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SUSTAINABLE DEVELOPMENT FOR COMMUNITY PLANNING

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This project report is submitted as partial fulfillment of the degree requirements of the Worcester Polytechnic Institute. The views and opinions expressed herein are those of the authors and do not necessarily reflect the positions or opinions of the United States Agency for International Development, the Escuela Superior Politecnica del Litoral of Ecuador, or the Worcester Polytechnic Institute of Massachusetts.

This Report is the product of an educational program, and it is intended to serve as partial documentation for the evaluation of academic achievement. The report should not be construed as a working document by the reader.

ABSTRACT

This report investigated the applications of sustainable development in Ecuador, as well as the processes and policies involved in community development. These investigations resulted in the formulation of a methodology for community planning, which embodies the concepts of sustainable development. Existing methodologies for community development, for the introduction of environmentally conscious productive activities in communities, and for implementation of environmentally sound operations were used as tools in the development of our methodology. Too, personal experience and systematic evaluation using matrixes of criteria were utilized in definition and formulation of our project. Effective application of this methodology may be utilized by both communities and institutions in future planning efforts.

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AUTHORSHIP STATEMENT

The group members of the SUSTAINABLE DEVELOPMENT FOR COMMUNITY PLANNING team contributed equally to the completion of the project. Therefore, each group member, Todd DiNoia, Spirit Joseph, Eduardo Mendez, and Vail Mosier, takes full credit and responsibility for the entire content of the project.

EXECUTIVE SUMMARY

This Interactive Qualifying Project was made possible by the linkage between Worcester Polytechnic Institute and Escuela Superior Politecnica del Litoral. This linkage was funded by the United States Agency for Internatio al Development.

The IQP Sustainable Development for Community Planning had two major objectives. The first of these two objectives was to investigate the practice of sustainable development in Ecuador. As a result of this investigation, a second object was identified. This second objective was to develop an outline for sustainable activity selection and implementation in small communities.

The purpose of this IQP was to propose a planning process to be used by development organizations in small communities. To develop the planning process, we used, as a sample, Fundacion Natura's program in Puerto Hondo, a small community located outside of Guayaquil.

The project contains a fully developed outline detailing the process to follow when developing a community in a sustainable manner. Also, within this project, there are examples of how the planning process applies to Puerto Hondo. The information utilized in the development of the planning process was obtained from various environmental organizations in Ecuador. Research

regarding sustainable development was accomplished at Worcester Polytechnic Institute.

Upon completion of the two objectives, the following conclusions were reached:

- The best way to develop a community in a sustainable manner is to follow the seven step process of information gathering, standardizing collection, prioritizing information, applying information to decisions, creating awareness, modifying plans, and implementing the project.

- The success of the seven step process depends on the involvement of the planner and the community. If the process, as outlined in the IQP, is implemented, the short term results will be a development of the community in a sustainable manner according to the needs of the community members.

Upon review of the above conclusions, we proceeded to formulate the following recommendations:

- The use of the development process outlined in the IQP should be used by communities, development organizations, and, possibly, the Ecuadorian

government to establish community development in a sustainable manner.

- The outline for development should be made available, through the government, to communities and organizations that desire it.

- Development organizations and the Ecuadorian government should ensure sustainable development of communities by implementing the outline detailed in this project.

These recommendations are meant to serve as a possible course of action for development organizations and the Ecuadorian government. The implementation of these activities, whether it be any or all, would be beneficial to the members of communities that are, or will be, developing.

INTRODUCTION

In execution of our project, we investigated the practice of sustainable development in Ecuador. Through association with Fundacion Natura, an environmental organization, we were invited to participate in a development program in the small community of Puerto Hondo, Ecuador. The purpose of this project was to propose a planning process to be used by development organizations in small communities. To develop the planning process, we used the example of Fundacion Natura's work in Puerto Hondo as a point of reference. Research regarding sustainable development was accomplished at Worcester Polytechnic Institute, while information regarding actual planning methods was obtained from organizations in Ecuador.

The definition of sustainable development that was adopted from the World Commission on Environmental Development report of 1987, *Our Common Future*, was "an approach toward meeting the needs and aspirations of present and future generations without compromising the ability of future generations to meet their needs". This concept is of great importance globally and is now being introduced to developing countries, such as Ecuador. Certain indicators of a sustainable society might include "recycling, minimal use of renewable resources, maximum resource-use efficiency within industrial processes, exploitation of renewable resources at a rate less than

their natural rate of ecologically safe regeneration, and reduction of waste generation levels to well within the assimilative capacity of the environment" (Kautsky, 1993).

In order to maximize future development and quality of life, communities in developing nations must be introduced to the concept of sustainable development while they are in their development stages. Through awareness, education, and motivation, communities can understand the process to use for development. However, it is difficult for communities to gain the awareness, education, and motivation by themselves. This is the reason that outside organizations are of such importance in development. Thus, the use of a proper planning process can help organizations guide communities to awareness and motivation.

The following steps of community development were identified as important points of planning; (1) gathering information about the community; (2) standardizing a method for regular collection of this data; (3) prioritizing the information; (4) applying information for decision making; (5) creating awareness within the community regarding existing plans; (6) discussing and modifying plans with the community; and, (7) implementing activities. The planning process that was developed embodies the general pattern found through the evaluation

of other methods used for community development by organizations.

When using a process of community development, it is vital that the importance of each step is not overlooked. Although certain steps may seem simple or unimportant, each is critical to the success of the whole program and may take a significant amount of time to execute. In conclusion, to achieve sustainable development in a small community, a defined planning process, such as the one developed, should be used. Use of such a tool will assure that all the important qualities and features of the specific project are discovered.

This project is being developed under the WPI/ESPOL linkage agreement, funded by the U.S. Agency for International Development. The project is established, partially, for the development of Ecuador on both national and institutional levels. Institutionally, WPI and ESPOL are the main coordinators for the project. Local organizations such as Fundacion Natura, OIKOS, and PMRC have also influenced the development of the project. The information gathered throughout the duration of the project is available to interested parties, including industries, communities, government agencies, private organizations, and educational institutes in Ecuador and the in United States.

An Interactive Qualifying Project, or IQP,

emphasizes the relationship between technology and society. The WPI Undergraduate Catalog describes the IQP as emphasizing technological effects on societal structures and values. Application of the concept of sustainable development stresses the same points, as well as challenges us to identify and investigate the inter-relationships of society, in this case Fundacion Natura and Puerto Hondo, and the technologies that may be developed in the area. Technology, in this sense, is anything that aids in the progress of the community. Thus, our study of sustainable development and its application to Fundacion Natura's project in the community of Puerto Hondo is suitable in fulfilling the Interactive Qualifying Project's (IQP's) requirements.

LITERATURE

REVIEW

The following literature review contains a general discussion of sustainable development along with information about Ecuador, such as its history, economy, and resources. Although our project focuses specifically upon the use of a methodology, with Puerto Hondo as an example, all contents of the parts of the literature review are important. The information about Ecuador's history, economy, and resources helped us to understand the state of Ecuador's sustainable practices in the past and present.

SUSTAINABLE DEVELOPMENT

The widely used definition of sustainable development that we have adopted from the World Commission on Environmental Development report of 1987, *Our Common Future*, is "an approach toward meeting the needs and aspirations of present and future generations without compromising the ability of future generations to meet their needs". The concept of sustainable development does not imply that quantity is important. Instead, it means planning for the long term. A sustainable society is a flexible society that can

persist over generations due to foresight of necessary physical and social systems (Meadows, 1992, p. 209).

The concept of sustainable development has been used to establish resource management programs throughout the world. Within the concept of sustainable development, two major schools of thought exist. First, the Neo-Malthusian viewpoint holds that there is a direct link between the population growth and sustainability in the future. This view maintains that there is a limited number of resources available to be used and reused. The population must decrease rapidly in order for development to proceed in sustainable manner. Conversely, the Revisionist's viewpoint is that the effect of population growth on sustainability can either be positive or negative. The direction in which development will proceed depends on variables such as money, labor, and natural resources.

It is common knowledge that decisions made by humans are major forces influencing the ultimate state of the earth. Therefore, how humans perceive their life span and the natural resources they use is important. Often there is divergence and conflict among various decision-making groups (Stead, 1992, p. 6): namely among business organizations, industrial committees, governmental agencies, and educational institutions, as examples. This dissension is due to varying assumptions, values,

commitments, desires, and perceptions of situations by each group (Stead, 1992, p.6). The commonly held opinion is that the earth is the only readily available source of natural resources that can be converted to goods and services (Speth, 1990, p. 9). One has to keep in mind that economic activity can only be sustained over the long run if it is recognized that these activities must function within the limits of the earth (Stead, 1992, p. 7).

It is widely accepted that there are certain signs of unsustainability in the world. Human consumption is one indicator. The following facts illustrating unsustainable practices have been taken from Viederman's (1993) article, *Sustainable Development: What is it and How Do We Get There?*. Humans and their economic activities consume 40 percent of the productivity of plant material created each year by photosynthesis. The rate of increase in human use is about 2 percent per year, meaning a doubling in thirty-five years. Since humans are but one of between five and thirty million species on the earth that make use of these materials, this would appear to be ecologically impossible.

Similarly, land degradation is proceeding at alarming rates. Thirty five percent of the earth's land is already degraded, and this damage is largely irreversible in a human time scale. Soil loss outpaces

soil formation by at least a power of ten; in the United States soil erosion rates are estimated at 7.1 tons per acre annually, which is fourteen times faster than the formation of soil. This rate clearly demonstrates one of many unsustainable activities.

Loss of biodiversity is reflected in the decline of the world's richest habitat, tropical forests. Fifty-five percent of the world's tropical forests have already been destroyed. Some five thousand species become extinct every year, a rate ten thousand times higher than in pre-human days.

The number of poor people in the world continues to grow despite extensive official assistance efforts and a quintupling of the global economy's output since 1950. Even in the wealthy, market-oriented industrial economies of the North, one hundred million people still live in poverty.

Viederman notes in Current History 1993 that a sustainable society is a society in which community is seen as essential for survival, and diversity, both cultural and biological, will be preserved and defended. Viederman expands that there are certain revolutionary goals associated with a sustainable society. These are inclusive of economic, social and cultural, political, and ecological goals. These goals are listed below.

Economic goals:

- employment creation
- equitable income distribution within countries and redistribution among countries
- the establishment of an equilibrium between the economy and other human and nonhuman systems
- technology exchange, not simply technology transfer
- economic self-reliance at the community and national level

Social and Cultural goals:

- equity and justice, emphasizing needs over wants
- full status as participants in the polity for all regardless of race, gender, ethnicity, or class
- maintenance of cultural diversity, including respect and support for indigenous peoples
- strengthened communities through the participation of individuals and social groups in the conduct of their own affairs; everyone will be represented at the table
- revitalization of sustainable rural communities through the development of environmentally sensitive and economically productive agriculture, family farming, and appropriate value-added environmentally sound industrial

development

- revitalization of communities within urban settings

Political goals:

- political security, calling on the participation of communities in defining the problems of the people and developing solutions, so as to protect from nondemocratic internal threats and to meet the needs of the inhabitants
- strategic security, so that communities are able to defend themselves against external threats, coercion, or invasion, whether economic or political
- environmental security, under which a viable balance is struck between a community's population and the demands made on it relative to its economic endowment (including its natural capital and its levels of technology) and performance, and which allows it to protect itself from environmental assaults from outside the community
- a world that is largely demilitarized

Ecological goals:

- planning for ecological stability that will fit with increased general self-reliance and rely much more on renewable and recyclable supplies of resources
- environmental protection through greater concentration on resource and waste repository constraints, which may require resource planning and target settings to minimize the use of resources and the production of wastes
- technology assessment, management, and regulation, with particular attention to unintended consequences in the medium to long term
- focusing first on waste reduction and then on waste management
- zero toxins - which, while it may not be a fully attainable goal in a modern society, represents a more appropriate one than "acceptable risk"
- balancing ecological debt within and among countries
- maintaining biodiversity
- sufficiency rather than simple efficiency, since high levels of consumption are generally incompatible with the conservation and preservation of the world's resources

- population stabilization

The concept of sustainable development does not exist in a void. Instead, sustainability is related to and dependent upon many circumstances. Sustainability needs to be developed with the right mix of policies for correct regulation. According to Schmidheiny (1992, p. 146), a mix should include efficiency, flexibility of response, confidence in the regulatory environment, gradual introduction, legal equity, and transparency of compliance.

To develop this mix, "The growing opportunities and responsibilities in forestry require private business to analyze the market conditions and the basic principles of sustainable use of this renewable resource" (Schmidheiny, 1992, p.148). Business has many opportunities in the involvement of the forest industry. Such opportunities include:

- effective control of assets
- financial resilience
- the ability to use resources efficiently due to market competition.
- resources for afforestation
- opportunities to combine forest investments with investments in forest-product-using

industries and agriculture

- good employment, training, and social development conditions
- access to markets
- access to technology and research capability
- institutional longevity

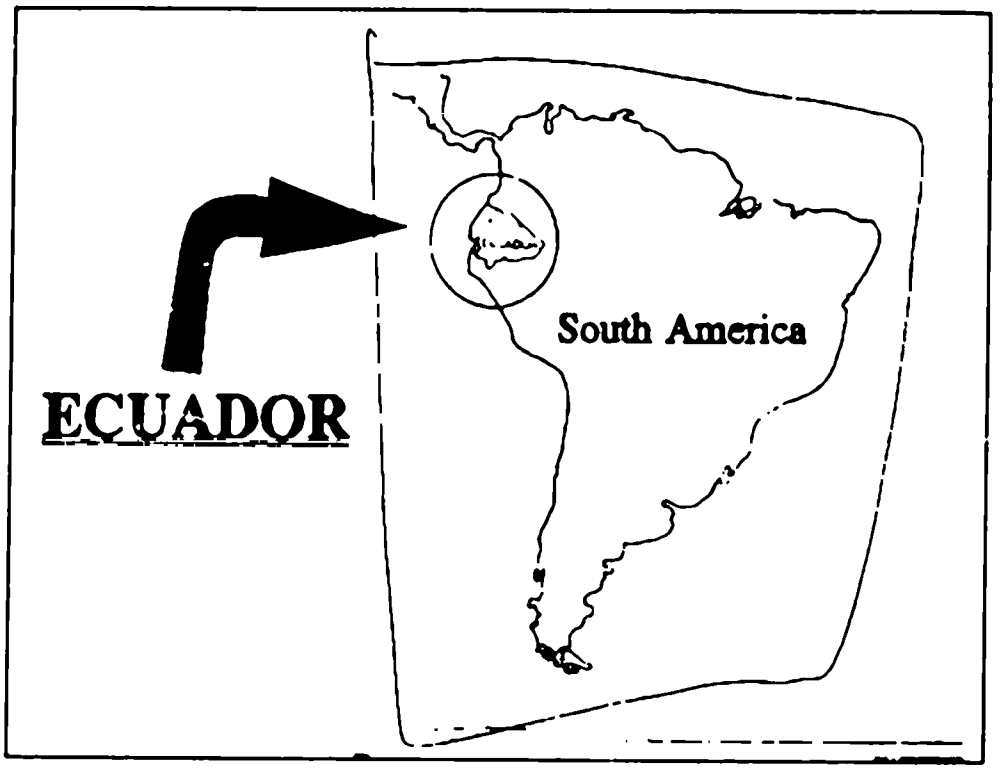

Figure 1

FACTS ABOUT ECUADOR

The official name of Ecuador is the Republic of Ecuador, Republica del Ecuador. The country, located along the equator in western South America (See Figure 1), is relatively small with an area of 104,505 square miles (World, 1992). Located north of Peru and southwest of Columbia, Ecuador is divided into four main areas: coastal plains, highlands, eastern jungle, and the Galapagos.

The Guayas Province(See Figure 2), in which our

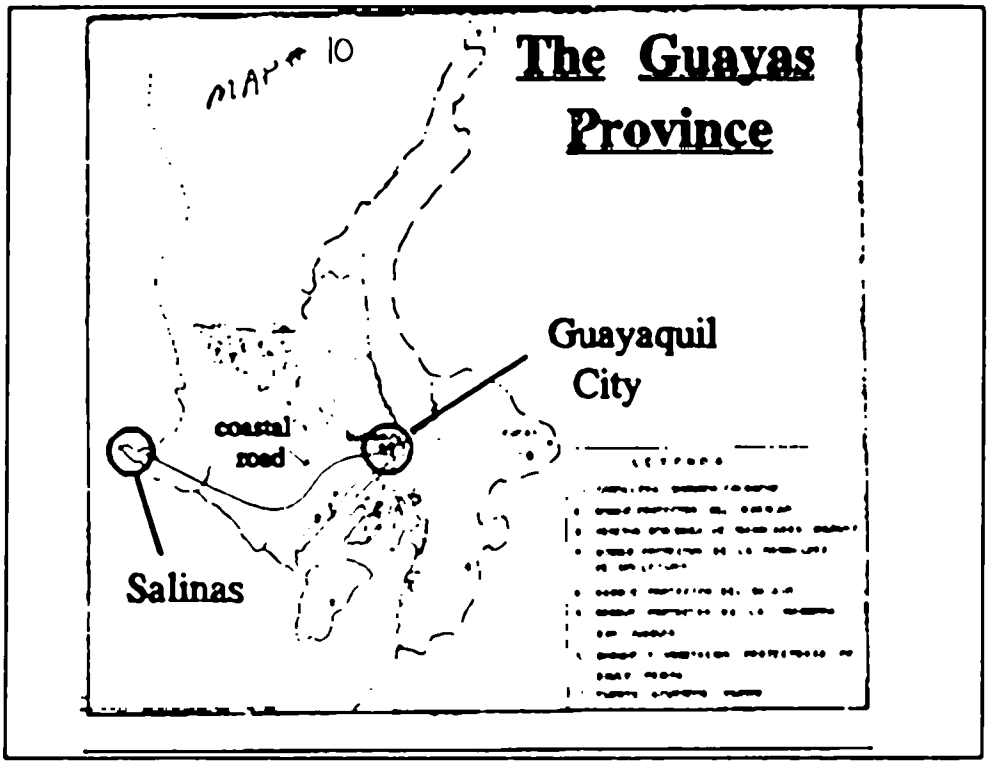

Figure 2

area, Puerto Hondo, exists, covers about 35 percent of all the coastal provinces of Ecuador and about 8 percent of the total national area. Within the Guayas region, the Puerto Hondo sector covers approximately 13,500 Hectares(ha.), and has a climate that is typical of a mangrove forest. Data from the PMRC shows that between the months of January and March it is primarily rainy, while April through November is considered the dry season, and December is a month in flux. Throughout the whole year, the temperature ranges from eighteen to thirty-seven degrees Celsius.

