The Impacts of Tourism on Local Communities and the Environment in Colombia's Pacific Coast

by

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ABSTRACT

Integration with the market economy has produced important benefits for people living in the Tribugá Gulf, a strip of rainforest on the Pacific Coast of Colombia. Based on interviews and census information, this study shows that tourism has opened new markets and employment opportunities to local dwellers, allowing them to increase their incomes, educate their children, and improve sanitary conditions, in an otherwise extremely poor region. The study also shows that the economic gains are being accompanied by environmental damage which can erode the basis of the economic benefits, a clean environment. This study recommends a set of policies that would help protect the natural environment, provide immediate improvements in the living conditions of the local communities, and protect the long-run viability of the tourism industry, thus setting the region on a more sustainable path of development.

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Introduction

Tourism is a fast growing industry worldwide. Higher incomes and cheaper airfares have promoted the expansion of tourism to remote places that once had little or no contact with the modern world (UNEP 1986, 1). It has been widely argued that tourism generates important earnings from domestic and foreign sources and promotes the development of linked activities. Thus governments and entrepreneurs are eager to exploit and develop their natural resources as tourism attractions. But tourism expansion often has considerable impact on the environment and on the way of life of the host population (Pearce and Kirk 1986, 3). Although economic benefits might be obtained in the short term, the costs of environmental degradation and the reduction in the well-being of the local population can overwhelm the apparent gains.

This study focuses on a small patch of Colombia's tropical rainforest, the Tribugá Gulf, where tourism has boomed for the last decade. Though this form of integration with the market economy offers local residents additional income and employment, allowing them to meet some basic needs, the major economic benefits from tourism go to the owners of hotels and restaurants. The communities—living in conditions of extreme poverty and unable to profit from the new enterprises—have instead sold their lands to entrepreneurs and entered the market economy as employees.

Furthermore, tourism is hurting the quality of the environment. The demand for natural resources is increasing and the pollution of streams, beaches, and the ocean grows uncontrolled. Unsustainable extraction of timber, fish, and game together with water pollution not only harm the ecosystems but also the people who depend on these resources for their

livelihood. The pristine landscape that attracts tourists in the first place is now at risk of disappearing because of the consequences of their own arrival. The hotel owners, however, prefer to maximize their profits in the short run by avoiding measures to protect the natural environment, even if these would ensure them a permanent source of income.

This thesis is divided into three chapters. The first presents a brief description of the natural wealth of the Tribugá Gulf so that the reader can understand the dimension of the damages that might occur if tourism continues unchecked. The way of living of the local communities, who have been the stewards of this natural endowment for more than two centuries, is also discussed. Based in part on my field work during the summer of 1996, the second chapter contains a description of the tourism boom that started in the mid 1980s. In this chapter I explain how tourism has driven people from their traditional activities toward employment in the new industry while at the same time it promotes the abandonment of other occupations. In the second part of Chapter II, I test the hypotheses that the new incomes have allowed families to increase the quality of their life, as measured by: a) school enrollment among young residents, b) housing conditions, c) access to drinking water and sanitary services, and d) migration trends. In the third chapter I focus on the environmental repercussions of tourism. Unfortunately Colombia's government does not have a system of environmental indicators that could be used to monitor the impacts of the different economic activities. As a consequence, this study lacks strong quantitative evidence to assess the environmental impacts of tourism on the Tribugá Gulf. In an effort to overcome this difficulty I have drawn from other countries' experiences and from the qualitative data collected during my field research to estimate the stress on the local environment. Finally, I

conclude by discussing policies that Colombia could follow to ensure environmental protection and community development, that is, promote a more sustainable regional economy.

Chapter I. The Tribugá Gulf: People and the Environment

Natural Ecosystems

The Tribugá Gulf lies in the middle of Colombia's Pacific Coast and is only accessible by boat or plane. The Gulf is surrounded by steep forested hills, known as the Serranía del Baudó, a 375 km-long chain of hills with heights between 600 and 1,200 m. (Martínez 1993, 112). The Serranía—mainly of recent volcanic origin—has been a natural barrier isolating the Gulf from the interior. The forests that frame the beaches are among the most humid regions in the world. They are located in the zone of inter-tropical convergence, an equatorial zone where the trade winds of both hemispheres meet, generating a cloudy band with intense precipitation (between 8,000 and 12,000 mm per year; Cantera 1993, 15). The temperatures are constant year-round with an average of 25° C to 27° C but extreme variations can be observed in a single day ranging from 35° C at noon to 12° C at night (Cantera 1993, 15; Forsyth and Miyata 1984, 13). The combination of significant slopes and constant rain accounts for the many rivers and streams that mark the landscape. The rivers are short, fast-running, and transport large amounts of sediments from the upper reaches to the coasts, thus making the beaches sandy and muddy (Cantera and Contreras 1993, 66). The ocean is low in salinity and relatively warm, with an average temperature of 25° C. Two high tides and two low tides per day are characteristic, and the retreating low tide can leave a beach of up to 200 meters wide (Cantera 1993, 20-21).

The Tribugá Gulf is part of the so-called Pacific Corridor, a strip of lowland rain forest that encompasses the western shores from Panama to Ecuador. The corridor has been described as one of the most biologically

diverse places in the world (Myers 1988, 187-208). Though the biological diversity for animals is high, it is below that found in the upper Amazon; however the corridor appears to contain the highest number of plant species in the world (Gentry 1993, 208). One remarkable characteristic is the high endemism, meaning that many species of plants, birds, butterflies, reptiles, and mammals are original from this area and can only be found here. The high level of endemism has been attributed to the combined effects of: a) the union between North and South America about 10-15 million years ago, which established a terrestrial corridor for migration between the two hemispheres; b) the appearance of the Andes 3-5 million years ago, which secluded the western coasts and thereby promoted speciation; and c) the glaciations that further isolated the region and strengthened speciation (Alberico 1993, 236-238).

Tall trees cover the Gulf's hills, many of them reaching heights of 40-50 m. The dense canopy hides a rich understory populated by abundant bushes, smaller trees, gigantic grasses, lianas, and epiphytes (Pinto-Escobar 1993, 175). Palms are an important element of the Corridor's landscape. About 44% of the 250 species of palms in Colombia can be found in the Serranía, usually in small scattered groups (Bernal and Galeano 1993, 222).

The African-Colombian Communities

The remarkably well-preserved state of the natural landscape in Tribugá reflects both low population pressure and primitive systems of production, which together account for low levels of consumption of natural resources. Traditionally, the Gulf has been scarcely populated. Its first dwellers were two Amerindian populations, whose existence was reported by the Spaniard

chroniclers that explored the Pacific shores in the seventeenth century (Tamayo 1996, 55). In the nineteenth century the first African-Colombian colonizers arrived to the Gulf. They were descendants of slaves that the Spaniards had brought to work in the gold and platinum mines south of the Gulf.

Mining was the most important activity developed on the Pacific Coast during colonial times. In the early seventeenth century the Spaniards began exploiting the mines with indigenous labor. Overworked, malnourished, and attacked by illnesses from the Old World, the indigenous population soon succumbed—less than a hundred years after mining started, the Indians' numbers had been reduced by ninety percent (Rueda 1993, 464). The Spaniards were forced to import African slaves to replace the Indian workers. In the late eighteenth century mining declined all over the Pacific Coast. Due to decreases in international prices of minerals and to the rising costs of extraction (mainly because of the prices of the slaves) profits fell. This decline in profitability of mining coincided with the eruption of riots and protest movements by the black population against colonial abuses. While several slaves escaped, many others bought their freedom thorough the mechanism of manumission put in place by the Spanish crown. Manumission was an important social safety valve and by the early nineteenth century at least a third of the blacks had used it to gain their freedom (Sharp 1993, 407). Both escaped and freed slaves moved into the forests where they searched for alternative ways of living, far from the colonial administration. Generally they established themselves in small villages by the mouths of the rivers and along sea shores where they could fish and cultivate some land, utilizing technologies that often persist to this day (Ibid., 414).

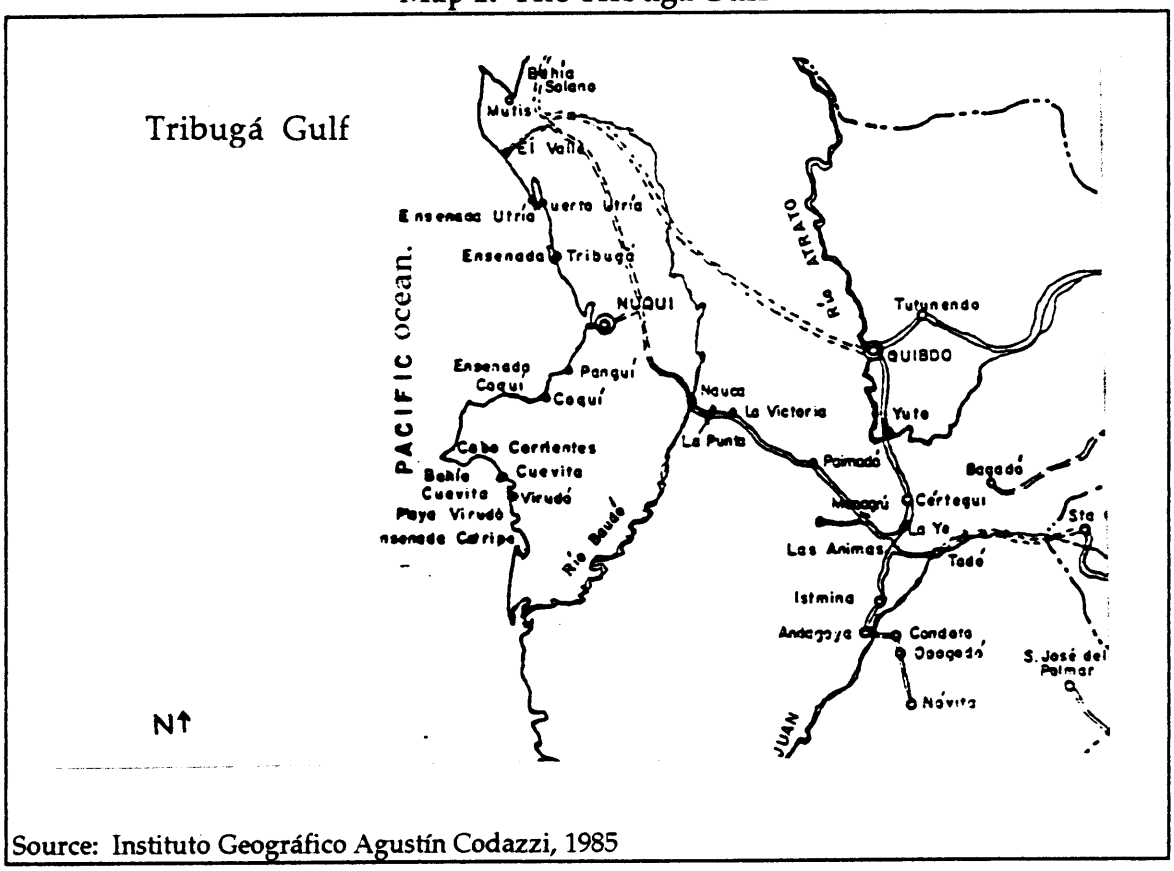
The first settlers of African descent arrived in the Tribugá Gulf by the middle of the nineteenth century coming from the Baudó and San Juan rivers. They founded the town of Coquí, then gradually populated the whole Gulf, known today as the municipality of Nuquí. The town of Nuquí was established in 1846, but civil wars and social unrest in the recently independent Colombia delayed its legal recognition until 1916, when it became a municipality of the department of Chocó (Senado de la República-Presidencia de la República 1989, 17). Successive production booms of two export crops triggered the settling of Tribugá. The gathering and export of *tagua* nuts (*Phytelephas seemannii)* began in 1840 (Ocampo 1984, 99-100). *Tagua,* also known as vegetable ivory, was exported to international markets through Panama as a raw material for buttons. Production increased sharply until the 1890s, when it reached 600,000 tons. By 1910 *tagua* was the sixth export crop of Colombia. The trade in *tagua* started to decline in the early 1940s as industrial substitutes appeared (Ibid., 376) and by the 1950s plastic had replaced *tagua* in the button industry.

The other important product that drove settlers toward the Tribugá Gulf was rubber (*Castilla elastica*). World demand for rubber soared in mid-nineteenth century, when it began to be used in large quantities as a water-proof material and as a cover for wheels. The exploitation of rubber on the Pacific Coast of Colombia was strong in the 1860s but declined two decades later when the extraction industry moved to the Amazon and, later, to Southeast Asia (Ibid., 383-389).

