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Perceptions About the Environment From the Cayo District of Belize

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Perceptions About the Environment

From the Cayo District of Belize

A Thesis Presented to the Department of Geography
and Geology
and the
Faculty of the Graduate College
University of Nebraska
In Partial Fulfillment of the Requirements for the Degree
Master of Arts
University of Nebraska at Omaha

by
Jean Vincent

April, 1998
Thesis Acceptance

Acceptance for the faculty of the Graduate College, University of Nebraska, in partial fulfillment of the requirements for the degree Master of Arts, University of Nebraska at Omaha.

Committee

Chairperson

Date June 23, 1998
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Abstract

Perceptions About the Environment
From the Cayo District of Belize

Jeanie M. Vincent, MA
University of Nebraska, 1998

Advisor: Dr. Philip Reeder

Land use from associated exponential human population growth is causing dynamic and destructive changes on the Earth’s surface. Before land use management can be modified to conserve our remaining global resources, however, a better understanding is needed of how physical and social land use aspects interact.

This social science research was conducted to answer the research question of ‘what variations in perception exist among three categories of the social construct; Local Workers, Land Owners/Managers, and Tourists in the Cayo District of Belize. Also examined were pertinent background factors and individual characteristics involved in perception and relationship formation such as social status, ethnological makeup, age, level of environmental awareness, personal experiences and individual attitudes towards local political and economic situations.

By analyzing data from 47 personal interviews using survey questionnaires, variations of perceptions about the environment
produced specific trends. An association was found to exist between perceived environmental conditions and social category. Although Tourists were consistently more aware of perceived environmental problems/pollution than the Land Owner/Managers, and Local Workers, Tourists and Land Owner/Managers had the closest levels of awareness, followed by a much lower level of awareness for the Local Workers.

A bond was found between social category and familiar types of land use. People have a tendency to perceive things they can relate to dependant upon their experiences in life. Relationships were also found to exist between categories and economics, level of education, and travel experience.

Levels of awareness and perception were found to be affected by background characteristics such as the parallels between high perception levels of environmental problems by Tourists, with natural history types of experiences/attractions they liked best about Belize and/or the Cayo District, and the viewpoint that rain forests should be preserved. For locals, the higher the percentage of Belizean parentage, the lower the perception level of environmental problems. Also, the higher the level of land ownership and duration at job type, the higher the level of perception. In conclusion, individuals and society will not become aware of environmental situations, much less take action to protect them, unless it can be directly related to their experiences.
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Introduction

Land is being cleared and/or developed, as well as being destroyed at an alarming rate to keep up with human demands. Nearly a third of the earth’s land surface is being threatened by desertification, expanding at the rate of 6 million ha (16.26 million acres) a year. Another 21 million ha (51.891 million acres) a year can no longer support any type of crop production or grazing (Lean, et al, 1990). As much as 25% of the earth’s total bio-diversity or about one million species are thought to be at serious risk of extinction through habitat loss during the next 20-30 years [WTTERC, 1993 (UN 1990)].

Tropical rainforests, the oldest and richest terrestrial habitats in the world, covered nearly half of the earth’s surface a thousand years ago. Now, they cover only an approximate one fifth. Tropical ecosystems are fragile and their recovery is not as expeditious as temperate terrestrial ecosystems [Reehorn, 1993 (Cairns, 1988)]. For example, patterns and processes that have been formed and disrupted by varying land uses has an impact on disease development. Pathogens regulate and are regulated by land use history (Castello, et al., 1995). Also, exemplified is the fact that even after an entire century of regrowth, the number of bird, tree and primate species will be only half of what it was originally [Reehorn, 1993 (Miller, 1991)].

The tropical forests are being cleared at the rate of between 16 and 20 million ha (39.536 to 49.42 million acres) a
year (Lean, et al, 1990) or, from a finer temporal perspective, 60.705 ha (150 acres) per minute (Rainforest Action Network, 1992). Only four out of 43 developing countries have increases in annual growth rate of forest and woodland areas (World Resources Institute, 1992) and only about 5% of the world’s remaining tropical forests lie within the boundaries of national parks or reserves that receive at least nominal protection [Frumhoff, 1995 (Sayer and Wegge, 1992)].

The desire for development in LDC (lesser developed countries), and countries striving to improve living standards regardless of their current status, place a serious strain on the earth’s resources. The estimation of resources used by people in the United States during their lifetime is 540 tons of construction materials, 18 tons of paper, 23 tons of wood, 16 tons of metals, and 32 tons of organic chemicals, all of which is 15 times as much as people in developing countries use (Orr, no date). As developing nations progress and try to catch up with other more developed countries, the tendency is to move from agrarian to industrial economies.

Unfortunately, as a general rule, the first step in the process is ‘development’, which has taken on the connotation of having to clear the land. The technical definition however, does not include this connotation. It is defined as ‘the process of improving the quality of all human lives’. This includes the (1) raising of people’s standard of living through ‘relevant’ economic growth processes; (2) creating conditions conducive to
the growth of peoples self esteem through the establishment of social, political, and economic systems and institutions which promote human dignity and respect; and (3) increasing people's freedom to choose by enlarging the range of their choice variables [Bartosh, 1995 (Todaro, 1982)]. 'Sustainable Development' has an even more precarious definition because it takes on the meaning of improving the quality of life while living within the carrying capacity of supporting ecosystems. 'Sustainable Economy' a product of 'Sustainable Development', incorporates maintaining its natural resource base, as well as continuing development by adapting and improving knowledge, organization, technical efficiency and wisdom (Belize Review, 1995).

In any ecosystem, regardless of the scale, land is used by the various communities of individuals of different populations living in a given area together with the non-living physical environment (Department of the Environment, Ministry of Tourism and the Environment, 1993). Human land use however, is usually considered to be the most important component of global change, accounting for the transformation of one-third to one-half of the Earth's ice-free surface. When human land use changes in one country, there are interactions with other components, which alters the structure and function of the earth as a system (Vitousek, 1994). Thus, these changes affect every country in the world, whether directly or indirectly.

Industrialized countries became concerned with environmental
protection as early as the late 1940's through the early 1960's. As increasing trends of global warming, alterations in the biogeochemistry of the global nitrogen cycle, and ongoing land use changes (Vitousek, 1994) became evident, concern for environmental protection grew in developing countries as well. Now, it is of global concern in which viable options must be created and nurtured to create a balance between economic progress and preserving our remaining undeveloped natural environments.

People in developing countries, struggling with maintaining a meager existence and economic survival, will not have an interest in sustainability and/or development of any kind, much less saving the rain forests or any other natural areas unless they can relate to the reasoning and be shown that it is beneficial for them and their families. Sister Fahima at the First National Symposium on the State of the Belize Environment (Department of the Environment, Ministry of Tourism and the Environment, 1993) stated her views on development and the environment by saying that 'small villages have little chance to do anything because of economics and that with development comes massive destruction, all the while they still don’t get electricity, proper water or sanitation, thanks to the 'politricksters' and development'. People entrapped in poverty will go to extraordinary lengths to alleviate their poverty, including the exploitation and the depletion of the environment (The Belize National Report, 1992).
Therefore, to protect our remaining environmental resources, it is vital to understand how peoples' values and behaviors are established. The worth of both conservation efforts and resources is related to many factors including social, cultural, and physical aspects evolved from mankind's desire and ability to use the resources (Parson, 1972). For example, approximately 90% of the trees in tropical rain forests of developing countries are hardwoods, which collectively earn about $8 billion a year as exports. One tree alone can be worth as much as $1,000 (U.S.) (Lean, et al, 1990). In comparison, the typical salary of a local worker performing various manual labor duties in the Cayo District of Belize is only $10 USD per day (survey questionnaire responses, 1995). It should now be understandable why individuals opt to sell a tree, disregarding rainforest protection policies, rather than put in the economically equivalent of 100 physical labor days.

