic situation is bad.
>> (Johnny McManus, 10/23/94)

Some local people have become dependent on development aid. In terms of related development projects, of special relevancy to CAMP are the *Ayuda Popular Noruega*-supported Haulover Marine Laboratory and the Dutch/Nicaraguan government bilateral aid project, DIPAL. Both of these

projects are aimed at the sustainable development of the Pearl Lagoon commercial fishery. APN started in 1988 by building a ice making plant, the laboratory, and organizing a lagoon-wide fishing union. The project has been plagued with corruption and incompetence throughout. Furthermore, the exclusive hiring of plant administrators from Managua and the poor relations between the laboratory and local fishers has led to the formation of large barriers between this project and the communities. APN maintains that it has spent at least one million dollars (US $) in the area with little result.

DIPAL began in January, 1994 and at an opening ceremony pronouncing it's plans and large budget of 1.2 million dollars (US $). The meeting nearly broke down when local fishing union officials demanded that DIPAL consider a different Nicaraguan implementing agency then MEDE-PESCA, the Nicaraguan bureau of fisheries development that has a reputation of corruption and favoritism to foreign commercial fishing interests, and that local people have an opportunity to have input into the project's plan. DIPAL has subsequently continued by building a office in Pearl Lagoon Town complete with computers and air conditioners, built a new two-story laboratory in Haulover (in addition to the APN laboratory), and outlined a plan for the purchasing and marketing of fish from Pearl Lagoon, all of which has raised great expectations amongst the local fishers. DIPAL has also hired 5 local people as secretaries and field workers and begun to organize a board of local fishers that are suppose to act as advisors to the project.

Both APN and DIPAL are well endowed with resources, but this has not been necessarily to their advantage since local people feel as though these projects have preyed on their poverty and squandered their finances on wasteful activities. Using their poverty to justify large salaries in the capital city.

> The rich use the poor as a bridge.
> (Johnny McManus, 2/3/93)

Furthermore, most of the high expectations usually lead to disappointments as the direct economic benefits of these large-scale projects rarely materialize.

> We live in the promised land... People come and
> make promises and then leave.
> (Ervin Roy, 2/3/94)

Obviously a cynicism about large development projects exists in Pearl Lagoon. Nonetheless, people are still attracted to them in the hopes that they may gain something personally.

In this context, CAMP is an anomaly. In 1993, the project had no budget. At this stage of the project, few resources were needed besides a meeting place, which was generously provided by the local women's sewing cooperative, and water monitoring equipment, which were brought by Patrick Christie from the University of Michigan.

In December of 1994, the International Development Research Centre (IDRC), accepted the proposal for approximately $US 10,000 in funding that had been developed by Patrick Christie and Roberto Rigby. In anticipation that the funds would soon arrive, and perhaps, in the hopes of proving their efficacy as fund-raisers *vis a vis* DIPAL and APN. In February, 1994 Patrick Christie and Roberto Rigby announced to the research group the small grant that would cover the project's expenses and a salaried communal investigator. The arrival of funds from Canada was delayed fifteen months due to the reorganization of CIDCA and the unresponsiveness of the Ministry of Foreign Cooperation, the government agency that must approve all foreign aid. Fortunately, the fellowship for Patrick Christie was enough to cover basic meeting and research costs, as well as the communal investigator's salary in 1994. Eventually, the funds arrived in May, 1995. The building up of anticipation for the funds and the subsequent negative effects of its delay was an important theme for CAMP in 1994 and the first half of 1995, and one that continues to plague the progress of CAMP today according the communal investigators. It distracted staff from concentrating fully on the work at hand and now prevented the communal investigators full freedom to travel in the lagoon.

> I feel to myself like it (the research) is OK, but what we need is transportation and "viatic" (daily stipends) to visit the other communities.
> (Communal Investigator, 3/2/95)

It is difficult to place the blame for the delay of funds on any one entity. The CIDCA Managua office maintains that the check sent from IDRC did not have a project identification number on it and as a result it was lost within the University of Central America bureaucracy and that the communal investigators have not supplied the necessary reports to access the travel funds and . The communal investigators maintain that the Managua CIDCA offices do not wish that projects are managed on the Coast, or at least do not prioritize the needs of projects while foreign coordinators are out of the country.

The expectations that have been set by the large-scale development projects are high. For example, both APN and DIPAL use 65 horsepower outboard motors on $7000 fiberglass skiffs for transportation. CAMP uses a 9 horsepower outboard motor on a $700 wooden skiff. While the continuation

of certain CAMP activities, such as forest surveys requires transportation, it is possible that too much attention is being placed on the limits of CAMP's resources rather than finding creative means of overcoming these limitations or redirecting some of CAMP's energies to activities that do not require such resources.

Fortunately, the strengths of CAMP's community relations have allowed it to co-opt resources from local institutions such as the high school, Haulover Laboratory, and the Moravian church. Mary Brighton, a high school natural science teacher, has used the water monitoring project as a field project for her students. She has used school hours to plan and implement this program. The Haulover Laboratory has allowed CAMP to use their lab space for the water testing, a decision promoted by Roberto Rigby to improve the historically poor relations between the laboratory and the community. CAMP meetings take place at the Moravian Church's meeting hall and the secretary types the invitations. As McCarthy and Wolfson (1992) have pointed out this type of co-optation is quite common among social movements and may lead to greater acceptance within the community. It is likely to have a positive impact on the viability of at least the water monitoring program. A 1993 participant in the water monitoring program encouraged Patrick Christie to work to incorporate the water monitoring in the regular school curriculum in order to improve its viability.

> The water testing, I feel like that going to come
> strong man, Patrick. You know that's how I feel...
> Try to work it into the school, then. Get this thing
> into the school. This come to like a tradition two
> time a year.
> (Steve Temple, 6/30/94)

The accruing of resources to participants in CAMP should not only be thought of in terms of material gains. For example, 1993 and 1994 students cited their interest in gaining skills that they can use at a university and highlight on scholarship applications as some of their principal motivations for participating in the water monitoring program.

Nonetheless, given the context in which CAMP exists and the task that it has set for itself, it is difficult to argue against the importance of funding resources for the maintenance of its current form. This may ultimately mean that CAMP will necessarily take a different form once funds diminish or are terminated. Nonetheless, the value of the accomplishments of CAMP - the raising of environmental consciousness, the establishment of a management plan, the launching of educational careers in natural resource disciplines among local youth, will not be diminished if ultimately CAMP changes its form.