The people who had moved to the Gulf in the wake of these extractive booms stayed even after their production declined. In 1905 the population of Nuquí was 2,553; in 1993 the date of the last census, the municipality had only increased to 5,176 (Rueda 1993, 482; DANE 1993, Table 1), barely doubling in

almost a century. Today eighty three percent of the people are African-Colombians, 14% are Indians, and the remaining 3% are white or mestizo (Alcaldía Municipal de Nuquí 1995, 29). The urban part of Nuquí has 2,000 dwellers, while the rest of the population lives in seven small villages scattered along the coast at the mouth of the main rivers. (See Map 1.) The remaining Indian communities have retreated to the upper reaches of the rivers.

Map 1. The Tribugá Gulf



Source: Instituto Geográfico Agustín Codazzi, 1985

The Department of Chocó is one of the poorest of the country: 70% of its population lives in extreme poverty. The infant mortality rate hovers around 110 deaths per thousand births, four times higher than the national average, and one of the highest rates in the world (Rueda 1993, 474). Nuquí is

not an exception: more than 50% of its population lives in poverty (DANE 1993). Sanitation and health care are poor. Basic services are limited—electricity is available in the town of Nuquí for four hours at night while rural areas have no electricity. There is no delivery of drinking water; people get their drinking water from rivers and streams, which is also where they dispose of all household wastes. Literacy rates are low (more than 25% of the population cannot read or write; DANE 1985), and fertility is high (more than 6 children per woman) especially among teenagers (Rueda 1993, 475).

After the extractive booms of *tagua* and rubber, little or no trade has occurred between the Gulf and other regions. Until recently, the communities have lived pretty much in autarky, producing what they consumed. They practice riverine farming, where soils are richer and access from the villages is easier. Each family owns a few plots along the rivers and the beaches. They grow maize, rice, yucca, plantain, and coconuts. Wild plants that supplement their diet, such as cocoa, palms, and fruit-trees, are left in the plots. Farming technique is very simple: if the soils are dry enough people burn the land before planting new crops; otherwise the plots are only slashed. No herbicides or fertilizers are added to the soils and all farming is done with manual tools. Men and women participate alike in agriculture. Their simple technologies and the lack of chemical inputs translate into low productivity of the crops. With the exception of rice, yields per hectare in Nuquí are lower for the main crops than the average yields for the Department of Chocó. (See Table 1.) The rest of the Department shares similar geophysical and climatic conditions with Nuquí but has access to better technology, which accounts for the higher yields.

Table 1. Average Yields

Crop	Yields (kg/hectare) Nuquí	Yields (kg/hectare) Department of Chocó
Plantain	6,125	9,000
Rice	3,750	2,100
Corn	555	1,500
Yucca	4,750	9,000

Source: Alcaldía Municipal de Nuquí, 1995.

After agriculture, fishing is the most important economic activity in the area, providing the population's main source of animal protein. Fishing is an artisanal activity practiced only by men. Rivers are not fished because they are steep and fast, thereby impeding the development of a varied and abundant fauna. But the sea close to the shore is deep and contains many tropical and subtropical species.

Two other resources extracted by the communities are game and timber. Each family exploits its *respaldo*, a backyard beyond the agricultural plots, whose boundaries are hardly defined. These *respaldos* are mainly used to gather nuts, fruits, and medicinal herbs. Farther into the forests lies communal land, where large trees can be cut for canoes or for houses, and where people go to hunt. The main game species are rabbits, armadillos, and *chigüiros* (a rodent species). Occasionally, wild pigs and tapirs are spotted, but these animals have decreased in number lately. People also eat monkeys and wild turkeys.

When the businessmen of the tourism industry arrived to buy land along the Gulf of Tribugá, these were the living conditions they found. The changes that the outsiders have brought about are the subject of the next chapter.

Chapter II. The Effects of Tourism on the Communities of Tribugá

Tourism Enterprises and Changes in Land Tenure

Wealthy families from the interior of Colombia started buying the Gulf's beaches in 1988 (Fundación Inguedé 1995, 6). These properties are used for the construction of private country houses, small hotels, and tourist cabins. Their size, on average, is less than two hectares. There are also three large cattle ranches (Ibid.). Recent studies report that 90-95% of the shore land—once belonging entirely to local families—is now owned by white families from the interior, while the remaining 5% is up for sale (Ibid.; Tamayo 1996, 61).

Beautiful beaches and unblemished natural surroundings lured investors to the area; however, the fast pace at which land has been sold can only be explained by the combined effect of several factors. The tourism boom in Tribugá is partly the extension of a similar phenomenon that occurred in the neighboring municipality of Bahía Solano. Bahía Solano was the first town in the northern part of the Pacific Coast to build an airport for small planes. The airport opened in 1961, allowing for the first time frequent and reliable contact between the Coast and the rest of the country. The scenery and sport fisheries attracted numerous investors; demand for beach-front properties grew, raising the price of land. By the 1980s most properties along the coast of Bahía Solano had been sold, so investors began to look for new areas with comparable features but lower prices. The Tribugá Gulf offered the ideal conditions. Still tourism only started when access to this "new frontier" was ensured. This happened in 1985, when Nuquí's airport

opened, offering regular flights between the town and the major cities of Colombia.

Another element that contributed to the expansion of tourism was the establishment of the Ensenada de Utría National Park in 1988. The park is located on the northern end of the Gulf and has a total area of 50,000 hectares, 24,000 of which are in the Pacific Ocean. The park called national attention to the region and its natural beauty. Finally, land sales had been facilitated because rights for shoreline properties were clearly established. This is unusual along the Pacific Coast, where most of the lands are part of the Pacific Forestry Reserve, owned by the government. In the 1960s the Institute for Agrarian Reform—INCORA—took some of the land from the Reserve and legalized titles for all dwellers in Bahía Solano and Nuquí (Tamayo 1996, 54-55).

By 1996 more than 30 facilities were already open for tourists, while an undetermined number of private country houses were scattered along the shores. The resulting tourist population demands additional goods and services, particularly for food and for housing materials. To satisfy these demands many native people now spend a good deal of time growing, collecting, and catching goods for tourists. Other villagers are employed directly by the tourism businesses to supply required services, such as launch operators and hotel workers.

New, industrial goods are being brought to the region. Many of them are cheap substitutes for commodities that are produced locally (such as corn flour and soap) and often are made of more durable materials (such as plastic buckets and pans). To have access to these new goods, local people must enter the market economy by selling their products, their labor, or both.

New Sources of Income and Employment

Propelled by tourism, Tribugá's economy has opened up to trade with other areas of the country. The standard economic theory of trade argues that integration with a market economy will create important gains in income and efficiency. Cash income increases because more goods—including labor and land—pass through the marketplace. Improvements in efficiency come from the resulting specialization of production, with different regions manufacturing those goods and services for which they have a competitive advantage. My field research indicates that local people have indeed derived economic benefits from the expanded trade. These gains can be divided into: cash from property sales, employment in hotels and restaurants, more frequent and spread transportation services, larger markets for fish, and sales of non-timber forest products.

PROPERTY SALES

I asked eight owners who sold beach-front properties in the villages of Arusí, Coquí, and El Valle what amount they had received. Their properties sold for $10,406 to $12,816 per hectare between 1988 and 1993.[1] Prices varied depending on the slope of the terrain, the length of the beach-front, and the proximity to Nuquí or Bahía Solano, where the airports are located. Compared to urban land or even to fertile land near urban centers, these prices are low. Nonetheless, they represent a great deal of money to the local people. In 1995 the average salary of an agricultural worker in warm-weather

[1] All prices used in this chapter were given in pesos. I converted them into dollars using the market exchange rate published by the National Reserve Bank (Banco de la República 1996, Table 71.) The values are presented in 1996-dollars unless otherwise specified. When needed, I corrected for inflation using the CPI published by the Census Bureau (DANE 1996, Table 41.)

areas of Colombia was $5.35 per day (Dane 1996, Table 58). At this rate, the head of a family would have to work every day for 5 to 6.5 years to earn the income from selling one of these beach lots. Property sales have thus allowed some families to increase their investable wealth, an otherwise unlikely event in a region where there are no banks or other credit institutions to hold savings or lend money.

Selling a beach-front property can be a good deal for the African-Colombian owners, since land does not provide them with much income. Beach terrain is not used for permanent dwelling or for access to marine resources—people live in villages at the mouths of the rivers, which are the principal route to the sea and thus to all important fishing grounds. The principal loss from the sale of beach land is that of the coconut plantations growing there. Women used to extract coconut oil for cooking while the fruit was a common ingredient in traditional recipes. With the expansion of markets, however, women have been able to switch from coconut oil to substitutes such as soy, corn, and palm oil, which are imported from the interior of the country at low prices.

DIRECT EMPLOYMENT IN THE HOTELS AND RESTAURANTS

There are two major tourism seasons coinciding with school vacations: June to July, and December to January. A minor stream of tourists come between August and October when the humpback whales (*Megaptera novaengliae*) arrive to mate and nurse their offspring (Flórez and Capella 1993, 46). During these periods local people are employed as maids and cooks in hotels and restaurants, as tourist guides, and as boat drivers. One of the groups that has benefited the most from tourism are women who, for the first time, are being paid for their work. A cook's wage in 1996 was between $8 and $10 per day.

The day starts at seven in the morning preparing breakfast, and ends at seven in the evening, when dinner has been served. Thus the hourly wage is equivalent to about $0.75. One woman is in charge of cooking in each hotel, though she might be helped by a daughter or younger relative, who receives no monetary compensation but is given three meals per day. Maids are hired to clean the rooms and do the laundry (in the rivers), earning about $0.59 per hour.

Some men are hired as launch operators. They receive higher wages than women do and usually have a shorter working day. Their job is to transport tourists to nearby attractions: beaches, coral reefs, the National Park, Indian groups who live upstream, water falls, and springs. For these drivers the day generally starts at ten and ends before dusk (around six o'clock). They use boats that belong to the hotels, which also provide gasoline. Boat operators are paid $2 per hour and their helpers—usually sons or nephews—receive about $1. Although many local men own their boats, some of which are engine-operated, they cannot offer their services directly to the tourists. Tourists buy food and transportation packages, from the hotels where they are staying, making it difficult for independent boat owners and cooks to offer their services. (In the village of Coquí one woman has established her own restaurant. She was able to do so only because her clients are not tourists, tied to previously bought packages, but representatives of non-governmental organizations (NGOs) traveling to the area for research purposes.)

A group of young boys and girls who return home for school vacations also benefits from tourism. They organize trips for tourists to nearby rivers, mangrove forests, and the Park. This crew of eco-guides is a remarkable example of how the community can organize itself to earn extra income from tourists, while promoting environmental education and conservation. The

group was organized by a young professional from Coquí who studied agricultural sciences at the regional university. After graduating, he worked as a research assistant for Fundación Natura, a domestic NGO, that does biological research in the park. As he became more knowledgeable of the importance of the mangrove forest, he decided to work for its preservation. Together with teenagers who go home for the holidays, he organized a series of workshops on natural history and conservation of mangroves. The doctor from Nuquí gave them first aid training, and then they began to offer tours through the forests. Paddling canoes, the young guides take tourists for either a two-hour or a whole-day trip. The long trip includes observation of flora and fauna, dives among the mangrove roots, a discussion about the characteristics and functions of the mangrove, and lunch. The price is $8 per person, and between two and five people go on each trip. The guide receives $2 while the rest of the money is put into a fund to finance various needs of the community: fresh water supply, housing renovation, medical insurance, etc. Villagers hope that in the long-run the fund will grow to the point where they can finance the construction of a tourist cabin that they would manage themselves.

TRANSPORTATION INDUSTRY

The influx of tourists has encouraged the growth of the transportation industry. Opening in 1985, Nuquí's airport today offers two daily flights to major cities of the country. Incoming flights can bring up to twelve passengers. A survey of tourists arriving in January 1995 found that 115 tourists arrived in a 6-day period—an average of 19 people per day (Pérez 1995, 5). The movement of passengers in the area has formed a small crew of semi-skilled and non-skilled workers at the airport: representatives of three

airlines sell tickets, an air traffic controller and two luggage handlers are paid by the airport. The airline employees and the air traffic controller receive an income of $1 per hour; the luggage carriers receive half of that sum. Two people from Nuquí's municipal office collect a tourism tax at the airport's exit. Additionally, informal enterprises have developed around the airport: shops for beverages, food, and crafts; children who offer to carry tourists' belongings to hotels or to the boats that cross the Gulf.