Aside from purely economic considerations, how land is to be used, or in the case of environmental protection, preserved, is largely dependent upon various social auspices. The perceptions of various groups of people work to shape their priorities which in turn, affect behaviors and ultimately affect how land is managed and used. For example, if the local people do not perceive that a problem exists within their environment or with the use of their land, they would have no reason to actively protect it. This would imply that any type of conservation effort or environmental protection was not necessary. Once
deemed unnecessary by the locals, land use management changes and conservation efforts would be met with a lack of participation and/or support.

Considering that the future state of the environment is dependant upon how land is and will be managed, it would be beneficial to understand some of the intrinsic relationships that exist between humans, their land and its use, and how physical land use and social aspects interact. The greater the knowledge of these relationships, the better society can adapt to and deal with the circumstances (Boal and Livingstone, eds., 1989). Any achievement of future goals dealing with conservation and land use may well depend upon what social science research, such as this thesis, contributes to the existing knowledge base from other related science disciplines and sources (Sanders and Pinhey, 1983).

Before solutions to environmental problems of global magnitude can be developed, it is advantageous to gain an understanding on a smaller scale. Therefore, the approach taken with this research was to examine the perceptions about the environment that contribute to the precarious balance between economic growth and subsistence versus. environmental protection and conservation on a local level.

The country of Belize was selected for the study area for several reasons. First and foremost, Belize is a prime example of a developing country with a high birth rate, struggling to achieve the goal of balancing economic development and
subsistence with protection of its natural environment. This struggle, according to Lean, et al. (1990), as in all developing countries, revolves almost entirely around land use and how it can provide for its people. Another reason is that a large area of Belize's land resources consist of intact rain forest that reaches its climax growth only after 400-500 years. Without careful consideration and management this priceless resource may be rendered a worthless wasteland past the point of recovery.

With all this in mind, this research was undertaken to determine perceptions of the people about their environment and land use, as well as to provide an understanding of some of the social relationships that exist on a local level in the Cayo District of Belize. Having this information available to the Government of Belize would be beneficial in formulating strategies and policies for development and management of land with the least amount of impact on people and the environment. Thus, simultaneous sustainability of both the social and physical environments would be possible. The research design and results from this study can also serve as a guide for similar research in other districts of Belize, as well as other developing nations.

To accomplish the objectives of this research, it was necessary to examine and attempt to answer the research question 'what variations of perceptions about the environment exist among three categories of the social construct; Local Workers, Land Owners/Managers, and Tourists in the Cayo District of Belize'. Also, to answer the research question, it was necessary to
examine pertinent background factors and individual characteristics involved in perception and relationship formation such as social status, ethnological makeup, age, level of environmental awareness, personal experiences and individual attitudes towards local political and economic situations.

Although, we as scientists are not able to observe social structure directly, by observing individuals' social positions such as, their jobs, incomes, and background, the necessary pieces and parts will fit together to form an indirect 'whole'. By gathering and combining this type of social data, an empirical whole is constructed, that should reflect the larger social phenomena of social structure (Sanders and Pinhey, 1983).

Determining the various relationships that exist can be quite difficult as social variations among people is much greater than significant physical differences (Sanders and Pinhey, 1983). Therefore, to determine what the relationships are in this research endeavor and to arrive at a better understanding of them, it was necessary to conduct interviews with people from the three different social position categories. Surveys were used, as they have become priceless tools in uncovering how people feel about their physical and nonphysical issues and surroundings (Sanders and Pinhey, 1983; Canter, and et al., 1988; Gelledge and Stimpson, 1987; Zube, 1980; Boal and Livingstone, ed., 1989; and Harvey and Bell, 1995).

To conduct the surveys and gather information for this project, the direct method of observation was used, in the form
of face-to-face interviews (Sanders and Pinhey, 1983; and Gelledge and Stimpson, 1987). Forty seven survey questionnaires were completed while interviewing local people and tourists which were used to gather data about themselves as individuals and their perceptions. These data were then analyzed, with the process and the results being useful not only for adding to the knowledge base on environmental perception and conservation, but also for developing or improving land use programs and management.
Objectives and Purpose

Considering the rapid changes to the earth's surface from human induced land use, it is vital to take any and all steps to conserve our remaining undeveloped land and resources. When approached in this manner and on all scales, from local to global, there is a chance, ideally, that humans will be able to live within their environment in globally sustainable harmony.

Developing countries such as Belize, which contain some of the last vast expanses of rainforests, need to be commended for their conservation/preservation efforts. Any country, especially developing countries struggling to improve their economy and living standards for their people, however, have limits with regard to funding and scientific data that can be used for land management and conservation projects. Therefore, in dealing with the many aspects and dynamics of the environment, the contributions of various organizations and individuals must be diverse, covering both the physical and social science realms.

As discussed in other sections of this thesis, any conservation project or land use management effort will not succeed without the support of the people. The support of the people, depends on their perceptions and relationships with the land. Therefore, without a clear understanding of the perceptions the people have about their environment and land use, the development and maintenance of land use management and conservation projects will be extremely susceptible to failure.
This thesis will serve the purpose of providing insight on peoples' perceptions about the environment in the Cayo District of Belize. The collective data and subsequent analysis from 47 personal interviews with tourists and local people should provide a tool for understanding some of the relationships that exist between the people and their environment. This information can then be used by the Government of Belize to assist in developing strategies and policies which allow development and management of land with the least amount of impact on people and the environment. The research design and results from this study can also serve as a guide for similar research in other districts of Belize, as well as other developing nations.
The importance of perception has been unveiled in study after study with regards to conservation and land use management. The exact definition and/or relationship that exists between perception and the environment is somewhat elusive however. Some researchers view perception as an action by individuals performing in the environment as they perceive it to be and/or as an understanding or basis for their planned actions (Boal and Livingstone, eds, 1989). Others, from a slightly different perspective, see it as a fundamental connection or link between a society's management of natural resources and their perceptions of nature (Bruun and Kalland, ed., 1995). Just what the action, understanding or link is and how strong the link is, is very important. The more knowledge people have about their environment, the greater the level of awareness. The greater the level of awareness, in the form of perceptions, the greater the influence on the actions of the people (Boal and Livingstone, eds., 1989) as people do not directly respond to their real environment, but to their mental image of it (Gelledge and Stimson, 1987).

There are many definitions of 'perception', almost as diverse as the perceptions themselves, dependant upon who is using the term and for what purpose. For the purpose of this
thesis, perceptions will be defined as geographers use it, 'to look at how things are seen by people, involving an interaction or transaction between an individual and their environment' (Gelledge and Stimson, 1987).

There has been much debate as to whether or not perceptions can be directly linked to behaviors (Unger, 1994). Regardless of whether the linkage is direct or indirect, however, perceptions are of paramount importance. They are a part of human behavior in which perceived knowledge is built and are one of the first vital steps toward individual behaviors. Subsequent behaviors are an interaction between humans and their environment that depend to a great extent upon how surrounding situations are perceived (Christopher, 1968; Vogel, 1996; Moore and Golledge, 1976). Individual actions/behaviors accumulate, becoming collective societal behaviors, which then ultimately govern land use management and conservation actions. For example, in a study about farming practices and soil erosion, conducted by Carlson and et al. (1994), as perceptions and/or levels of awareness increased, farmers began to use more conservation practices, which in turn decreased soil erosion.