In conclusion, while CAMP has been successful, either through outside assistance or co-optation of existing institutions, to accrue a certain basic level of resources, it is apparent that the limitations are of concern to participants and staff. Given the economic crisis in Nicaragua and the current standards set by large-scale development projects, the limits of CAMP's resources may negatively affect its viability in the long term - at least in its current form. The resources that CAMP will gain from APN's laboratory may improve CAMP's potential to accomplish its goals by improving it legitimacy among some people. It may also damage the viability of CAMP, given the historically poor relations between the former laboratory director and local people. Most interviewees, when given the opportunity to question Patrick Christie at the end of each interview, focused their questions on the continuation of some level of financial support to CAMP in Patrick Christie's absence. Nonetheless, so far, the participatory research process is continuing at least at some level regardless of the constraints it has faced and perhaps has avoided the pitfalls of some of the large-scale projects such as pessimism over the true objectives of a project.

The dynamics within the participatory research process employed by CAMP cannot, however, be completely understood by merely looking to the resources it has mobilized. Rather, one must also consider the social context of this project. Recently, the move towards melding the resource mobilization school of thought, with social psychologist theory has been particularly effective in providing a comprehensive view of social movements. Therefore, although not directly addressed in formal interviews, a number of interesting relations between CAMP and the culture and political landscape at the local, national, and international level will now be presented.

Frame Resonance

CAMP is operating in a complex social landscape. The Atlantic Coast is a place where indigenous cultures have interfaced and clashed with Mestizo, British, and North America cultures. Pearl Lagoon Town elites appropriated the indigenous lands of the Miskito communities Haulover and Raitipura through legal tactics in the early part of this century. The Contra War on the 1980s destroyed whole communities and displaced thousands from the Coast. Young men from Haulover committed such atrocities as killing whole Pearl Lagoon families by lobbing grenades in windows at night, stating that these families were communist and had abused their communities for decades. Except during the Revolution, multinational enterprises, with the aid of corrupt Nicaraguan government officials, have been active in the extraction of timber, agriculture, and fishery products from the Coast for four centuries. In response to resource destruction and the ensuing poverty, development based on modernization theories that stress technocratic fixes to complex

problems, have become the norm. Even in the seemingly innocuous realm of research, local peoples have felt exploited by researchers that collect valuable information from in the communities, yet give nothing in return.

Within this remarkably complex context, the participatory research process employed by CAMP has been described by its participants as something novel in Pearl Lagoon. This may be their impression, but it should be kept in mind that the most popular components of the Sandinista Revolution, such as the literacy and health campaigns were largely based on the writings of Paulo Freire (1993), one of the original proponents of participatory research. All of the Nicaraguan staff involved in CAMP were active participants in the literacy campaign during which they traveled to remote communities on the Atlantic Coast for months at a time to teach basic literacy skills and to partake in community life.

The resonance of the participatory research process employed by CAMP with either cultural or master frames of the Atlantic Coast was inductively researched. The results have uncovered resonance and discordance between this process and the existing frames. The participatory research process resonates with the distrust of elites and of people from other parts of Nicaragua that are immigrating to the Coast. In a more positive light, it also resonates with values that stress education.

In 1993, as demonstrated earlier, participants in CAMP were able to identify solvable problems that they had in common. This meeting and the process it employed provided a venue for farmers and fishers to come together to discuss common problems that they faced, therefore the process was able to resonate with the struggle to survive which almost all people on the Coast must face.

As the Coast has been visited, and in most cases abused, by foreigners, a certain level of distrust of foreigners has been bred. It would be misleading however to over emphasize what we consider a healthy distrust of foreigners. *Costeños* are extremely welcoming and giving people, but, like anyone, they do not wish to be taken advantage of.

Local people are also distrustful of the government agencies and employees that have played a part in the squandering of the Coast's rich natural resources. This cynicism includes the opinion of leaders who maintain they are common *Costeños* with the best interests of the Coast at heart. While addressing the National Assembly delegation head in June, 1993 the frustration of not being heard by those in power is evident.

> It not what... Ray Hooker want to tell me... But
> what I *feel*, and what I *think*, and what I *live* here
> on the Atlantic Coast. Ray Hooker not a

fisherman, he don't know what I feel. So *I* feel and
I going to tell what I feel, what I live, what I
experience. And I think this will be sufficient. Mr.
Ray Hooker tell me what he *want*, but he can't tell
what to believe. But I livin', feeling that what I
pass here in life.

(Johnny McManus, 6/16/93, Italics represent
inflection in the voice.)

The distrust of privileged people is based on years of oppression in which
knowledge and rights were disregarded. As a result, they conclude that the
elite can never know what it feels like to be a poor fisher or farmer.
Participatory research was born out of the need to give voice and strength to
Brazilian illiterate people. It has since become a tool for disempowered
people throughout the world.

Another distrust expressed by some people at CAMP meetings is that
which is directed towards that "Spaniard" colonizers from the interior of the
country.

There are 3000 hectares of land in Patch river (the
western portion of Pearl Lagoon basin). Who are
we loosing it to? The Spaniards! They cut down the
land. Plant grass. Then sell it. They then make it
bigger. But it's *ours*. The land is going to become a
savanna, then a desert. What do we have in the
Pacific? Many of you know the Pacific. Savanna.
Peeled land. Then they have no land. In Nari
River they are coming out. Not going to have any
more fish. No more shrimps. And this we have to
stop! This is our land! And this is why we are
having this meeting.
(Edwin Morris, 5/10/94)

The displacement of Mestizos to the Atlantic Coast is without a doubt of great
environmental and cultural importance. But this is most certainly a case of
"blaming the victim" since most of these Mestizos are landless peasants who
were displaced by war or land-hungry elites.

This distrust has historic roots that reach back centuries when the
Spanish and British fought over control of the Atlantic Coast, using local
peoples as their pawns and therefore causing deep resentments on either side.
The languages and cultures of the two coasts are different. The land use
practices as highlighted above are different as well. While the participatory
process has allowed people to voice their discontent with feeling "overrun"
by the "Spaniards". It will hopefully not lead to destructive behavior between

different ethnic groups. One counteracting process has been for some farmers to reach out to Mestizo farmers to discuss their land use practices and to invite them to CAMP meetings, although this has not been very effective since meetings are conducted in English, the first language for most participants. Such negative outcomes may be avoided by improving the level of communication between ethnic groups and approaching Mestizo communities individually.