During the last six years, marine transportation from the airport to all villages and tourism facilities has become available. Two boats, each with capacity for 25 people, operate in the area. They are owned by local residents who charge $6-$10 per trip, depending on the distance to be covered. The boats have established daily routes: three days a week one of the boats goes from Nuquí to the southern part of the Gulf, on alternate days the other boat travels to northern destinations. The two owners hire assistants to sell tickets, an operator, and a helper. Thus maritime transportation has generated incomes for at least six more families.

FISHERIES

Increased access to Tribugá—by plane and by ship—together with the additional demand from tourists, have helped convert fishing from a self-consumption activity to a commercial one. Businessmen from the interior have installed processing facilities in the villages to collect the daily catch, freeze it, and send it to cities. Tourism enterprises also buy the catch directly from fishermen.

The main fishing area is Cape Corrientes, at the southern end of the Gulf. There, about 32 artisanal fishermen work for two fishing companies. These companies do not pay them a daily wage but instead they buy the catch

from fishermen, who are free to decide how many days they will work in each week. Since each journey lasts about 12 hours, men usually fish only two or three times a week. They leave late in the afternoon, when the tide is low, and return by mid-morning the next day. Each fisherman owns his canoe. For security reasons they work in groups of ten or twelve canoes. Each one chooses a spot in the sea to tend his line, then spends most of the night alone, though close enough to each other to be ready to help in case of emergency.

Back on shore, men clean the catch, weigh it, and collect their money from the owner of the freezer. The average price paid for fish is $0.60/lb.; for shrimp, $0.99/lb. Hotel and restaurant owners often intercept returning fishermen in the open sea to buy fresh fish directly. Hotel and restaurants pay about 40-50 percent more for fish but are not reliable shoppers and only buy small quantities. So even though tourism does generate revenue for the fishermen, they still rely on the commercial fisheries for their main source of income. When enough fish has been collected (about 50 tons) it is shipped to Buenaventura, the biggest city on the Pacific Coast, or sent by plane to Pereira, in the interior of the country. The fish is then distributed to national and international markets.

NON-TIMBER FOREST PRODUCTS

Supported by Fundación Inguedé, an environmental NGO that works in the area, some members of the community have received training in extracting and processing non-timber forest products. Inguedé promotes the sustainable extraction of these products to increase the value of the forest, generate income for the local dwellers, and help preserve the ecosystems. These goods are sold in local shops, and at the airport, and are also sold by Fundación

Inguedé in Bogotá. Two products have been especially successful: handicrafts made from *tagua* and *huina* oil (a vegetable oil with cosmetic properties). Also, and on their own initiative, two women's groups have started to produce jellies and preserves with native fruits.

Tagua nuts are the seeds of a palm that grows wild in the lowland tropical rain forest. The tree takes ten years to reach maturity and begin producing fruits, which, when ripe, harden and fall to the ground, where they can be collected. Harvesters cut the husk and extract the seeds. These are dried out of sunlight until ready to be cut and carved. The *tagua* project started in 1991. Although the original idea was to export raw seeds to international markets, demand was lower than expected, and *tagua* produced in Ecuador was of higher quality and lower cost. Still, important quantities of *tagua* had been collected in Tribugá, so Fundación Inguedé tried to find ways to use the raw material and to at least partially satisfy the expectations created among the Gulf's people. The Fundación hired an industrial designer and an artist to teach the villagers how to craft the nuts into marketable goods. Four women learned how to make buttons, while six men learned to carve sculptures of local fauna. Today this activity occupies an important part of the artisans' time—for two of them, *tagua* carving has become their only occupation. Thanks to tourism, their handicrafts now have a local market, which is even more important than Fundación Inguedé's sales in Bogotá. When taken to Bogotá, the goods' prices increase but not enough to offset the higher costs for intermediaries, transportation, and commercialization. Thus the artisans' margin of profit shrinks while sales remain low.

It is difficult to accurately assess the income gains of these *tagua* craftspeople. They can hardly read and count, and thus they do not keep books of their sales, costs of production, or time spent on their labors. Since

the concept of a wage is alien to them, the artisans do not put a price on their time. Nor do they spend a constant amount of time each day crafting their buttons and sculptures. Rather they do it when they need the money, when they have free time from their other occupations, or just when it is pleasurable. These workers sell their products either to small local shops, or from their own houses. On rare occasions they will send their children to the beaches to offer the handicrafts to tourists. Small sculptures sell for $6-10 each. Since *tagua* nuts are found in the wild, and since the tools were provided by Fundación Inguedé, every sale signifies a net income for the household. The carvers who have made some calculations estimate that in the peak tourist season they can earn on average about $140 a month. One man reported earnings of $398 in the month of December of 1995. A button-maker can make up to a dozen buttons a day, which she sells for about $8. Here, Fundación Inguedé provided the instruments and work materials with the women's commitment to re-pay their costs from product sales. None of them knows how much she has paid off nor how much she still owes. Because button-makers do not work every day, it is hard to estimate how much they make in a month. When asked what they do with their earnings, one of them said she paid the monthly rent and bought clothes for her four children. Another mentioned that she sold all her production of one month at the airport, making a profit of US $200. Though *tagua* production remains low it does represent a significant income for certain households, particularly for women who have not received any income in the past.

Fundación Inguedé also supports a local association of agriculture producers—ASPROVAL—to process oil extracted from the *huina* palm (*Carapa guianensis*). This oil has cosmetic properties and is sold by the association to local shops, or is shipped to the Bogotá market. Profits are re-

invested in the association, but so far they have been small. Fundación Inguedé's efforts to sell the product abroad have not yet succeeded.

Two groups of women in the villages of El Valle and Coquí have begun to produce jellies from native fruits. Their profits have allowed each group to build a house in their town for meetings and for making jellies in a collective and more organized manner, instead of in their individual kitchens. The new houses also provide a place where women can receive some training. They have invited experts to help them improve their canning techniques and to give talks on issues of health and nutrition. The women hope one day to equip these collective houses to host tourists, but that would require enough capital to build bathrooms, install electric generators or solar panels, bring in fresh water, and buy furnishings.

Table 2 summarizes the activities promoted by the tourism boom. Tribugá's people have earned important amounts of money, though this income has not been evenly distributed, leaving many untouched. Families selling beach-front properties received quantities of cash that would have been impossible to get otherwise. More importantly, perhaps, for many other people, their labor has gone from unpaid to paid. Among the new wage earners, fishermen have gained the greatest benefits, since their occupation provides them with permanent income. For the many women that now combine the tasks at home with various paid occupations, the new income has also been significant; and groups of artisans and guides have developed skills that now allow them to benefit from tourists. Nonetheless, these employment opportunities are limited. Most local people do not have the skills to do better paid jobs, such as hotel manger or accountant, nor the required capital to start their own business.

Table 2. Summary Information on Estimated Income from New Occupations in Tribugá

Activity/Occupation	Income (US $)	Approximate number of employees
Property Sale	10,000-12,000 (once)	undetermined
Cook	8-10/12-hour day	30
Maid	5/8-hour day	30
Launch operator	15/8-hour day	40
Launch helper	8/8-hour day	40
Eco-guide	8/trip, 6 of which go to the village of Coquí	24 (who benefit 280 habitants of Coquí)
Airline employee	8/8-hour day	8
Luggage handler	4/8-hour day	2
Fisherman	0.60-1.00/lb. caught	32
Tagua artisan	140-390/month	12
Jelly-producer	undetermined	50

Agriculture has suffered as a result of tourism. To take on their new occupations, people have had to abandon some of their farming activities, replacing traditional products with industrial substitutes. The municipality mentions in its Development Plan that "agriculture production is an activity that has declined, losing the importance it used to have." (Alcaldía Municipal de Nuquí 1995, 39). Production and consumption of coconut oil are slowly declining. Other crops have also been affected by the transformation of the economy. The production of plantains, which are the main source of carbohydrates, has changed with the growth of tourism. In the past people planted the *hartón* variety for their own consumption, and the *popocho* variety, which is more resistant to pests but not as tasty, for their pigs and other domestic animals. Today they no longer cultivate *hartón* plantains because the trees require constant attention, especially to control pests. As more family members are employed by tourism, less time is

available to work the land forcing them to grow *popocho* even for their own consumption.

The reduction of farming relative to other economic activities is common to modernizing nations (Timmer 1990, 47). Given the opportunity many people will chose to abandon difficult and time-consuming agricultural chores. Paid jobs give people access to goods and services from the modern part of the country, and, in their own eyes, advance their well-being. The following sections describe how the transition to the market economy has changed living conditions in Tribugá. I look at those aspects that citizens themselves pointed to as crucial—education, housing, and access to basic services—and also explore the possible effect of development on rural-urban migration, a widespread phenomenon on the Pacific Coast.

Impacts on People's Lives

EDUCATION

Due to higher incomes, more families have been able to send their children to secondary school. Parents in Tribugá place a great value on their children's education because they realize that it can lead to better jobs and higher incomes. Nevertheless, most students only finish elementary school since villages on the Gulf do not have secondary schools. The only high school is in the town of Nuquí. To send a child there, parents need to have enough cash to pay for tuition plus room and board, and they must be able to afford the loss of the child's labor. Tourism has offered the needed extra incomes and secondary enrollment has increased significantly.

Table 3 presents data on high school enrollment for 1985 and 1993, a period that covers the advent of tourism. Whereas for the rest of Chocó the

percentage of secondary students enrolled remained roughly constant, in Nuquí the number grew by more than 20%.

Table 3. Secondary School Enrollment at the Municipal Level Department of Chocó 1985 and 1993

	1985	1993	Change 1985-1993
Nuquí			
Population 10-15 years old	887	1,030	
Enrollment in Secondary School	161	225	
Percentage enrolled	18.1%	21.8%	20.4%
Rest of Chocó's Municipalities			
Population 10-15 years old	43,050	55,586	
Enrollment in Secondary School	4,862	6,808	
Percentage enrolled	11.3%	12.2%	7.9%

Source: Table 3A. (See Appendix.)

HOUSING CONDITIONS

Citizens frequently told me that when they have savings, they try to improve their houses, either by changing logs that have deteriorated or, if they have enough money, by replacing wooden walls with cement blocks, and thatched roofs with tin. Though timber and palm are inexpensive building materials, they do not last long, nor do they provide much protection against insects and rodents. Social scientists have argued that the abandonment of these construction materials represents a loss of cultural identity and aesthetic values, a sign that progress is sweeping away the traditions of the native people (Tamayo 1996, 75; Mosquera 1993, 510). From the perspective of people living in Tribugá, however, this change makes sense. The new materials improve the quality of their life while saving them time in repairs. People whose income has increased the most due to tourism, such as boat owners, store owners, and fishermen, now have cement houses with tin roofs.

(Census data on housing materials actually show an increase between 1985 and 1993 in the number of houses made with timber, bamboo, and palm. This result contradicts the testimony of Nuquí's residents and what I and other researchers have observed. Apparently, the Census Bureau has included the new tourist houses, cabins, and hotels among those structures built with "inadequate materials." These tourist buildings are purposefully made of timber and palm to emulate the indigenous architecture, but are equipped with modern amenities.)

BASIC SERVICES

As expendable income has increased, people have installed latrines in their backyards. Latrines reduce the likelihood of illnesses such as cholera. They also help keep beaches clean, an important factor for attracting tourists. The Census Bureau produces an index that measures the shares of houses without toilets and without water lines. Table 4 presents the values of the index for Nuquí and the rest of the municipalities of Chocó in 1985 and 1993. Nuquí has improved its sanitary conditions at a much faster rate than the rest of the municipalities. As no new water lines have been installed in Nuquí, the municipality's improvements solely reflect new latrines. Most of the houses that remain without sanitation facilities are in the town of Nuquí. In the small villages, where the best beaches are located, 95% of the households have installed latrines (DANE 1993, 28).

Table 4. Inadequate Basic Services at the Municipal Level Department of Chocó 1985 and 1993

	Percentage of Households with Inadequate Sewer and Water Supply		
	1985	1993	%Change 1985-1993
Nuquí	47.0	30.0	-36.2%
Rest of the Municipalities	70.5	63.2	-10.3%

Source: Table 4A. (See Appendix.)