Linkage is demonstrated also by the fact that many protected areas and conservation efforts have failed, because perception, as an important factor influencing behavior, was overlooked. Various land use environments and how they should be used, are as people perceive them to be (Moore and Golledge, 1976). Once locals perceive that there is no benefit in maintaining a
preserve or reserve, exploitation and depletion of preserve resources follows, as authorities do not usually have the means to police the area. This may take place as early as the initial planning stages of the protected areas unless it is realized at the onset that protected areas are not biological islands and that they must be integrated within a broader ecological and human framework in which perceptions plays a part (Durbin and Ralambo, 1994).

'Perception' and the environment can never be totally independent of each other, as the environment is what it is perceived to be, and is limited only by the perceiver and how much of it the perceiver considers (Lombardo, 1987 and Gibson, 1979). It is a form of environmental knowing which follows the viewpoints of Gibson (Lombardo, 1987) and Moore and Golledge (1976), that entails not being limited to the instantaneous present with beginnings and endings, but a knowing that is a dynamic, continuous process. Also, for this thesis, perception will assume some of the characteristics of environmental cognition by being referred to as an awareness, images, information, impressions, and beliefs that individuals and groups have about environments and related activities involving the environment. These characteristics are influenced by, and involved with culturally related indirect material-information derived from other people, their values, views and interpretations. Other influences from both the past and present include indirect means, such as media, stories, legends, songs,
Perception is an extensive process in which people select, organize and interpret all available sensory stimulation and turn it into a world that is coherent and meaningful, at least to themselves (Christopher, 1968). In the perception formation process or cycle, when observations come into contact with background characteristics and situational factors, they become perceptions and/or a level of awareness. Personal valuation and prioritization come into play, which also serve to reinforce the background factors and original perceptions, thus forming new perceptions. Larger scale influences such as national economics come into play as well, metamorphosing the valuation and perceptions even further. Perceptions and behaviors are reciprocal (Lombardo, 1987), as behaviors can take place at any or all given points of the cycle, changing the environment, which invokes more changes in perceptions.

This would partially explain why the more visible and destructive pollution is perceived to be, the more action is taken. As people become aware of health effects from the environment, usually from some form of news media, their perception changes. The people become increasingly concerned and as they become more concerned, their perceptions change about the environment causing them to take action (Gould, 1993). An example of this would be in the situation of a river being deemed
a hazard for children. Only after the level of awareness/perception of the locals changed, did they decide to organize and do something about the problem, forming a local constituency for remediation of the river (Gould, 1993).

**Perception and Experience**

A predominate factor that strongly influences perceptions is experience. Experience is what each individual knows, does and feels (Canter and et al., 1988), as well as being the sum of means through which we as individuals, know reality and construct the concept of 'world' (Tuan, 1977). It is also an act and/or creation from what has been dealt out in life, leading to the compounding of feelings and thoughts, to forming a type of knowledge (Tuan, 1977). As individuals, we are the sum of life's shared and unique experiences (Tuan, 1977 and Boal and Livingstone, 1989), which is considered to be more than the sum of psychological, social, economic and political forces (Boal and Livingstone, eds., 1989)

People act in order to accomplish both social and economic goals based upon how the environment is perceived to be, biased by their unique experiences. These experiences equip them with 'filters', accounting for different reactions to the 'same' environment (Boal and Livingstone, eds., 1989). For example, Vogel (1996) found that the perceptions of farmers who had personally experienced environmental pollution were quite
different from those who had fewer or no experiences with pollution. Those with more experiences were much more aware, concerned and willing to take action in regards to the environment than those farmers with fewer or no experiences. This demonstrates that a strong direct path to environmental behavior stems from problem based knowledge as it is related to personal experience.

**Perception and Value**

If environmental components are too far away to add to personal experience and/or are too small to be significant compared to existing personal experience, they are often not perceived as existing (Gibson, 1979) or are of little value (Heider, 1959). Before an environmental element can have value, the individuals doing the valuing must know that it exists as individuals act not only on perceptions and experiences, but on value as well (Boal and Livingstone, eds., 1989). Value is assigned to both physical and social features in the environment, even if the individuals are aware of the object through a secondary source (Boal and Livingstone, eds., 1989; Gellendege and Stimson, 1987; and Heider, 1959).

People are much more likely to take part and/or action in environmental practices if the perceived environmental problems pose a serious threat to something most individuals value highly, their own health and well-being (Hallin, 1995). In one study, whether or not people were likely to take action to help a
specific species of injured animal was primarily dependant upon their perceptions and/or valuation of that species (Owen and Dangerfield, 1994).

The perceptions, values and foci of individuals about the environment continually change over time, based upon spatial, temporal and scale relationships, as well as intensity of the occurrence (Arcury and Christianson, 1990; Moore and Golledge, 1976; and Unger, 1994). Immediately following catastrophic events such as droughts, floods, chemical spills or nuclear reactor explosions, concern for the environment and associated actions increase considerably. The farther away an individual is from an occurrence, and the lower the intensity of the occurrence, the lower the level of concern. As spatial and temporal distancing between occurrences increases, concern and associated actions decrease.

**Perception and Scale**

Effects of scale have a direct relative relationship between the environment and perception. From a small scale perspective, there is the individual level, at which individuals live their daily lives. This is the portion of the scale relationship where ‘experience’ as it affects perception comes into play, as discussed previously in this section. All the basic needs are encompassed at this scale level, including employment, shelter and consumption of basic commodities.

Quite often, this is also the scale level of which
environmental degradation and individual action toward improving environmental quality is perceived as unimportant by individuals. Individual impacts have a tendency to be numerous, diffuse and so small that they are usually and unfortunately, perceived as trivial. Both individuals and society usually perceive businesses and manufacturers as the main causes of environmental problems (Unger, 1994). The reason individuals are reluctant to take action toward improving environmental quality is because they tend to perceive that a concerted action by a group or a large organization is required to do any good and that their individual action/s is insignificant (Vogel, 1996).

Although problem areas such as these begin at the individual scale level, the actual difficulty lies within the journey of individual perceptions across scale levels. When a breakdown occurs in the traverse from the individual scale to progressively larger scales, individuals don’t realize that the arena affected by them is much larger than just them as an individual. Local communities and even their nation states are affected. It is a global system that we live in, with current crucial events of the world structured by us as individuals, which in turn structure our lives on a global scale (Taylor, date unknown).

From a larger scale perspective, a conflict exists between economists and ecologists about the environment and environmental degradation. Economists tend to perceive that technological innovations can be relied upon to solve environmental problems, while ecologists are less inclined to trust technology.
Economists also tend to overly stress the ability of markets to allocate resources efficiently and to ignore possible threshold effects, which is a central concern of ecologists. An optimistic starting point for agreement does exist however, as economists share the ecologists' concern on the importance of global-scale issues and they agree that the world's natural capital is becoming increasingly scarce. The relationship of scale between the human economy, to the scale of the ecosystems that support it is critical (Folke, 1995).

Erosion and conservation issues bring about conflicts of interest on a smaller social scale. Although these conflicts stem from a wide variety of reasons, politics and economics are the basic sources. Existing development and production improvement techniques for agriculture are often unsuitable or inaccessible to small farmers or land-users, especially in marginal areas, where special assistance would be the most advantageous. A cooperative effort with other small land-users is usually difficult to achieve because of diverse needs, conflicting conservation concepts and different farming practices. Therefore, small land-users usually act as individuals rather than as a collective unit in making land use decisions and are thus ineffective in expressing their interests for their economic good in either formal or informal channels. This in turn causes them to be ineffective politically as well (Blaikie, 1985).