The population of Ecuador is approximately 10.3 million people, with an average annual growth of

population of 2.4 percent. The life expectancy is 66 years. These factors lead to a projected population of 18 million by 2025. Adult literacy is 14 percent, and the daily calorie supply per capita is 2,531 (World, 1992). About 92 percent of the population is Catholic. The population is 40 percent Mestizos, 40 percent Indian, 10 percent White, 5 percent Black, and 5 percent unclassified (Kurian, 1992, pp. 529-530).

POLITICS OF ECUADOR

During the course of the twentieth century, Ecuador's political system and policies have continually fluctuated. The reason for Ecuador's evolving government style can be found in the opposing economic styles of the Sierra and the coast in the middle to late nineteenth century, when modern industrialization was just beginning.

During this period, the officials in the mountainous Sierra region were attempting to maintain the same economic system that had been operating for the past century (Cueva-Davila, 1982). This economic plan was based upon the hacienda system. The hacienda system is similar to that of the European feudal system, a system in which a landowner allowed people to live on his property, in exchange for their working the land. In

Ecuador, these tenant families cultivated crops for the land owner. When harvest time arrived, the landowner would take the vast majority of these crops as payment for the use of the land. The leaders of the Sierra had prospered using the hacienda system because the textile industry, which they owned, was the only industry operating in the country (Cueva-Davila, 1982). Therefore, the inhabitants of the Sierra did not want to introduce any new type of system.

Meanwhile, major economic changes were occurring in the coastal regions. These changes were based upon the production of cacao and began in 1880 (Hidrobo, 1992). Unlike the textile industry of the Sierra, the new cacao industry utilized a capitalistic economy by paying its workers a set wage. Furthermore, industries providing food and clothing came into being to support the needs of agricultural workers (Hidrobo, 1992). However, the cacao industry was located in the coastal areas, where only 17 percent of the population lived (Hidrobo, 1992), and until the early twentieth century, the Coast did not have enough people to effect such a change in the national economy. However, by 1910, the population on the coast had slowly risen to 25 percent of the total population of the country (Hidrobo, 1992, p.16). Once the coast had the people as well as the industries, the new bourgeois system of an open market, heavily based upon exports,

developed (Cueva-Davila, 1982). Therefore, the people living in the coastal region of Ecuador became the liberals in the government, while those in the Sierra became conservatives (Cueva-Davila, 1982). This political dynamic of opposition has continued throughout the modern history of Ecuador.

ECONOMIC HISTORY

The following seven paragraphs are paraphrased from Hidrobo (1992), unless otherwise noted.

During this century, Ecuador's economy has experienced a boom in three economic areas: cacao, banana, and oil. As discussed in the previous section, the cacao boom began in the late 1800's and led Ecuador to become an industrial based nation. However, in 1920, a decline in the production of cacao occurred. At the same time, cacao prices began to fall in the international market due to new suppliers of cacao. These two factors led the government to a course of devaluation of the exchange rate in order to keep the cacao industry competitive internationally. The decreased value of the sucre caused the price of imports to be raised and forced the people to buy domestic products.

Partly in response to the economic decline, the government was overthrown in 1925, and an industrialist, Luis Napoleon Dillon, came to power. The new government restricted the money supply and instituted high interest rates. These reforms caused Ecuador to remain much the same until 1948 when the banana and coffee industries began to boom.

Starting in the late 1940's, Ecuador's relative stability led The United Fruit Company to concentrate all of its efforts in the area. In fact, Ecuador concentrated so strongly on the banana industry that, by 1952, it was first in the world in the production of bananas. During this same period, the coffee industry was experiencing a smaller growth, with 9.1 percent of the rural population engaged in coffee production.

In the late 1950's the process of urbanization began to accelerate, and the percentage of the population living in urban areas rose from 28 percent in 1950 to 44 percent in 1980. People were moving to the city for two major reasons. First, workers were attracted to the city to help in the shipping of bananas. Second, as the banana industry slowly declined, plantations were forced to close and the plantation workers naturally moved to the city.

The next and perhaps most significant economic change in Ecuador came about in 1972 with the help of two

U.S. oil companies. Texaco and Gulf jointly worked to increase the production of oil in Ecuador and succeeded in raising Ecuador to its highest economic level to the present date. After that increased production began, oil exports made up 60 percent of total exports and 34 percent of the national income. As a result, per capita income increased from $273 in 1970 to $1,270 in 1980.

During the 1970's, the process of industrialization began to expand rapidly as a result of the oil boom. During that time, industrial production increased to six times the previous rate and production of small factories tripled. Unfortunately for Ecuador, in 1981, oil prices began to fall, and later, in 1983, floods damaged the agriculture crops. The combination of these two factors caused an economic collapse.

In response to the failing economy, the government proceeded to initiate stabilization efforts. These efforts slowly took effect, and the rate of inflation decreased slowed while deficits were lowered. Eventually, in 1988, President Borja took office and reduced the deficit, controlled the growth of the economy, and slowly adjusted the exchange rate. As a result the overall economy was improved with import tariffs being lowered by 5 to 20 percent. However, as recently as 1992, a deficit exists, and inflation has been greater than 50 percent since 1988 (Agenda, 1993,

p.66).

In Ecuador, there has been a succession of economic booms followed by slumps. After each economic slump, the society was forced to develop another industry as its main source of income. By examining Ecuador's long term economic trends, increasing motivation to adopt sustainable developmental procedures can be observed.

Achieving a sustainable economy means maintaining current levels of resource use, industrial activity, agricultural activity, and population growth so that the country's current status can be sustained for generations to come (Stead, 1992, p.6). For Ecuador, a sustainable balance for a diverse economy may mean reduction as well as maintenance of current resource uses and activities.

CURRENT ECONOMY

Ecuador is classified as a lower middle-income country having a free market economy (Kurian, 1992). The number one export is crude oil production, currently at 344,000 barrels per day. The second major export of Ecuador is bananas, while the third is shrimp at an annual revenue of approximately 400 million U.S. dollars (World, 1992). The fourth highest source of hard currency is tourism. In 1992, approximately 800,000 people visited Ecuador and brought in $380 million (U.S.) (World, 1992).

Ecuador's average economic growth rate from 1965 to 1990 was 2.8 percent, with a peak of 13.5 percent in 1974 (Kurian, 1992, p. 534). Currently, the entire economy is experiencing a downswing. In fact, Ecuador's total external debt is close to $12,105 million U.S. (World, 1992). This is primarily due to the drop in oil prices over the past decade. Furthermore, the country's oil supplies are steadily being depleted, while consumption of oil is on the rise. This combination means that, by the year 2007, Ecuador's own oil industry will not be able to meet the country's oil needs, and the importation of oil will begin.

The following three paragraphs are paraphrased from Corkill (1988) unless otherwise noted.

Currently, one of Ecuador's most pressing problems involves urban expansion. From 1962 until 1986, the percentage of people living in cities nearly doubled, increasing from 27.9 percent to 51 percent. This problem is most acute in the city of Guayaquil, the largest city in Ecuador. In some squatter settlements near Guayaquil, where 75 to 80 percent of the people have salaries below the official minimum wage, the population grew ten or twenty fold between 1978 and 1982.

Living conditions in the growing unofficial housing area are difficult. Since Guayaquil is built very close to a major river with many estuaries, these outlying communities are built almost entirely upon the rivers. The houses, because they are almost entirely on the water, must be built upon stilts or by filling in an area of the river with garbage, sand, or any other available fill material. In addition, families are forced to live in extremely close quarters, with around 72 percent of the homes in the suburbs exceeding two people per room. Furthermore, 89.3 percent of the houses lack piped water while 85.7 percent are without sewerage and use the river as a waste disposal system.

In addition to housing, employment is a major

problem in Ecuador. In 1975, 51.2 percent of the Ecuadorian work force was engaged in informal sector employment. Informal sector employment is a pattern of labor that is characteristically without real definition or security. In fact it is widely known that employers may fire without notice, there is no minimum wage, and the employer is in complete control. Provision for accident or injury, or pension for long-term disability incurred during employment is non-existent. Moreover, there is no insurance scheme or family supplement. Furthermore, during periods of unemployment, there are no health or safety regulations controlling work conditions.

RESOURCES AND MANAGEMENT

Throughout history, from the cacao boom, the banana boom, to the now occurring oil boom, Ecuador has relied on the use of its land to provide products and resources for its economy. Ecuador has provided land for livestock, agriculture, mining, and forestry, as seen in Figure 3.

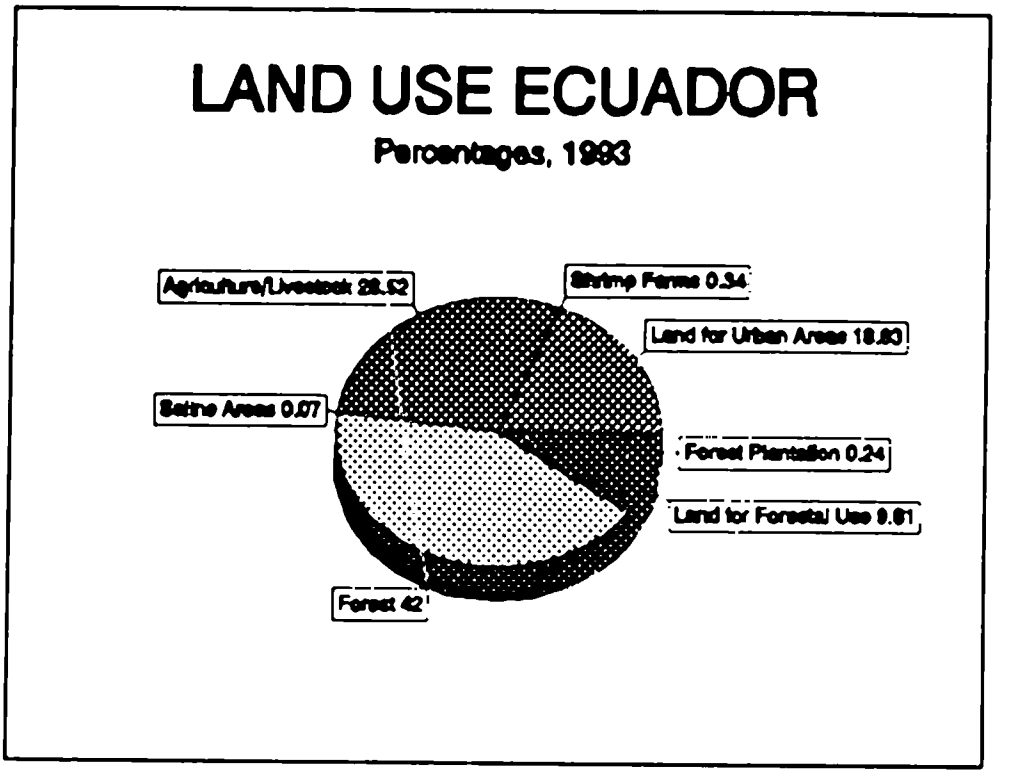

Figure 3

Agriculture

Agriculture has always been a key component of the Ecuadorian economy. Currently, agriculture uses 28.52 percent of all the land in Ecuador (World, 1992). The agricultural activities of Ecuador have involved many types of crops, as shown in Table 1.

TABLE 1 - CULTIVATED LAND AND CROPS OF THE REGIONS

Province	Surface (ha)	Crops
Esmeraldas	90,630	coffee, plantain, cocoa, abaca, corn, palm, bananas, coconut
Manabi	304,000	coffee, corn, cocoa, plantain, yucca, cotton
Guayas	304,000	rice, cocoa, coffee, corn, bananas, cotton, straw, pineapple, plantain
EL Oro	76,000	bananas, cocoa, coffee, sugar cane, corn
Los Rios	360,000	cocoa, coffee, rice, soja bean, corn, plantain, bananas

Table taken from Study of Ecuadorian Water Quality, Progama de Manejo de Recursos Costeros, 1993.

Overall agricultural crops account for 15 percent of the Ecuadorian GDP (Kurian, 1992, p.537). One example of the problems within the agricultural community involves the neglect of environmental hazards through the use of pesticides on banana plantations. These pesticides are used to kill insects on the plants, and, thereby, improve

overall production. However, the pesticides eventually run off from the plantations and enter nearby shrimp farms. While the pesticides help production of plantations, they are suspected to have quite the opposite effect on shrimp farms, helping to cause the low 30 percent survival rate of the shrimp (Pizarro, October, 1993). In addition to this ecological effect, the pesticides also have an economic effect on the shrimp farms, lowering the product yield as indicated above.

Forests

The following information has been taken from the 1992 World Development Report, Development and Environment, unless otherwise noted. The natural forest of Ecuador is estimated by Cifuentes et al.(1993) at 11,473 thousand ha which, as previously shown in Figure 3, is about 42 percent of all Ecuador's land. The forests in Ecuador are of several types: humid tropical forests, humid subtropical forests, dry tropical forests, and mangrove swamps, as seen below in Figure 4.

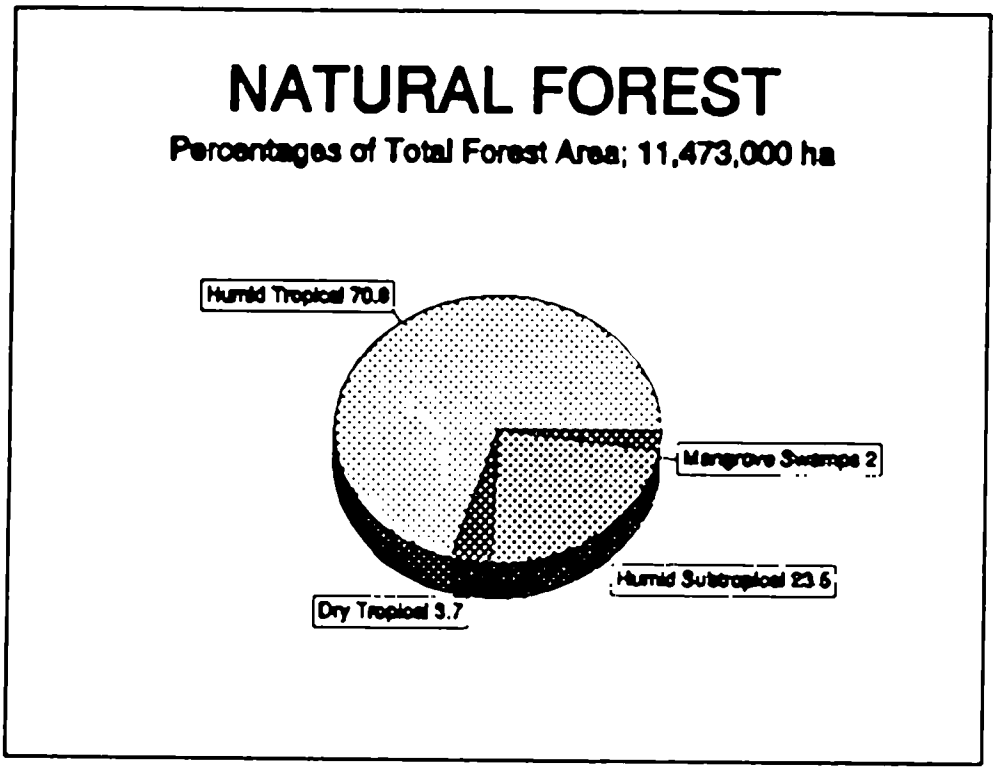

Figure 4

These forest areas are not only a source of wood and energy, but they also regulate water supplies, moderate climate, protect soils, and provide a habitat for millions of species. A move for land reform has led to the removal of an estimated 35 million hectares of forest during only a twenty year period between 1962-1985 (Barriga, 9/13/93, e-mail). At the present time, it is estimated that in Ecuador 160,341 ha. of forest are cut down annually. These forests are cut for furniture, house construction, exports, agricultural expansion, and use as fuel in domestic, commercial, and industrial applications. If the present deforestation rate maintains its current level, forest reserves in Ecuador

will be exhausted by the year 2030 (Cifuentes et. al). As seen in Table 2, Ecuador's percent of land deforested is much higher than even Brazil's or the continent of Africa's and far exceeds that of developed nations such as the United States and Japan.

The large amount of deforestation has led to erosion, loss of soil fertility, desertification, and the endangerment of many wildlife species. Sedimentation, or erosion, occurs because the soil does not have any tree roots to hold it together. This, in turn, leads to the clogging of water ways, which leads to a lesser exportation capacity. The exportation capacity is lowered because some ships are not even able to enter port, as they do not clear the river bottom.

Table 2 - SELECTED INDICATORS OF NATURAL RESOURCES

Change in Land Distribution
1966/68 to 1986/88 (> 3 percentage points)

ECUADOR	Cropland	Pasture	Forest	Other
	.....	10.2	-19.0	8.1

Forests: Changes in 1980's

	Deforestation (x1000 hectors)	(%)	Reforestation (x1000 hectors)	Water Withdrawal %, 1980's	Number of Endangered Species 1990
Africa	4040	0.6	297	3	4546
Brazil	3650*10	0.7	449	1	2895
Ecuador	*340*	*2.3*	*4*	*2*	*349*
Europe			1031		
Japan			240	16	78
United States	159	0.1	1775	19	2379

Source: *Statistical Yearbook - 1990/91, 38 Issue*. Data available as of September 1, 1992. Department of Economic and Social Information and Policy Analysis, Statistical Division; United Nations, N.Y., 1993.

Protected Areas

The 1992 World Development Report states that Ecuador has 18 nationally protected areas comprising 107.5 thousand Km2, which is 37.9 percent of total the land area. However, from conversations with personnel from INEFAN and from the 1989 report "Strategies for the National System of Protected Areas" Juan Carlos Blum (October, 1993) has concluded that the number of nationally protected areas of Ecuador is 15. These 15 areas constitute what is called Ecuador's Natural Heritage Areas that are managed by the government.

A program working under the office of the President of Ecuador, the Coastal Resources Management Program, PMRC, has established five zones of special management(ZEM). However, there are other areas that are not considered by the Heritage areas but are earmarked for special management. The comuna of Puerto Hondo and its surrounding mangrove forest is included in this category.

As recently as forty years ago, The Peninsula de Santa Elena in the Guayas Province was a flourishing forested area. However, the amount of deforestation brought upon by the use of wood has turned the peninsula into dry, arid land. Currently, there is a necessity in the province to sustain the forest industry in order to offer forest resources in the years to come.

Deforestation has contributed to short term economic growth and alleviation of poverty. However, according to some experts, reforestation techniques are needed in parallel to provide long-term economic benefits both environmentally and socially (Schmidheiny, 1992, p. 149).

Coastal Ecosystems

Mangrove swamps constitute a significant ecosystem because they serve as filters of wastes and pollutants between land and sea. The swamps also reduce land run-offs, prevent overloading of organic substances, and prevent sedimentation (Kautsky and Folke, 1989 p. 9). Mangroves, too, act as both sanctuaries and breeding grounds for countless terrestrial and aquatic fauna (Saclauso, 1989, p. 7). They provide a life-support system for the environment and for the humans who use the resources.