MIGRATION

Since the 1950s the people of the Pacific Coast have migrated in large numbers from rural to urban areas (Villa 1996, 19; Galán 1994, 85), searching for better jobs and public services. Despite—or because of—the new economic opportunities provided by tourism in rural areas of Tribugá, this migration pattern has accelerated. Based on the population counts of 1973, 1985, and 1993, and on the estimated natural rates of growth,[2] I have calculated the annual rate of migration out of Nuquí. Table 5 demonstrates that coinciding with the advent of tourism, the migration rate has increased rapidly, far surpassing that of the rest of the Department.

Table 5. Migration Rates at the Municipal Level Department of Chocó 1973 - 1993

Annual Rate of Out Migration (%)		
	1973-1985	1985-1993
Nuquí	0.44	3.90
Rest of the Municipalities	0.86	1.84

Source: Table 5A. (See Appendix.)

One possible explanation is that while tourism gives families new jobs and income, these very benefits allow some family members to move to the cities and seek even greater economic opportunities. Increased secondary school enrollment may also play a role. High school graduates might be less

[2]Defined as the rate of birth minus the rate of death.

willing to stay in their home towns where skilled jobs are scarce. An older man in the village of Arusí (personal interview, June 1996) declared that "youths do not like working the land. They find it humiliating and too hard. They prefer to have their hands clean and work in the mayor's office." A high-school student in Nuquí mentioned (personal interview, July 1996) that as soon as he finished his studies he would like to become a teacher in one of the municipal schools, instead of becoming a fisherman like his father[3].

Summary

Fewer Tribugá families live in poverty today than in 1985 (Dane 1985, 1993). Although this cannot be entirely attributed to the rise of the tourism trade, it is clear that tourism has contributed to better standards of living. The benefits, however, have not been equally distributed among the population. Families who owned beach properties and sold them saw their wealth increase compared to those families who only owned inland property. People with skills valued in the new economy, such as launch operators and fishermen, make more money than traditional farmers. Tourism has also created new occupations—*tagua* artisans and jelly-producers have acquired profitable skills. Many women have benefited from the new economic system as they now have jobs that pay them for their labor.

The greater income of tourism has been invested mainly in the well-being of the younger generation. Parents pay for their children's education, which opens up new employment opportunities. Housing and sanitary improvements protect the entire family from diseases, but especially children.

[3]Lipton has observed that in developing countries not only the poorest individuals of a community migrate from rural to urban areas, but also the wealthier and more educated ones (Lipton 1982: 196).

Healthier children do not spend as much time recovering from diseases and thus are able to work and study more. Migration has accelerated, possibly triggered by the tourism boom, especially if related to property sales and education. However, further research is needed to determine whether there is a connection among them.

Chapter III. The Effects of Tourism on the Gulf's Ecosystems

Although Colombia's government has not monitored changes in the environmental quality of Tribugá, there are signs that tourism is undermining the health of the local ecosystems. Tourists have increased both environmental pollution and the demand for natural resources. The cumulative impacts of a denser population may well exceed the capacity of the natural systems, leading to their collapse. The next sections present some of the actual impacts of tourism on the coastal ecosystems and on the upland forests, then describe the likely future consequences if these negative impacts remain uncontrolled.

Coastal Ecosystems

Carpenter (1983, 250,251) has identified tourism's major threats to coastal zone ecosystems: sanitary sewerage discharges, solid waste disposal, water development and control, changes in shoreline use, land clearing and site preparation, and coastal natural resources use.

SANITARY SEWERAGE DISCHARGES

Untreated sanitary sewerage discharges are rich in nutrients, particularly nitrogen and phosphorous compounds. When the load of these nutrients increases, a process known as eutrophication, the composition of the aquatic ecosystems change favoring the growth of those organisms that flourish in a nutrient-rich environment. They are generally microorganisms, such as algae and bacteria, that start blooming, consuming oxygen faster that it is produced. Oxygen scarcity reduces the survival of other marine life, from

zooplankton, to shellfish, to finfish. The more algae cover the waters, the less sunlight penetrates the surface, preventing photosynthesis. This, in turn, reduces the productivity of phytoplankton, and macro algae—the primary producers—causing a food shortage for higher marine organisms.

Waste waters introduce pathological substances that further menace marine and human life alike. If fecal coliforms and virus agents appear in high concentrations, the likelihood of outbreaks of waterborne illnesses increases, through skin-contact with or ingestion of polluted waters. Another major source of illness is the consumption of mollusks, especially shellfish that filtrate the waters, accumulating pathogenic bacteria, coliforms, and viruses.

In the Tribugá Gulf the discharges of the latrines end up, untreated, in the neighboring rivers. The hotels' septic tanks were built regardless of nearby aquifers or flooding levels, and their operation is not being monitored. Thus, problems of filtration and mixing of polluted water with ground and salt waters may be occurring. This situation is not particular to Tribugá. It commonly affects most of the areas in the tropics where tourism development is expanding, but where the infrastructure required is inadequate to cope with the needs of an increasing population. Cases of ecosystems' degradation and water pollution due to raw sewerage have been reported in large-scale towns with important resort developments such as the Island of Antigua in the Caribbean (Jackson 1986, 9) and in Cancun (Cervantes and Meza 1993, 58-61). In these places lack of planning and cooperation among investors and the local governments allowed the problem of untreated sewerage to escalate to the point where foul odors and turbidity of the waters—particularly of the Nichupte Lagoon in Cancun, once considered among the cleanest in the world—forced tourists to leave, decreasing sales

and hotel bookings. In Malaysia and Jamaica sewer contamination reached the point where shellfish became unfit for human consumption (Carpenter 1983, 258). The problem of raw sewerage entering the waters has also affected small isolated areas with incipient tourism development such as the Maldives (Domeroes 1993, 79-81) and the Penang Island in Malaysia, where tourism development is similar to Tribugá's in that there is little investment in infrastructure and informal accommodation in unstructured cabins (Wong 1993, 90).

The ecosystems prone to suffer the most from this type of pollution are estuaries, ponds, and mangrove forests. Since they are relatively protected from the ocean, they have a lower flushing capacity compared to open shoreline. These embayments and calmer areas involve the confluence of creeks, estuaries, and rivers with the sea and, thus, are the places where silt and pollution discharges from upstream end up. Because they offer protection and a good supply of nutrients they are very productive, serving as spawning and nursery grounds for marine ecosystems, a characteristic that makes them even more sensitive to any source of pollution.

Artisans in Nuquí, interviewed by Jaime Salazar, executive director of Fundación Inguedé (e-mail communication, April 1997), mentioned that they have noticed an increase in the turbidity of drinking water and attributed it to the presence of tourists and businessmen in the area. They also said that their communities badly need clean water supply and waste water treatment but that when the Department of Chocó allocated the funds for that purpose, contractors took the money and did not build the infrastructure.

Carlos Vieira, a biologists working in the mangrove forests of Tribugá, which cover about 1,500 hectares, has not noticed any major impact on water quality due to raw sewerage discharges (telephone conversation, February 26,

1997), but water quality samples to support this claim have yet to be taken. On the other hand, statistics provided by the municipality show that malaria, critical respiratory infections, critical diarrhea, and multiple parasitism continue to be the principal causes of morbidity, even given sanitation campaigns (Alcaldía Municipal de Nuquí 1995, 32). These diseases are associated with viruses, bacteria, and infections to whom polluted and stagnant waters are ideal medium for survival.

The World Health Organization warns to limit the coliform counts to no more than 10,000 coliform bacteria or 2,000 fecal coliforms per 100 ml. of water (Pearce and Kirk 1986, 5). These measures for Tribugá has not been taken and are urgently needed, especially if tourism activities continue expanding and the number of visitors increases.

SOLID WASTE DISPOSAL

The disposal of wastes at the shoreline of rivers and ponds can cause pollution, disruption of habitats, and changes in the hydrological cycle. The main ecosystems affected are estuaries, marshes, coral reefs, and mangrove forests that are not only very productive, but also filtrate the waters. When solid wastes and debris accumulate in these areas, modifications in water circulation patterns occur. This in turn impairs flushing and filtration, increasing suspended materials and water turbidity, and decreasing the supply of fresh water. Additionally, these changes block migratory routes and cause declines in fish productivity.

In the Tribugá Gulf solid wastes have usually been thrown into mangroves and swampy areas. In the past, this practice did not cause damage since the loads were small, and most of the garbage was organic matter, promptly recycled by the ecosystems. Today, due to increased trade with the

interior of the country, inorganic, non-biodegradable materials are entering the waters. Plastics and cans are piling up in backyards and riverine zones. (See Pictures # 1 and 2.) The problem of waste disposal is already evident. Carmen Lucía Gómez and Alberto Herrera, two hotel owners indicated increasing concerns about how to handle the waste (personal interviews, El Valle and Coquí, July 1996.) Some visitors also showed surprise at the amount of garbage sitting at the rivers' margins. Jaime Salazar and Luis H. Henao, representatives from Inguedé who have traveled for years into the zone, are shocked by how frequently they now find plastic containers on their ways through the forests and beaches, especially the all-too-familiar bright-yellow bottles containing bleach used for laundry (personal interviews, Bogotá, July 6 1996).

Mr. Herrera, has devised a solution to the problem of disposing inorganic wastes in his hotel. He requires guests to take with them the recyclable garbage they brought in or consumed during their stay. Cardboard, plastic, glass, and cans are packed-up and put together with the luggage when tourists leave, to be disposed in their city of destiny. The feasibility of expanding this program to other facilities should be explored together with an economic incentive appealing to tourists.

Picture 1
Arusí River—Shoreline covered with wastes

Picture 2
Wastes in a Backyard at Arusí

WATER USE

As population increases, demands for fresh water for bathing, drinking, cooking, and sewage disposal also increase. The first effects of water diversion for human consumption are changes in hydrology. The balance between fresh and salt-water in estuaries changes, producing changes in salinity, and altering the flushing capacity of the ecosystems. The combined effect of these chemical and physical alterations are biological displacement of species, changes in species composition, reductions in biodiversity and stocks of plants and fish communities, inhibition of photosynthesis, decreases in biological productivity, and habitat modification and destruction. Diminished flushing capacity can impair the ability of ecosystems to assimilate pollutants, making the impacts discussed in the previous sections even more severe. If water withdrawal rates are higher than replenishment rates, the supply for human consumption will steadily decrease. When coastal streams are dried-up, the rate of sediment transport decreases and less fresh-water enters the marine ecosystems. Beaches start to erode, since the deposition of sediments is lower than the erosion caused by wave action. As salinity increases, marine productivity slows down. Fresh-water shortages have affected coastal tourism in Costa del Sol, Southern Spain where low rainfall and recent periods of draught impaired the adequate supply of water to all the tourist facilities during the summer months (MacDowell, et al. 1993, 195-196). Although the Tribugá Gulf has a rainfall regime that keeps water bodies replenished, shortages in periods of draught have affected the villages of Coquí and Juradó. These two towns share their drinking water which is taken from the bordering Coquí River. In dry periods the supply of water cannot satisfy the demand of both villages. Shortages have generated conflict and resentment among the residents of both localities (Alcaldía Municipal de

Nuquí 1995, 19-20). As demand for fresh water increases and the filtration functions of the ecosystems are impaired by pollution and habitat disruption there might not be enough water to supply native needs, or to ensure adequate water distribution to the tourists.

International calculations for water consumption per-capita vary from 2 m^3/year in Malagasy to 180 m^3/year in the Unites States (Carpenter 1983, 391). Other estimates for coastal communities in the Third World report a minimum requirement of 50 m^3/year per capita, including drinking water and fresh-water for other uses as well. Measurements on the current levels of per capita water consumption and the average flow of the rivers and streams that bathe the Gulf have not been taken. If these measurements were available, the municipal government could determine how many people each village can support. Local officials lack the instruments and capacity to perform these studies. However, they can appeal to the Regional Planning Council that groups all the western departments to conduct that study and provide the estimate for carrying capacity of the watersheds of Tribugá.

CHANGES IN SHORELINE USE

The construction and use of piers and docks is one of the activities that tourism brings to coastal areas. These may cause severe environmental damages, especially when the facilities are numerous. Such structures are usually built in calm areas, protected from the influence of waves and winds. Construction removes sediments, increases turbidity, and may involve the loss of some trees and shoreline vegetation. Once established, they can block sunlight, reduce photosynthesis and thus, marine life productivity. In Tribugá few of them exist, but as tourism increases the cumulative impact of

several structures sitting next to each other, may impair the adequate functioning of the shoreline ecosystems.