Other problems of scale exist on the political side.
Political institutions have to deal with a temporal scale problem of elections being too immediate to deal with long-range problems. Individually, those who cast votes to change national policy are highly influenced by the local and stochastic events of their lives. Consequently, there may be agreement on national policy, inconsistently applied at local scales. Scale translations socially, are difficult to transcend from national to local. The same people who feel strongly that the environment as a whole should not be degraded, do not comprehend that for effective ecosystem management they need to respond or act at local levels where the influences of other factors on decision making become more apparent (Pastor, 1995).

Background characteristics are an important part of the many factors that affect each individual's perception process. Some of the characteristics that uniquely combine to make up an individual are gender, religious beliefs, education, mobility, place and duration of residence, income, and family background. The characteristics that pertain most directly to this study are age, ethnicity or culture, and socio-economic status.

With respect to age, the attributes are relative and very controversial. As a general rule, relative youth is associated with open-mindedness, an ability to learn (Department of the Environment, Ministry of Tourism and the Environment, 1993), being better educated, and being receptive to change (Carlson and
et al., 1994). By some, youth are also seen as being more concerned about environmental issues due to a shift in priorities as people grow older, where concern for the environment is replaced with other salient responsibilities such as economic considerations, family well-being, and health-related issues (Caro and Ewert, 1995; Arcury and Christianson, 1990; and Vogel, 1996). Conversely, some believe that the youth of today do not have respect for either their social or physical environment until they have their value systems shaped by history, and experience, thus attaining a more 'mature' or 'experienced' age (Hallin, 1995).

Some studies have shown a strong relationship between age and the perception formation process, especially with regards to immigrants (Caro and Ewert, 1995; and Miyares, 1997). Some studies have shown that there is a weak relationship between age and perceptions at least with regards to environmental issues (Caro and Ewert, 1995). Mixed findings such as these may appear to be inconclusive. However, this is clearly demonstrative of how research results are only as conclusive and applicable as the relative age frame being examined and the purpose of the associated study.

**Background Characteristic—Culture**

Culture is like an anchor, which serves a multitude of functions to meet the needs of people, to define, delimit, protect, nurture and make sense of their lives (Tuan, 1996).
Culture is uniquely developed and dynamic, giving each group its own characteristic tint. In considering the same environment in which different groups depend on for both their livelihood and sense of well-being, the people in each group will recognize identical features, but with a slightly different cast (Miyares, 1997; Tuan, 1977 and Tuan, 1996). Thus, cultural differentiation, both directly and indirectly, influences perceptions, value, behavior, and the structure of various relationships (Boal and Livingstone, eds., 1989 and Tuan, 1977).

Because Belize is multicultural, it has always been on a continuum of cultural integration and change due to the multitude of cultural groups which will be discussed in the study area section. The dynamics of the continuum have increased drastically, especially in recent years because of a large influx of immigrants from Guatemala, El Salvador, Nicaragua and Honduras. These immigrants, approximately 90% of which are illiterate and unskilled, have brought their predominantly rural way of life and traditions, which requires them to primarily rely on agriculture for a means of support (Belize Today, 1992).

An example of an unsustainable agricultural practice the migrants have brought with them, is the use of lime. The lime, used to neutralize the soil, must first be extracted from native rocks, causing significant areas to be deforested. Then, the lime is burned to prepare it for use. This requires more forests to be cleared for fuel wood which is used for the drying kilns (Belize National Report, 1992).
Another agricultural practice with major environmental repercussions which the migrants have brought with them, is the routine use of pesticides and agrichemicals (Department of the Environment, Ministry of Tourism and the Environment, 1993). Milpa and small farmers have adopted these practices, not realizing that the associated environmental pollution affects the wildlife they utilize for food, and the streams they use for washing, bathing, and quite often for drinking (Department of the Environment, Ministry of Tourism and the Environment, 1993). Uneducated use of pesticides rapidly changes to abuse, affecting not only the environment, but costs of production, toxicity factors, and the overall production of vegetables on an economic basis (Pulver and Swift, 1994).

Other environmental problems that have taken place with the uncontrolled immigration is the toll on local economy, resources and services. The combination of a lack of education on issues of personal hygiene such as garbage and sewage disposal, and frequent disregard for ecological fitness are considered responsible for playing a leading role in the increasing environmental degradation brought about by unsanitary living conditions, increased pressure on land use, and the increased creation of settlements (Belize National Report, 1992).

**Background Characteristic-Social Structure**

Probably the most common belief involving the relationship between social structure and environmental issues, is that only
the elite or wealthier segments of society can afford to be concerned about the environment. Individuals who are lower in economic status are generally seen as being too preoccupied with issues of economic survival and physical well-being to be interested in such matters (Caro and Ewert, 1995). The basic concept of this, may have merit, as part of the reasoning behind this stems from how social context effects human thought and action, thus serving as a creator of the environment. Global change, for example, is only understood to the extent that it affects everyday life, with everyday life being held firmly in place by an individual's social setting (Harvey and Bell, 1995).

Whether or not this belief is valid in its entirety, many studies have shown how social structure is an important characteristic to be taken into consideration. In fact, social ranking may be more influential in perception formation about the environment than ethnicity (Caro and Ewert, 1995). In one study, only after individuals attained the social position of role-models, such as teachers or some type of group leader, did they perceive that environmental issues were important. In the same study, youth that were at a higher socio-economic level were more aware of environmental issues, primarily because of the type and amount of media to which they were exposed (Hallin, 1995). Urban studies have shown that groups with higher income, education and mobility, were more concerned about and familiar with their environment than lower income counterparts (Boal and Livingstone, eds., 1989 and Skrentny, 1993). In another study, on a larger
social structure scale, environmental concerns were similar across industrialized countries such as West Germany, Austria, the United States, Britain, and Australia compared to developing countries (Skrentny, 1993).

**Economics**

On all scales, environmental issues are considered both political and economic issues (Blaikie, 1985). With economics, there are many factors that influence perceptions and the 'value' of the environment and environmental conservation, especially for the poor. These range from economic distortions to underlying labor and capital endowments and constraints. One of the perceptions affected by the economic-land use tie is that of land valuation; land is perceived to decrease in value and importance as industrialization increases (Christopher, 1968). Another is brought about by the reliance on various types of land use for economic support which directly affects conservation, degradation, or remediation related (Caro and Ewert, 1995). In a study about remediation conducted by Gould (1993), comparing two towns, it was determined that much of the local resistance to environmental remediation stemmed from the economic dependency of the town. The town with the tourism and recreation based economy was much more receptive to, and active in, remediation efforts as residents felt the need to have their town be more appealing for tourists (Gould, 1993).

In Costa Rica, a study was conducted to determine the
perceptual effects that the creation of an ecotourist attraction, the Tortuguero National Park, had on local inhabitants. Established in 1975, the park isolated some natural resources, such as wildlife for hunting and land for farming, from local residents. Heads of households were asked to compare their lives at the present time with a decade earlier. The majority reported that their quality of life was worse, primarily because of inflation and unemployment. However, since there were no control subjects, such as individuals from another community living away from the park, the overall impact of the park on the local community’s attitudes and lifestyle was unsubstantiated. In 1989, the Tortuguero’s residents were again surveyed and 100% of the respondents agreed that it was good that the park is protected, as it provided direct employment, opportunities for tourism development, and the conservation of nature (Jacobson and Robles, date unknown).