Aquaculture in mangrove areas has many social, human, and ecological impacts, and therefore, costs associated with it. These costs merit attention in order to weigh environmental effects in the long term. Typically, communities are located around the mangroves and depend on the swamps for everyday life. The mangrove swamp is one of the main ecosystems used as a habitat for the production of aquacultural products. However, as mangroves are cut for the production of aquaculture

farms, many resources and natural processes are lost having a direct impact on the surrounding environment and communities.

John Dixon(1989) notes in his "Valuation of Mangroves" that because the market usually determines the value humans place on goods, the true value of mangrove forests are not considered accurately when deciding land use. Dixon reasons that the marketed value of the goods produced by mangroves is only a small fraction of the total services that mangroves can supply. Mangroves provide a ecosystem of great value for many species whose loss is not calculated into marketed costs.

Because of their low market value, the mangrove is a prime candidate for conversion to other uses such as fish ponds, ports, marinas, and coastal roads. Dixon outlines that many situations merit destruction of mangrove. This is true when the value of the alternative is of greater value and necessity than the total value of the mangrove as an ecosystem. For example, in Singapore, the major port of Jurong was partially built on reclaimed mangrove that was cut and filled. The port now serves as an important industrial site (Dixon, 1989).

The conversion of mangroves to aquaculture ponds may also infringe upon other low-cost cultural systems like oyster and mussel farming that are dependent upon the ecosystem support provided by the mangrove forest.

Conversions of mangroves for uses such as fish ponds and shrimp farms results in a loss of a nutrient sink of the contiguous coastal zone(Saclauso, 1989, p. 6).

Shrimp Farming

As discussed earlier, Ecuador has shown a trend toward concentrating its economy solely on one industry. Once it entered the world shrimp market, Ecuador quickly established itself as one of the market's leaders. The region that contributed the most to this achievement was Guayas.

Within the Gulf of Guayaquil, there are five different types of shrimp. These five different types of shrimp are captured by 250 fishing boats. There are also more than 650 shrimp farms within Guayas, employing 50,000 persons. The region boasts more than 118,000 hectares of mangrove, 76,000 hectares of shrimp farms and 10,000 hectares in salty zones. Between the period of 1969 and 1984, Guayas converted 52,000 hectares of mangrove into shrimp farms. In the period between 1984 and 1987, the total number of shrimp farms increased by 22 percent.

Aquaculture development can increase the food production capacity of the aquatic environment, but it is common knowledge that if not properly managed, it can also result in negative ecological conditions. In the

production of shrimp through shrimp farming, negative ecological effects can be seen where improper management has led to overcrowded populations of shrimp beds. Overcrowded populations result in the decline of growth through direct deterioration of water quality, or through social mechanisms, such as weakening of individual shrimp, making the shrimp vulnerable to parasites and organisms that cause diseases (Saclauso, 1989, p. 7). In highly intensive systems, organic loading, the presence of too many organic substances exists due to shrimp waste and excess feed. Organic loading provides favorable conditions for growth of organisms and parasites. For example, in shrimp feeds for the culture of P. monodon, the estimated amount of food converted to shrimp flesh is only 20 percent on dry weight basis; the remaining 80 percent takes the form of feces, urine, and gases that provide the major source of nutrients for both pathogenic and nonpathogenic organisms (Saclauso, 1989, p. 7). The implementation of chemicals and drugs can be used to counteract these effects, but can also have costly effects on the production of the aquaculture species.

METHODOLOGY

PROJECT OBJECTIVES AND FOCUS

When we began our project, we had a general objective that had been decided upon through contact between ESPOL and WPI. This initial objective was to investigate sustainable development in the Guayas region. First, we developed a plan involving the entire Guayas province. We determined five physical topic areas which had demonstrated a lack of sustainability. These areas, which are found in the sector between Santa Elena and Manavi, were: the dry tropical forests, mangrove swamps, shrimp farms, agricultural sites, and industrial sites. After completing a comprehensive evaluation of the concept of sustainable development in each area and the interrelationship of these areas, we planned to focus upon one in order to fully develop a discussion of policies for sustainable development in that area. We believed that on-site experience, interviews, document research, field data, and the use of a conceptual model would prove to be our main information-gathering methods.

Upon reaching Ecuador, we determined that our previous cbjective, to investigate five general areas and then focus on one, was much too large to be completed within seven weeks. Therefore, we began to look for some more specific possible project topics. We built a list

of possibilities primarily through interviews with ESPOL, government organizations, and non-government organizations. The non-government organizations interviewed were the Fundacion Maldonado and the Fundacion Natura, while within the government we met with CLIRSEN (Centro de Levantamientos Integrados de Recursos Naturales por Sensores Remotos) and the PMRC (Proyecto de Manejo de Recursos Costeros).

As a result of these interviews, we developed eight possible project topics. Three of these projects involved the geographical area of Manglaralto, a small town located along the pacific coast. Of these three projects one dealt with the dry tropical forest, one with the use of dams for irrigational purposes, and another one involving the local fishing community. The fourth possible project dealt with the study of ceramics as cultural history on the Salinas peninsula. The fifth involved a cement industry, located outside of Guayaquil where industry and society demonstrated no major conflict. The sixth possibility involved looking at the impacts of an irrigation system for several sections of the Salinas peninsula. The last two potential projects were developed through discussions with Fundacion Natura. The first of the projects dealt with an ecological bridge between Manglaralto and the Guayaquil area, while the second project involved the development of Puerto Hondo,

a community outside of Guayaquil.

Having these eight options, we had to begin to narrow our list of possible projects. To accomplish this task we developed a list of criteria that our project needed to fulfill. These criteria were;

- accessibility to the area
- mobility within the area
- extent of cooperation of interest groups working in area
- usefulness to Ecuador and the community in which which we would be working
- usefulness of previous research
- feasibility of project in a seven week period

By applying this list of criteria to our eight possible projects, we were able to narrow our options down to two. The first option was the project involving the comunas in Manglaralto, while the second dealt with the development of the Puerto Hondo community. Through talks with the project advisors we were able to choose one area of focus, Puerto Hondo.

We chose this particular project for several reasons. First, of all the possible projects, the Puerto Hondo community was most accessible, as it is located just outside the city of Guayaquil along a main highway

leading to the Salinas peninsula. Second, we believed mobility within the comuna itself and the region would not pose a major problem, since it could be accessed by car, bus, or boat. Last, we thought working within a project being developed by Fundacion Natura would yield many advantages. Fundacion Natura is a nongovernment organization held in high regard in Ecuador. The Fundacion has an active, cooperative relationship with Ecuador's government, ESPOL, and most importantly, with the people of Puerto Hondo.

The relationships mentioned above offer three major benefits. The first benefit is that Fundacion Natura's reputation and connections gave us access to information and personal contacts that would not normally be available to us. The second benefit is that the people of Puerto Hondo are willing to participate in the activities implemented by Fundacion Natura. Third, the Puerto Hondo comuna contains a vast ecosystem of mangrove swamps in conjunction with the industries of shrimp farming and fishing. These, combined, made the project attractive as a project site.

Specifically, within the Puerto Hondo Project, Fundacion Natura requested our assistance in one of two areas. One of the areas was to work on a budget for their general development project in Puerto Hondo. This first request was made so as to create awareness and

promote funding for the project. We proposed to work on the second option, which was consistent with the theory of sustainable development, namely identifying and outlining sustainable activities that could be utilized in the region. The scope of a project of such investigations seemed rather large, so the group decided that, at a later date, the focus might be narrowed to the detailed outlining of one alternative practice chosen.

Upon investigating the town, one specific desire was frequently mentioned by the inhabitants. This was the desire to have, no matter what activity was decided upon, a systematic method for choosing activities, as well as for implementation, that could be adopted in the future by the townspeople. Due to the frequency of this desire, coupled with the lack of a documented developed strategy as such by Fundacion Natura, the group deemed the establishment of such a methodology of greater importance at this point than the identification of possible activities.

We deemed it important to research and propose existing methodologies that could be used in the Fundacion's already existing program. The use of a carefully crafted and well thought out methodology is vital to the success of any sustainable development program because it assures that decisions are being based upon criteria that take into account the people's needs,

desires, and expectations.

DEVELOPMENT OF PLANNING PROCESSES

The first step in the development of a planning process was to gather information pertaining to a methodology that Fundacion Natura could use in working with community development. The information regarding this topic was obtained primarily from four sources. The first information about planning processes came from a government organization in Ecuador, the PMRC. This organization provided us with interviews and documents that described the methodology they use for working with communities. OIKOS, a non-government environmental organization in Ecuador, also provided us with information regarding the general process that they use when working with communities. This information was given in the form of a workshop that the IQP team attended. Our third major source of information came from the case study of a Brazilian forestry company, Aracruz Cellulose. Unfortunately, this information could not be obtained through direct contact, but came instead from intermediate authors. Our final source of material was a previous project completed by two WPI students on the topic of ecotourism in Costa Rica.

Once we finished gathering information on these four

various methods for working with communities, we evaluated the content and purpose of each. Upon evaluation of this, as well as any inter-relationships and discrepancies among the methods, we needed to decide which one or combination of several methodologies we wanted to use in development of our methodology for community planning.

Of the four sources we started with, we noted that the methods utilized within both the Aracruz Cellulose forestry company project and the previous WPI project were incorporated into the processes as outlined by the PMRC and OIKOS. Only written documentation of information from Aracruz Cellulose and the Costa Rican IQP project were available to us. Since we were not able to ask any questions, this fact greatly limited our overall understanding and ability to use these two models. In addition to this limiting factor, the fact that direct contact with community planners and communities was accessible, through the PMRC and OIKOS, led the group to utilize these last two institutions as our main sources.

The remaining two models, from the PMRC and OIKOS, were both used in Ecuador, and therefore we had direct access to the creators of the respective processes. Ultimately, we decided, for two major reasons, to base our planning process upon that of the OIKOS organization.

First, since we had spent an entire day completing a workshop on the OIKOS methodology, as compared to a shorter lecture type presentation of the PMRC model, we felt much more comfortable in our understanding of the OIKOS process. Our second reason, also related to the amount of time, was that the OIKOS process went into significantly more depth than did the PMRC, most importantly, encompassing that of the PMRC. While our process was based upon that of OIKOS's, we also used certain elements of the other methodologies we had researched, in addition to our own experiences.

TESTING OF PROPOSED PLANNING PROCESS

Once we had obtained a working community development methodology, we needed to test it, using Puerto Hondo. At this point we proceeded to obtain information on the community of Puerto Hondo. Fundacion Natura supplied us with documents on the historical background of Puerto Hondo, the specifics of the Fundacion's program, and legal agreements between the community and the Fundacion. Meanwhile, CLIRSEN provided us with maps of the area surrounding Puerto Hondo.

In addition, we conducted site visitations both to the community and to its surrounding environment. These

visits to the community were used to acquire information about the people's needs and expectations. In addition to determining these needs and expectations, we had to discover two things: the exact relationship between Puerto Hondo and Fundacion Natura, and what the community expected Fundacion Natura's project to provide. The only way to accomplish these objectives was through the use of interviews. For these interviews, which proved to be our primary source of information in dealing with the community's social aspects, we developed a series of questions that needed to be answered. Within our list of questions, we developed several major categories of interest. Our questions about the town followed the basic guidelines of first acquiring general information on the town, then developing the legal, economical, social, and educational backgrounds. Learning the expectational feelings among the members of the community was the final step. Appendix D shows a general list of the types of questions asked to individuals of the community to obtain information in the above mentioned categories.

To obtain answers to our questions, it was necessary to talk to many different people within the community. First we interviewed the past president of the community, Mr. Jose Apolinario Angel Lainez, who had held office from 1976 to 1992. This interview was important in order

to obtain information about how the leadership of the community viewed future development of the town. In addition, the interview provided information about what tasks the community was trying to accomplish. We also interviewed the town doctor and dentist, neither of whom lived within the town. They helped us to understand what health conditions and problems existed within the community. These three interviews gave us a view of how the more educated members of the community felt about development issues within the community. However, it was also important to assess how the general public of Puerto Hondo felt about these same issues. Therefore, we interviewed people who held regular jobs within the community, for example, a store owner, a restaurant owner, and their families. From all of the interviews, we acquired a general view of the problems within the community, its needs, and the expected benefits from Fundacion Natura's project. All of this information was used to develop the main result of our project, a methodology for community development.

DATA AND INVESTIGATIONS

THE FUNDACION NATURA'S PROGRAM

Fundacion Natura is a non-governmental, non-profit association that is national in scope. Its mission is to contribute to the conservation of nature and sustainable development in a global dimension for these are indispensable conditions to preserve life and better the overall human condition, both in the present and future.

Fundacion Natura's fundamental action is oriented toward transforming the current habits, behaviors, and consciousness of the population. This is a process of change of structure and social relations in accordance with the environment.

Fundacion Natura and the comuna of Puerto Hondo, in 1989, signed an agreement with the objective of preserving the natural mangrove forest that surrounds the township as well as its estuary (See Appendix C). The initial contact with Fundacion Natura was made when the community became concerned with both the projected expansion of Guayaquil along the coastal highway and the threat of external urban developers infiltrating their comuna (Corrales, October, 1993).

Since 1989, Fundacion Natura has been developing a proposal for sustainable community development in Puerto

Hondo. The final and updated proposal of 1993 along with the first proposal can be found in Appendix C. The basic components of the proposal are to educate Guayaquil and its surrounding area while at the same time promoting, within this area, an attitude of conservation regarding the mangrove forest ecosystem and the coastal environment. Along with educational awareness of the environment, Natura wants to introduce development alternatives for the community. Their proposals, until now, have been the result of the use of an informal methodology. However, Fundacion Natura plans to further execute its projects through use of a formal methodology, a Rapid Rural Assessment Plan.

The activities outlined in the proposal for Puerto Hondo were generated outside the community. However, Fundacion Natura's proposal was cleared at the Puerto Hondo town meeting by the people in attendance. The interactions between Fundacion Natura and Puerto Hondo have resulted in a second agreement in 1993 (See Appendix C). This second agreement gave Fundacion Natura ownership of a fifty hectare area in Puerto Hondo, on which the construction of the first of four proposed buildings is to be completed.

The proposal by Fundacion Natura is already in the initial stages of implementation, with construction of the first building started in early December, 1993.

Furthermore, the electric and sewer hookups are already in place. This, partly, has been made possible by the support of the nearby cement company, which has donated fill for the foundation of the building.

Presently, it is Puerto Hondo's intent to open the doors to other public and private entities who may wish to assist in development of the comuna.

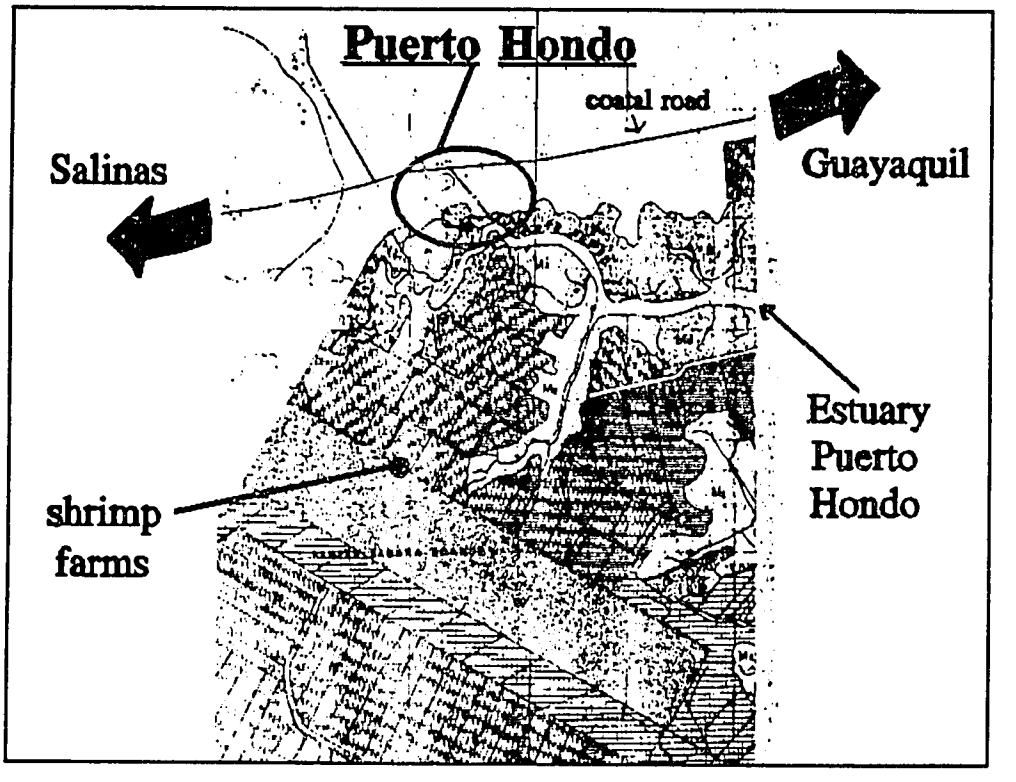

Figure 5

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INFORMATION ON THE COMMUNITY OF PUERTO HONDO

The following three sections detail information we gathered about the town of Puerto Hondo, which is located along the Salinas highway outside of Guayaquil (See Figure 5). This information was gathered in order to gain experience in the development of a planning process.

History

Formally information on Puerto Hondo was gathered from CLIRSEN and Fundacion Natura. The following is representative of the information gathered and was mainly taken from the office of V. M. Rendon y Rumichaca, unless otherwise noted.

The area of Puerto Hondo was first established in 1960 when both agricultural and fishing families settled the area. The community was officially constituted as "The Association of Small Agriculture" on October 6, 1977, through ministry accord No.0344 signed by the brigade general Oliverio Vazconez, Minister of Agriculture and Cattle. A comuna is an independent community that normally regulates its own development, typically with a population of less than 2,000. The particular comuna of Puerto Hondo was established by 36

founding fathers, of whom 30 are still alive today.

The original location of the town was across the Puerto Hondo estuary, but since this sector was declared a national park, the town was forced to relocate. This national park was never actually implemented, and instead, numerous shrimp farms have developed in the area. Puerto Hondo currently exists between the estuary and the coastal highway between kilometer markers 15.5 and 17.5 (See Figure 5). On March 1, 1978, the regional committee of appeals of IERAC, the institute that regulates land, finalized the township process by confirming the revision of 158 ha. of land in favor of the small agriculturers and workers of the Puerto Hondo precinct.

Puerto Hondo lies within a region designated as protected forest. The legislation of this area is carried out by INEFAN, DIGMER, and the Comission Tecnica Recursos de Agua. Enforcement of such legislation is performed by the Policia Maritima. However, the extent of this enforcement is limited.