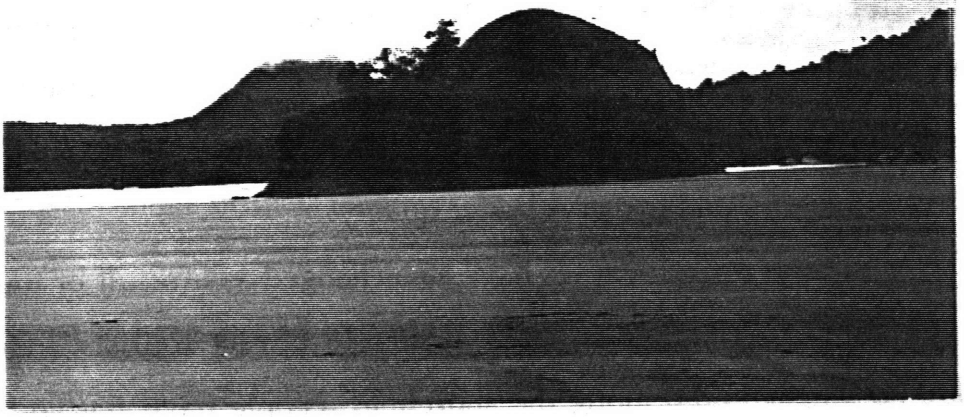
Not only the infrastructure but the boats themselves can harm the coastal environment. The operation of boats generates pollution from oil spills that occur accidentally or when emptying and filling tanks. Oil reduces the amount of oxygen available in the water, affecting the food web. It also reduces beach appeal and introduces toxic substances such as lead. Fish and fish eggs can become contaminated, hurting their productivity. Oil can also form a film attached to shorebirds hampering the waterproofing and heat regulating functions of their feathers. In the Gulf these effects have not been monitored and major spills have not been reported thus far. However, boats are believed to have caused important habitat disturbances. They travel freely over the few coraline formations, perturbing wildlife with noise and wave formation, damaging the coral reefs as they pass. Some members of the community and the director of one of the local NGOs mentioned that humpback whales no longer enter the Ensenada de Utría, a traditional stop along their migratory route, because of the intense noise, water disturbances, and pollution of daily maritime traffic. Older people in the area also remember that some year ago the whales used to drift closer to the shoreline and to fishermen canoes.

The climatological conditions of the Gulf—low salinity, constant rains, and water turbidity—did not allow coral reefs to establish successfully. Only a few reefs developed during the Pleistocene (Carlos Vieira, telephone conversation, February 26, 1997). In the 1970s these scarce habitats were frequently dynamited by the local population. This technique proved very efficient in terms of catch per effort, but lethal to the reproduction of the species. By the late 1980s the National Institute of Natural Resources and the

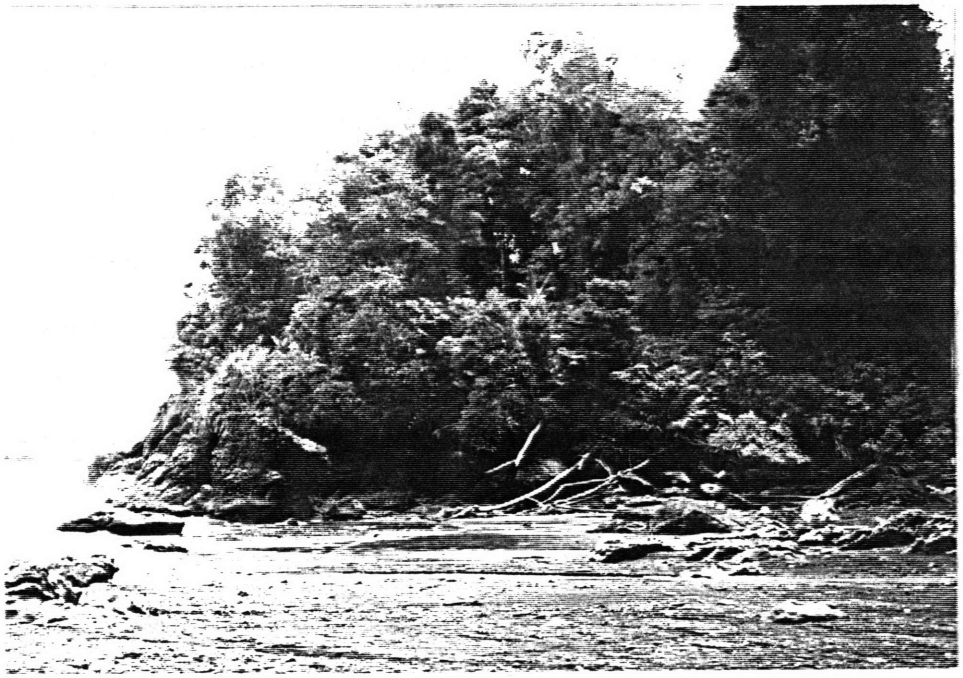
Environment—Inderena—campaigned with the fishermen to stop this practice. Since then corals are recovering and local people have not only become aware of their importance for marine life productivity but also realize the appeal they have to tourists. Although tourists are a major stakeholder in the protection of the coral reefs, they also can cause accidental or intended damage by extracting pieces of coral they might regard as inoffensive souvenirs, stepping on the reefs, etc. Through educational campaigns the remaining coral reefs of Tribugá should be protected not only because of their beauty and incredible diversity, but because they protect the coastal zone, prevent beach erosion, and preserve water quality.

The conditions of the beaches have also changed as a result of tourism. Native communities clean them periodically to attract tourists. Human wastes are no longer found along the shoreline. People have started to use latrines instead (see Chapter II). Shoreline debris—such as logs and bark—carried by the ocean to the beaches are also being removed. Pictures 3 and 4 illustrate how different two contiguous beaches in Cape Corrientes look when debris have been removed and when they have been left to wave action. The removal of debris may seem trivial, but it diminishes the protection of the coastal zone from the sea forces. If houses or other facilities are built in front of the coast, communities should think twice before removing these natural barriers.

Picture 3
Beach at Cape Corrientes where debris has been removed



Picture 4
Beach at Cape Corrientes—Debris left by waves' action



A positive effect of tourism and the presence of environmental NGOs in the area has been the protection of some of the wildlife that inhabits the coastal zone. Sea turtles have benefited from the sympathetic attention of tourists and biologists. This endangered species uses the beaches of Tribugá to lay its eggs in the calm tropical nights. Native people traditionally consumed turtle meat and eggs. The increase in human population raised the demand for these reptiles bringing them to the edge of extinction. In 1989 Fundación Natura established a program to protect the nests of the turtles with the participation of local communities. Through educational campaigns, representatives of Natura informed the public about the decrease in sea turtle population because of overconsumption. They held meetings with the community of El Valle proposing the establishment of a protected area in the beach for turtles to hatch. The communities agreed and in 1987 4 km. of the shoreline were designated as a mini-sanctuary where turtles freely lay their eggs and nobody is entitled to catch. Each September, when the turtle eggs break, members of the community together with biologists from Natura help between 15,000 to 20,000 offspring make their way to the ocean. Community involvement in the protection of the sea turtle has been key to ensure that no poaching occurs. They have voluntarily restricted the consumption of meat and eggs and now see themselves as the stewards of the resource. Locals no longer eat turtle meat "since it is not fun to have to hide to eat," as one of the fishermen said. The sanctuary has even become a (nocturnal) tourist attraction driving people to watch the turtles laying the eggs and to help the offspring find their way to the sea.

LAND CLEARING AND SITE PREPARATION

Land clearing activities for construction of houses affect the surrounding ecosystems by removing vegetation and soils, contributing to erosion. Further risks involve the introduction of non-native species that can out-compete the indigenous ones. The loss of vegetation leaves land more exposed to natural forces, such as storms, flooding, and beaches movements, increasing the costs of repairing natural effects.

In the Tribugá Gulf land clearing and site preparation examples vary from the "primitive" and minimal disruptive clearing of a few meters to build a cabin with native materials, to the construction of semi-mansions—equipped with all the amenities of luxury houses in the city—to the clearing of several thousand hectares for cattle ranches.

By the summer of 1996 there were two mansion-like houses in the Gulf, one of them built on top of a moraine island. Access to those properties was severely controlled. But local people mentioned that site preparation and their actual construction took several months. Building in moraine islands is not very smart since these islands erode in response to winds, currents, and sea level changes (Kaufman and Pilkey 1983, 24, 96-97).

About 2,500 hectares of forests were cleared by a single owner in the town of El Valle (Tamayo 1996, 74), depriving the area of valuable timber and habitat for many species. Cattle ranching is not the most productive activity to develop in the rain forest. Soon the soils get compacted, nutrients are washed away by intensive rainfall, while the high humidity weakens cattle, reducing yields. But physical productivity is not always the main reason for such investments. In the Amazon, for example, entrepreneurs—large and small—have opted for this alternative to claim the land, enjoy public subsidies and low-interest credits, and get access to rents that are not related to

land productivity or public subsidies—such as regional political power (Hecht 1993, 689).

After protests and complains from the NGOs and the communities, the government ordered the owner to stop clearing his land. So far he has complied with the ordinance, but nothing prevents such an event from occurring again somewhere else along the Gulf.

Finally, the introduction of exotic species, whether accidental or intended should be of concern in this area of high biodiversity. They can take the place of native species, increasing the risk of losing the latter which are endemic to this unique place. "Alien species can possess competitive, predatory, parasitic, and defensive strategies with which the native biota have had no evolutionary experience." (Noarse 1993, 130). Some of the most devastating examples of the effects of alien species over native wildlife include the introduction of cats in Australia which are wiping out many species of birds (PBS 1997) or the incidental transport of Red Sea species into the Mediterranean Sea through the Suez Canal that have depressed populations of ecologically similar Mediterranean Sea species (Noarse 1993, 134-135). Cats can eliminate bird and iguana population in Tribugá, as they did in the Galapagos, while exotic plants, with no native plague that controls its spread, can be more resilient and become more abundant than the native ones.

COASTAL NATURAL RESOURCES USE

Due to the integration of the local economy with the larger regional markets, the composition and quantity of goods produced and harvested locally has changed. Traders are most likely to want to obtain those locally produced items with the highest price to transport cost ratio, favoring proteins over

nuts and seeds, and these over rubber, leaves and streams (Wilkie et al. 1995, 3). Trade also tends to favor goods that come from the commons, because part of the cost of producing those goods is borne by the community, while the total cost of producing agricultural goods is borne by the market (Ibid, 4). Thus, the goods that are more valuable for export start being produced more intensively, while those that are cheaper to import stop being produced. This change in production has an impact on the diversity of the resources: It is expected that a smaller number of native goods will be produced/taken to satisfy the market, although still some of the other goods might be extracted for domestic consumption. The goods with a high value per capture cost ratio, such as fish and game, will be harvested first. The effects of specialization in the most valuable goods on biodiversity are unclear. Specialization decreases the eveness[4] of the resources. But since other goods will not be harvested, the net effect on species richness is undetermined. The effects on non tradable goods will depend on the relationship between these and the tradable ones (e.g. the existence of predator/pray or host/pollinator relationships that can cause imbalances in the interaction among species.)

In the Tribugá Gulf the demand for fish has soared and species that were not captured in the past (such as shark) are now being commercialized. Fishermen mentioned that catch-effort has increased in recent years and that the sizes captured are smaller. Tourism and the establishment of storage and transportation facilities have increased the demand for fisheries. But marine life is also exposed to the destructive action of shrimp trawlers that work close to the coastal zone. Although they are forbidden to fish near the coast, they seldom comply. The action of these vessels has been compared to the use of bulldozers to clear cut the rain forest (Russell 1997, 21.) They not only catch

[4]Biological eveness refers to the share of different species that make up a community.

fish or shrimp, but destroy the habitats the species they pursue depend on. Fishermen I interviewed said trawlers' noise scares the fish away. Noise is indeed an important disturbance but it is not the only problem caused by ships. They also turn over sediments, increase the turbidity of the water, and reduce the supply of oxygen, impairing primary production and respiration, depleting marine life.[5] In the face of increasing demand and use of technologies far more destructive competing with artisanal fisheries, action is needed to protect and manage fisheries, a vital resource for local people. A strategy to protect artisanal fisheries might include the establishment of reserve zones that secure a permanent supply of species—a strategy that has proven successful in other parts of the world (Hinrichsen 1997, 17). NGOs with the cooperation of local authorities, fishermen, and tourism companies can also start an aggressive campaign to denounce, control, and punish trawlers that trespass the legal boundaries.