Another example of how environmental conditions and economics combine to shape perceptions about the environment, took place in Belize, along the cayes/barrier reef at Hol Chan Reserve. Initially, the reserve was met with negative perceptions and skepticism from the locals, because fishing was inhibited at part of the reef, which involved their livelihood. They later realized that by respecting the conservation efforts of the reserve, it would be of value to them, as fish would have a place to reproduce and in turn repopulate depleted areas (Gibson, 1988).
Belize, like many developing countries, is largely dependant on hardwood harvesting to be used for various products and exporting, according to Crystal (1993). He further states that the economy is a free market, based in part on forest products, with a recent emphasis on agriculture. Barry’s (1992) discussion of the economy in the book *Inside Belize The Essential Guide to its Society, Economy, and Environment,* disagrees however. Services, bolstered by tourism, are given credit for contributing more to the Gross Domestic Product (GDP) than either primary or secondary productive activities (Barry, 1992).

The primary activities which account for 18% of the GDP, include agriculture, forestry, fishing, and to a lesser extent mining. Secondary activities, including manufacturing, electricity, water, and construction, represent approximately 25% of the GDP. Agroprocessing, such as citrus concentrate extraction, is officially classified as part of the manufacturing sector, which contributes to making agriculture the most important economic activity in Belize (Barry, 1992).

As one of the top two sources of revenue from the environment in Belize, agriculture has a great deal of impact on both the environment and peoples’ perceptions. Soil erosion, for example has been found to be a source of water pollution, even more serious than industrial effluents. High sediment loads in the rivers are caused by deforestation, over-cultivation of
marginal lands and agricultural runoff which carries sediments, nitrates, and phosphates (WTTERC, 1993). The very existence of some wildlife and plant species are threatened by agricultural and human settlement encroachment [Bartosh, 1995 (Miller, 1989)].

In Belize, over 90% of the population practices some form of agriculture (Day, 1993), with slash and burn subsistence farming being responsible for 75% of the forest clearance [WTTERC, 1993 (EIU, 1992)]. Although the majority of current agricultural land (65%) is located in valleys or depression basins and a portion of the hills slopes, use of river valley margins (side slopes) has increased substantially (Reeder, et al, 1996) and contributes significantly to soil erosion (Day, 1993).

Soil properties most negatively affected by forest clearance for agriculture are clay fraction percentage and soil depth. Organic content and nitrogen levels are also adversely affected even if cropping takes place for only two or three years (Furley, 1987). Soil cultivated for a three year period would lose approximately 4000 kg/ha of organic matter, thus requiring a seven to sixteen year fallow recovery period (Reeder, et al, 1996).

In the Cayo District, high soil losses have occurred during both ancient Maya times and over the last 20 years. However, during the Maya period, conservation practices were adopted, such as extensive terraces, to cut down on the soil losses (Beach and Dunning, 1995). Unfortunately, that is not the case in the Cayo District today. Only about 33% of the farmers have minimal
knowledge of simple conservation practices with even less, 15%, being aware of beneficial contour plowing and cover crops (Pulver and Swift, 1994). Another major conservation obstacle is the practice of plowing the land up and down the hills (Barbier and Bishop, 1995). Hopefully, these obstacles will be overcome by both introduced conservation methods and environmental educational programs initiated by various organizations and governmental departments. It is much easier for farmers to adhere to known and familiar practices, than to make changes that are totally alien (Blaikie and Brookfield, 1987).

Increasing the use of conservation practices in Milpa farming would not be so important, if low levels of population could be maintained (Beach and Dunning, 1995) and agricultural productivity increased. This does not appear to be the case in the Cayo District however, as on average, farmers generate only about $7300/year farming approximately 9 ha (23 acres) which equates to the generation of only about $732/ha ($300/acre). In order to survive, small farmers must therefore clear a collective total of over 900 ha (2,250 acres) each year of which 35% or 320 ha (788 acres) are mature forests in protected areas (Pulver and Swift, 1994).

Perceptually, conservation techniques that require special skill, fertilizers, and/or pesticides have a history of not being accepted in Belize (Hartshorne, 1984) or completely ignored if they differ from existing agricultural practices (Beach and Dunning, 1995). Pulver and Swift, (1994) found that most farmers
thought soil conservation was something abstract and would place limitations on their farming system. It was looked upon by others as suspicious and a few even believed that the real purpose of discouraging the use of high slopes for agriculture was an attempt to deprive them of land (Pulver and Swift, 1994). In some cases, as in most developing countries, farmers perceive that soil erosion is not a problem over which they have any control, nor is it a problem that concerns them (Beach and Dunning, 1995).

Misconceptions and lack of awareness about conservation by farmers, especially young farmers, can be partially attributed to the educational system and the low status given to farming by society in general. Youth are not being exposed to conservation at early enough ages in schools (Pulver and Swift, 1994). Significant cultural changes by both locals and immigrants, are necessary for the future environmental well being of Belize. This can be accomplished through formal education and exposing children to new ideas and opportunities previously unknown to earlier generations (Miyares, 1997).

Although farmers in Cayo are receptive to vital new conservation and sustainable agricultural ideas, only the conservation practices with the most economic gain will be maintained and/or adopted (Pulver and Swift, 1994). For example, the traditional practice of letting degraded land recover through long fallow periods has been abandoned, because it isn't financially feasible to buy or clear the increasing amounts of
arable land needed to meet the demands of Cayo’s rapidly increasing population (Barbier and Bishop, 1995).

Small farmers are at more of an economic disadvantage than wealthier, large land holders. Because of their resource-poor status, the small farmers quite often face a host of problems in their production efforts, such as not being able to cover their labor costs (Department of the Environment, Ministry of Tourism and the Environment, 1993) and/or not being able to afford the necessary conservation measures required to retard the soil erosion. Also, considering that innovative behavior involves risk and uncertainty, small farmers and milperos (larger land holders) are much more reluctant to undertake new practices which might increase their financial risk. Comparatively, the wealthier, large land holders are better able to weather the failure risks involved in trying improved agricultural practices and so stand to gain more from the benefits of risk (Blaikie and Brookfield, 1987).

**Economics-Livestock in Belize**

Pastures for livestock production cover large areas in the Cayo District. They are usually developed from partially cleared lands that gradually become a native grass pasture, or from areas that were farmed with annual crops until the fertility deteriorated to the point that crops could no longer grow (Pulver and Swift, 1994).

Although improved pasture grasses have been available for
several years, few small farmers have tried or adopted any form of them. The over-grazing of already degraded pastures and a considerably low carrying capacity of 0.32 animals/ha (0.8 animals/acre), require that large areas of land be continually cleared, which in turn increases erosion problems and downstream effects (Pulver and Swift, 1994).

### Economics—Citrus Production in Belize

Production, processing and acreage for growing citrus in the Cayo District, as in all of Belize is expanding at a rapid rate. In all of Belize, almost 1 million boxes of citrus were produced in 1983, compared to more than 4 million boxes per year in the early 90's (United Nations Industrial Development Organization, 1993). Environmental problems associated with citrus production is on the rise as well. Slope and marginal land areas with shallow soils are being cleared, which leads to soil erosion problems. This has increased citrus acreage that requires more fertilizer and watering/irrigation. Currently, fertilizers are used at an average of 1121 kg per ha (1,000 pounds per acre) per year (United Nations Industrial Development Organization, 1993). Environmental degradation from this type of land clearing takes shape in the form of biodiversity loss and quality reduction of riverine eco-systems (The Belize National Report, 1992).

Environmental problems from citrus processing include increased demands on area resources because of worker population increases, increased cost of waste transportation and disposal,
and the possible contamination of area land and water resources in the event of a hurricane. The main environmental problem however, is disposal of both liquid and solid waste generated by citrus processing (The Belize National Report, 1992).