A final resonance between participatory research and feelings of disempowerment is concerned with knowledge. It has now become apparent in all resource management fields, that the opinion and knowledge of local people matters. Traditional knowledge of environmental management has proven its worth. And even if a person discredits traditional forms of knowledge, it is apparent that in most cases unless local peoples agree with a prescription for resource management implementation will be very difficult. While technicians may doubt the environmental stewardship abilities of local peoples, some of the most successful, long standing resource management schemes are based on local people's appreciation of the need to sustainably exploit resources (Ostrom 1990, Shiva 1989). Some of most motivated and effective stewards are those who are in constant contact with the resources upon which they depend. The blame may be more justifiably laid at political and economic systems that breed rampant exploitation of resources by local people in order to survive in a world market system.

When asked to express what motivates his voluntary sacrifice of dozens of hours to CAMP, Samuel relates it to his experience as a fisher and his desire to change the way resources are exploited.

> OK, Patrick, to be very honest, umm, the experience
> what I had toward natural resources as a fishermen.
> After seeing the disaster that we have in our forest
> and also the fishinin area, it always a dream... to
> think about where we could be able to find a
> solution to think about taking care of the natural
> resource.
> (Johnny McManus, 10/23/94)

It would be misleading to state that all the people in Pearl Lagoon feel this way. In fact, research group members maintain that it is probably a small percentage of the people. They feel that education of their neighbors is the only way to address this issue.

The Atlantic Coast has been researched by a number of North American and European scientists. The Autonomy process attracted many researchers interested in supporting a Sandinista program that stood for cultural autonomy and self determination (CIDCA 1987). Ethnographers and

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sociologists have studied the Miskito use of their natural resources and their relation to the world economy (Nietschmann 1973). Upon his arrival in Haulover, people were curious if Patrick Christie was going to write a book about them just as other foreign researchers had about nearby communities. Certainly, Pearl Lagoon people were familiar with having researchers among them. And while no one has ever spoken maliciously of researchers, some have expressed concern about the "mining" of information from communities without the intent of giving anything in return to the communities.

> One of the thing that we are very careful about is
> that someone come, get all the information and
> take it out and run with it.
> (Johnny McManus, 10/23/94)

Although some people, especially those who are not involved in CAMP, may at times ask Patrick Christie what his purpose is in a foreign land, the participatory research process seems to have allayed some of the reservations of those who are wary of researchers taking their knowledge for their exclusive benefit.

> One of the most apparent social values in Pearl Lagoon is that of education and preparation of the youth for successful careers.

> The people from our community here know that
> the information what we are picking up remain
> into the community. And people stay prepare here.
> (Johnny McManus, 10/23/94)

One receives the impression that few children in the most built-up community, Pearl Lagoon Town, are following in their parents' footsteps as farmers or fishers. When the group of high school students that participated in the 1994 water monitoring were asked what profession they would like to enter, all but one preferred white-collar jobs such as doctors, nurses, and business administrators. As mentioned previously, students felt that by participating in the water monitoring that they may gain skills that would help them in university or to gain a scholarship. One student's father remarked that he was fortunate to have such an experience in school that was never a part of his education. Mary Brighton, the high school teacher who is active in the water monitoring, has remarked that she has learned from the experience that teaching natural sciences in the field is more interesting for her students. The participatory research process seems to resonate with the values of *Costeños* that place a high value on education.

Youth commonly play an important role in social movements. This seems to be the case in the incipient environmental movement in Pearl

Lagoon. Two students relate their opinion that it is the youth rather than the elders of Pearl Lagoon that are aware of environmental problems.

> Jerry: I feel that idea would be for the following, our generation. Because many of our parent lacking more onto this. Them don't see no problem in that. Them drinking water for so long and not getting sick.
> Robert: As Jerry said, that would be for the more farther generation because, you see, people getting more educated. And getting more learning about things.
>
> (10/19/94)

Environmental problems, however do not seem to rank among the most serious problems that the youth face. The most serious perceived problems, both before and after participation in the 1994 water monitoring program were the lack of electricity, drugs, early pregnancy, and nothing to do.

Originally, we had hypothesized that participatory research might resonate with either the Autonomy process or the values of the Revolution. Baring the discussion of the Hooker Fishery Law on 6/8/93, neither Autonomy or the Revolution were commonly discussed. Given the horrible experience that Pearl Lagoon people passed through during the war, there may be a preference to distance oneself or any discussion from the Revolution and the associated Contra War. Regardless of whether it was the Autonomy process that actually empowered people to raise such claims to their self-determination and control of natural resources, most people involved in CAMP are of the opinion that the natural resources of the Atlantic Coast should be for the benefit of *Costeños* . When asked whether it was a good idea for local people to get involved in the research of their natural resources. Mary Brighton replies:

> That's a good idea, because it *their* natural resources.   (10/19/94)

Further disillusionment with the Revolution or Autonomy may have taken place when the Hooker Fishery Law, which was one of the first tangible attempts to give *Costeños* control of their resources, was vetoed by the President and never enacted. People often remark that Autonomy is an empty promise, manipulated by most political parties for their own goods.

In 1995, most interviewees expressed their distrust or disillusionment with the formal Autonomy process, but they also did not associate CAMP with the

Autonomy process. Rather, they commented on their struggle to gain control over their natural resources and they did associate CAMP with this struggle.

On the regional level, regional councilors, the representatives that are suppose to oversee to the implementation of the Autonomy Law, have expressed interest in CAMP during meetings between councilors, CAMP staff, and research group members. On an international scale, the participatory research process most certainly resonates with international trends in coastal resource management as previously discussed and demonstrated by IDRC's financial support.

Certainly, this process must resonate with some values or aspirations that local people have, or else they would have stopped volunteering their valuable time are requesting resources from development agencies. If and when CAMP is on a more sound financial base, it will be possible to determine the potential of this resonance. However, while the participatory research process employed by CAMP seems to resonate with certain frames on the Coast, it also seems to be "discordant" with others.

Frame Discordance

Four frames or norms that this process does not resonate with are: the general dislike for meetings, the distrust of group processes, the tendency to depend on outsiders, and the opinion that natural resources are endless and that any efforts to manage them will be a threat to the role of men as providers to the family.