Upland Ecosystems

The forests of Tribugá are communally exploited by the villagers who extract timber for housing and canoe construction; gather plants and fruits for medicinal use, direct consumption, and materials for utensils; and hunt. The timber has not been extracted for commercial purposes because there are no roads to transport it, and because the rivers are too steep and shallow to carry the logs. However, in the last decade more timber has been extracted to build

[5]Elder members of the community do not consider the shortage a steady, long-term phenomenon. They say fish have particular cycles, with years of abundance and years of scarcity. Scientific understanding of these matters have indeed showed that populations do not have linear behavior and that low population levels can bring a stock to plummet because they do not reproduce efficiently or they succumb to predators, a phenomenon known as depensation. However, recent studies have demonstrated that fish stocks world wide are not collapsing because of depensation but because of plain, simple over fishing (Barinaga 1995, 1043).

tourism facilities. The increase in marine transportation has produced limited attempts to export logs to Buenaventura, the biggest regional marketplace for timber (Luis Gilberto Murillo—Former director of the Chocó's agency in charge of natural resources management, telephone conversation, February 21, 1997). Although there are not estimates of volume of logging, some valuable species have become scarce such as: *abarco* (*Corinania pyriformis*), *amargo* (*Welfia regia*), *jigua negro*, *nuanamo* (*Virola sp*), and *guayacán* (*Vitex sp*) (Jaime Salazar, e-mail communication, April 1997; Universidad Tecnológica del Chocó et al. 1996, 27-28).

Game species have started to show signs of reduction (Carlos Vieira, telephone conversation, February 26, 1997). Big mammals such as peccary and wild pigs are no longer captured, and hunters say that many other minor species have gone further away. The Amerindian communities living at the head of the rivers also acknowledge the reduction in game. They blame it on increased demand by larger human populations, but also on habitat fragmentation and logging, triggered by the construction of a road connecting the interior coffee growing zone with the coast. The construction of the first seventy kilometers is already completed and has left a landscape of destruction, severe damage to watersheds and hydrological cycles, and an unprecedented wave of encroachment and clear cutting in the forests (Universidad Tecnológica del Chocó et al. 1996, 15-19, 21-31). Although indigenous peoples managed to stopped the construction in 1993 (Los Angeles Times, 20 August 1995, sec. A, p. 2) until an environmental impact study was completed, the pressure to finish the road has increased, since it is in the interest of powerful landowners, the coffee growers, and the Ministry of Transportation to do so.

Preemption versus Mitigation

Tourism activities in the Gulf of Tribugá have increased the pressure on the natural ecosystems in diverse ways. Water quality is at risk because of the disposal of raw sewerage. Solid wastes are changing the hydrology of estuaries and mangroves, reducing their flushing capacity, mixing, and filtration functions. Demand for fisheries and forest products has increased and some signs of danger are being noticed by fishermen, hunters, and loggers who are witnessing a reduction in stocks. Additional alterations of local habitats are caused by oil-related pollution, destruction of coral reefs, noise disturbances, and the sweeping of the sea bottom by ships. Until now, these alterations have seemed minor in the eyes of the local people, tourism entrepreneurs, the local government, and the NGOs that work in the area. But the evidence suggests that these impacts will become more severe as tourism develops further. The country's strong economic development, easy access of the area, a reduction in air fares due to increased competition, and the availability of accommodations with an acceptable level of comfort to tourists, are all reasons to believe that Tribugá will consolidate as a favorite destination for hundreds if not thousands of Colombians in search of the last pristine beaches.

The bad news from this analysis is that the ecosystems of the Gulf are at risk. The good news is that the major damages are yet to occur and thus Colombia can apply preemptive measures. More than thirty years of international experience dealing with environmental problems demonstrate that prevention is cheaper and more effective than mitigation (Mathews 1995). Additionally, taking action before the problems escalate helps build the capacity to deal with those problems, thus avoiding improvisation. If the

central government joins the local NGOs and authorities in an effort to collect data and monitor environmental variables, they will be able to anticipate harmful activities and modify them. By starting early, local authorities can design a management plan to protect the resources that incorporates the needs of the local communities and that has the support of entrepreneurs who will also benefit from the protection of the natural assets. The process of consultation and discussion on the best ways to protect the environment will also help the region come up with a comprehensive understanding of their environment, and a clear position regarding the development projects—the conclusion of the road and the construction of an international maritime port—that the national and state governments are proposing in the Gulf.

Chapter IV. Equity and Sustainable Development in Tribugá

Winners and Losers of the Development Process

Tourism has produced profound modifications in the social, economic, and environmental conditions of the Tribugá Gulf. The market economy has permeated the traditional subsistence economy introducing prices for goods and services that were not priced before. The first of these transformations was the appearance of a land market for beach-front properties. In less than a decade most of the properties along the coast were sold for about US $10-12 thousand per hectare—equivalent to 6 years of continuous work for a rural laborer.

Labor markets have been created to provide the goods and services required for hotels' operations. Tourism employs local people as construction workers, cooks, maids, tourism guides, and boat drivers. Other economic sectors such as air and maritime transportation also employ some Tribugá residents. Additionally, tourism has stimulated fisheries, the extraction of diverse forest products, and the production of handicrafts and jellies. Based on my field study it appears that over a tenth of the adult population of Tribugá is directly involved in activities related to tourism. Although seasonal, these activities represent an important source of cash income for the local economy that did not exist before.

In response to tourism, local dwellers have changed their allocation of time. Some traditional activities no longer take place, or are less important, while others have become more frequent. People no longer harvest coconuts to produce oil. Instead, they buy other vegetable oils brought from the interior. The shift in the varieties of plantain cultivated toward those that

require less attention also illustrates how people have freed time from agriculture to engage in other occupations. On the other hand, fisheries and the extraction of timber, *tagua*, huina oil, and fruits, have become more important because these products are in demand by tourists. A survey of the changes in daily activities over several years would be required to assess the effects of these shifts on the sustainability of the natural resources.

Increased cash incomes have allowed localities to improve education and sanitary services. Teenagers in Tribugá have to travel out of their home villages to receive secondary education. It is expensive for a family to support a young member outside the home and to bear the cost of the labor lost by his or her absence. This expenditure became affordable due to cash savings provided by tourism which allowed secondary enrollment to increase by more than 20% between 1985 and 1993. In the rest of the municipalities of the region, where no tourism development took place, secondary enrollment remained almost unchanged.

Sanitary conditions are better now than they were before tourism increased. In 1985 53% of the houses in Tribugá did not have water delivery or sanitary services. By 1993, only 30% of them were not yet covered by these services. This result is remarkable when considering that basic service coverage for the rest of the municipalities in the region grew only 1985 to only 6.8%, in eight years.

The evidence of other improvements in the quality of life is less powerful. The statistics for housing conditions show a small but increasing percentage of the houses being built from perishable materials. This result, however, is the product of two opposing phenomena. On the one hand, native people, whose income has increased, have improved their houses by using more durable materials. On the other, tourism facilities and country

houses are being built from logs and palms, emulating the local architecture. Although these houses are equipped with all the modern services, they are considered inadequate by the Census Bureau, and thus explain why the total percentage of inadequate housing increased between 1985 and 1993.

People in Tribugá have continued to move out of the Gulf. It is difficult to say whether tourism has failed to offer enough income opportunities to hold the local population, or if new sources of savings have allowed people to move faster out of the countryside. Further research is needed to tell the story of migration in Tribugá, explain the motives, means, and destinations of migrants, and how the growth of tourism in the region has influenced that decision, if at all.

Besides these improvements local communities still endure severe poverty. Mortality rates remain high, especially among infants. Health care is scarce and the population frequently suffers devastating outbreaks of cholera, diarrhea, and malaria. Although people are receiving higher education, tourism companies only demand local labor for the lowest skilled activities. Tasks that require higher skills—such as bookkeeping, management of hotels, restaurants, and fishing companies—remain in the hands of outsiders who have the training, the experience, and the capital to make the investments. The black communities do not have access to the capital required to build and equip the facilities. They also lack the training needed to manage and profit from their own enterprises. As a result, only a minimum part of the wealth generated in Tribugá remains in the area. The major gains go to those who own the facilities and the land along the shore. They are foreigners who live and consume in the big cities and whose profits from tourism are seldom reinvested in the Gulf. To give the black communities training as well as credit—tailored to their needs and

repayment capabilities—would not be impossible, but the government must commit to invest time and resources to meet these goals.

Environmental impacts of tourism are also unequally distributed in Tribugá. Raw sewage is either dumped directly into rivers and the ocean or goes into septic tanks that were built regardless of their proximity to ground water and tidal influence and, thus, are probably leaking. The denser the population arriving in Tribugá, the greater the problem of water pollution in the area. Waste water discharges increase the load of nutrients and pathological agents in the water, affecting the productivity of the ecosystems, the composition and health of the species they harbor, and ultimately human health. The level of solid wastes, particularly plastic and other non-biodegradable materials, is a direct consequence of tourism. These materials are not produced in Tribugá but imported from the cities for tourists to consume. As trade increases many industrial goods become part of the basket of goods of Tribugá families. Their disposal into the riverine zones and backyards threatens natural systems and the landscape. As the demand for drinking water rises and pollution levels get worse, it will not be long before this resource becomes scarce. In the competition for drinking water, those who can afford it will get it while those who cannot will have to cope with poor water quality, higher risks of diseases, or longer journeys in search of clean water.

Concern is on the rise among the local population, the Amerindian tribes from upstream, and certain NGOs about the sustainability of natural resources in Tribugá. More timber, fisheries, and game are being extracted at a faster pace. The main threats to the sustainability of marine resources are pollution, habitat destruction, overexploitation, and competition with industrial fisheries. Inland, deforestation and landless peasants'

encroachment are causing a decline in the amount and size of trees and amount of game available for local dwellers. These goods are the foundation of their livelihood: their main sources of animal protein and shelter, as well as an important source of cash. Their scarcity and likely depletion will diminish the standards of living of the African-Colombian and Amerindian communities. They will have to bear the effects of malnutrition, illnesses, and deaths associated with water contamination and resources depletion.

In the long run, environmental degradation is also detrimental for the businessmen who own the land and the facilities along the beaches. A longer term perspective will cause them to see that their investments are being hurt by the growing problems their own industry is producing. However, they have few incentives to look into the future. High interests rates, a climate of political instability and social unrest, and little planning and control by the authorities, favor a logic of exploitation that can be described in "mining-like" terms where investments are made to exploit the resources as fast as possible. Once depleted, the capital moves to the new frontier to continue with the same pattern. Such behavior creates costs which are hard for society to assume. As the landscape is destroyed and species are lost, fewer resources will be available to satisfy needs.

Profiting from Conservation: Strategies and Tools

The main questions concerning the development of Tribugá are how to ensure that local communities improve their conditions of life without losing their resources; how to develop a clean tourism industry that is still profitable; and how to engage actors in a regional plan that distributes the benefits more equitably, and preserves the resources for the future. To

answer these questions conservation and equity should become primary considerations in the decisions made by entrepreneurs, tourists, local dwellers, and government authorities. To make environmentally sound decisions these agents must have sustainable alternatives available and the incentives to chose them (Noarse 1993, 188). I offer a set of policies that meet these tests.

ENVIRONMENTAL QUALITY INFORMATION AND EVALUATION

To make the right decisions, public and private agencies must have enough information and evidence to support their choices. Scientific information on the physical, chemical, and biological processes is indispensable to determine the current functioning and health of the ecosystems. Scientific research also provides environmental quality indicators to assess environmental degradation and its causes, and to identify corrective measures that would restore what has been damaged. With the environmental indicators managers can set targets while periodical monitoring of the indices makes policy evaluation feasible.

Biological studies sampling the resources in the Pacific Corridor have pointed out the incredible richness and diversity of this region (See Chapter I). However scientists agree that most of the resources in the area remain vastly unknown while the natural cycles and processes are still poorly understood (Gentry 1993, 208). The baseline data and monitoring system are lacking in Tribugá, impairing the design of any comprehensive and realistic plan for managing the resources of the Gulf. The few scientific studies that exist—sponsored by foundations such as Natura and Inguedé—are mere descriptions of some of the resources. They do not constitute a methodical

and integral research of the natural ecosystems, and they do not provide indicators about environmental quality.