During peak production, 800 boxes can be processed at each of the two processing plants (United Nations Industrial Development Organization, 1993). On an annual basis, the two processing plants generate about 75,000 tons of solid waste (assuming a raw input of 150,000 tons) which contains about 15,000 tons of dry solids. Solid waste from both companies is hauled to a company owned dump site. Wastes disposed of in this manner cause unpleasant odors and ground and surface water pollution, in addition to the pollution associated with the use of diesel and bunker oil used to meet processing energy requirements. In March of 1993, a major fish kill occurred in Big Creek near Melinda because a holding pond failed to contain leachate from decomposing solid citrus wastes (Department of the Environment, Ministry of Tourism and the Environment, 1993).

Liquid waste, estimated at approximately 40% of the initial citrus input (58,000 m³) plus another 15,000 m³ per annum for oil extraction, is discharged directly into surface water. Environmental quality of surface water is threatened because of high COD (chemical oxygen demand) in the discharge of liquid wastes or untreated waste water, volatile fatty acids, and leachate from solid wastes. The surface waters are particularly vulnerable because of their naturally low COD and alkalinity.
Tourism, especially ecotourism, as recognized by the Government of Belize (GOB), is ranked second to agriculture in economic importance, and has a very strong link with people and the environment. Not only can it be a powerful lobby for conservation, but it can also exert more effective leverage on the general public and its customers than any other commercially orientated sector of the world economy. Considering that economic value must be assigned to ecological resources if they are to be conserved, ecotourism has provided a powerful incentive to secure a clean and healthy environment. The primary reason is that financial value can then be derived from attractive landscapes, protected areas, or wildlife, which are either without monetary value to the indigenous society, or are threatened by industrial development (WTTERC 1993). For example, the Kenyan ‘visitor attraction value’ of a single lion has been estimated at $27,000 per year and of a herd of elephants is $610,000 per year. It also seems to confirm that ‘the trees are not as valuable as the forest’ [Giannecchini, 1993 (Tourism Management, 1993)].

Ecotourism has a multitude of definitions, ranging from just being a ‘buzz word’ for marketing with no actual environmental value, to meaning environmentally sustainable tourism which takes
the visitor 'back to nature' with the least amount of impact on the environment (Fennell and Eagles, 1990). Out of the $55 billion earned by travel and tourism in developing countries in 1988, $12 billion was due to ecotourism (WTTERC, 1993 (EIU 1992)). In 1990, 11.5 million U.S. citizens took trips with environmental themes (Giannecchini, 1993 (Weiner 1991)) and a recent poll of international travelers at Latin American airports found that 47% cited nature destinations as an important factor in vacation planning (Giannecchini, 1993 (Brooke 1991)). Boo (1990) found that in Costa Rica, 30% of the tourists surveyed reported natural history as being an important factor influencing their choice of destination.

In the Cayo District, the rural atmosphere and lack of large scale tourism development is a major draw as tourists come to Belize to see the numerous national parks and wildlife reserves, experience the barrier reef and Cayes, and visit the numerous Mayan sites (Allender, 1990). In support of this, Boo (1990) found that an estimated 72% of tourists come to Belize for vacation because of their interest in the flora and fauna of the country. Also, a Belizean hotel manager claims that 30% of all his hotel guests visit Belize for the same reasons (Jacobson and Robles, date unknown). Because Belize has a relatively unspoiled environment and is growing in popularity as the global demand for eco-tourism increases, in the next ten years, it may very well have the ability to substantially increase its revenue by riding the current wave of 'eco-tourism'.
This will provide the direct monetary rationale for enacting environmentally sensitive policies (Belize National Report, 1992), even though to date, much of Belize’s tourism infrastructure has been financed with foreign assistance or by foreign investors. Tourism has greatly increased the job market for locals. It is estimated that each job directly related to tourism generates or supports two jobs indirectly (Belize Today, 1992).

An example of how ecotourism is mutually advantageous to conservation and revenue production for the locals is demonstrated by an ecotourism type of fishing using the catch and release method in which approximately 95% of all the fish caught are released. The bonefish, a fish supposedly protected by law, for example, would only bring in a few dollars at a local market. That same bonefish, from an ecotourism perspective, time and time again, would attract numerous anglers which would bring in hundreds of dollars.

Hotel owners, tour guides and the government, in the form of taxes, are the direct recipients of income generated from these activities. However, farmers and other locals indirectly benefit as well, by selling food and other products for consumption by tourists. It is estimated that sports fishing brings in more money to the country than the mahogany business did 25 years ago (Department of the Environment, Ministry of Tourism and the Environment, 1993), thus providing both economic and environmental sustainability.
If ecotourism is not controlled however, the allowance of large and expanding numbers of foreign tourists or mass tourism, may have profound repercussions upon the environment and society as a whole (Allender, 1990). On the resource side, travel and tourism consumes resources such as metal, coal, oil, wood, and food crops. A considerable amount of fuel is used to transport visitors from point to point, food and energy requirements increase as does waste, litter, and erosion potential. On the physical environment side, they may collect coral or fossils, hunt rare species or aggravate problems of over-fishing and possibly provide a market for products from unmanaged forests or endangered species (WTTERC, 1993).

**Land Use and State of the Environment in Belize**

The overall goal of Belize is to accomplish sustainable development and preserve the environment, which strongly ties the economy to the health of the environment. Such an idealistic and optimistic plan for the future may be feasible if long term policies for sustainable development are adopted, without having to divert resources to remedy past environmental degradation (The Belize National Report, 1992). The government is still plagued however, by its inability to develop appropriate standards to accompany environmental laws. In part, this is because of the lack of a complete current inventory of species in the country and a lack of scientific knowledge regarding the intricacies of
Belizean ecosystems.

This, combined with the national goal of sustainable development, Belize's concern for the global environment, and the protection of bio-diversity, has led to an explosion of research in the last 20 years into Belize's environment (The Belize National Report, 1992). Related studies have shown that although the current state of Belize's environment is relatively healthy, there are indications that rapid change is affecting the environment. Accelerated forest clearance, increased agricultural investment and the construction of new buildings, settlements, and infrastructure are adversely affecting environmental systems (Day, 1993).

Some of the adverse affects from development include rapid soil erosion, pollution of rivers and streams, over exploitation of marine resources, accumulation of solid waste, decrease in floral and faunal reservoirs, deteriorating water conditions, and difficulties related to meeting the traditional resource needs (Department of the Environment, Ministry of Tourism and the Environment, 1993). Indirectly related to development and/or human population increases are hunting and forest clearance which is beginning to negatively affect wildlife populations, endangering some species and causing others to retreat into interior forests. Both legal and illegal hunting pressures are depleting game species and a variety of protected species (Day, 1993).

Development of private domestic, industrial, tourist and
agricultural activities can detrimentally affect both marine and terrestrial environments. The source of 77% of worldwide marine pollution is inadequate sewage disposal and dump sites (WTTERC, 1993). Unfortunately, Belize contributes to this global problem by having its own inadequate sewage facilities and a lack of sanitary landfills, causing solid waste to end up in rivers and streams. A small town the size of San Ignacio, alone, can generate 12-15 tons of garbage per day (Department of the Environment, Ministry of Tourism and the Environment, 1993 and United Nations Industrial Development Organization, 1993).

Another environmentally related problem of having limited staff and budgets needed to deal effectively and efficiently with environmental management is from having such a small population and economy. The Government cannot retain qualified personnel without the ability to pay salaries that compete with what can easily be earned in the private sector or abroad. There is also a need for the existing legal system to be strengthened or a new strong one developed, to regulate activities that impact the environment, including strict procedural standards for implementation (Belize National Report, 1992).