When asked during interviews why certain people stopped coming to meetings, the most common responses were that the economical situation was bad and that some people just do not like going to meetings. This is not surprising and has been addressed by attempts to make the meetings shorter and more lively. The economic crisis has limited the ability of CAMP to attract the poorer segments of the population in the participatory research process regardless of their interests natural resource management. Thus, the majority of participants in CAMP meetings are students and salaried professionals, such as teachers, union leaders, and development extensionist. This issue has been discussed and the research group and CAMP staff have decided that an appropriate response would be to meet with farmers and fishers individually and ask to participate in their meetings if they are part of an organization.

The dislike and distrust of group processes was somewhat surprising to Patrick Christie at first, since *Costeños* are part of a remarkably social society. The reticence to work in a group in a project is probably a direct result of the high level of corruption in most projects and the tensions that exist between different social groups.

But it's scarcely to see a group organize... I am a
religious man, this one is anti-religious one, the
next one working there... It's very difficult. I always
see failure in farming groups here...Some come
with the intention of getting money...

(Jimmy Bryant, 5/13/93)

One-on-one contact, a method that research group members have suggested
for outreach, seems to be a logical response to these barriers to collective
action, while continuing the collective action in as transparent a manner as
possible to retain those who are involved and potentially attract potential
skeptics.

As highlighted in the earlier discussion of dependency, paternalistic
development programs and economic crisis has resulted in a situation of
helplessness.

You know we have a custom here, everybody come
and do thing for us. And by ourself we hardly.

(Mary Brighton, 4/21/94)

This is a characteristic that although deeply ingrained in some, may not
prevent participatory research efforts, since as noted earlier, in every
community there are those members that strive for self-reliance. When Mary
Brighton was asked if outside specialists should do the research necessary for
the establishment of a management plan, she still acknowledged the tendency
towards dependence, but stressed the need to get people involved in order to
raise their awareness of how natural resource misuse affects them.

Because we so use to that people coming and doing
things for us. That it be *hard* for you to do
something for yourself. See what I mean? For
example, like how you come. OK could do these
thing direct(ly for the people). I think people get
more deep involve in this thing than if somebody
just come and they do is teach this is so and so and
so. People really don't know the way *how* these
thing affect them.

(Mary Brighton, 10/19/94)

It is a objective of CAMP to bring such persons in contact with those
who feel dependent and helpless. To address the economic crisis is a more
difficult goal. But the sustainable management of resources need not be
unprofitable. For example, ecotourism and resource management schemes

for fisheries have raised the yearly incomes of Filipino fishing communities (Christie et al. 1994).

The opinion that the still relatively abundant, although rapidly disappearing, natural resources of the Atlantic Coast are endless is common, especially among older people.

> (People) feel like the natural resources can't done
> and things like that...(They say) [y]ou can't done this
> thing then, you know. So it no use in try protecting
> this thing when you can't done it. Some say, we
> just hearing about this thing. From so much years
> we living like the older ones then. So much years
> we living. And this thing never yet done. And we
> living so long and we have this thing in
> abundance.
> (Steve Temple, 6/30/94)

Unfortunately, the age of seemingly limitless resources is over in Pearl Lagoon. Fishers are already complaining of lower catches.

> Before the hurricane, fish were plentiful. Fishers
> destroy their own resources. Gill nets are wasteful.
> (Fishing union member, 2/3/93)

The idea of natural resource management, if not presented tactfully does not sit well with the value of the man as the provider of food and income for the family.

> It could be an insult to a man to tell him not to
> hunt... If you tell a hunter not to hunt, he is going
> to say that he has 6 children....'
> (Jimmy Bryant, 5/19/94)

As demonstrated in the Philippines, coastal resource management need not be seen as a threat to a way of life, rather it can be supportive. This depends on the level of input that local people have in the shaping of a management plan. Furthermore, as Shiva (1989) has demonstrated, women have a valuable role to play in resource management. The role of women as resource stewards on the Coast and the potential threat of the resource management to traditional means of providing needs further investigation.

In conclusion, the participatory research process employed by CAMP seems to resonate with sentiments in Pearl Lagoon that are characteristic of disempowered people, most notably, the frustration of local people with a

political and development model that they feels has not represented their rights and interests, the frustration of those whose knowledge system has been discredited, and the distrust of people from different parts of Nicaragua that are perceived as a threat. It also resonates with the forward-looking perspectives of those who see education and resource management as necessary. Unexpectedly, it does not strongly resonate with the formal process of the Autonomy law or the Revolution, or at least it is not openly professed.

The process is potentially in conflict with a number of other frames present on the Coast, namely the general disinterest in meetings, the distrust of group-centered development projects, the feelings of dependency on outsiders, the belief by some that resources are endless, and the potential perceived threat of natural resource management to the traditional role of men as providers.

The original intent of this portion of the analysis, to inductively investigate potential resonance between the participatory research process and viable existing frames. The resonance of CAMP with certain frames has already demonstrated that this has aided the viability of the participatory research process.

Conclusions

The analysis presented has attempted to address some of the most salient questions surrounding the viability of the participatory research process employed by CAMP. Few longitudinal studies are available for similar processes. This analysis focuses its attention on questions that were raised by the participants in CAMP and social movement theory.

This investigation has not, however, directly addressed the question of the affects of power struggles between classes in a Marxist sense. Such an analysis may help to explain the relation of the research group with local elites and with people who are even further disenfranchised themselves, such as landless Mestizos. This will require further investigations and analysis with this framework in mind.

The relations with other development projects such as DIPAL and APN was also not sufficiently addressed beyond the context of dependency. This is principally due to the fact that such an analysis necessitates a longer period of interaction between CAMP and DIPAL before meaningful conclusions can be made. Most certainly, this interaction will have major implications for CAMP given the style of research that DIPAL has chosen to employ and the relative power that DIPAL's funding offers it. The fact that research group members have chosen not to enter into a formal agreement of cooperation is significant and may indicate their concerns that DIPAL will monopolize or co-opt the project they have associated themselves with.

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An analysis of the level of organization in 1993, 1994, and 1995 indicates that this factor is critical to the viability of the participatory research process employed by CAMP. Significant improvements in the level of organization in 1994 seem to indicate that viability beyond 1995 is possible.