Upon land division and community settlement, professionals from Guayaquil bought sections of the township. Because of the influence of these professionals, both water from the city of Guayaquil and electricity were introduced to Puerto Hondo (Corrales, October, 1993). It must be noted that city water is not

necessarily always potable, and this fact does cause problems within Puerto Hondo, which are discussed in the later text.

Today there are approximately 300 families and about 2,000 inhabitants in the Comuna of Puerto Hondo.

In 1989, the comuna signed the first of two agreements with Fundacion Natura, see Appendix C, which established a cooperative effort for community development. The second agreement, see Appendix C, which granted ownership to Fundacion Natura of a plot of land in Puerto Hondo for the cooperative project, was signed in 1993 following the program proposal for the community, see Appendix B.

Lifestyles

Information regarding the lifestyles of the members of Puerto Hondo community was obtained through informal conversations with community leaders. The people of Puerto Hondo have as main activities: fishing, agriculture, work in nearby factories, small industry such as hand crafts and construction, and some artesenal professions. To date, data regarding the employment of the people of Puerto Hondo is inconsistent and has not been validated. Also, we do not have data regarding the numbers of people involved in specific types of employment. Nor do we have any information regarding the

formal employment of women or teenagers. The current leader, Sr. Ortega, estimated unemployment within the community to be 50 percent (Ortega, October, 1993). The majority of the formally unemployed people of Puerto Hondo attempt to make a living by engaging in informal employment, such as harvesting shrimp larvae to sell to shrimp farms (Corrales, October, 1993). However, it is not clearly understood by us what Sr. Ortega considers employment.

The past president of the community, Sr. Lainez, estimated that 10 percent of the townspeople are unemployed, 10 percent are formally employed, and the remaining 80 percent partake in informal employment activities. The same problem of definition exists regarding what is meant by formal and informal employment. There is also a lack of specification of the possible work force.

A problem within the community, which was brought to our attention by the former community president, Sr. Lainez, involves the vendors who work alongside the highway on the northern border of Puerto Hondo. Most of these vendors are transients, not from the town, and it is Lainez's opinion that these vendors have no regard for the well being of the community. He has noted, and we have seen, that the vendors disposing of their wastes in a careless manner, wherever convenient.

Sixty percent of the town residents do not have roots in the town of Puerto Hondo. This situation creates differing levels of concern among townspeople for community development. Due to time constraints, the group was not able to fully determine the extent of these differing views.

Throughout the past five years, the comuna of Puerto Hondo has undergone a transition in the type of housing in which they live, bringing a sense of stability to the area. The comuna has converted to the use of more permanent structures than those of the past. Today, the majority of houses and buildings are constructed of wood and cement, instead of the old materials, sugar cane, bamboo, mangrove, and zinc, which are typical of settlers.

Puerto Hondo does not have a high school. However, it does have a public elementary school. The majority of the children of Puerto Hondo attend the Puerto Hondo Community public school, which has only six elementary grades. Typically, in Ecuadorian small communities, there is only one teacher per school. However, in Puerto Hondo, there are six teachers. Although the Puerto Hondo school system is out of the ordinary, various townspeople noted that the level of education is unsatisfactory. The responsibility for this sub-standard level has been placed on the teachers, who, according to the former

president,are not as competent as they once were.

The teachers are currently on strike, as they have been for nine weeks. The Ecuadorian policy of "mobilization" in which soldiers replace strikers was scheduled to occur on November 30, 1993. However, because approximately 100,000 teachers are striking, the ability of the government to enforce this plan is questionable.

Even when school has been in session, the teachers have not kept regular hours, working a minimal three or fours hours a day. This fact was pointed out by various townspeople to illustrate the apparent lack of concern for students by teachers. The reader must note that the viewpoints of the teachers are completely unrepresented by our studies.

The school itself consists of three buildings, of which only one if fully enclosed. Grass and weeds grow inside the unfurnished buildings. While the group encountered one young boy who said he liked school and enjoyed going, we do not know the actual rate of absenteeism of the students in Puerto Hondo.

Various services are available to the townspeople. For example, a doctor, who is not a member of the community, is present Monday through Friday. From discussions with this doctor, we have learned that cholera is a problem, primarily because people neglect to

wash their food and boil their water.

Everyone in the town of Puerto Hondo has access to electricity and water from Guayaquil. In addition, cooking is typically accomplished using kerosene as fuel. Overall, the people seem to be of the opinion that they live a more comfortable life than those in the city of Guayaquil.

While there is no formal processing of waste in Puerto Hondo, recycling is a way of life for some people. Goods, such as newspaper and glass bottles, are extracted from the garbage and sold in order to provide income. Also, the food components of the garbage are typically composted. The rest of the garbage is dumped in a common area or wherever convenient. Most of the garbage is dumped along the main roadside, but is done during the night so as to avoid notice.

Puerto Hondo functions as a comuna. Politically speaking, we have not been able to uncover the exact ramifications of such a title. We were not able to identify, never mind contact, the present formal decision makers within the community. We recommend identification of these decision makers, as well as informal decision makers and gatekeepers of information, to update and extract the remaining information as noted. Contact with such people could also lead to knowledge of the qualities that the people of Puerto Hondo feel are necessary for

the decision makers of the community to possess, shedding light on issues of importance to them.

Town business is conducted at monthly meetings, occurring on the first Saturday of each month (Ortega, October, 1993). The town is governed by a directive. Forty percent of the townspeople participate in the community by paying their 2,000 sucres a month dues.

Resources and Management

The coastal ecosystem provides a home for aquaculture and terrestrial life. Bass, robalo, lenguado catfish, mussels, cherry stones, and purple crabs are some of the species of aquaculture in the Puerto Hondo region.

Gerrardo Corrales of Fundacion Natura estimates that to date 2,500 hectares of the region have been converted from mangroves to shrimp farms. The remaining 8,000 to 9,000 hectares of mangroves are untouched. Every shrimp farm owner has a long term concession from DIGMER and, therefore, DIGMER has the power to regulate activities in the area inclusive of buying and selling land.

Currently, there is a freeze on further land concessions in the Puerto Hondo region. Similarly, no one is authorized to cut down mangrove trees.

Because PetroEcuador has a terminal in the Puerto

Hondo region, the Navy continually patrols the area, thus reinforcing the existing laws. These continual patrols seemingly have halted the destruction of mangroves in the region (Pizarro, Oct 1993). While this is true, it is the opinion of the former Puerto Hondo leader that townspeople would cut mangrove if requested of them. This example illustrates the true level of valuation of the mangrove as a compared to a possible small monetary gains.

Shrimp farms in the Puerto Hondo region vary both in size and ownership. Ownership is of two kinds: group and private. However, both types of ownership operate in relatively in the same manner. Shrimp farming is currently a monocultural activity in the Puerto Hondo region. Machinery used in shrimp farms consists of pumps which elevate and lower the water level in the shrimp ponds to the desired amount.

The water in the water ways of the entire region is visibly polluted. Pollution, both urban and industrial, is generated primarily from the city of Guayaquil and affects the shrimp yield. One researcher estimates that there is only a 30 percent survival rate among the growing shrimp (Pizarro, Oct 1993).

Among the productive activities in the town are limestone extraction, charcoal production, and small business operations.

GENERAL PLANNING PROGRAMS

The following five sections discuss processes that are used in working with community development.

Costa Rica Methodology for Analyzing Ecotourist Activities

The Costa Rican Ecotourism IQP proposal outlines one process of evaluating the specific activity of ecotourism in an area. Their methodology utilizes the determination of carrying capacities to identify activities that operate within the guidelines of sustainable development. Four types of carrying capacities are noted: ecological carrying capacity, facility capacity, physical capacity, and aesthetic capacity.

Ecological carrying capacity is the calculation of the number of people a particular area can handle before excessive environmental degradation occurs. This capacity can be modified by altering activities and procedures. Facility capacity denotes the number of actual accommodations available, while physical capacity designates the fixed amount of space available. The limit of aesthetic carrying capacity is determined subjectively. It is the point at which the enjoyment of

an activity is hampered by the appearance of other tourists. Employment of such capacity calculation for evaluation was the method of choice in the study of the activity of ecotourism in Costa Rica.

Aracruz Celulose Company, Brazil

An example of a successful community development program is the development of the Brazilian company Aracruz Celulose. Aracruz Celulose is a company located in an area of Brazil that was destroyed by deforestation twenty years ago. Good business techniques utilized by Aracruz have led to the establishment of a successful reforestation program for pulp production.

Aracruz, in Brazil, is developing sustainable forestry plantations linked to a pulp facility. Aracruz, which specializes in the development of kraft pulp for paper production, is located north of Rio de Janeiro in the forests of Espirito Santo and Bahia. Throughout the 1960's, farmers, charcoal makers, loggers, and livestock raisers in these regions stripped and burned the lands for their private use. However, they did not replace any of the trees they removed. This extensive clearing of the tropical forests destroyed the lands leading to severe soil erosion and depletion which made

it impossible for farmers to grow sufficient crops. The local economy and environment suffered. Poverty set into the region.

Aracruz Celulose Company began a program of reforestation of the land with the financial support of the Brazilian government. As a result of extensive research and experimentation, the company proposed to reforest the lands with a variety of eucalyptus plantations suitable for the area. They began with a plan that provided for:

- substantial research and development into the most appropriate strains of the eucalyptus.
- establishment of a state-of-the-art pulp mill.
- a port to distribute the final product.
- development of extensive social infrastructure for the local community.

In 1967, the first plantations of eucalyptus trees were established. Continuing research teams then learned more about local conditions and introduced eucalyptus seeds imported from regions having similar conditions. The first introduction was successful and yields increased from twenty-five cubic meters of wood per hectare each year to thirty-five cubic meters of wood per hectare each year.

In 1979, the company made a major breakthrough in generating a method of vegetative propagation based on cloning techniques. They were able to grow eucalyptus trees that reached maturity within seven years that were of uniform wood and disease resistant to the environment. Aracruz Celulose Company then decided to conserve the remaining 27 percent of the original tropical forests, regenerate the rest of the depleted lands with the new fast-growing eucalyptus, and plant 1.5 million native trees lost in the area.

Aracruz then proceeded to plant 60,000 fruit trees to bring back the lost bird populations and distributed 9 million eucalyptus seedlings among small farmers to reduce the cutting down of native forests. Aracruz Celulose Company grew at a tremendous rate. They increased their pulp production to 1 million metric tons per year with the addition of a second plant. They were the first Latin American pulp mills using the "clean" cell membrane process meeting stringent regulations of both Europe and North American.

The reforestation program has been very successful, making Aracruz Celulose the leading company in Brazil, with 1991 sales of 300 million dollars. The company now employs 7,500 workers, 60 percent from the state of Espirito Santo alone, and 30 percent from the neighboring states of Minas Gerais and Bahia (Schmidheiny, 1992, p.

329). This has decreased the flow of people to overcrowded Brazilian cities and has led to the formation of a local community.

Aracruz financed the construction of recreational centers, elementary schools, vocational training centers, and health care clinics costing more than 15 million dollars. Aracruz was successful in adopting a program that looked towards long-term development. This program was achieved through the implementation of four steps:

- Information Gathering; including technological analysis and research of the land, the economy, and the like.
- A plan of activities and implementation for proposed program.
- Involvement of the community to generate awareness, developmental training, employment, and the like.
- Execution, evaluation, and management of the program.

Aracruz Celulose created a program of sustainable development through proper resource management combined with innovative appropriate technologies for the generation of its natural product. Working with a sustainable view of the forests in mind, Aracruz Celulose

Company has developed a complex industrial ecosystem that works towards a product as well as a safe environment.

The company in its regeneration of the depleted lands has guaranteed their supply of environmentally sustainable eucalyptus for pulp production and has reflourished the land for what it does best; production of natural resources. Aracruz continues to become almost self-sufficient in terms of energy as they incorporate industrial waste and tree bark into their processes. This means that biomass now provides more than 90 percent of total energy requirements (Schmidheiny, 1992, p. 329).

The natural old forests have been protected by careful arrangement of the eucalyptus creating a well balanced coexistence of eucalyptus and indigenous forests. They continue to guard against over exploitation and are reducing the pressure for logging native forests for wood products. Involving the community has enabled Aracruz to grow with and among the people, ensuring a sustainable economy and future for both the people and company.

The Methodology of the PMRC

The PMRC (Proyecto de Manejo de Recursos Costeros) is a government organization formed through the coalition of three independent institutions: the Ecuadorian government, the U.S. Agency for International Development (USAID), and the University of Rhode Island. This coalition has been working in coastal resource management for the past seven (established 1986) years. Other institutions are incorporated into the various branches of PMRC. These institutions are the following: DIGMER, ESPOL, MAG (Ministerio de Ganaderia y Argricultura), and IEOS (Instituto Ecuatoriano de Obras Sanitarias).

In the last seven years, the PMRC has established five continuously running projects which are called Special Zones of Management (ZEM's). These ZEM's were each established through the use of the methodology of the PMRC, outlined in the following section. The methodology of the PMRC was formulated, tested, and then implemented in each of the ZEMs. The group, therefore, considers this methodology tried and proven. PMRC has enjoyed much success through the use of this methodology. Last year the PMRC was the recipient of the "Planeta Azul" award/grant. This award/grant is given out to one environmental organization per year and carries much

prestige.

For the reasons mentioned in the above paragraphs, the group feels that the PMRC's methodology for project development is acceptable in its entirety. Similarly, all of the institutions incorporated within the PMRC are reputable. The national and international recognition received by PMRC also gives the PMRC's methodology merit.

PMRC's mission statement consists of achieving six general objectives in Ecuador. These six objectives are interrelated and can be summarized as follows:

- create and execute coastal resource management programs
- obtain and update information dealing with coastal resources
- develop procedures to evaluate environmental impacts directly dealing with coastal resources
- identify and analyze factors that affect coastal resources
- identify the capacity of personnel dealing with coastal resources
- develop as an institution so that it can deal with the previous objectives

With these objectives in mind, PMRC has developed the following methodology to accomplish their mission.

This methodology is as interpreted by Myreya Pozo, of PMRC, and verbally transmitted to the team members. This specific project implementation methodology is an adaptation of the general methodology used by the United Nation's UNESCO

The project implementation methodology utilized by PMRC can broken into four steps:

- Sensitization and education
- Organization
- Capacitation
- Execution

These steps are carried out continuously and do not necessarily have to follow the order in which they are outlined.

Sensitization.

The process of sensitization is the most difficult step outlined in the methodology. This step is continuously being executed throughout the span of the project and involves educating the members of the community. By educating the community, PMRC hopes that the community will recognize, on its own, that it is part of a complex system involving nature and that all of its

actions, in one way or another, affect natural processes of the environment.

Educating the community is done through individual programs that are targeted for each specific project that PMRC undertakes. Some examples of educational activities carried out by PMRC consist of inter-personal communications, workshops specially designed for each project, house to house visits, demonstrations of the effects of human activities on nature, and question and answer periods in which the community voices their opinion.

All of the activities outlined above serve the purpose of sensitizing the community through the use of education. It is important to keep in mind that these programs are going to be implemented in a community that may not be educated. PMRC may find that the members of the community may not know how to read or write. As a result, PMRC must develop programs that are flexible enough to be implemented in many different ways.

Organization.

The organization component of a PMRC project can be carried out before any of the other steps. Organizing, for example, may take place before sensitization. The PMRC organizes itself around the number of user groups

found in the area of work. Some examples of user groups are: fishermen, shrimp farmers, individuals that hunt larvae, and people that collect oysters. By organizing a community into user groups, PMRC is able to identify the specific groups impacts on the environment and their specific needs. Since the impacts and needs of the groups are identified, capacitation may occur.

Capacitation.

PMRC achieves a good level of community response by educating individual user groups to their specific needs. The capacitation step of the PMRC methodology is divided into two parts. First, it involves making each user group aware of the environmental hazards that they create. Second, it helps the user group to become capable of dealing with the specific hazard and the agencies that regulate environmental activities. It is this fact that makes the user groups feel that they are an important part of the community, and in the long run, transforms the user groups into powerful parties that are able to regulate the damage being done to the environment. Regulation is usually achieved when a user group applies pressure to individuals that still persist in performing abusive activities on the environment.

Execution.

The execution part of the PMRC methodology is the finalization of the first three steps of the process. Since the user groups are sensitized, organized, and their skills enhanced, they can be considered able to apply pressure on others to act in an environmentally friendly manner. In theory at least, the planning process and implementation will enable PMRC's general mission to be accomplished: namely, the coastal environment will be better protected.

The Methodology of OIKOS

OIKOS is a non-governmental organization based in Ecuador. The organization wishes to represent community interests specifically dealing with individual life. However, they deem it necessary to keep in mind that individual life is a function of quality of life from a natural and social framework perspective. The organization's global vision is to help transform productive and cultural processes of society through environmental technology, science, and education so that

these processes do not interfere with the natural processes that are fostered on the planet. OIKOS is explicit in that it does not have any economic, political, or religious interests.

Even though the OIKOS Corporation for scientific investigation and environmental technology was established less than one year ago, it has already received the recognition of other institutions that deal in the same area. This is, in part, due to its founder and present director, Mr. Marco Encalada. OIKOS is a direct reflection of Mr. Marco Encalada's views of development.

One major activity carried out by OIKOS is the establishment of partnerships with communities to help the individual community learn to manage itself in an environmentally friendly manner. In launching such projects, OIKOS has four main areas of emphasis: environmental education, scientific diffusion of ecological issues, technology transfer activities, and the development of new enterprises.

OIKOS, with the overall global vision in mind, has developed a general framework that they use to create practical methodologies for working with communities and developing projects within communities. Encalda, the founder, shared with us (November, 1993) the framework of these methods. The methods are noted in the following

text.

There are two different types of projects developed by OIKOS, an autonomous project or a project that is inserted into another program. Each type of project requires the analysis of a series of factors such as judicial, technological, administrative, financial, and political. Each type requires a methodology with which to carry out the project.