From the scientific side, many of the ecosystems in Belize are still poorly understood, which makes regulation formation and execution extremely difficult. Thus, many non-governmental organizations (NGOs) are depended upon for environmental inventories and studies. The last extensive survey (albeit outdated) of the forests and flora of the colony was published by
Stanley and Record in 1936 (Munro, 1984). Another problem area for the Government of Belize is that even though Belize does not possess any heavy industry and has thus remained free from the environmental injury that has often accompanied industrialization, there is still the desperate need to create an industrial pollution control program (Belize National Report, 1992).

All types of land use involve allocating resources of different scarcities to achieve or maintain an income stream from a piece of land. And, often times, no matter how tangible the evidence of environmental erosion/degradation from human land use is, it may remain unrecognized or be unimportant to people living in affected areas. Only when the degradation reaches a critical, sometimes irreversible level, is it perceived to be a problem (Blaikie, 1985).

The Government of Belize feels that they recognize problems such as these, which are a product of complex interrelationships that exist among the environment, poverty, trade, finance investment, science and technology, and consumption patterns (Department of the Environment, Ministry of Tourism and the Environment, 1993). They also contend, that they understand the extremely close tie that exists between the Belizean economy and the health of the environment (Belize National Report, 1992). Thus, it has been deemed vital, that to even consider the thought of sustainable land use and economic development, there must be a full partnership between environmental and political/economic
interests (Office of Economic Development, 1988).

Others, such as Barry (1992), do not feel that there is a land use strategy in Belize and that legislation requiring environmental impact studies prior to major land use decisions or development projects doesn't exist. Barry also feels that the agricultural sector is not guided by the principles of sustainable growth but rather by profit margins and the dictates of the market. Short-sighted economic development and inappropriate agricultural practices is seen as the blame, resulting in environmental decay such as soil erosion, pesticide contaminations and continuing deforestation (Barry, 1992).

To the individual or small farmer, the government may often be seen as the 'enemy', with the governmental representatives having completely different cognitive maps from those of the individuals. Therefore, intervention by the government to bring about 'better' land management is frequently met by suspicion and non-comprehension. In peasant society, specialized interventions such as forest protection or pastoral regulations seem incomprehensible and quite incompatible with the moral economy of their society (Blaikie and Brookfield, 1987).

Regardless of the problems and opinions that abound about the use and abuse of the environment, and whether or not things have been done properly in the past, the important thing is to recognize that economics, politics, and cultural forces are all a part of the human dimension that far exceeds any complexity that is physical in nature. Therefore, before a program of land use
can successfully be established and handed down, the extent to which the program contributes to the working class individual’s psychological integration with the national community needs to be determined by examining their perceptions. Perception involves both evaluation and awareness. The individual must be shown that there will be an advantage to her/him as an individual before they will make a commitment (Parson, 1972). Other factors that affect awareness, include the publicity given to a program, the manner in which the elite overcomes the resistance of the working class, the part the government plays, and the degree of involvement of the working class individuals in the process of implementation.

Thus, it is vital to investigate ‘social factors’ such as the ones examined in this literature review and thesis. By adding physical scientific data to an understanding of how basic perceptions are formed, what some of the existing perceptions are, and how they are affected by various background characteristics, as examined in this study, outside influences can be shaped and added to positively contribute to the effectiveness of land use management and conservation efforts.
Study Area

Geologic and Physical Attributes

Considering that the majority of the Earth's remaining rainforests, 895.7 million ha (362.50 million acres) (Lean, et al., 1990), is located in the 23 developing countries of Latin America, Belize is an ideal country for environmental conservation research. Approximately 93% of the area in Belize is still loosely classified as 'forest land' (Belize National Report, 1992). Not only is Belize concerned with subsistence and economic growth, but it is also one of the top two Latin American countries involved with environmental conservation. Approximately 30%, 688,900 ha (1,702,272 acres/2,545 square miles) of its land has been set aside as designated reserves (Belize Review, 1991).

Located in the Yucatan Peninsula, Belize is an English speaking country about the size of Massachusetts. It covers 22,968.9 km² (8,866 square miles) and has a population of approximately 200,000 (Ulrich, 1995). Belize is bordered to the north by Mexico, to the west by Guatemala, to the south by Guatemala and Honduras and to the east by the Caribbean Sea (see map).

Extremely high rates of biodiversity, are found in Belize; at least two thirds of the earth's species (Department of the Environment, Ministry of Tourism and the Environment, 1993).
This is due, in part, to the fact that Belize is located at the intersection of the southern most border/ecotone of North American species and the northern most border/ecotone for South American species.

Another reason is that Belize has large areas of intact tropical rainforests and the second largest barrier reef in the world. Rainforests and reefs have the highest levels of biodiversity found of any type of ecosystem and are important for this reason not only nationally, but globally as well. Also, these two types of ecosystems are important to global environmental health, serving as carbon sinks which process gaseous pollutants produced by other industrialized countries into life-supporting oxygen (Department of the Environment, Ministry of Tourism and the Environment, 1993).

Belize is home to 121 species of mammals, 504 species of birds, 107 species of reptiles, and 26 species of amphibians. It also contains some of the last healthy populations of the Black Howler Monkey and the Jaguar in the world (Belize National Report, 1992). Although Belize does not yet suffer from severe environmental degradation, the population density is increasing and land is beginning to be exploited more intensively (Hartshorne, 1984), especially in the last 10-12 years.
Study Area - Cayo District
Of the six districts which comprise Belize, Cayo is the largest, covering more than 5,180 km² (2,020 square miles). Cayo was selected as the study area because a variety of major revenue producing land-uses occur within this district. Aside from tourism; agriculture, cattle ranching, and citrus production are important economic activities in the area.

Cayo is significantly different from other districts in terms of rainfall, land and soil characteristics, as well as the socio-cultural setting. Agriculture is more diversified and commercial interests are common due to the significant number of immigrants and refugee settlers. The rural life in Cayo is in part influenced by roads, market centers, availability of supplies and services, schools and hospitals, tourism, and the interests of social and religious organizations in the area. Some differences are attributed to the distances and or proximity of townships or villages to larger villages or major towns such as Belmopan, San Ignacio, and Benque Viejo (Pulver and Swift, 1994).

Topography in the Cayo District varies from flat savanna plains, barely at sea level, to Victoria Peak, the highest point in Belize at 1120m (3,675') located in the Maya Mountains (Rand McNally, 1993). The Maya Mountains, the most prominent physiographic feature in Belize and the oldest land surface in Central America, consists of a granitic core and ancient (Paleozoic) sediment exceedingly low in minerals capable of providing nourishment for growing plants (Hartshorne, 1984). On
the northwestern slopes of the Maya Mountains is a remanent of that ancient land surface (Hartshorne, 1984), which is an important forest area for controlled logging called the Mountain Pine Ridge (Glassman, 1989). The majority of the remaining terrain in Cayo is Cretaceous limestone with many typical karstic landforms (Hartshorne, 1984). The natural vegetation is humid and wet-dry tropical forest with the limestone areas being vegetated in deciduous seasonal forest containing a wide variety of wildlife and high overall species-richness. Soils found on the limestone are patchy, calcareous mollisols or vertisols with soil profiles being less than 30 cm thick and steeper slopes having little or no soil cover (Day, 1993).

The Mountain Pine Ridge Upland Plateau consists of kaolinitic clay and quartz sand. The pinol soils also found here are lacking in plant nutrients, particularly in exchangeable calcium, magnesium and available phosphorus. Systematic regeneration and management of natural pine forest has proven to be comparatively inexpensive and well-adapted to these soils because it is totally unsuitable for agriculture (Hartshorne, 1984).