Dependency on outside agents or finances is of interest to theorists and practitioners of participatory research. These findings indicate that the steering committee for CAMP has taken over significant responsibilities, however many responsibilities still rest with the communal investigators and co-coordinators. A certain level of dependency on outside funds in order to reach the goals that have been set seems inevitable and is borne out by the stoppage in activity in the absence of support.

CAMP has been successful in accruing basic necessary resources through outside sources and through co-optation of established institutions in Pearl Lagoon. Both participants and communal investigators are concerned with the level of resources that CAMP has access to. Problems resulting from funding delays and the high standards set by well-funded development projects may negatively affect CAMP's viability. This may shortly change with the transference of the APN laboratory to CIDCA.

Finally, the participatory research process employed by CAMP resonates with a number of viable frames established in Pearl Lagoon, however, it also conflicts with other frames. Those frames which were identified as significantly affecting the viability of the process will be under further investigation.

COMMUNITY CASE STUDIES

These case studies were prepared by two of the communal workers to highlight the communities in which they work and the progress of their efforts. The co-coordinators of the project have decided not to edit their documents, in order to maintain their perspective as people from these communities.

ORINOCO, prepared by Bonifacio Gonzalez:

I) Introduction:
    A) Overview of community:
        1) Ethnic Groups: Garifona, Creoles, Mestizos
        2) Population Size: 1550 people.
        3) Economic Situation: Eighty percent of the population are unemployed.
        4) Occupations: The people depend on farming and fishining. The others are teachers, preachers, councilors, and the heads of different organizations such as the pineapple project, the tree nursery, and the fishing project. The first two projects are sponsored by FADCANIC and the last one is sponsored by APN and DIPAL.

    B) General description of work:

        I have formed a CAMP commission in each community. We have meetings where we discuss different items and explaining things clearly.

II) Natural resource situation:

    A) Main natural resources problems in the community:
        1) Exploitation of the natural resources without control.
        2) Burning of the forest in the summer.

    B) Feelings of people in the community about natural resources situation:
        Many people think that natural resources were created by God, so everything is eternal. And other people are saying that many years ago, there were a lot of fish, shrimp and logs. But now things are getting fewer. Some are saying that there should be some control plan set by the people and government in order that the resources could increase. Before establishing a control, they say that the government should make some alternative (incomes available).

III) Tools and mechanisms:

A) Ways to get the participation of people:
Inviting them to participate in different workshops on participation and ways to better their social relations. Also whenever the organization is going to elaborate a yearly plan, they must invite people from the communities to participate in the elaboration of the plan.

B) Ways I use for the message of CAMP to reach the community:
1) through the pastors of different churches.
2) visiting home to home.
3) by holding activities in the schools where students participate.

C) Ways to collect data:
1) orient people how to fill out the fish catch data forms.
2) visit people house to house.
3) interviewing.
4) keeping a journal.

IV) Evaluation of CAMP

A) Strengths of CAMP
1) Working through the different problems in the communities.
2) Fishermen and fisherwomen and students are moving the whole communities around the CAMP program.

B) Weakness of CAMP
1) CAMP doesn't have enough money to hire more workers in every community.
2) CAMP doesn't have a means of transportation
3) All of the workers are men.

C) What are some problems that you are confronted with?
1) Transportation is so difficult in the lagoon that it does not permit us to reach meetings in time.
2) Communication between communities is difficult.
3) The administration of the project is bad, so that we don't get our salaries on time.

V) Relation of CAMP in the communities

A) Feelings and opinions in the communities about CAMP.

It is one of the most important projects because it is concerned about natural resources, which is what we depend on for our living.

B) Are people aware of the main objectives of CAMP?
Yes, people are really aware of the main objectives of CAMP.

C) What is the impact of CAMP on the communities?
It really has a great impact on the communities due to the participation of the teachers, members of the fishermen and fisherwomen coops, and the students.

D) What is the relation of CAMP to the poorest people in the communities?
We have many people we consider the poorest people that are now integrated in the commission of CAMP.

E) What is the relation of CAMP to other organizations?
CAMP has a good relation with many of the organizations that are working in development projects in the communities. CAMP has many things in common with other NGOs working on natural resources. With men and women organizations and teachers we share together during meetings promoted by CAMP.

VII) Participatory research

A) Do people in the communities have interest in research?
Yes, because people have been seeing the effectiveness in research before you do any project. But not all people feel this way. But we are teaching them the basic skills of doing research and the effectiveness of research, so that with time they would be involved in this process also.

VIII) Recommendations

A) Materials
Having a boat with a small engine would allow investigators to carry out CAMP programs to other communities more often. I need a better salary.

B) Education
I plan to capacitate myself better by taking courses in forestry and fisheries.

KAKABILA, prepared by Ray Garth

I) Introduction to community:

Kakabila, which means the mouth of a seed, consists of Misquito speaking people and also Creoles. This community has a sukia, that cures thousands of people from all over the world by using herbs. This community has always had a sukia that cures by herbs and prayer. The predominant two religions are Anglican and Catholic. Both leaders are from the community. The community also has four teachers and one pre-school teacher.

A) Population size:
The population is 310 people and the majority are men.

B) Economic situation:
The economic situation of the community s very bad. There is no type of work. People only depend on fish, shrimp, and green turtle.

C) Occupations:
Most people are homekeepers and farmers. There are two ministers and four teachers.

D) Organizations in the community:
There are a few groups: the women's coop, the fishermen's coop, the farmer's group, the church group, and the CAMP group. I am working with the women's coop, the fishermen's coop, the farmer's group, and the CAMP group.

II) Description of work:

A) Activities accomplished:
I have organized meetings, put posters in the community, visited home to home, and walked in the forest and commented on what I saw.

B) People that I am working with:
I am working with 28 women from the coop, 18 men from their coop, 4 teachers, 5 CAMP staff, and 13 sixth grade students.

III) Natural resource situation:

The main natural resource problem is that they are finishing. People once use to find logs to build canoes near the community. Today, people have to buy logs. Shrimps and fish are the same.

This year, people haven't caught shrimps and people are strongly talking about this situation. The people are sad about the natural resource situation. A great number of people depend on natural resources to school their children, to buy clothes and shoes, and to build their houses. If the natural resource should finish, it would mean that the majority of students from the Pearl Lagoon area would have to stop studying.