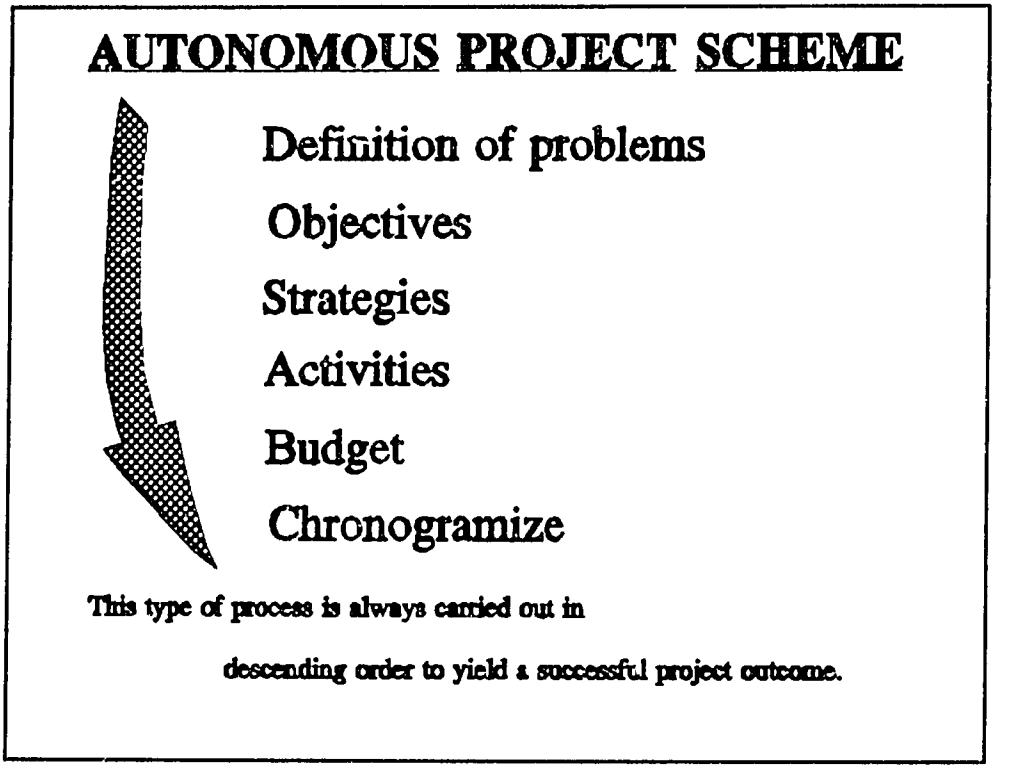

Figure 6

In an autonomous project, the problems must first be defined, then the objectives, strategies, activities, budget, and chronogram defined in succession (See Figure 6). The methodology of an inserted project follows the

same progression; however, each phase of an inserted project is defined with both the specific project and the broader project objectives in mind.

Definition of Problems.

For OIKOS, the first and most important step in any type of community development project is to identify the problems that the community faces. The problems in the area are usually based upon perceptions, both of problems and needs. Perceptions are based on knowledge and attitudes, which have various behaviors and habits associated with them. It is possible to discover the perceptions of the townspeople through interviews, assemblies, surveys, or informal observation.

During definition of problems and needs, perceptions, not only of the target audience, but also of the defining body, are considered. Perceptions of situations between OIKOS and the community are not always the same. When they differ, the correct perception must be derived, since the actual need is a function of a combination of perceptions. To decide if the need is to change the perception of the targeted audience or of OIKOS and whether the perception is of a scientific matter or social matter, all perceptions must be

researched through an extensive compilation of information regarding needs, desires, and expectations.

In addition to the actual problem, the problem's cause also needs to be identified. Causes can be put into three main categories: lack of awareness, sensitivity, or motivation. The strategies and objectives for resolving a problem will differ depending upon the type of cause. Similarly, some problems require habitual responses while others require only a one time response.

A problem could be caused by an individual's lack of awareness that there is a problem. However, in another case, the individual may know of the problem, but not really care. This means the problem was caused by a lack of sensitivity. According to OIKOS, sensitivity comes from losing something, whether it be within religion, health, economy, life, or emotional aspects such as friends or family. Finally, an individual may be aware and sensitive but not be motivated to alleviate the problem. Economic, social, and political factors may force the individual to behave in an atypical manner.

Objectives.

After all of the needs have been identified, OIKOS develops objectives to deal with the problems. There

must an intimate relationship between problems and objectives. When OIKOS speaks of objectives, they mean three things: Who? What? and When? Each specific objective must be very explicit and complete, as this is the basis for design.

At this point, it is important to identify the target audience. Whenever attitudes are dealt with, objectives must take into account the personal situation of the target audience. To accomplish their objectives, OIKOS attempts to positively sensitize and educate the audience to the project. Without sensitization, there is no need for a community to act.

Humans exhibit specific behaviors that, often, do not match their attitudes. Because of this, OIKOS maps out their expectations of the target audience. There are hundreds of cultural traits and psychological perceptions that affect behavior and must not be neglected.

Specific objectives of OIKOS take into account both the problems and the needs of all people involved. Outlining objectives of knowledge, attitudes, and behaviors build the general objective. OIKOS may decide to take this general objective, break it down, and execute it, or they may construct several objectives to result in the general objective of the project.

Strategies.

There should be at least one strategy for achieving each objective that has been recognized. If there is more than one strategy for an objective, then they should all, necessarily, be interrelated. The strategy should begin with a statement, followed by goals, process, feasibility, and finally, evaluation.

In the first step of strategy statement, OIKOS describes the entire strategy. Who will be performing what tasks? Goals of the strategy must be explicit, so a process can be built.

To make a process, the beneficiaries of the project are defined and segmented if possible. OIKOS also defines the message, frequency, and mode of transmittance. Project activities and technical feasibility are OIKOS's finalizing steps of the process of strategy building.

Activities.

Specific activities are developed to accomplish each strategy. These activities should greatly involve the community. Once the activity has been selected, the medium to be used is specified. Training people to run the activity is performed next. The goal that the

activity was designed for must be tested and subsequently implemented. Evaluation of specific feedback completes the process.

To carry out the specific activity, people who are responsible must be defined, as well as the amount of time needed to implement and execute the activity. The actual dates of activity, whether it is occasional or habitual, must also be defined. Last, the required equipment needed to carry out the design and operation of the activity is specified.

Budget.

In defining and clarifying all of the above, a budget can be developed. From this, determination of the feasibility of the proposed activity can be calculated. The budget for each section and the overall program is extremely important for two reasons. First, so that OIKOS's own goals are not set too high, and second, so that OIKOS does not raise the people's expectations to an unreachable level and thus ruin any possible future work in the area.

Chronogram.

The chronogram is an exact timeline of events in the project. As is the budget, this tool is important in terms of planning. While the budget examines monetary resources, the chronogram allows evaluation of time constraints.

Conclusions

The group's resultant process, achieved through direct cooperation with the OIKOS corporation, PMRC, and research into two other projects, Aracruz Celulose case study and an IQP completed in Costa Rica, is outlined in the following RESULTS section. This methodology is an adaptation of the general methodology outlined by Mr. Marco Encalada in the workshop held on Friday, November 19, 1993, along with points from the other three sources. From our investigations, the group discovered that all four of the models were inter-related and had many similarities.

The first step of all four is basically information gathering in one form or another. Both Aracruz Celulose and OIKOS explicitly state this, while, in the other two methodologies, this step is implied. The entire Costa

Rica process is basically an information gathering activity intended to determine the carrying capacity of a tourist activity. Similarly, for PMRC to execute its first step, sensitization, information must have been gathered in order to know what the people need to be informed about.

The next step, as stated by Aracruz Celulose, is to plan the actual project. For OIKOS, planning the project involves creating objectives, strategies, specific activities, a budget, and a time line. Meanwhile, the PMRC organizes each project based upon the specific situation of the community.

Each of these outlines agrees that, next, the community must be involved. For the Aracruz Celulose company, this consisted of providing jobs and health services to the community. The PMRC uses a standard method at this step in that they identify groups in the community and, subsequently, use them as tools to instigate change. Lastly, OIKOS achieves this step in a process they call internal planning. OIKOS believes this is the stage when the community is able to have some control over the project.

Of course, the final step for any project is to execute the actual project. This step involves evaluating and managing the entire project.

Since three of the four models were very similar,

any could have been used as a basis for our planning process. We chose to use OIKOS as our foundation. This particular model was chosen because, of the three applicable models, it was the most detailed. Furthermore, as can be seen, the OIKOS methodology basically encompasses the concepts outlined in each of the other models.

RESULTS AND DISCUSSION

PLANNING PROCESS FOR SMALL COMMUNITIES

The following outline is a general outline of a planning process for development work in small communities.

I. EXTERNAL PLANNING PROCESS

A. Information Collection

1. Informal

a. become friends

b. make town aware of project

c. verify if townspeople agree with project

d. discover working relationship with community

e. work with the community leaders

f. identify problems the planner will face

g. decide how to propose eventual project to town

2. Formal - libraries, employers, institutions

a. history

b. statistics

c. legislation

d. outside influences

B. Standardize Method for Periodic Data Collection

1. Create a model of community
2. Evaluate model - to determine what information needs to be collected periodically
3. Share findings as way to test conclusions of B.2.
   a. community leaders
   b. townspeople
   c. colleagues
4. Design a standard and method of periodic collection
   a. survey
   b. interviews
   c. attend town meetings

C. Prioritize Gathered Information

1. Outline elements
   a. community needs
   b. community expectations/desires
   c. community problems
   d. causes of problems
2. Evaluate elements
   a. frequencies

b. trends

c. intensities

3. Use matrix to evaluate elements from various perspectives

a. planner(s) involved

b. community(ies) involved

4. Use the combined perceptions result to determine order of importance

D. How to Apply Information for Decision Making Process

1. State Objectives

2. State Goals

3. Define Strategy

a. beneficiaries

b. senders of information/facilitator

c. media

d. messages

e. frequency

4. Define Main Activities

a. select content

b. train personnel to deliver content

c. select media used to deliver content

d. elaborate on content

e. test

f. implement activity

g. evaluate activity

II. INTERNAL PLANNING PROCESS

A. Create Awareness within Community of Existing Plans, from I. D.

1. Actual plan
2. Process through which plan was generated

B. Discuss/Modify Plans with Community

1. Informal discussions
2. Workshop
   a. design
   b. implement
   c. evaluate
3. Test runs

C. Implement Modified Plans

1. Workshops
   a. Design
   b. Implement

c. Evaluate

2. Tasks for community

3. Follow-up

The entire outline of the planning process consists of two modes of planning: external and internal. External plans are all of the activities conducted by the planner prior to the point at which the community is able to exhibit control in the planning process. Internal planning begins once the community takes over partial control of the planning process. External planning can be performed in various degrees: non-participatory, semi-participatory, participatory, or consultant. The more participatory an external planner is, the longer the planning process takes to develop a detailed plan.

In developing the planning process with Puerto Hondo as a working example, our role was representative of a participatory party. The reason for such participation is that we were developing the process with Fundacion Natura in mind, since Fundacion Natura has initiated a program to develop Puerto Hondo. This initiation and resultant responsibility toward Puerto Hondo makes Fundacion Natura a highly participatory external planner.

After developing external plans, the process of developing internal plans begins. Success of external

plans are dependant upon how they convert to internal plans. When external plans are converted to internal plans, the hypotheses of external planning are tested. It is over the internal plan that the community has the opportunity to exhibit control. Hence, the community can either accept or reject the external plans.

The hypotheses of the external planning process are typically modified based on the wishes of the community. Upon conversion of the project to internal planning, the community has the opportunity to elicit the process, change the orientation or direction of activities, and reset priorities. The only thing an external planner can do to keep modification to a minimum is carry out the external design to its fullest extent.

In development of this approach, it was necessary to use a practical example to confirm that the methodology, as outlined, is realistic. For this application, the community of Puerto Hondo, undergoing an existing program with Fundacion Natura was used.

The fully detailed outline of the planning process is very long and can be confusing. Therefore, in the following text, when the reader needs to refer back to the basic planning process, we suggest the following section be used, for a general understanding of the key components of the planning process.

I. External Planning

The part of the planning process that is developed with control initiated only by the planner.

A. Information Gathering - to establish a relation with the community while obtaining information on the towns background, social and physical structure, and the communities expectations, needs, and desires.

B. Standardize Method of Collection - to develop a concise, well thought out method of collection to obtain necessary, important town data, which is influenced by change and social conditions.

C. Prioritize Information - To classify which information is most important for the development of the program. This step can be performed simultaneously with standardizing a method for collection.

D. How to Apply Information for Decision Making Process - Within this step is the creation of the method being used for implementation of the plan within the community and the internal planning process. The planner will state his/her objectives and goals, along with the strategy and the main activities to accomplish them.

II. Internal Planning

The internal plan is developed with direct involvement of the community. The community will now take part in the process of decision making, with partial control, of the external plan.

1. Create awareness - This is accomplished by the planner to make the community aware of the plans devised from the external plan. It is important that the community knows all aspects of the plan to insure that the community will make decisions with complete understanding of the planners intentions and program design.

2. Discuss/Modify Plans with Community - this step clarifies any modifications made by the community of the plan. Once modifications are made, then the plan is redefined, and the internal process proceeds with the acceptance of both the planner and the community.

3. Implement Modified Plans - The revised plan is now implemented within the community. This can be

performed through workshops with the members of the community. Tasks are created, initiated, and then follow-up activities are generated for any necessary changes.

The above outline is intended only to be general outline of the actual planning process. It is not intended to be understood by the reader when read alone, but is instead meant to supplement the detailed explanation. Therefore, a detailed application of the planning process, in relation to Puerto Hondo is explained below. It is recommended by the authors that the above outline be used as a reference guide with the following section to ensure that the reader can follow the lengthy detailed planning process.

APPLICATION OF THE PLANNING PROCESS

External

The design of the external plan follows a general four phase scheme: collect general information, standardize method for periodic data collection, prioritize information, and apply it for decision making.

Information Collection.

For this phase, information was gathered within the community of Puerto Hondo. General information was required to make an initial assessment of the community as a whole. This process can be divided into two techniques of collection, informal gathering and formal

gathering.

Informal gathering of data can be considered a method of verbal collection, focusing on, but not limited to, information found within the town. To gather information informally, there are seven basic steps to be performed by the planner.

The first step, becoming friends with the people of the community, needs to be carried out so the townspeople do not feel threatened or coerced by the planner. Although seemingly simple, this relationship takes a significant amount of time, and is a key component of the information gathering process. An amiable relationship can aid in reinforcing that the planners' objectives are to be helpful to the community. A positive relationship will also aid in extracting true feelings. As the first part of our work in Puerto Hondo, we attempted to gain the friendship of the community in several ways. For instance, we frequently visited the community and held conversations with the townspeople, as well as became patrons of town business.

The group found out, first hand through our involvement with the town of Puerto Hondo, that the relationship between a community and a planner is a delicate one. For example, during one visit, as the group was walking down the main street, a truck drove by and one of the town inhabitants yelled out "hippies".

This experience is a perfect example of the fact that planners are always outsiders. The fact that we were from the United States certainly enhanced the problem; however, any planner will face the difficulty of making friends and fitting into the community.

Creating awareness among the community, is the second step of gathering information. Once friendships have been made, planners need to create awareness within the community of their intentions. The community must be made aware of the general objectives of the planner, as well as how those objectives will be further developed. Some possible formats for creating awareness are informal interviews, a general town meeting, or written documents.

The third step, verification of the objectives and method of planning, is essential. If a community does not believe in the objective, message, or plan, the project will fail. This process can often be carried out with step two, creating awareness. In Puertc Hondo the verification process can be accomplished through media, such as pamphlets or flyers; at town meetings; in an open forum during town functions; or via one on one dialogue. During one visit to Puerto Hondo, for example, the group interviewed a married couple who had lived in the town for fifteen years and currently own a roadside restaurant. The group explained the project goals to the couple and proceeded to ask them several questions.

Through these questions, the group wanted to evaluate the couple's knowledge of Fundacion Natura's program in Puerto Hondo. The couple knew of the program and were interested in it, but they voiced only a single request: namely, that they wanted the road in front of their restaurant paved because there was too much dust. This specific example showed the group how hard it really is to obtain and transfer information between a planner and the members of the community in which work is done. It also showed that some members in the community may be looking for direct benefits of the program to suit their business activities. The married couple did not express that the paved roads would be best for the entire community, but they wanted them for their own direct benefit.

Once verification occurs, the working relationship between the planners and the community can be examined. This fourth discovery step should not be omitted. Defining the relationship may bring to light problems in the process of communication. The causes of problems should be noted and appraised, whenever possible, to ensure their elimination. Lack of attention at this step may lead to inaccurate future assessments, hence, invalid conclusions. In our case, this step was rather difficult because the normal source of relations, the town government, was practically nonexistent. While we did

meet with the former president of the community, we were not able to talk to any of the people presently involved in the governance of the town.

During another visit to Puerto Hondo, we wanted to interact with the town by attending some kind of community gathering. The group was told that the entire town would gather for a soccer game on a Saturday afternoon. However, when the group arrived, we found that the soccer game was cancelled. The cancellation of the soccer game was a setback to the group, but we decided to walk around the community in the hopes of interacting with some people. As a result, several people invited us to attend Saturday mass.

The group decided to attend the service and hopefully to talk with the community's priest in order to learn more about the social aspects of the community. When mass was over, the group approached the priest, but he had to leave immediately in order to give a sermon at a nearby town. This last example taught the group that a planners must continually arrange and rearrange their schedules in order to accommodate the community, sometimes to no avail.

The fifth step involves working with the previously identified community leaders. Working with the community leaders aids in extraction of overall assessment of the community's needs and desires. Assessment of the

qualities of the leaders, too, is helpful. The assessment aids in identifying characteristics that townspeople deem important in a leader. We dealt with one of the leaders of the community, Mr. Angel Lainez, who initiated cooperative efforts with Fundacion Natura. Although we did not complete any direct work with him, it was obvious from our discussions that such a leader would be of great assistance in any type of project.

Outlining the problems and difficulties aids in explaining the limits of gathering information. Describing these problems may assist in qualifying gathered information. For example, if a group is biased, they may need to be specifically sensitized at a later date, or information taken from them may need to be qualified.

The first six steps of gathering information occur during the external planning process and are steps of becoming more adaptive to the community. In addition, these steps must be tailor made for specific communities and planners. While they may not, in reality, be carried out in the exact chronology as outlined, each merits consideration.

The seventh, and final step, occurs during a mixture of the internal and external approaches. In this step, the external planner decides how project will be proposed to the community. Once the project is proposed, its

acceptance is determined. Therefore, step seven is, partially, an internal process.

Meanwhile, the technique of formal information gathering can be carried out both within and outside of the community. This includes gathering documented information about the town such as town history, governing legislation, and statistics. With Puerto Hondo as our focus, we gathered formal information from several sources. First, Fundacion Natura gave us documents regarding the community's history and legal agreements. Also, PMRC and CLIRSEN, two government organizations, provided us with technical details regarding the resources and geography of the area. Formal gathering could also be carried out through research at libraries, corporations employing townspeople, special interest agencies, and institutions that may have information on the community.

In order for a project to be successful, clear goals and objectives for specific actions must be identified. Therefore, the aforementioned outline of the information gathering process is not a waste of time, as it provides a basis for the objectives.

Standardize Method for Periodic Data Collection.

Standardizing a method for periodic data collection is the second phase of community planning. Once a general assessment has been made of the community, a method for periodically collecting town data must be established. This method can be accomplished in the following four stages.

In the first stage, a conceptual model of the community including its history, demographics, framework, problems and needs can be developed from the general information gathered in the previous process. From this model, planners can draw a general picture of the town. From this general view, the information that changes over time can be designated for periodic collection.