To build the baseline data and institutionalize the monitoring system on the environment I propose the creation of a research institute to conduct the studies, develop the environmental indicators, and train technicians in the monitoring practice. This institute would be the basis for further research in the area, and the advisory body for local policy-makers in the design and implementation of projects that affect the environment. To take advantage of existing capacity, I propose that the institute be attached to one of the universities located in the nearby cities. They have programs in basic sciences and the environment, and that may be willing to establish a field research institute at Nuquí. The in-situ physical plant would offer scientists the necessary support for their studies—tools, a base camp, communication facilities—while the main campus would provide the resources required to produced and spread the findings throughout the scientific community.[6] The program might start as a summer institute for students and professors to take the classes and do their research. If successful, it might become a permanent branch of the university. Funding for the school of field studies should be provided by the Ministry of the Environment in the initial stages. The Ministry will be the first beneficiary of this institute since it badly needs qualified employees able to understand and manage the country's resources. It also has more than $9 millions from the Global Environmental Facility to implement the Biopacífico project, a program devised to protect the biodiversity of this rich area (CI-NRDC 1994, 43). In the long-run, the university would be expected to find the financial resources to make the

[6]Through publications, workshops, access to grants for research, courses in the subject, among others.

program self-sustained—through research grants, contracts with public and private agencies, and tuitions.

The success of the institute would depend on the quality of the research and its relevance for management practices. It may become a novel institution in the country that leads this kind of applied research and updates managing criteria. At the local level, the institute would bring more resources to Tribugá and might even demand some of the local labor force that has secondary education but lacks employment opportunities in the region. High-school graduates can be trained to assist researchers in several areas and can monitor the environmental quality once the baseline studies are concluded. By employing them not only a share of the resources invested in the center will stay in Tribugá but also the assistants' understanding of environmental processes and responses to human interventions will spread throughout the community, serving as a vector of information and education.

ENVIRONMENTAL EDUCATION

A strategy to expand knowledge would not be complete if the knowledge remains in the ivory tower of the scientists and researchers who study Tribugá. For research to have a real impact on people's lives that enables changes in behavior, its findings must be spread among society. Information outreach must not only be directed to local authorities and Ministry's officials, but to all the involved parties in Tribugá—local people, tourists, and owners—whose behavior is hurting the environment. These activities would help people realize the value of the natural environment, the risks that threaten it, and their responsibility for the damages as well as for the conservation of the resources. Local schools can be the vehicle to educate

residents. Curricula can be modified to emphasize the study of the local biology and geography and to include applied research in the area. Some of the professional graduating from the regional universities or the biologists who work in Tribugá can help teachers develop the curricula. This is an inexpensive strategy that has a multiplier effect among the community since young members can share their knowledge and encourage their families to use the resources more efficiently and preserve them for the future.

Public officials and local leaders are not entirely aware of the threats to natural resources and the different tools they can use to protect them. Lack of information prevents them from taking advantage of legal and financial resources they can tap to improve the quality of life of their constituencies. For example, the National Government has set up funds for co-financing projects in rural development and technical assistance if proposed by local authorities. Thanks to the new constitution, local authorities can now impose regulations and taxation for environmental purposes. Communities can also get access to grants and donations from national and international agencies that promote biodiversity conservation and community projects in the forests. That information has not reached the local level. The NGOs can be the ones who bring it by hosting workshops with local leaders and authorities on how to use the tools available and how to access financial resources.

Although tourists are the main stakeholders in the preservation of the natural environment, they can cause considerable damage by littering the beaches, stepping on the coral reefs, and removing fauna and flora. However, with a small effort they can be taught and motivated to behave in more responsible ways. The eco-guides can organize civic campaigns and contests among tourists to keep the beaches clean and to prevent the removal of

native species. Natura and Inguede's representatives in the cities can disseminate information to a wider public by writing articles to the newspapers to draw the attention of potential tourists about the norms they should obey when vacationing in Tribugá and how they can get involved in active campaigns to protect the Gulf. They can also seek the support of the National Corporation of Tourism to distribute informative pamphlets and recommendations, via airlines and tourism agencies, to the people who travel to Tribugá.

CURBING THE EFFECTS OF EXISTING PROBLEMS

Qualitative evidence exists on current signs of environmental degradation caused by water pollution, solid wastes disposal, and increasing consumption of natural resources, propelled by tourism. On these fronts the municipal government should take action to avoid that escalating problems before the carrying capacity of the ecosystems is exceeded.

Water Pollution. One of the major environmental risks people in Tribugá cannot afford to leave unattended is the pollution of the waters. Maintaining water quality is vital for local communities and for the tourism industry that requires secure and pure drinking and swimable waters. Since villages are different sizes, and waste water disposal differs between towns and tourism facilities, the solution to this problem has to be tailored to the requirement of each specific group.

The town of Nuquí, with over 2,000 permanent residents and a few hundred tourists coming each season, is the most crowded place in the Gulf, where the production of wastes is higher and, thus, where attention should go first. To solve sanitation problems in developing countries, an effective technology has been the construction of stabilization ponds for primary

treatment. These ponds are a low cost alternative for removal of pathogens and have minimum operating and maintenance requirements (Kalbermatten et al., 1980, 151-153). If placed far from the sources of water, the ponds will retain nutrients in their vicinity which will not go directly into the waters. This alternative should be considered among other possibilities, and the most suitable option for the region should be chosen. The municipality has a limited annual budget to build and operate the ponds. For this reason, local government and neighborhood associations should agree to build the facilities jointly, with neighbors volunteering their labor to construct the household connections and pipelines, while the municipal government would provide the design and construction materials. Maintenance would be carried out by communal crews who would periodically inspect and fix the connections and pools to ensure their proper functioning. The model developed by Nuquí might then be followed by the smaller villages, establishing facilities according to their population size.

Because tourism cabins are not congregated but scattered along the shore, the system that works better for them is the construction of septic tanks. The facilities have already installed them but it remains unknown whether or not they were built properly. A crew of experts should assess the conditions of all existing septic systems, and provide guidelines for redesigning and rebuilding those that are faulty. To finance this operation, the municipal government may impose an annual fee for water quality control to tourism companies. The annual revenue would be used for further maintenance and inspection. To ensure the reconstruction of the facilities that are faulty, the municipal government may withhold the functioning licenses as a mechanism of coercion. Owners must renew their license every year. If their tanks are leaking, they would be advised to fix

them in a period of 3-5 years. If after that time they cannot offer proof that their tanks work fine, their annual license would not be renewed. Without the license, they owners would not be able to open their hotels to the public.

Solid waste disposal. Accumulation of solid wastes threatens waters and shoreline habitats. Organic waste produced in Tribugá is promptly degraded, but recyclable wastes pose a challenge for the authorities since they cannot be transformed locally. At least two options should be considered to deal with this problem. The first one is to encourage tourists to take to their home cities the recyclable materials they used during their vacations. Since this strategy is based on citizen's awareness and responsibility towards the environment it requires educational campaigns and should be supplemented by an economic incentive—so that people perceive they are compensated by the effort of taking an extra box with their luggage. This could be done through organizing weekly contests among tourists offering discounts in the hotel bills or airplane tickets for those who take with them the largest amount of recyclables. The cost of a ticket—about 80 dollars—can be paid collectively by the participating hotels. This strategy has the advantages that, if accepted, the implementation costs are low and management procedures simple, while it promotes a more sensitive attitude towards the environment. However, since it is based on education the results might vary depending on the receptivity of the public and their previous exposure and concern about environmental issues. If it fails, an alternative road is to establish a collecting point at Nuquí where a couple of employees dispose of the materials they collect, once a week, from the villages and the facilities. Then, through a contract with the airlines, the municipality can deliver the

materials to one of the major cities to be recycled. The costs of transportation and the employees wages will be charged to the hotels.

Alleviating pressure on fisheries, timber, and game. In Chapter 3, I showed that increasing demand for timber and other forest products, as well as encroachment are the likely causes of the reduction in the stock and size of timber and game. If the forests of Tribugá disappear, the unique species they harbor would be lost, the rain regimes will be altered, the supply of fresh water will be reduced, and the sediments that nourish the beaches will no longer be transported. After being cleared, the hills and shores of Tribugá would have lost all their appeal and they will no longer be able to sustain the local population. The first step to protect the forests from encroachment is to give the communities legal titles over the collective land they have traditionally used. In 1993 the Colombian Congress passed the Law # 70 to give Black communities these titles (Senado de la República 1993, Ley 70). The law attempts to defend the territories of the communities from encroachers and to promote sustainable use of the resources, by securing long-term ownership. Although clear property rights, by themselves, do not ensure a halt to the colonization pressure, they provide communities with a legal tools to defend their territories and, thus, must be obtained. So far, the application process has been delayed in Tribugá because people are not completely aware of the benefits of the law. They also need to agree on the territories they are going to claim and, thus, need to solve possible disputes over land with neighboring communities. The application process includes the fulfillment of several requirements and frequent trips to the regional and national public offices, which the communities are not able to undertake on their own. To speed the process local authorities, NGOs, and grassroots organizations should organize information dissemination sessions to clarify

the benefits of the law, meet with local leaders to designate the territories, help resolve possible conflicts, and accompany the communities in the application process outside the region.

To achieve sustainable use of the natural resources, concrete benefits should be perceived by the communities as a result of their efforts. Timber is the most valuable and most desirable resource of the forest. The domestic prices of timber are well under the international prices and do not represent the real rent for the resource (Berry 1995, 31-32). Since little value is placed on timber, there are not incentives to maintain its productivity over time. For this reason I consider that the strategy to promote sustainable management of the forests is to pay communities higher prices provided that they cut the forests in a sustainable way. To do so I propose the establishment of a community project in one of the villages in Tribugá with the help of international agencies that promote this kind of initiative. One of them, the Rainforest Alliance—a US-based non-profit organization—has a program called Smart Wood that promotes the production and marketing of sustainably harvested timber around the world. If the communities agree to carry on the project, forestry experts from the Rain Forest Alliance can help them to ensure the project complies with the sustainability standards, and thus, certify the wood. Once certified, timber will be shipped to the international clients of Smart Wood, generating important benefits for the community.

Clearing land to plant crops accelerates deforestation if the fallow periods are not long enough to allow forests to regenerate. Peasants in Tribugá said that each two or three years they have to move to new land because yields start to decline —the soils "get tired" and weed takes over. Alleviating the pressure on the forests can also be achieved by increasing the

productivity of the parcels and diminishing the requirements of new land each couple years. Tribugá farmers do not use fertilizers or pesticides for their crops. Their techniques of production are very simple accounting for very low yields (see Chapter I.) As contact with the modern society becomes more frequent, it is likely that those chemical substances will find their way to the communities in the forests. The use of fertilizers and pesticides can boost production for a few years but in the long-run it is detrimental for the environment and generates a strong dependence among farmers and an urgency for cash. However, they are not the only or most efficient way to increase productivity. Organic practices and techniques that make wise use of the natural environment are being developed around the world. Biological control of plagues, pollinators promotion, and the use of natural systems for nutrient recycling are just a few examples of practices that are being tried to increase yields in environmentally sound ways. In the city of Palmira there is a program for the development of tropical agriculture funded by the US-AID that has resources and research results that can be applied to the crops in Tribugá. In Cuba, the Institute of Agrarian Sciences is also developing sustainable technologies for tropical agriculture. The communities of Tribugá can get access to those institutions and their technologies through the fund set up by the Ministry of Agriculture and the World Bank that gives small credits and grants to communities and local governments for technology transfer. With the appropriate technologies, local farmers can reduce effort, increase yields, and improve their diets and income, while protecting soils, water, and species diversity.

To supplement the previous measures and help pull additional resources form the national treasury and international aid agencies, a part of the forest can be designated as a natural reserve. International experiences in

declaring protected zones have shown to be very successful in gaining government attention for policy reform and in achieving conservation goals. The establishment of a Silver Bank Whale Sanctuary in the Dominican Republic in 1986 (Noarse 1993, 192) or the Hol Chan Marine Reserve, in Belize (Ibid, 266) are just a couple of cases in which NGOs, scientists, and communities joined forces to protect their resources and changed adverse policies at the national level.

Fundación Inguedé has been interested in creating a natural reserve in the Southernmost part of the Gulf. Now they need to engage in a consultation process with the communities to negotiate the area and conditions under which the reserve might work. To motivate community participation in this process, people have to perceive that there are gains resulting from the deal. In order to do so I propose that Inguedé establishes a tourism center, like the one that exists in Panama where the Kuna Indians have devoted part of their land to conservation and have allowed scientific tourism to take place, producing important economic benefits for the community (MacKinnon et al. 1986, 101). Since people in Tribugá lack the capital for the initial investment, the NGO with its own funds or through help from World Wildlife Fund can finance the establishment of the facility. Inguedé can offer internships to schools of business and hotel administration whose interns will train local people in hotel administration and customer service. Besides the economic benefits the project will render, the resources will remain unaltered, and the land would be under permanent surveillance by the NGO and the communities, making encroachment more difficult than if it was idle. Since forests represent an important source of materials and food, some extraction should be allowed, under norms created and agreed upon by the community and Inguedé.