People would be happy with a plan to control the use of natural resources, because it would be the only way to better this solution. At first, people was saying that the shrimps and the fish cannot end, but today people realize that without a good control of our natural resources, they can be finished completely.

IV) Tools:

A) Ways to get the participation of the people:
One of the ways I use to get people to participate is by visiting home to home and talk with them when they are free. In a meeting, sometimes I ask a direct question. In a workshop, people express their feelings after it is over.

B) What ways I use for the message to reach the community about CAMP:
The ways that I use is by nailing posters in different parts of the community, by calling meetings and explaining the objectives of CAMP, by visiting people at home, by talking to people on the streets, by talking to people while they are going to their plantation, by talking to people while they are going to feed their hogs, and by organizing a CAMP group. I use posters, so what I write remains to show to the other groups. If a group does not agree with something, we change it and circle the question. Then in the following meeting we discuss the question that is circled.

C) Ways that I collect data:
I collect data by visiting home to home, visiting different communal meetings, by talking to different coop leaders, by visiting the sukia, teachers, and farmers, and writing my weekly journal.

V) Evaluation of CAMP

A) Strengths of CAMP:

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At the beginning of CAMP, it was weak, because people never understood the objective of CAMP. But today, the majority of people are shoulder to shoulder with CAMP. People realize that CAMP is one of the only organizations that works together with the people and also respects their opinion, teaches people to handle their fish data, and gives a clear understanding about their natural resources.

B) Weaknesses of CAMP:

The weaknesses of CAMP consist of three points: the administration, the communication between communities, and the lack of transportation.

C) What were some of the problems that I confronted in my work?

At first people never use to come to meetings when we had them. Some people asked if CAMP was going to help them economically. People use to ask if it was a political movement. Today, our people agree to work shoulder to shoulder with CAMP.

VI) Relation of CAMP to other organizations:

CAMP has a very good relation with other organizations and projects like: DIPAL, APN, MARENA, MAS-PROMAD, the health department, and the regional council.

VII) Participatory research:

A) Reaction of people to participatory research:

At first, people were ashamed to participate in meetings, so we decided to make home to home visits and to speak to people in their language, Mosquito. Today our meetings have a strong discussion about our natural resources and what people should do to control them so they don't finish. People agree with participatory research.

B) Impact of CAMP on the community:

CAMP has a strong impact on the community and also the Pearl Lagoon area. People really agree that CAMP should work some more years around the area educating some more of our people, teaching the youth about our natural resources, and different ways to make investigations and collecting data.

C) Relation of CAMP to the poorest people in the community:

>   CAMP has a good relation with poor people, because they are the
>   ones who express to you their problems and feelings toward the
>   situation of our country and they are the first ones to get up and
>   work with CAMP hoping that this is the real solution to our
>   problem of natural resources.

D) Relation of CAMP to women in the community:

>   We work closely with 28 women from a coop group. They are
>   promoting CAMP in the community and agree to make control
>   of our natural resources, before it is too late.

E) Do people in the community have interest in research?

>   Yes, people from the community that work with CAMP are
>   really interested in making research about forestry and fish. But
>   there is a economical problem, so they cannot devote all their
>   time to collect information daily.

VIII) Recommendations:

A) Ways to improve our communications:

>   To improve communications we need to meet at least once a
>   month to plan together. We also need a small motor and canoe
>   to guarantee our transportation for water testing and to visit
>   different areas of study.

IX) Future Plans:

>   Our future plans are to involve more teachers, students, and
>   pastors to participate in the work. We plan to guarantee better
>   data taking and to involve more women in the research. We
>   would like to have at least two more years of research.

STRUCTURED INTERVIEW, MARCH 1994

PRE-INTERVIEW

START CASSETTE

DESCRIBE WHAT WILL BE IN THE INTERVIEW:
In this interview I will asking you many questions about the Coastal Area Monitoring Project, the project that we were working together on last year. The questions will be related to three main points. There will be:

  1) questions about what happened with the work that we started while I was away in the States from June to January;

  2) questions about which direction the project should go;

  3) questions about if an evaluation program should be started for the project.

DURATION OF INTERVIEW: This interview should last about 1 hour.

WHO WILL BE INTERVIEWED:
 I will be interviewing all of the people that regularly attended meetings last year at the 'Sewing Taller' about the natural resources in the Pearl Lagoon area. These people are: Edwin Morris, Patrick Eaton, Jimmy Bryant, Mary Brighton, Ernest Till, Doreen Singer, and Johnny McManus.

INTENTION OF INTERVIEW:

  I hope that the information from this interview can be used for my studies at the University of Michigan with my thesis. I also hope that this information can also be used for the improvement of the project that we have started. If the group that we worked with last year at the 'Sewing Taller' is interested, I will summarize the results of these interviews and present them at one of our meetings. Is it OK with you if I use the results of these interviews for my thesis?

Is it OK if I record this interview with this tape recorder so that I don't miss any important information. If at any time during the interview you would like to stop the tape recorder, please ask me and I will turn it off. I will take the cassette to my office in Bluefields and type out what you said during the

interview, analyze it , and if you like present the results to you personally or in a meeting.

All of the information from the interview will be confidential. This means that your name will not be mentioned in any report or thesis that I might make.

I am asking you to do this interview for two reasons:
  1) for my thesis at the university I need to document what is happening with this project;
  2) I also want to hear what people think of this project so that we can work together to improve it.

INTERVIEW

Before I start the interview, I would like to review what was happening with the project just before I left for the States in June. There were 4 main points with the project then:

  1) there was a program to test the water from Mos Mos creek with a group of students from the Institute. By May they had finished there testing and by June they had written a report about the quality of the water for the fishing union and the institute;
  2) there were also the meetings that we had at the Haulover 'Taller' to identify the most important problems that you have with natural resources in the area. The group decided that there was a need for regulations to control the exploitation of natural resources in the area;
  3) as a result of these meetings the group decided to have a larger meeting at the CIEETS hall in Pearl Lagoon to discuss some regulations that might be useful to control the exploitation of natural resources. At this meeting we also discussed a law from Ray Hooker to regulate the fishing here on the Atlantic Coast.
  4) The last point of the work last year was that a small group of people met to take the results of the meeting at the CIEETS hall about the Hooker law and to prepare a document for a delegation that was coming with Ray Hooker to Pearl Lagoon.