In the short time we had in Puerto Hondo, we were only able to categorize information by basic divisions. As seen by our outline of questions in Appendix D, we divided information about the town into six basic categories of information: general, legal, economic, expectational, educational, and social. While we did not create a model for regular data collection, we do believe that information regarding the community's concerns and development, as well as information pertaining to feedback from current programs, should be collected.

The method by which periodic collection will occur

must be defined in the second stage. Possible options for collection include surveys as well as informal contact and observation by Fundacion Natura. If surveys are used, a budget must be made to calculate cost and evaluate feasibility. Calculations, for example, must be as detailed as determining the number of pieces of paper needed to collect information from the 220 family's of Puerto Hondo, and the cost of ink to print each page. The frequency of collection must also be specified in order to project the long term costs.

The third stage involves the sharing of the particular method devised for collection with colleagues and townspeople. Sharing and testing the idea of the standardized method will aid in the development of the optimum manner and content of information collection from the target audience.

The fourth and final stage is that of design. The design of collection must take into account monetary constraints. Budget calculations of the physical cost of executing collection must not be neglected during design. Actual design of the standardized method completes the second phase of community planning.

Prioritize Gathered Information.

From the periodic information gathered, there must be some sort of evaluatory system established to prioritize the information. To do so, various elements must be delineated. There are four basic steps for prioritizing the information gathered: outline needs, expectations, problems, and their causes; evaluate frequencies, trends, and intensities of the aforementioned outlined elements; determine appropriate perceptions; and prioritize information.

For evaluation of information to occur, a general understanding of the community's needs, problems, causes of problems, expectations and desires must be obtained; both from the perspective of Puerto Hondo and of Fundacion Natura. Once all of these elements have been noted, evaluation can commence.

Secondary evaluation includes outlining the frequencies of specific problems and trends. The importance and intensity of the stated element is a highly subjective factor. Because planners are in complete control of the external process, by mere definition, it is their responsibility to carry out this procedure to the best of their ability. This determination of importance cannot be done solely on a quantitative basis. A community may not identify an

existing problem simply due to a lack of education. Similarly, a planner must take into consideration that an issue, which is of utmost importance to the community, might not be significant in the eyes of the developer. It is for this reason that modifications of foci, plans, and activities are made in the internal planning process. The external planner can strive to limit these revisions by assessing the elements with an open mind.

A perceptions matrix (See Figure 7) may be a useful tool in determining true needs and problems. Because the actual need may be one neither as defined by the community nor the planner, a matrix may aid in prioritizing the information. The need may be one exactly as defined by the community and not the external observer, or vice versa. If this situation exists, or the real need is somewhere in between, the actual need then becomes twofold. It becomes both the need itself, and the need to change a perception of it. This, again, is a determination performed by the external planner alone, so it is one in which much consideration must be taken in order to achieve accuracy.

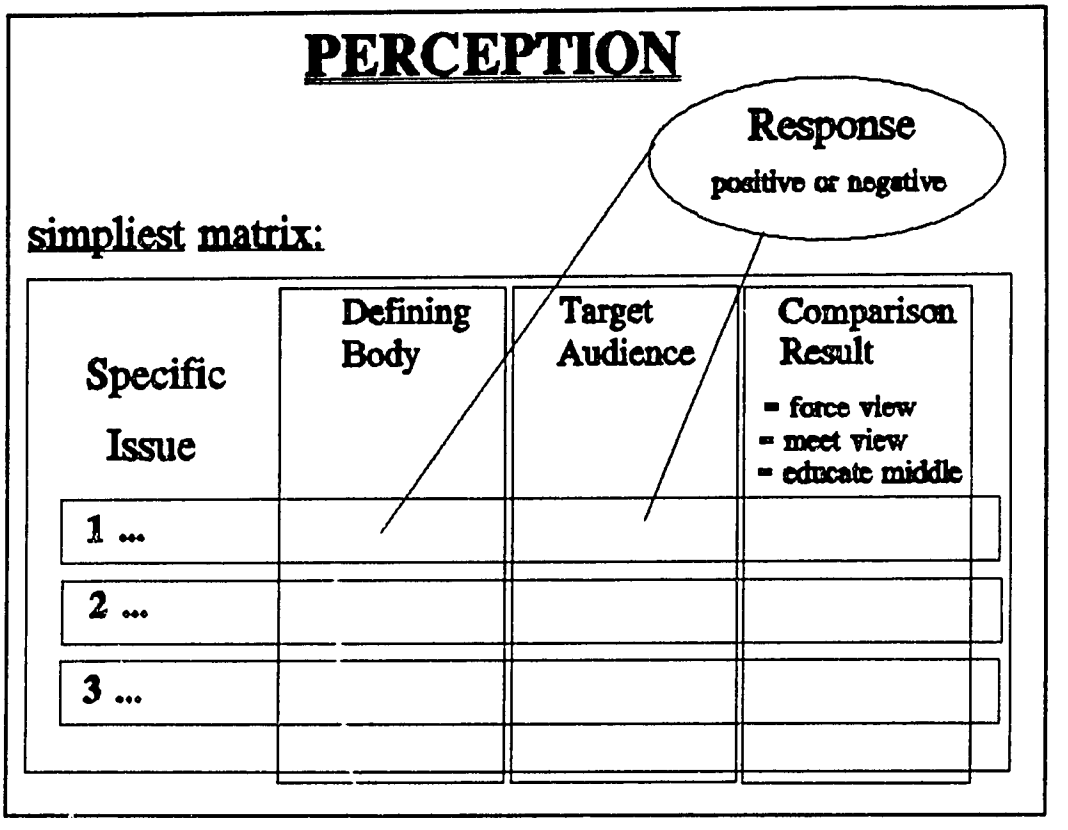

Figure 7

Lastly, using the perceptions combined in matrices above, the planner can identify the important aspects of the community data. Stating the order of importance helps the planner to develop the best activities for the existing community conditions.

How to Apply Information for Decision Making Process.

Once data has been collected and prioritized, the planner can move into the next phase of planning: application for decision making. This application considers how to choose activities and, subsequently,

implement them. The application can be broken down into a series of tasks.

To begin, the planner must state the general objectives for the community project. This is done to clarify which direction the planning process is moving. Since it uses continually updated data, the main objective is considered only a general statement that may change throughout the development of the project. As new data is developed, the planners need to look at the objective statement, the community feedback, and the prioritized information, to ensure that the objective reflects the needs of the community.

In Puerto Hondo, we felt the general objective should be to provide jobs and develop the community in such a way as to preserve the surrounding environment. The objectives of Fundacion Natura are identified as being much the same (as seen in Appendix B).

Once the objectives of the project have been identified, specific strategies and activities can be developed in order to reach the objectives. In Puerto Hondo, one such activity, suggested by Fundacion Natura, is the construction of an environmentally friendly shrimp farm. Such a shrimp farm would not directly affect the economic situation of Puerto Hondo, as the shrimp farm would not employ many people. However, the ecologically friendly farm could be a great benefit to the estuaries

and mangrove swamps surrounding Puerto Hondo. If such a farm proved to be economically viable, then all the shrimp farmers could be convinced to use such machinery, and thus assist in preservation of the environment.

Along with stating the objectives of the project, the planner must establish goals. The goals will serve as another guideline for keeping the needs, expectations, and perceptions of both the planner and the community in focus.

Using the gathered and prioritized information, the planner must next identify specific strategies. Strategies are developed for a either a series of programs or for specific activities outlined by the objectives of the program. In order to accomplish an environmental education program, for example, the planner needs to define the community members involved in the program. One specific example might involve an education program designed to target shrimp farmers for the purpose of increasing their understanding of current farming practices and appropriate alternatives. Before the program can actually be carried out, the planner must identify the receivers and beneficiaries of the program, the senders of the information, the media involved in the sending process, the specific messages to be sent, and the frequency of sending them.

Upon completion of an education program, the next

task may be to implement a more viable farming activity, such as the one hectare shrimp farm, as a trial. Again, the planner must look at who is going to benefit from this activity. The application of a one hectare shrimp farm utilizing environmentally friendly equipment would serve as a tool to promote the incentives of new technological ideas along with environmentally conscious practices.

To illustrate yet another example, if incentive within town were created to promote visitation at the experimental shrimp farm, possibly by introducing visits to the farm as a stop on an ecotrail, the beneficiaries would be both the tourists and the town members.

An ecotrail can promote qualities of the environment, its importance, and good environmental practices. Puerto Hondo, being surrounded by the diverse ecology of mangroves and estuaries, is a prime candidate for developing this activity. An ecotrail would produce many jobs as a result of the need for maintenance and operation. Employment would also be created by the need for services for the influx of tourists. The determination of the beneficiaries of a program is extremely important because the nature of the audience will determine the materials used and the way they are used.

In the Puerto Hondo region, senders or facilitators,

as they are labeled in the result's outline, may include Fundacion Natura, the cement company, ESPOL, or others contributing to community development. Identifying the senders of the information means clarifying who is going to be involved in the implementation of the proposed activities. The sender will vary depending upon the activity being executed. In the case of construction of the buildings for Fundacion Natura's educational awareness program, the senders involved in this task would include the local cement factory, which provides building materials for the town. The media by which messages will be sent must also be defined. For the community of Puerto Hondo, the media of an environmental educational awareness program could include such things as pamphlets; however, it depends on the literacy rate of the town members. The manner of presentation of information is key in the acceptance of that material.

For these reasons, the context of the actual message must also be closely identified along with the media chosen. The content of the messages must be reflective of the fixed goals and objectives of the project.

The designer must also specify how often the particular audience should receive the message. The problem may be solved in a single instance, or if the solution must be made a habit, repeated exposure to the message may be necessary. This design component is

critical in creating the desired response from the community.

Once the community, or specified target audience has been sold on the idea of the project and the planner has executed preliminary trials, the planner may formally define the main activities of the program. The first step in doing this is definition of content of the activity. Similar to the process of selection of messages, the content of the activities must parallel the goals and objectives of the broader project. The content of the activity must take into account how the beneficiaries of the activity will respond to the chosen content, so as to maximize a positive response. Also, personnel must be trained to carry out the activities. This may occur in various fashions, possibly through the use of workshops or seminars. The media needed to execute these tasks must then be selected.

Next, the planner should test the proposed activities for feasibility. Testing of the feasibility of the designated activity can be accomplished through application to a model. The actual implementation of the activities will serve as the major test of the process. During this testing, changes will be directed by the community in the phase labeled by the outline as internal planning. This includes actual trial of the activity as defined, and evaluation of the feedback to the activity.

This feedback can be used to modify the activity to achieve objectives.

For the program of Fundacion Natura, the design of productive activities is one of the objectives. Specifically, for the design of an ecotrail, many activities need to be instituted, keeping in mind the community of Puerto Hondo. First, the Fundacion Natura must select the content of the activities that are of importance to the organization and community. For example, one activity will be to design a specific path through the surrounding ecosystem. Will this path be by means of a boat through the estuaries, or will it be by foot through the mangroves, or both? The actual path designed can be done by the specific activity planners, or developed with community members. Once the path is chosen, personnel will need to be educated and trained for conducting the walk or ride. These people must develop an educational background on the trail, its purpose, its highlights, and specifics about the surrounding ecosystem. Since Fundacion Natura is responsible for development within Puerto Hondo, they would be responsible for conducting this education.

The mediums used to transmit information regarding the trail could be in the form of workshops. Determination of the best type of ecotrail could be calculated in many ways. Models of other trails in

Ecuador could be compared to the resources available in Puerto Hondo, followed by an actual test of sample trail setups. Feedback from experts in the design of ecotrails can then be used to evaluate the effectiveness of the trail.

Internal

After the external plan has been completed, the actual internal plan is begun. The line between the external plan and internal plan is the point at which the community begins to have some actual control over the project. Previously, the community's only role was as a supplier of information and as test audience for the intended general plan. However, once internal planning begins, the town can exhibit some control over the actual planning and implementation of programs. The process of internal plan is broken up into three main stages: making the community aware of plans, discussing and modifying the plans with the community, and implementing the modified plans.

First, in making the communities aware of plans, the planner must make the community aware of the specific strategies and activities that were developed in step of

I.D, "How to Apply Information for Decision Making Process", of the external plan. This step is considered internal because the community's response to the awareness of plans begins, and it is this response that determines the progress of the project. The community can again be made aware of plans in the same manner as making them aware of your general objective in step I.A.1.b., "Creating Awareness of project to the community".

Once the community is aware of the planner's project, the community must have a chance to discuss and modify the goals with the planner. This step can be accomplished through informal discussions or through the enactment of a workshop with the community. Such a format would allow for the entire community to be involved. If such a workshop is used, it must be planned, implemented, and then followed by a method of evaluation. At this stage, the planner must realize that the original plans created may be changed by the community.

Once the strategies and activities for the project have been agreed upon by both the planner and community, the plans must be implemented. The implementation may be carried out through three steps: first, through a workshop, or any other available method, to fully develop the activities that will be used; second, through the

development of specific tasks to be completed by the community; and finally, through a follow-up process that generates new feedback.

This feedback loop generates a new core of information, which needs to be evaluated, and thus circles back to the first step of external planning, information gathering. The external planning method then acts as a model to be reviewed with the new information collected and involvement of the community to better shape and define the plan's objectives and goals, thus developing the internal plan and finalizing the planning process.

Other Comments.

The community planning process, explained above, is a series of steps of decision making. Decisions are made through a process of diffusion of information from awareness to evaluation(See Figure Eight).

To induce the adoption of a specific activity or perception, the interest of the parties involved must be generated. To do this, information that sensitizes the audience must be delivered. To accomplish this, identifying the perceptions of both the sender of the message and the receptor is imperative. For example, if the idea of an ecotrail were the intended resultant

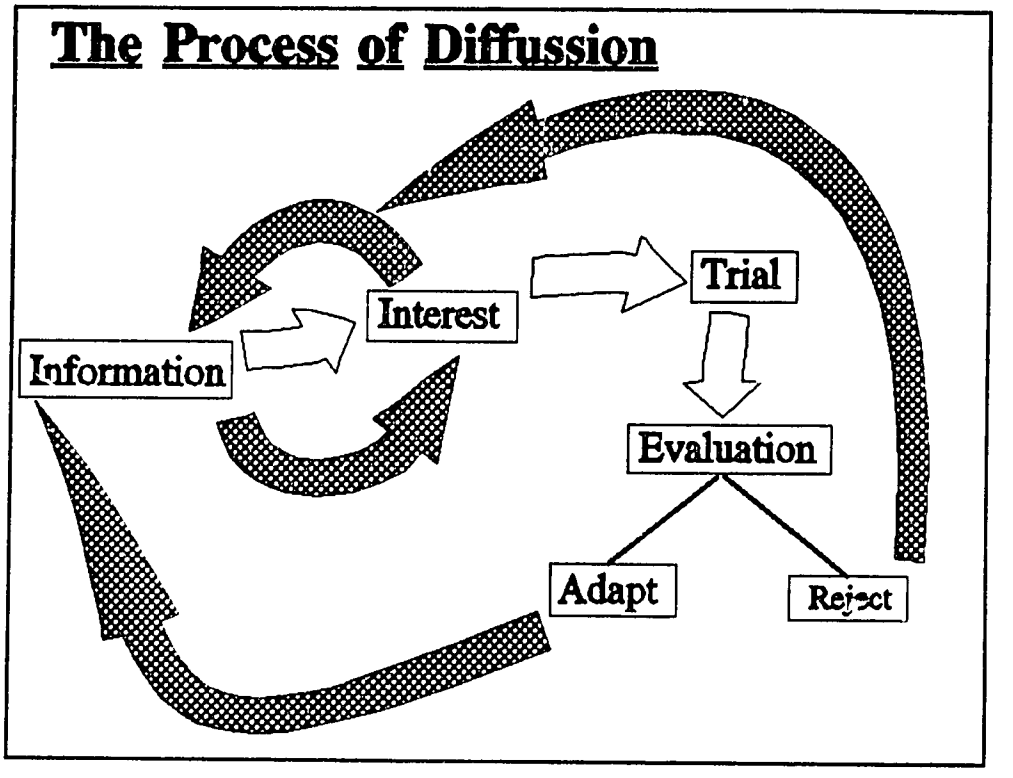

Figure 8

activity for a community to remedy a specific problem, the process outlined in figure seven must be used to obtain definitive adoption of the activity. It is not complete to develop a strategy of implementation with consideration of problems and needs from only one point of view.

Figure eight also traces the steps of persuading someone to engage in an activity. For example, how would someone be persuaded to visit an ecotrail each year? To start, the person must have knowledge of the trail and its facilities. Secondly, this knowledge must generate an interest within the person. This will be contingent upon the degree of sensitivity of the person. The

motivational element previously discussed weighs heavily in the interest segment of the process.

Once interest is generated, the person would go through a trial phase, possibly visiting the trail. After the trial period comes personal evaluation. If the result is positive, then trail visitation might occur regularly. As the diagram illustrates, awareness, sensitivity, and motivation are all major factors affecting the decision making process.

To encourage people to change, they must be made aware of the advantages associated with changing the habit. Problems must all be mixed and managed. This is true because one problem or cause may contradict that of another; therefore the entire picture must be looked at in order to outline advantages.

All activities really run together to give a specific end, the objective based on the problem. Both in developing and carrying out a project, there is an intensified need to develop activities in a systematic, focused manner. This focused manner must always keep in mind the main objectives of the overall program.

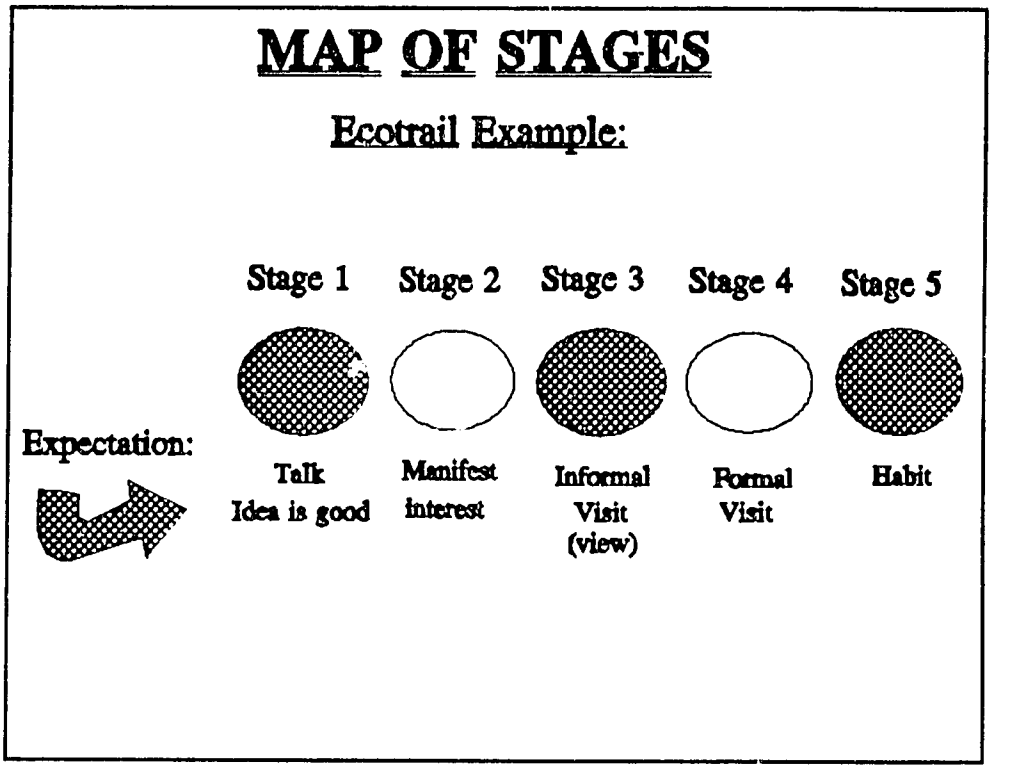

Figure 9

Seemingly, the formulation of stage five is of most importance. However, the initial stages cannot be neglected, and often they are more helpful for a natural social progression may result.