Fisheries are also suffering the impacts of integration with the market economy. Trawlers' disruption of sea bottom is one of the main causes of decrease in fisheries. The National Institute for Fisheries and Aquaculture, has written regulations that prohibit trawler ships from fishing near the coast, determine legal net sizes, and ban the use of dynamite for fishing purposes. Local people comply with the regulations but outsiders, particularly the trawlers, constantly violate the laws, and are seldom punished (Martha Méndez, National Department of Planning: e-mail correspondence, April 1997). Trawlers cruise over fragile ecosystems—such as coral reefs and mangrove forests—destroying the bottom of the sea, polluting the waters, and increasing noise, turbidity, and sediments resuspension.

Enforceability has proven to be very difficult because of lack of personnel patrolling the areas, bureaucratic gridlock that causes delays in the investigations and sanctions, corruption of the authorities that leads to impunity, and—as a consequence of all of the above—a widespread feeling among the communities that complaining is just a waste of time. To tackle the enforceability problem patrolling could be more efficient if fishermen can alert the coast guard in a timely fashion when flagrant violations occur. They might do so if they are granted a permit to use the existing radios at the National Park in Utría and at the Inguedé Station at Cape Corrientes. The existing complaint procedures have to be followed, even if their efficacy is limited. However, they can be accelerated if NGOs make public announcements in the cities and use other strategies such as shaming violators and calling attention to the matter through newspapers and other media pressing the authorities to promptly resolve the cases.

Due to simple technologies and low catch, artisanal fisheries have been able to sustain the stock of marine resources. However, the increasing

demand and availability of transportation facilities are exerting pressures for extracting more fish. The more fishermen catch today the higher their present incomes. However, if the extraction of fish exceeds the capacity of the resource to replenish, the future income of fishermen will deteriorate and fisheries might collapse. To ensure that fisheries are sustained over time and that fishermen benefit from the opening of the markets, higher prices have to be paid as reward for the sustainable management of the resource. This goal can be accomplished if one of the NGOs that promote trade of non-timber forest products establishes contacts with American and European agencies that certify and distribute fish, shellfish, and shrimp extracted in sustainable ways and that profit artisanal fishermen. Rain Forest Produce from Chagrin Falls, Ohio is one of the many companies that market these products in up-scale stores and markets throughout the US (The New York Times, "Good Conscience Hearts of Palms," 12 March 1997, sec. C, 2). If a company like this agrees to certify the artisanal fisheries of Tribugá and contracts for the shipment of a regular amount of fish, fishermen can get higher prices for their products and can invest in their own facility to freeze the catch until it is ready to ship, avoiding the intermediaries that today capture about 88% of the final price.[7]

FUNDING THE STRATEGIES

The implementation of these strategies requires sufficient and permanent flow of resources to be maintained over time. Most of the policies and projects described need initial investments but are intended to become self-sufficient, so that they do not depend on exogenous sources of funding. For

[7]Fishermen get $0.60/lb. of fish at Nuquí. The same fish sell in the urban markets for almost $5.00/lb.

water treatment the municipality should pay for the materials and designs of the pools, while the communities and hotels would pay—through their labor and fees—the costs of installing and maintaining adequate treatment systems. The hotels would also pay the cost of transporting recyclable materials to urban centers—if the good will of the tourists prove to be insufficient. Additional funding for this program would come from the sale of the materials to the recycling plants.

Community based projects for sustainable harvest of forest products and fisheries would require initial capital investments and the establishment of contracts with foreign agencies. The NGOs that work in the area should be in charge of these tasks. They have the national and international contacts and the credit-worthiness to receive the resources and lend them to the communities, holding property of the assets. Since projects are based on market incentives, once they start working, they will produce profits to re-pay investment and become self-sufficient.

The only project that needs an important infusion of resources form the National Government, at least for the pilot phase, is the research institute for information gathering, monitoring and analysis. It is the role of the public sector to fund research and development activities because they benefit society by and large, but they are not attractive to private investors who cannot appropriate all the benefits. Over time, the products of the research and the expertise developed by the center would be a valuable resource for environmental policy design and implementation around the country.

Local authorities can also raise income for environmental and social programs through taxation. Two types of taxes can be implemented in Tribugá. The first type are those that capture the rents derived for the use of the natural resources. The coastal and upland environments of Tribugá

provide many important goods and services. Beautiful beaches, clean waters, varied fauna and flora, are all nature-produced assets that are not priced by the market and thus are regarded as free. Economic decisions that undervalue—or completely ignore—these goods and services tend to benefit projects that are economically viable but environmentally unsustainable. To capture their value, beach-front properties should be taxed. Local dwellers who still own part of these properties and use them mainly for subsistence, might be relieved from the obligation. But hotel and country house owners who profit from these places should pay the tax. Tourism taxes should also be placed on travelers, and fees should be charged to the National Park visitors. The municipality should also collect monthly fees for the water used by the hotels. The money can be used to maintain the riverine zones and to clean the waste water.

The second kind of taxes are based on the "polluter-pays" argument and attempt to capture the cost of the externalities placed on others by private decisions. In Tribugá at least the following should be charged: taxes on oil operated boats for the pollution and disturbance they cause in the waters, and taxes on oil-operated electric generators as disincentive to its use. The revenues collected can be used to cover part of the cost of changing to solar energy. Solar energy is converted to electricity through photovoltaic cells. The cells are reliable, need little maintenance, and are perfectly suited for rural electrification since their costs fall only modestly as system size increases (Deudney and Flavin 1983, 87-88). A one square meter photovoltaic panel wired to a lead-acid battery can produce enough energy to sustain 5 lights, a radio, and a t.v. set. Its wholesale price varies between US $3.50 and US $4.74 per watt (US $0.25-US $0.40 per kilowatt-hour) (Flavin and Lenssen. 1995, 153, 156). Currently there are two non-profit organizations in the US—Enersol

Associates and the Solar Electric Fund—who help developing countries install and operate solar panels in rural and urban communities at small and medium scales (Ibid., 158-159). If subsidies or low interest credits are required, the Fondo Fen, a fund for environmental projects sponsored by the public electric utilities, can provide the resources and contract with one of these organizations to install the solar panels in the hotels and villages.

A LOOK INTO THE FUTURE

Conservation in Tribugá is at stake because the national government has allocated resources to finish the road that connects the coffee growing zone with Tribugá, and is doing the feasibility studies for building the international port. Although the completion of these projects would have severe impacts on the environment, powerful parties are interested in their construction. The coffee growers, who would gain a straight exit to the Asian and North American markets, are the first interested in these facilities. Coffee is Colombia's first export crop and represents over 20% of the total exports. The coffee growers' political power and lobbying muscle match their economic importance. The Japanese government, who has offered to lend the money and build the port (IAC, 1995), would collect the financial gains from the transaction, and would also have access to oil, timber, and fisheries in the Latin American markets. Latin America is thought to become the main supplier of these replacing southeast Asia who is on the verge of depleting its resources (WRI 1994, 131; Hinrichsen 1997, 18). The Minister of Transportation enthusiastically supports this project. Its influence in

government decisions has shown to overwhelm the power of the Ministry of the Environment.[8]

The policies I proposed need to be implemented without delay because they will provide the evidence to sustain local claims about potential environmental damages caused by these constructions. They will also give authorities the tools and the institutional capacity required to force any development attempt to comply with the objectives of sustainability defined for the region. The implementation of recommended policies and projects would create the interest groups who would benefit from and, thus, would support the protection of the natural resources: the tourists, who enjoy the amenities, the residents who would be engage in beneficial conservation projects, the local authorities who would have raised resources and support from their constituencies, and the tourism industry, who will have secured permanent profits from their enterprises. The future of the Gulf would depend from the cohesion and empowerment of these groups, and their capacity to defend the natural assets of Tribugá.

[8]In 1995 the Ministry of the Environment presented the conclusions of the environmental impact analysis of the first 70 kilometers of the road connecting Tribugá and the coffee zone. The study provides enough evidence to forecast the destruction of the forested hills that surround Tribugá. Nonetheless, the national government went ahead with funding the project making clear the that the environmental impact assessment was an innocuous requirement for the completion of the project.

Appendix

Table 3A. Secondary School Enrollment at the Municipal Level.
Department of Chocó. 1985 and 1993

Municipality	1985			1993			1985-1993
	Population 10-15 yrs.	Enrollment in Secondary School	Share of Enrollment	Population 10-15 yrs.	Enrollment in Secondary School	Share of Enrollment	% Change in Share of Enrollment
	1	2	3 = (2/1)%	4	5	6 = (5/4)%	7
NUQUI	887	161	18.15	1030	225	21.84	20.35
REST OF THE MUNICIPALITIES	43050	4862	11.29	55586	6808	12.25	8.45
ACANDI	1463	274	18.73	1783	383	21.48	14.72
ALTOBAUDO	1851	0	0.00	2307	0	0.00	0.00
BAGADO	1068	294	27.54	1469	412	28.05	1.85
BAHIA SOLANO	951	144	15.14	1224	202	16.51	9.02
BAJO BAUDO	3222	152	4.72	4032	213	5.28	11.98
BOJAYA	1075	48	4.46	1713	67	3.91	-12.39
CONDOTO	2220	691	31.13	2812	968	34.43	10.59
EL CARMEN	993	248	24.97	1123	347	30.90	23.75
ITSMINA	5384	1360	25.26	6680	1904	28.50	12.84
JURADO	450	87	19.33	677	122	18.02	-6.73
LLORO	1042	104	9.98	1339	146	10.90	9.27
NOVITA	1291	129	9.99	1739	180	10.35	3.59
QUIBDO	12570	n.a.	n.a.	16135	n.a	n.a.	n.a.
RIOSUCIO	3793	382	10.07	5477	535	9.77	-3.01
S JOSE PALMAR	1026	99	9.65	1183	139	11.75	21.73
SIPI	527	0	0.00	699	0	0.00	0.00
TADO	2342	698	29.81	3100	977	31.52	5.73
UNGUIA	1783	152	8.53	2097	213	10.16	19.17

Sources: Census Data 1985, 1993. Estadísticas Municipales 1985, 1990, 1993.

Table 4A. Inadequate Basic Services at the Municipal Level Department of Chocó 1985 and 1993

Municipality	Percent of Households with Inadequate Sewer and Water Supply		
	1985	1993	% Change 1985-1993
NUQUI	47.0	30.0	-36%
REST OF THE MUNICIPALITIES	70.5	63.2	-10%
ACANDI	68.4	36.0	-47%
ALTOBAUDO	61.5	95.8	56%
BAGADO	73.7	42.3	-43%
BAHIA SOLANO	33.3	13.1	-61%
BAJO BAUDO	55.8	43.5	-22%
BOJAYA	80.3	53.0	-34%
CONDOTO	60.2	77.8	29%
EL CARMEN	14.1	4.0	-72%
ITSMINA	69.2	66.4	-4%
JURADO	67.7	26.3	-61%
LLORO	85.0	85.1	0%
NOVITA	91.3	17.8	-81%
QUIBDO	73.4	74.0	1%
RIOSUCIO	91.5	76.1	-17%
S JOSE PALMAR	39.9	39.7	-1%
SIPI	95.8	89.4	-7%
TADO	85.0	74.0	-13%
UNGUIA	64.4	44.4	-31%

Source: Census Data 1985, 1993.

Table 5A. Migration Rates at the Municipal Level
Department of Chocó. 1973 -1993

Municipality	Annual Rate of Out Migration (%)	
	1973-1985	1985-1993
NUQUI	0.44	3.90
TOTAL—CHOCO	0.86	1.84
ACANDI	4.59	3.49
ALTO BAUDO	2.31	-1.83
BAGADO	3.27	-5.20
BAHIA SOLANO	0.66	1.84
BAJO BAUDO	1.48	3.19
BOJAYA	2.25	1.42
CONDOTO	4.21	2.51
EL CARMEN	2.98	3.39
ITSMINA	2.76	4.96
JURADO	0.75	0.95
LLORO	3.17	-0.41
NOVITA	1.45	4.35
QUIBDO	-2.30	1.77
RIOSUCIO	-2.29	2.22
S JOSE PALMAR	3.00	4.03
SIPI	-0.21	9.73
TADO	3.16	0.68
UNGUIA	-4.36	3.30

Sources: Census Data. Several years.
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