Then I went to the States from June of 1993 until January of 1994 to write my thesis for my Master's.

The first part of this interview is about the time when I went to the United States from June to January. I would like to know what happened here with the project that we were working on together called the Coastal Area Monitoring Project while I was away.

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_____ (name) did any activities related to the coastal area Monitoring Project take place while I was in the States from June to January?

What were these activities?

Probe:
How was this activity?
Who was involved?
Where did this activity take place?
When did this activity take place?
What were the results of this activity used for?
How do you feel about this activity?

I would now like to ask some questions about each part of the Coastal Area Monitoring Project.

Did the students continue the testing of Mos Mos Creek or any other water during the time that I was gone?

Probe:
How did they do the testing?
Who was involved?
What did the test?
Where did they test?
When did they test?
What were the results used for?
How do you feel about the work that was done?

(For the teacher:

If the water testing didn't take place, was there interest in conducting the testing?
What were the reasons that you and the students wanted to test the water?
Is there interest now to continue this work?)

I would like to ask some questions about the participation of the community in the review of Hooker fisheries law. Before I left, a small group of people met to review the law and make some suggestions to improve it. I left before they presented their suggestions to the delegation with Hooker that came at the end of June last year.

Was the work continued that was started to review the Hooker fisheries law while I was away?

Probe:
How was this work carried out?
Who was involved in this work?
What did they do?
Where did this work take place?
When did this happen?
What were the results of this work used for?
How do you feel about the work that was done?

What do you think made it possible for (or prevented) this work to/from be done?

Before I left for the States, there was a meeting of community leaders and people who had participated in the Coastal Area Monitoring Project at the CIEETS building. One of the purposes of this meeting was to review some possible ideas for regulation of the natural resources around Pearl Lagoon. To establish what is called a management plan Do you remember this meeting? (If not, try to refresh the interviewee's memory.) I would now like to ask some questions about what happened with this work while I was away in the States.

Did the work to establish regulations of the exploitation of the natural resources around the lagoon continue while I was gone?

Probe:
What work was done to establish these regulations?
How did the people involved do this work?
Who did this work?
Where was this work done?
How do you feel about the work that was done?

What do you think made it possible (or prevented) the work to establish some regulations for the natural resources in the area continue after that meeting at the CIEETS building?

Do you think that now there is interest to continue working towards establishing regulations for the natural resources in the area?

I would now like to change the subject of the interview, but before I do that I'd like to review what you told me to be sure that I have the main points correct and so that you can add or change anything that you like.

- Review main points from notes -

Is there anything you would like to add or change?

Now I would like to ask you some questions about my role in this project.
Please think back on the work that I've done last year and this year.

- Pause -

What do you think my role in this project is?
Do you think that the coastal area monitoring project would continue if I left
tomorrow?
Why do you think it is this way?

Now that I have a better understanding of what happened with the project
while I was away, I'd like to ask you some questions about the future of the
project.

What are your goals for this project?
How do you think we can reach these goals?
What materials would we need to reach these goals?
What kind of information would we need?
What kind of funds would we need to reach these goals?

As the last part of this interview, I would like to know what you would think
about an evaluation program for the coastal area monitoring project. Do you
know what an evaluation program is? An evaluation program, as I see it, is
when some one studies a project to see how it is functioning and how it can
be improved. This evaluation could be done by me or by other people
involved in the project.

Do you think that there should be an evaluation program for the coastal area
monitoring project?
How should this evaluation be done?
Who should do this evaluation?
What kind of things do you think it would be important to check on with this
evaluation program?
When should this evaluation be done?
How do you think the information from this evaluation could be used?

Do you think that it would be possible to involve people from the communities in this evaluation?

How do you think this could be done?

Sometimes people from the communities who work on projects participate in the collecting of the information for an evaluation.

Would it be possible to do something like this here?

How do you think this could be done?
Who could we involve in this work?

This is end of the interview. I would like to thank you for your participation. Do you have any questions that you would like to ask me?

-Pause-

Is there anything that you would like to add to your interview answers?

PRE-INTERVIEW

This is an interview that Kenneth Fox and Patrick Christie will be using in the communities of Haulover and Pearl Lagoon. The interview will ask questions about your goals for CAMP, how you feel the project is coming on, if you have any suggestions for how to improve CAMP, and what you would like to do with CAMP in the coming year.

The interview should take about one hour.

We will be interviewing people who were active in CAMP and people who use to be active in CAMP.

The most important purpose of this interview is to learn what you think about CAMP so that we can work together to improve it. Patrick would also like to use the results from these interviews for his own studies. Is this OK that he uses these results for his studies? You should realize that all of the information from this interview will be confidential. This means that your name will never be mentioned in any report or to another person when the results of this interview are presented. We are planning on presenting the results of these interviews to the group in the meeting this November.

We would like to tape record these interviews so as not to miss any important information. Is this OK? If at any time during the interview you would like to stop the recording, please just ask me.

We hope that you feel comfortable enough that you will be willing to be frank with us. The only way that we can work with you to improve CAMP is if you give us the truth, so please feel free to constructively criticize either us or CAMP. (Don't worry, I have thick skin!)

So, before we begin, do you have any questions?

Goals:

For any project it is important to have a goal.

Mr./Miss _____ what is your goal for CAMP, now that you've been involved in it for awhile?

How do you think that we can reach your goal?

What do you think might hinder us from reaching your goal?

Right now, CAMP is working in a general way. We are working on water quality, forest investigations, and fish investigations in the lagoon. Do you feel as though CAMP should focus on one of these areas or should it stay general?

If we should focus on one kind of work, what should it be?

Why?

Since people who participate in CAMP do it as a volunteer, we would like to know what motivates people to participate in CAMP.

What motivated you to participate in CAMP?

Participatory Decision Making:

I would now like to ask you some questions about how CAMP is being carried out.

How do you feel about the way that decisions were made about what activities were started in CAMP?

How do you feel about the way that decisions were made about how money was spent?

Do you feel as though usually the decisions that were taken in CAMP were made together by the group and the people working full-time for CAMP?

Do you feel that this is a good way to make decisions?

Do you feel like we could improve the way that decisions are made in the project? How?

Empowerment:

Now let's say that MARENA said that they are interested in helping us establish a forest reserve in Pearl Lagoon. Do you think that you could present the necessary information about CAMP and the investigations that have been carried out to MARENA?