CONCLUSIONS AND RECOMMENDATIONS

COMPLETION OF PROJECT OBJECTIVE

The goal of our project involved investigating the possibilities for sustainable development in Ecuador and subsequently assisting in achieving it. As previously defined, sustainable development means "an approach toward meeting the needs and aspirations of present and future generations without compromising the ability of future generations to meet their needs" (Meadows, 1992, p. 209). The results of our project, a methodology for community development and partial application of this methodology, does not explicitly discuss the concept of sustainable development. However, such a methodology can be a powerful tool in a town's reaching sustainable development. Without a clearly defined, well thought out process, development of a community can take nearly any path, except that of sustainability. Therefore, while our project result could be used for many purposes, if used correctly, it should lead to sustainable development.

PROJECT DIFFICULTIES

Throughout the project, the particular process of gathering information for the evaluation of Puerto Hondo,

the team encountered difficulties that affected the overall outcome of the project. Whenever dealing with a community project, the planner will encounter general difficulties, which they should be documented for analysis purposes. The reader should keep in mind that these particular examples are directly related to the work the group did with one specific town, Puerto Hondo. These examples should not be standardized so as to say that any other group working in this or any other town will encounter exactly the same difficulties.

As the group began working in Puerto Hondo, we carried certain perceptions of communities from past experiences. As a group, we did not have any knowledge of how small communities operate in Ecuador, a developing nation. Through this lack of knowledge and natural preconceptions, we encountered difficulties in the evaluation of the community. Lack of knowledge of the political structure of the community coupled with the limiting time factor, did not allow us to make certain contacts. Therefore, we could not truly examine Puerto Hondo within the correct context of how the community functions, politically and socially.

After recognizing this barrier, we found ourselves uncertain if we understood what the people were transmitting to us. This problem goes further than the language barrier, since only one of our team members was

a native Spanish speaker. In trying to learn about the community, it was difficult to feel comfortable asking questions and engaging in dialogue. This discomfort and concern about ensuring the community did not feel intruded upon was very difficult to overcome in the limited time we were able to spend there. There were few community members available to talk to and information obtained was limited. Because of this lack of diversity of information, the group found it difficult to define the whole communities needs, wants, and desires. The definition of these three things, being of importance to the overall outcome of the project, caused another stumbling block.

Another constraint faced by the group was time. The situation in which the group found itself was not the usual one. Originally, the group did not have an established area of focus within the work of sustainable development, and, therefore, had to spend time looking for a logical and useful one. This search limited the group when carrying out future ideas since the time constraint was always present.

This same time constraint did not allow the group to fully evaluate the information being gathered. In many instances, the group gathered conflicting information and could not evaluate or confirm the data because there was no time to do so. Therefore, almost all the information

had to be taken at face value.

Other physical attributes have to be taken into consideration when mentioning the difficulties of dealing with the project. The town is located on the 17.5 Kilometer of the coastal highway to Salinas. This location is about a half an hour away from the city of Guayaquil. Due to the lack of transportation to and from the town, we were limited to visiting the town only when time, funds and transportation allowed.

In addition to difficulties concerning the actual collection of data, the actual planning process for small communities, which was developed, also has several weaknesses and limits inherent in it. One of the weaknesses concerning our model is that to build a planning process the planner must execute a project to test it, but at the same time to develop a project the planner must have a process to follow. This type of circular design makes planning difficult and confusing. Another limit placed upon the proposed planning method involves the focus of the project. Because the primary goal of the project was education of the team members and not directly to benefit the community, the project may not have achieved as solid an outcome as possible.

All of the difficulties mentioned above should be taken into consideration when working on a community project that involves the same type of participation from

the community and the planners as this one did. Hopefully, our experiences illustrate how difficult this type of research is, and, therefore, create awareness about the types of difficulties that will be encountered in similar work.

FUNDACION NATURA'S PROGRAM

The description, history, objectives, and project components of Fundacion Natura's proposal, as listed in Appendix B, to our knowledge, outlines the documented extent to which Fundacion Natura has developed a methodology for action. Director Gerardo Corrales verbally endorsed that assumption.

It is obvious, from viewing Fundacion Natura's proposal that much time, consideration, planning, as well as good intentions, have gone into the formulation of their project in Puerto Hondo. Reading through the outlined description and history of the community, their objectives, and the intended components of the project illustrates this fact, as does the explanations and justifications. Let us also note that in Fundacion Natura's project proposal Section 4.3, each project component needs its own series of strategies and activities to complete the objectives not yet determined. We recommend that the methodology for community planning

as outlined in the results section be utilized in further project development. The methodology will provide, for the short term, a systematic data collection method, and, for the long term, an extensive database that will aid in future planning.

Furthermore, the group feels that development of Puerto Hondo should continue in the direction it has headed thus far. Although unable to gather a comprehensive model of Puerto Hondo, the group feels that activities such as an environmentally friendly shrimp farm, an ecotrail, and a waste management program would be beneficial.

As discussed previously, an environmentally friendly shrimp farm would benefit the environment and shrimp farmers. If the yield of an environmentally friendly shrimp farm is equal to or greater than that of normal farms, the shrimp farms owners would likely want to become educated about the new practices.

The group feels that the technique of polyculture should be investigated for use in the shrimp farm. One example of polyculture is the combination of oysters with shrimp. In such a system, the oysters filter the water by consuming excess food as well as waste from the shrimp. Without the oysters, shrimp often suffer from an overload of nutrients in the water.

The second proposed activity, an ecotourism trail

through the mangrove swamp, is also considered a good idea by the group. Such an activity should preserve the area's environment while also creating jobs, such as tour guides and restaurant owners. We were, however, concerned with two issues in regard to an ecotrail. The first concern is that Puerto Hondo's and Fundacion Natura's expected number of jobs from the activity may not be the same. If the community is expecting an extremely large number of jobs, then problems could occur. Our second concern deals with the local fishermen. If an ecotrail is implemented, the effect upon the fishermen must be determined and, if a problem exists, dealt with. Other than these two concerns, we feel an ecotrail will be a positive sustainable development practice for the town of Puerto Hondo.

The final possible activity for development, which the group identified, was a waste management program. Such a program seemed vital to the group from our experience in the community. The waste problem in Puerto Hondo is quite acute. If the previously discussed ecotrail is implemented, the lack of waste management would prove distracting.

In our research, the group discovered one very interesting waste management technique involving earthworms. The basic idea is to feed organic waste to the earthworms. The earthworms would eat the garbage,

and subsequently leave a layer of humus. This humus could be regularly collected and used as natural fertilizer. Furthermore, since the earthworms reproduce at a high rate, excess worms could be collected, ground up, and used for feed pellets for shrimp. Thus the entire process would eliminate organic waste, while at the same time providing two products, fertilizer and shrimp feed pellets. The group's concerns about the waste management system regard both the requirements for training individuals to operate the facility and the general populace's willingness to participate.

FUTURE PROJECTS

As a result of our investigations in Ecuador, several topics for future research and possible future IQP or MQP project work were identified. These topics are a direct result of contact with Ecuadorian government and non-government agencies that we encountered during the progress of our research. We feel that further research in each of the following areas is merited and that all of the subjects mentioned meet the requirements of either an IQP or MQP project.

The project that the group feels strongest about deals directly with the team's own work. This future project would entail the further development and testing

of the methodology developed by the group. The development and testing of our methodology could be accomplished in two steps. First, a team could research the implementation of an activity, picked through the use of the original methodology, and then subsequently modify the process of implementation of this activity according to the already existing methodology. Second, this project could eventually lead to a later project in which the previously chosen activity would be implemented. Activities could include an educational program for the primary school of Puerto Hondo, the development or design of a ecologically friendly shrimp farm, the design of an ecotrail that could be implemented in Puerto Hondo, or the design of a waste management program for small communities like Puerto Hondo.

As we discovered from our research, one of the main problems facing communities is a lack of involved teachers. The group feels that an IQP in this subject would be beneficial to both the students and the community. Projects involving teaching young people are frequent IQP topics, which, in Ecuador, would be rich in social issues.

Another topic that the group feels is of great importance, is the previously discussed design or development of an ecologically friendly shrimp farm. In the area of Puerto Hondo, there are over one hundred

shrimp farms. While these shrimp farms employ many people from the community, they have a detrimental effect on the surrounding environment. Because of the large amounts of pollution in the area, these shrimp farms also have a very low production, with, as noted earlier, only 30 percent of the shrimp larvae reaching harvesting age. Therefore, creating an ecologically friendly shrimp farm, which incorporates polyculture, will be of great use in increasing shrimp yield and in preserving the surrounding environment.

Fundacion Natura has interest in developing an ecotrail in the area of Puerto Hondo. A possible project could involve developing such an ecotrail through the mangrove forest. This project would have several positive qualities inherent in it. First, a working relationship has already been established between Fundacion Natura and the WPI/ESPOL linkage program. Second, this idea has already been embraced by the community. The group feels that working with Fundacion Natura would be of great benefit to both students and future projects.

The design of a waste management program for small communities, using Puerto Hondo as a pilot community, is a possible future MQP. The problem of waste is prevalent in most small communities in Ecuador. This problem occurs because of lack of funds, an insufficient method

of collection, and a general apathy towards waste management. If a community could dispose of its own waste without creating any health or environmental hazards, then the community would be taking a step towards sustainability. This type of project would be beneficial because the outcome, a waste disposal system, could be modeled or implemented in other communities.

The group also feels that general research into the topic of sustainable development in Ecuador is important. This type of general research could be conducted in any of the six areas our group originally looked at. The six areas are: agriculture, the oil industry, shrimp farming, mangrove use, industries involving the dry tropical rain forest, and industries in the city of Guayaquil. The group feels that these areas are lacking in information relating to sustainable development and, therefore, should be researched.

Other more specific topics that could also be researched for future projects involve working with institutions and government organizations such as PMRC and OIKOS. PMRC, a government organization, does a significant amount work with the management of coastal resources. Contacts in this organization are already established, which would facilitate a possible project. The people at PMRC were very helpful during the research into sustainable development and during the period in

which the group was trying to come up with the final methodology. It is also important to mention that PMRC's methodology is very similar to the methodology developed by the group. The people to contact at PMRC are Biologist Myreya Pozo and Biologist Alejandro Bodero.

OIKOS is a non-government organization that deals with community development and the development of methods for working in these communities. Mr. Marco Encalada, the present director of OIKOS, was extremely helpful to the group and showed enthusiasm in the WPI/ESPOL linkage program. The OIKOS corporation is an efficient organization that could provide substantial amounts of knowledge to students dealing with any type of general or specific development project work.

Studies of sustainable development in the Manglar Alto region are another possibility that could be looked into. Within this region, the group has already identified three possible areas of study. These areas are the following: the dry tropical forest in the region, the conflicts present in the fishing community, and the possible use of irrigational dams in this area to serve as a future water supply.

While working with the Fundacion Natura, another group may be able to aid in the development of an ecological bridge from Manglar Alto to the Guayaquil area. An ecological bridge is a protected area that, by

spanning several different habitats, creates a microcosm of vast biodiversity. This particular project provides for the involvement of sustainable development concepts in order to protect many natural habitats.

Each of the aforementioned projects deals with sustainable development practices, which the group feels is a topic of growing interest in Ecuador and the world. Therefore, all of the possible future projects mentioned should be given full consideration.

APPENDIX A:

MISSION AND

ORGANIZATIONS

This project was developed under the University Development Linkage Program, UDLP, of the United States Agency for International Development, U.S. AID. U.S. AID is a department of the International Development Cooperation Agency of the United States. The department was created in 1961 to provide economic assistance to developing nations throughout the world. In 1991, U.S. AID began the UDLP and awarded ten institutions in the United States with money to pursue linkages with foreign universities in developing nations. The Worcester Polytechnic Institute(WPI) - Escuela Superior Politecnica del Litoral (ESPOL)/linkage agreement was established under one of these awards and created the Ecuador Project Center of WPI.

ESPOL is a technological and engineering university located in the city of Guayaquil, Ecuador. The university specializes in the engineering, technology, special careers, and post graduate work.

ESPOL, as a well respected institute of Ecuador, has devoted itself to fulfill six main objectives: (1) to implement education in the fields of science and technical fields, (2) to create professionals, in these fields, that are needed by the country, (3) to develop investigations in science and technology, (4) to implement diffusion and extension in scientific and

technical areas, and (5) to contribute in the search for solutions to the current use of natural resources, the energy scarcity, the preservation of the environment, and the development of an autonomous technology that will foster the improvement of general living conditions, and culture of the Ecuadorian society, and (6) others as outlined in the law of university and schools.

The cooperation between WPI/ESPOL is vital to the operation of the Ecuador Project Center.

APPENDIX B:

FUNDACION NATURA'S PROJECT PROPOSAL

The following is an outline of Fundacion Natura's project proposal for the development of an environmental education center within the community of Puerto Hondo.

This translation of the proposal, from Spanish to English, was furnished by Fundacion Natura.

1. IDENTIFICATION DATA

1.1. TITLE: Environmental Education Center in Mangrove-swamp of Puerto Hondo.

1.2. PRESENTED BY: Guayaquil Chapter of Fundacion Natura.

1.3. RANGE:Regional.

1.4. LOCATION: KM 17 1/2 in Guayaquil-Salinas Highway.

1.5. LOCAL CONTRIBUTION: US $ 85.773,50

1.6. CONTRIBUTION SOLICITED: US $ 784.601,50

1.7. DURATION: Initial Consolidation Period: 5 years.

1.8. PRESENTATION DATE: July/August 1993.

2.- ACTION PLAN

2.1 Global Management of the Mangrove-Swamp Protected Forest surrounding Guayaquil and the Puerto Hondo Community.

2.2 Description:

Today the tropical forests of the planet are the focus of global attention for their important role as the source of biodiversity, raw materials, climate and water regulators, and as a habitat for native people. One of the ecosystems of the tropical forest are the mangrove swamp forests.

In Western Ecuador, the mangrove-swamp forests have suffered the impact of physical occupation from the development of important economic activities, such as shrimp cultivation in the four coastal provinces.

In Ecuador there have been established Reserve Areas that include different natural ecosystems. However, there are areas in Ecuador of important ecological value that are not included within those protected areas. Among these areas are the Western Forests, which include mangrove-tree forests located west of the Andes. This area needs to be protected in order to develop scientific

research, ecotourism, recreational and educational activities targeted to the Guayaquil population area.

The Puerto Hondo project site area not only includes the area of this rural community near Guayaquil, but also a surrounding territory that has mangrove-swamp forests, estuaries, saline pampas, shrimp farms and urban and marginal areas. The site is located twenty minutes from Guayaquil, the principal port of the country. Puerto Hondo is accessible by an all weather highway or by navigating the estuaries of the mangrove-swamp.

The principal objectives of the Fundacion Natura's Project are:

2.2.1. Educate Guayaquil and its population while promoting a favorable attitude for the conservation of the mangrove-swamp forest and the coastline environment.

2.2.2. Preserve an important part of the largest remaining mangrove-swamp, estuary and saline pampas area in Ecuador.

2.2.3. Offer non-destructive alternatives for the management of the natural ecosystems surrounding the city of Guayaquil to strengthen Protector Forest category.

2.2.4. Develop an appropriate field for scientific research, environmental education, and ecotourism.

Because of the characteristics of this project, it will not have a negative impact; instead it is intended to help recuperate degraded areas and preserve those that still exist in their natural state.

2.3 Location

The principal location of the project includes the Puerto Hondo community, where an Environmental Education Center will be located. This includes a surface of 13.605 hectares of the mangrove-tree forests, saline pampas, shrimp farms, and urban and marginal areas.

2.4 History

Guayaquil is the principal port and the most populated city in Ecuador with two million inhabitants. Like many developing cities in the world, it has an overstated growing rhythm that causes many environmental problems such as the poor quality of potable water, contamination of rivers, lack of green areas and bad management of solid wastes.

The degradation of the natural areas, of which the region has a great diversity, is a problem that is beginning to affect the quality of life in the city.

The coast of Ecuador is covered by 162.055 hectares of mangrove swamps. Since 1969 The mangrove swamps have reduced from 203.696 hectares to 162.055 hectares, a loss of 41.641 hectares(CLIRSEN, 1991). The major location of this important ecosystem is the Guayas River, on the Gulf of Guayaquil, with an area of 109.927 hectares(CLIRSEN, 1991). This reduction has been attributed, mainly, to the construction of shrimp farms and to urban expansion.

In the surroundings of the city of Guayaquil, at least 3,000 hectares of mangrove swamps have been for urban development of the city in the last 20 years. These developments have different social and cultural features, but they have something in common, their poor participation in the protection of the environment.

The suggested area for the development of the Puerto Hondo Project has some special ecological, social, and economic features that will allow the demonstration of the compatibility of conservation and development. At the same time, the project proposes alternatives for the management of the mangrove swamp forests that surround the city.

Fundacion Natura has had positive experiences in the management of two Protected Forests: El Pasochoa, an Andean Forest and Cerro Blanco, a dry tropical forest, located near Quito and Guayaquil, respectively. In both, activities such as scientific research, environmental

education, and ecotourism are being developed.

Near the forests, there is an important highway that facilitates access to the area. This highway will, in the near future, become a pole of development of Guayaquil, because the new airport of the city will be constructed in Dualar (60 kms. from Guayaquil). We consider it important to anticipate this in the management of the area of Guayas involving the government and private institutions, as well as the respective communities.

2.5 Beneficiaries

There are urban and marginal areas, as well as rural communities near the influence area of the project. The population directly involved in the project is approximately two thousand people, but it is important to consider the proximity of Guayaquil's population of nearly two million inhabitants.