If not you, than who do you think could do this?

Now, let's say that MARENA is against the idea of a forest reserve here in Pearl Lagoon. What would you do then?

Consciousness Raising:

Mr./Miss ____, do you think that the people of Pearl Lagoon are more conscious about their natural resources now than before?

Why do you think it is this way?

Has CAMP contributed anything to change how people feel about their natural resources? What?

Since you have become involved in CAMP, do you feel as though you have become more conscious about Pearl Lagoon's natural resources?

What other projects or people have made you conscious about natural resources?

Capacity Building:

In what ways do you feel more prepared in your understanding of natural resources since you became involved in CAMP?

What would you like to learn more about concerning natural resources?

Do you feel as though the group has the capacity now to do all of the work that it will take to reach your goal? Why/ or why not?

Before I change the subject of the interview, I'd like to review what you have told me so far. Please correct me if I haven't go something right.

REVIEW NOTES

Ownership:

Who do you feel makes most of the decisions for what activities will be put through with CAMP?

Who do you feel makes most of the decisions how funds for CAMP are spent?

Who do you feel controls CAMP in general? Why?

Who do you feel will get credit if CAMP is a success? Why?

Research:

One of the activities that we do a lot of with CAMP is making investigations about natural resources. I would now like to ask you about this important part of CAMP.

Do you know what sort of investigations CAMP has been making?

Do you think these investigations are they important? Why/ why not?

How do you feel about the way that people from the community are getting involved in the investigation of Pearl Lagoon's natural resources?

Do you feel as though the information that they are collecting is accurate?

Do you feel like it would be better to bring in a person with a lot of training from out to do these investigations for the people here? Why/Why not?

Do you feel as though this information that these investigations are collecting is valuable for the community?

How do you think we could improve the way that these investigations are done?

For participants in investigations:

Do you feel as though you manage the techniques that we used when we did the investigations in the forest?

Do you feel as though the results from these investigations are useful for the community? How?

Do you think there are other people in the community who would have interest in doing these kind of investigations?

Do you feel like participating in these investigations is a burden since you aren't getting paid for this work?

How do you feel like we could improve how we make these investigations?

I notice that when we make plans for trips to Pine Ridge or Pinal to make investigations, a lot of people say that they have interest, but when it comes to the day to go only a few show up. Why do you think it is this way?

Roles:

Now I would like to ask you some questions about my role in this project. Please think back about the work that I've done this year.

-pause-

What do you think has been my role in this project?

Now please think about the work that Kenneth (or Patrick) has done in the last three months?

-pause-

What do you think is Kenneth's (or Patrick's) role in this project?

What do you think is Roberto's role in this project?

Please think about the way that you have been involved in CAMP.

-pause-

What do you think is your role in CAMP?

Sustainability of CAMP:

Now I would like to ask you some questions about the future of CAMP.

Do you think that CAMP will continue?

Last year, when I (Patrick) left for the States CAMP stopped. Soon I (he) will be going again for six months. Do you feel as though CAMP will stop again this time?

If not, then what is different this time?

The last time I did these interviews in April, most people said that they felt as though one of the main reasons that CAMP stopped last year was because the group wasn't organized good enough.

Do you feel as though the group is organized good enough now to continue this work?

Do you feel as though the organization of the group needs to be changed? How?

Last time, people also said that the work stopped since I was the one behind things getting finished, behind people. Do you think it is still this way? Please explain.

I've noticed that some people who use to be very active in CAMP no longer are involved. Why do you think it is this way?

I would now like to ask you some general questions to end this interview.

What do you see as the number one accomplishment of CAMP so far?

What do you see as the number one failure of CAMP so far?

What activities of CAMP were for you the most interesting? Why?

What activities were for you the least interesting? Why?

Do you have any ideas for what we should do this next meeting on November 1?

One of the activities we are thinking of doing during this meeting is to ask people to come up with a name for the group. Do you have any ideas for a name?

Before we end this interview I would like to review what you have told me. Again if there are any mistakes, please correct me.

REVIEW NOTES

Do you have any questions for me at this time?

Thank you very much for you participation.

Interview Guide for Students Involved in Water Monitoring, 1994

Explain who I am : student in biology, here for 10 months, live in Haulover, did this work last year, married.

The purpose of this interview is :
- provide information about the effectiveness of the water monitoring program;
- help to orient the field leaders and trainers about the needs and interests of the students before the program;
- to give a chance to Patrick to get to know the students before the program;
- to provide information for Patrick's dissertation.

Orient the students to the basic components of the program:
- chemical monitoring
- fecal coliform
- writing a report
- action

Background of students:
- size of family
- age
- what level
- favorite subject
- have interest in biology?
- future plans, jobs
- had any chances to work in the field?
- have interest in helping the community?

Opinions about community/environment
- what do you think is the most important problem in Pearl Lagoon
- what do you think is the most important environmental problem

Opinions about water quality and monitoring:
- are you concerned with water quality in area- who should we work with on this program (accion medica, union?)?
- what body of water should we monitor, why?
- who should take care of water quality in the area or at the accopio ?

Motivations:
- what would you like to learn from this program?
- what would be the benefits of this work for yourself?
- what would be the benefits for the community?

Personal feelings/ confidence:

- do you feel like you can make a difference in water quality in the area?
- do you think you can do this work?

Thank for participation.

APPENDIX D
Interview Guide for Water Monitoring Trainers, 1994

Future plans:
- What are your plans for the future? (work, study?)
- Has the water testing program affected your choice of what you will do? How?

Their role:
- How would you like to help the water testing this year?

Motivation:
-Why are you interested in helping with the water testing this year?
- Are you doing this because Marnie or I asked you to?

Impact of the program
-What do you think are the benefits to the community from this water monitoring program?
- Are there any benefits for students that participate in this testing? What are they?
- What did you learn from the program last year?
- How has this program affected your interest in quality of water? In the environment? What are the reasons for this change?
- How can students make a difference in the quality of water in the area?
- What else needs to happen to improve the situation?

Improving the program:
- How could we improve this program for this year?
- Which students were most active in the program last year?
- How could we get all of the students involved this year?
- Why weren't women active last year like the men?
- How could we improve the participation of women in this program?

Project sustainability:
- Do you think it would be good if this testing takes place every year?
- How can we make this program so it happens every year?

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