3.- THE APPLICANT NON-GOVERNMENT ORGANIZATION(NGO)

3.1 Name and Address

Fundacion Natura, Guayaquil Chapter

Ave Carlos Julio Arosemena Km 2 1/2

P.O. Box 11327

Guayaquil, Ecuador

Telephone: 201628 Fax: 202073

3.2 Creation Date and Legal Status

Fundacion Natura is a private non-profit institution founded on July 19, 1978. The Statutes of the foundation were approved by the Ministry of Education.

3.3 Staff Responsible for this Project

3.3.1 Ing Eduardo Aspiazu Estrada, President
Guayaquil Chapter of Fundacion Natura

3.3.2 Mrs. Lourdes Luque de Jaramillo, Executive Director
Guayaquil Chapter of Fundacion Natura

3.3.3 Blgo Gerardo Corrales Falconi,Director of Urban Ecology
Guayaquil Chapter of Fundacion Natura

3.4 The NGO's Experience

Besides other projects in the field of environmental education, protection of the Amazon Basin, correct use of pesticides, evaluation of the ecological impact of projects, and conservation programs, the Fundacion has

had some experience with management of two protected forests: El Pasochoa near Quito and Cerro Blanco near Guayaquil.

3.5 Personnel

3.5.1 Project Director

3.5.2 Conservation Official

3.5.3 Environmental Education Official

3.5.4 Secretary/Assistant

3.5.5 Park Rangers and Nursery staff

Additionally, the Guayaquil Chapter possesses the administrative and technical capacity to manage the project effectively.

3.6 Financial Resources

The project has already received a contribution for seven thousand U.S. dollars from the Fish and Wildlife Service of the United States that will be used as Fiduciary Fund. Some of these funds have been used in the preliminary stages of the project.

The project will be presented to international organizations in order to attract more funds. We also plan to raise local funds. The funds are projected to come from local and national private institutions.

4.- ACTION PLAN

4.1 Duration

The Puerto Hondo project has an indeterminate duration, however the actual budget is for the initial consolidation period of five years.

4.2 Local Participation

The community of Puerto Hondo will participate in all the proposed activities and, eventually, will turn into the guardians of the mangrove swamp forests and the project.

Fundacion Natura signed a cooperation treaty with the community in 1989. The community of Puerto Hondo agreed to support the activities to be developed in the area, select a place for the construction of the infrastructure, and to participate in some of the work to be done.

Additionally, in May of 1993, another treaty was signed giving Fundacion Natura the management of a plot 2,574 square meters, where the Environmental Educational Center will be constructed.

The Fundacion Natura will manage the funds of the project and the completion of the objectives of the project. The Fundacion will also provide financial and activities reports for the donors.

4.3 Components of the Project:

The components of the project will be developed in priority order, involving the public and private institutions when needed.

The project components are:

4.3.1 Environmental Education

4.3.2 Research and Conservation of mangrove-swamps and their biodiversity.

4.3.3 Sustainable Development of the community.

4.3.4 Limited Ecotourism

Each component will have its own series of strategies and activities to complete their objectives.

4.4 Diagnosis and Up-dating of the data required to develop a Management Plan.

4.5 Infrastructure Implementation.

- Construction of an office-house that includes the conference and exhibition areas. The puerto Hondo community has donated a vacant lot for the construction of this infrastructure.
- Ecological pathways in the mangroves.
- Placing of signs.
- Implementation of a plant nursery of native

species to support reforestation.

4.6 Negotiation with the officials of the government in order to obtain adjudication of the areas in the estuaries, mangrove swamps and saline pampas not used, as well as degraded areas without actual use to recuperate and preserve them.

4.7 Improvement of the urban zone of the Puerto Hondo Community.

- Re-habilitation of the community park.
- Establishment of the wharf and a breakwater.
- Architectural and Urban reorganization of the community.

4.8 Environmental Education.

- Preparation of guides and park rangers.
- Production of audio-visual material.
- Audio-Visual equipment acquisition.
- Development of educational programs for the visitors, in the ecological pathways and navigation in the estuaries.

4.9 Pilot Program for a shrimp cultivation farm with educational, tourism, and experimental purposes.

4.10 Establishment of a crocodile breeding station in order to protect the species and development of educational and tourism activities.

4.11 Diffusion and Public Relations

- Elaboration of an informative package about the project to promote it nationally and internationally in order to obtain funds.
- Information for the media and the local tour operators.
- Co-ordination with other public and private institutions.

5.- VIABILITY OF THE ACTION PROGRAM

5.1 Continuity

Fundacion Natura will promote the long term management in cooperation with the Small Cultivators Association of Puerto Hondo.

5.2 Responsible for the continuity of the project

5.2.1 Fundacion Natura

5.2.2 Small Cultivators Association of Puerto Hondo

5.3 Sources of Financing at the end of solicited funds.

5.3.1 Collaboration of private, local and national institutions, and international cooperation.

5.3.2 Actual Fiduciary Fund.

5.3.3 We hope that in the future the project will be self-reliant.

6.- CHANGES IN THE LIFESTYLE OF THE COMMUNITY

6.1 Improvement in the level of environmental awareness of the people of Guayaquil and those in its area of influence.

6.2 Support of the community in the conservation of the mangrove swamps.

6.3 Collaboration of the shrimp cultivators of the area in the conservation of the water quality of the estuaries and mangrove swamps in order to guarantee long term sustainable production of shrimp.

6.4 Local community participation in the benefits of ecotourism.

6.5 Extension of the project to other areas of the Ecuadorian coast.

6.6 Participation of the community in the recuperation of natural areas by means of reforestation of the contiguous tropical dry forest as well as the rehabilitation of the mangrove swamps.

6.7 Production of informative material about the rational use our resources.

7.- PERIODICAL EVALUATION

The project will be evaluated annually in the following aspects:

- Number of visitors
- Community participation
- Production of plant material by the nursery
- Number of research projects realized
- Production of scientific and education material
- Public and financial support from private or

public institutions from Ecuador and from other countries

8.- BUDGET

This budget is for five years. During the first two years the construction and equipment of the Educational Center will be completed. In the three following years the costs are estimated for the maintenance of the installations and the operation. No annual increments have been included given the Fundacion's past experiences.

The local contribution will be:

• Fundacion Natura will cover 30% of the administrative cost.	$ 31.333.5
• And 30% of the Environmental Educational cost.	$ 14.300,0
• The Puerto Hondo Community will cover:	
50% of the construction of pathway	$ 5.500,0
50% of the construction of the guardian house	$ 4.500,0
20% of the construction of the nursery	$ 7.400,0

- Other Institutions

15% of the construction of a pilot shrimp farm	$ 13.500,0
10% Materials and equipment	$ 10.240,0

TOTAL OF LOCAL CONTRIBUTION	$ 85.773,5
TOTAL OF SOLICITED CONTRIBUTION	$784.601,5

APPENDIX C:

OFFICIAL AGREEMENTS BETWEEN FUNDACION NATURA & PUERTO HONDO

The following is an agreement between Fundacion Natura and the Community of Puerto Hondo. The agreement outlines Fundacion Natura's interest in the progress of the community of Puerto Hondo, Puerto Hondo's interest in protection of its mangroves and estuaries, and their joint desire to work in cooperation. Specifically, it gives ownership and responsibility of a plot of land within Puerto Hondo designated for use as an environmental education center to Fundacion Natura. Furthermore, the agreements states that both parties retain control for decision making purposes in the project for the educational center, which is designated to begin once funds are available to Fundacion Natura.

FUNDACION NATURA AGREEMENT WITH PUERTO HONDO, 1989

Translated from Spanish to English By Eduardo Mendez.

For the creation of the Center of Environmental Education in the Puerto Hondo Mangroves. Conson Parish, Canton Guayaquil.

On the second day of September, 1989, Mr. Franklin Gonzalez, president of the Fundacion Natura-Guayaquil chapter met with Mr. Jose Apolonario Angel Lainez, president of the Association of Small Agricultural Workers of Puerto Hondo, each representing the view of

his party. The objective of the meeting was to subscribe to this agreement involving the creation of the "Center of Environmental Education in the Puerto Hondo Mangrove" in conformity with the following clauses:

One: Fundacion Natura- Guayaquil chapter, has a particular interest in the defense of the mangrove, which will allow it an effective defense of the salty estuary in Guayaquil, as well as providing alternatives of recreation, environmental education, and tourism that will foster progress in the community.

Two: The Association of Small Agricultural Workers, is owner of a 158.79 ha of land, located in the 15.5 kilometer of the coastal highway, where protective work in favor of mangrove and estuaries has been done. Strong efforts in creating consciousness within the community to preserve their sources of income through fishing and capture of shrimp larvae have also been carried out.

Three: The two aforementioned institutions want to join together in order to stop the contamination and destruction of the mangrove forest and fauna, for the effects of insuring existence for future generations, the correct management of these resources, and the maintenance of the space that constitutes the "Green

Belt" out of the city of Guayaquil.

Four: The Association of Small Agricultural Workers of Puerto Hondo has the necessary infrastructure with which to realize an environmental education investigation program; this will facilitate the alternatives of tourism and recreation for the community, which will improve the lives of the people of the town.

Five: Fundacion Natura-Guayaquil Chapter, has the right to utilize installations owned by the Association, specifically, the children's playground, for as long their project lasts.

Six: The Association of Small Agricultural Workers of Puerto Hondo will release its ownership of the playground, and Fundacion Natura will proceed to build the installations required for the Center of Environmental Education. Improving the park, the drainage systems, lighting, the area where the road goes to the estuary, and the dock found in said place are also responsibilities that Fundacion Natura will have to assume.

Seven: If for any motive the project were to be suspended, while the required installations are being

built or Fundacion Natura quits working in the area, may it be that Fundacion Natura has achieved the objectives of the project or that there is a lack of funds, the improvements introduced to the community will be therefore for the benefit of the community as long as the community continues the work started by Fundacion Natura.

Eight: The funds received by Fundacion Natura either from national or international institutions will be used solely to finance the program stated above in accordance with the "profile of the project" that Fundacion Natura documented, presented and was fully accepted by the association of Small Agricultural Workers of Puerto Hondo.

Nine: If during the course of the project any changes occur due to a change in the overall scheme of the main project both parties involved in the agreement have to agree to said changes.

Ten: The Association of Small Agricultural Workers of Puerto Hondo will contribute to the project through community activity and involvement.

Eleven: Fundacion Natura, when hiring for said project implementation, will give preference to people from

within the town of Puerto Hondo.

Twelve: Fundacion Natura and the Association of Small Agricultural Workers of Puerto Hondo cooperatively realize joint actions of judicial, extrajudicial, executive, and administrative, character to avoid the destruction of such project work, which puts in grave danger the conservation of the protected forest.

Thirteen: The Association of Small Agricultural Workers of Puerto Hondo shall have three members of its community integrate the decision committee so as to help carry the communities voice into the decision making process.

Fourteen: In case of any agreement or decision making trouble, both parties agree that the committee of the project will resolve said circumstances.

Fifteen: Fundacion Natura and the Association of Small Agricultural Workers of Puerto Hondo will organize, every year, on the twelfth of October, a cultural festival that will showcase the works of Puerto Hondo as a community.

Sixteen: This agreement will be implemented when Fundacion Natura- Guayaquil chapter achieves the necessary funds to finance the project and its

objectives.

Signed by: Sr. Jose Apolinario Angel Lainez

Dr. Franklin Gonzalez

The following agreement is representative of the official transfer of the plot of land on which the educational center in Puerto Hondo is t be built. It reinforces the financial responsibilities undertaken by Fundacion Natura, as well as defines the method of conflict resolution.

FUNDACION NATURA AGREEMENT WITH PUERTO HONDO, 1993
Translated from Spanish to English by Eduardo Mendez.

A contract of the agreement between "The Association of Small Agricultural Workers of Puerto Hondo" and the "Ecuadorian Foundation for Nature Conservancy - Fundacion Natura".

May it be known by this contract that the following agreements have been meet or agreed on:

ONE: Who is Involved

Involved in this contract are the Association of Small Agricultural Workers of Puerto Hondo, which from now on will be called the Association, and the Ecuadorian Foundation for Nature Conservancy, which from now on for the purposes of this document will be known as the Foundation. The Association is legally represented by Mr. Angel Lainez as president. The Foundation is legally

represented by Mrs. Lourdes Luque De Jaramillo as executive director of the Guayaquil chapter.

Two: Preceding

2.1 The Foundation is an Ecuadorian entity with judicial and private rights, with social and public goals, without any monetary interest whose status was accorded through accord # 3226 given out by the minister of Education on the eighteenth of July, 1990.

2.2 The Association is a judicial entity whose status was approved through ministry accord #344, given out on the sixth of October, 1977.

2.3 The zonal chief of IERAC of Guayaquil disposes of the elaboration of the plans of lots and land sizes that were approved and certified by the chief of the technical department of IERAC on the eighteenth of November, 1986.

2.4 The zonal chief of IERAC of Guayaquil by accord # 4.431 on the twenty eighth of November, 1986, resolves to authorize the transfer of ownership of the association.

2.5 On the third of May, 1987, the Association defines the plans for development of the land and complies with the point made on 2.4.

2.6 The Association is now the owner of the land the size of 257,420 meters squared located in the k block, further defined as: Puerto Hondo Avenue with 75,80 meters, San Eduardo Street with 57,20 meters, Fourth Street with 61 meters, and the Riverside Street with 31,10 meters.

2.7 The Association in the third of April, 1993, authorizes the completion of an agreement with the Foundation that entails that 257,420 square meters be acquired from the association.

Three: Objective

The Association gives freely to the Foundation in agreement for user, described in the second part of the document, a lot of size of 257,420 square meters for purposes further described in this clause.

The Association declares that the objective of this contract is the execution of the project "Center of Environmental Education for Mangrove of Puerto Hondo" that compromises principally the construction of installations for the said center that entails drainage

systems, maintenance of the riverside street, public lighting, improvement of the playground and optimization of the area where the activities are being developed.

Four: Obligations of the Foundation

The Foundation agrees to complete all work required to finalize the project "Center for Environmental Education for the Mangrove of Puerto Hondo", being in charge of expenses for he execution of the project.

The Foundation agrees to present memos in which the progress of the project is detailed. If during the development of the project any major changes should occur, these said changes need to be approved by both the Foundation and the Association.

The Foundation also agrees to assume all financial responsibility for the development of the said project. The Foundation promises to let a member of the Association take part in all decisions, agreements, administrative decisions, programming and execution of the aforementioned project.

Five: Length of Contract

The Establishment duration of the contract between the Foundation and the Association is thirty years, parting from the date of signing. This contract can be annulled by the clauses of the civil code and other laws

that may apply. Independently of the agreement between the Foundation and the Association, if the Foundation does not subscribe to the third clause in this said contract before twenty years pass, the Association can terminate the contract.

Six: Legal Disposition Applicable

All laws from the "Agreement or Accord of Use" of the civil code apply to this agreement.

Seven: Controversy

If any controversy, not of judicial origin shall arise, both parts agree that they will let a judge from the city of Guayaquil resolve the controversy.

Signed by: Mrs.Lourdes Luque De Jaramillo

Mr. Jose Apolinario Angel Lainez

APPENDIX D:

QUESTIONS FOR

PUERTO HONDO

The following questions were developed by the members of the team for the community of Puerto Hondo. These questions were used as a tool for the first step of the external plan for the development of the methodology. They are a working example on gathering information.

GENERAL

What is the size of the town?

What is the land distribution in the area in terms of ecology? Who owns the land?

LEGAL

What laws govern the land?

Who enforces these laws? What is the penalty for non-compliance of any such laws?

Who makes decisions within the town?

ECONOMIC

What are the productive activities in the town now? Expected to come?

How much money is spent? on what?

How many jobs are present?

What is the diversity of jobs?

- agricultural - industrial - services
- environmental/ecological

What is the average income?

What is the expected development of the towns jobs?

lifestyle? income? vs. reality?

What is the income distribution of the town?

What percent men/women workers; formal/informal?

What is the distribution of money between men/women?

What is the productive capacity of the town?

What is the social class, educational level, skills?

How is the towns money distributed?

EXPECTATIONAL

How much do the people of the community expect the program of Fundacion Natura to change their lives?

Are the town's people supportive of the Fundacion Natura's involvement? If not - Why?

Does the community have any concerns with positive and negative (expected\unexpected) economical impacts, environmental impacts, cultural and social impacts?

What to the people feel is most important to develop? housing - jobs - education - control of government -

What alternatives for development has the community come up with? Why?

Do most community members have the same needs and desires?

How do the people value the environment?

EDUCATIONAL

What is the average levels of education completed by children from the community?

What is the current literacy rate in the community?

What are the current conditions of the school?

teachers - # students - # subjects

How many people who continue in education come back to the community?

SOCIAL

What are conditions of living ?

- housing - water - wastes -

How many people per house?

What is the health status among the community?

What are the major illnesses/injuries?

How affordable is health care?

What is the current life expectancy?

What is the infant mortality?

How many of the people who have grown up in the community stay?

Who is in the ecology club?

How is that club run?

Who is in the directive?

APPENDIX E:

PARTICIPATING ORGANIZATIONS

CLIRSEN - Centro de Levantamientos Intergrados de Recuros Naturales por Sensores Remotos
- Center for Natural Resource Information Gathering through the use of Remote Sensors

COMISSION TECHNICA DE RECURSOS DE AGUA - water resource agency made up of DIGMER, PMRC, INOCAR.

DIGMER - Merchant Marine National Directorate to oversees quality of water from industrial discharges and marine transportation.

ESPOL - Escuela Superior Politechnica del Litoral
- Polytechnic School for the Litoral

FUNDACION MALDONADO - a non-government environmental agency.

FUNDACION NATURA - a non-government environmental agency

INERHI - Instituto Nacional Ecuatoriano de Recursos Hidraulicos

IERAC - Instituto Ecuatoriano de Reforma Agraria y Colonizacion

IEOS - Ecuador Institute of Sanitary Infrastructure
- to whom you are supposed to report all sorts of discharges: solid,liquid, gas.

INEFAN - Ecuador Institute of Forest, Pristine Areas of Wildlife evaluates and regulates forest areas.

OIKOS - a non-government environmental agency

POLICIA MARITIMA - maritime enforcement police of Ecuador

PMRC - Programma de Manejo de Recursos Costeros

- Program for Management of Coastal Resources

USAID - United States Agency for International Development

APPENDIX F:

U.S. AID

- TRIP REPORT -

The Ecuador Project Center of WPI, established under the University Development Linkage Program agreement between WPI and ESPOL, was the center for execution of this project. The project team, Sustainable Development for Resource Management, attended the center, located in the city of Guayaquil, Ecuador, between the dates of October 16 and December 12, 1993. While in Ecuador, the project team visited the city of Quito, the city of Cuenca, the community of Puerto Hondo, the Salinas Peninsula within the Guayas Province, and the province of the Galapagos Islands. The project team conducted interviews with government, non-government, and private organizations and institutions of Ecuador. This project report is the result and accomplishment of the project team while attending the project center.

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