In the Mountain Pine Ridge Upland Ranges, pinol soils occur on the rounded crests of many ridges. Lithosols of the Baldy series are found on the slopes and are exceedingly shallow. Mass wasting events pose a serious threat as these lithosols are unstable and highly susceptible to erosion. Thus, the land is suitable only for use as protective forest (Hartshorne, 1984).
The uplands of the Maya Mountains consist of steep and precipitous slopes where the soil mantle is very thin. Outcropping rock is common as are narrow strips of colluvial and alluvial soils in narrow valley bottoms (Hartshorne, 1984). In the main valleys, the alluvial soils are usually red-brown acidic sands and clays (Day, 1993). Widely scattered, relatively fertile alluvial soils found in these often inaccessible areas are subject to flash flooding and obliteration by landslides. Primary forest and cohune palm vegetation serve as a stabilizer for these soils. If removed however, the result would be accelerated sheet and gully erosion. In turn, subsequent erosion debris would inundate the plains below contributing to the instability of almost 90% of these landscapes (Hartshorne, 1984).

Less steep areas of the Maya Mountains lowlands can be used for sustained-yield forest management, but are not suited to most forms of agriculture except permanent tree crops. When the soils are maintained with a permanent grass cover, citrus, cacao and coffee have been grown successfully, provided they receive continuous applications of phosphate fertilizer. In addition, many of the soils are well suited to dairy production. All of these soils require careful management as soil depletion takes place at an exponential rate until the soil is infertile or severely eroded and is abandoned or used only for rough pasture. The relatively high level of natural fertility can withstand milpa farming if allowed a three to five year fallow cycle (Hartshorne, 1984).
The system of rivers in Belize provide for the majority of human water needs (Belize National Report, 1992). The Macal River drains a large area of high relief from 1020m (3346') elevation at Baldy Beacon, down to 70m (230') at Black Rock (Hartshorne, 1984). The Mopan River enters Belize from Guatemala. The Belize River originates at the confluence of the Macal and Mopan Rivers, just south of San Ignacio (Department of the Environment, Ministry of Tourism and the Environment, 1993).

The Belize River, known to old timers as the Belize Old River, flows generally northeast, from San Ignacio to about 19km south-southeast of Crooked Tree, then south and southeast to enter the sea near Belize City. Considerable recharge is assumed to come from springs in the Cretaceous limestones between San Ignacio and Belmopan (Hartshorne, 1984) as well as tributary streams along it course. It is hopeful that this recharge can offset the ill effect of farmers using the Belize River as a drainage system for about 24% of the country (Department of the Environment, Ministry of Tourism and the Environment, 1993).

Average annual rainfall in Cayo is between 2000-2400 mm (80-96") with a marked dry period from January to May. The contrasting wet season runs from July to October (Day, 1993). The Benque Viejo and San Ignacio area usually receives about 1323 mm (52") of rain (Hartshorne, 1984). Water resources are strongly limited in the karst of Cayo, requiring careful management and conservation, especially with the demands of Cayo's growing population (Day, 1993).
Surface water is used exclusively for domestic purposes by an estimated 70% of the population of Belize. San Ignacio and Belmopan in the Cayo district obtain their municipal water from streams and the Belize River (Hartshorne, 1984). Away from the main river valleys, maximum use of intermittent surface water supplies and tapping into the more reliable underground sources is required (Day, 1993). For example, between Benque Viejo and San Ignacio deep wells are used to reach water-bearing zones in the deeply weathered limestone (Hartshorne, 1984). Although wells provide a reliable supply for communities adjacent to the main highways, in more remote areas such as a Mennonite community in Upper Barton Creek, rainwater catchment and ephemeral streamflow is relied upon (Day, 1993). Many small villages are located near creeks with a reliable water supply from which the inhabitants 'dip' their drinking water, as well as using it for bathing and laundry (Hartshorne, 1984).

Pollution hasn't been considered a serious problem even though fecal and detergent contamination of potable water was and is a real risk (Hartshorne, 1984). Now however, at least in the Hummingbird area, recent increases in population, agriculture, and industry has had an impact on water supplies, particularly on surface sources in the upland karst (Day, 1993). Springs, seepages, ephemeral streams, and small reservoirs cannot meet the demand in the dry season and water has to be obtained from Belmopan or from the Sibun River by tanker or truck. Contamination is a growing concern as human and livestock
populations increase. Waste disposal even in San Ignacio is rudimentary and is being blamed for contamination concerns. Rivers such as Barton Creek and Little Barton Creek show evidence of contamination by soil erosion and by local disposal of solid and liquid wastes. When animals foul water in Caves Branch, Dry Creek and elsewhere, and it is noticed, alternative sources have to be used (Day, 1993).

Agriculture-Farming and Livestock

Out of 5.7 million acres, Belize contains some 2.2 million acres that are currently classified as suitable for agriculture (Belize National Report, 1992). During the '80s', only about 2% of Belize was used for agriculture, which equates to 6% of the land that was considered suitable for agriculture. Although the potential for agricultural development is considerable, many soils have moderate to severe limitations for modern agriculture. Out of the total 15,000 km² of soil that can support mechanized agricultural implements, and doesn't require costly drainage improvements, only about 4500 km² is capable of agriculture without large financial and technological investments (Hartshorne, 1984).

Even with these limitations, this leaves a large fairly untapped source of arable land for future agricultural use. Currently, agriculture, including forestry and fisheries, is the largest contributor to the national economy, employing one-third of the work force and accounting for about half of the GDP. This
is the rationale behind agricultural development being the top priority of the Government of Belize (GOB) (Hartshorne, 1984).

Some of the obstacles standing in the way of agricultural development are lack of infrastructure, difficulty in obtaining credit and capital items for small and mid-sized farmers, and contemporary attitudes about inaccessibility (Hartshorne, 1984). Also, affecting agriculture more specifically in the Cayo District, is poor land quality related to the stony soils. This quality dictates the need for large expanses of land to be used in subsistence farming (Pulver and Swift, 1994).

Farming is considered sedentary to semi-sedentary and out of the estimated 12,000 farmers in Belize, 85% are considered small farmers with only about 25% of the total number of farmers owning the land they farm (Department of the Environment, Ministry of Tourism and the Environment, 1993). Because of immigration, only about 40% of the small farmers are considered native to the area. Among the rural/farming immigrants, 66% are non-Belizeans, mostly from El Salvador with the remainder being from Guatemala and Honduras. Immigrants possess both long and short-term leases, although many squatters are also present (Pulver and Swift, 1994).

Citrus agriculture is very important to the national economy and is a major source of foreign exchange, bringing in excess of 28 million U.S. dollars (HASKONING Royal Dutch Consulting Engineers and Architects, 1993). The total number of hectares used for citrus in 1986 was estimated at 7548 ha (18,650 acres).
The land area being used, doubled from 1989 to 1993, covering some 16,188 ha (40,000 acres) which is expected to increase to 24,282 ha (60,000 acres) in the near future (Belize National Report, 1992). Production is expected to be at nearly 8 million boxes by the year 2000 (Day, 1993).

In the mid 1980's two major citrus processors owned 36% of the groves, while the remaining 360 citrus growers (90%) farmed less than 8 ha (20 acres) (Hartshorne, 1984). The land area used for citrus has continued to increase in the Cayo district from about 430 ha (1,063 acres) in the early 1980's to over 1500 ha (3,707 acres) in 1991. Plantings after that in the eastern karst area brought the latest approximation up to 2500 ha (6,178 acres) (Day, 1993).

Although most of the increase in citrus production has been at the expense of cattle grazing, there is still over 1000 ha (2471 acres) of pasture for cattle, horses, sheep, goats, pigs, and poultry (Day, 1993). In 1978, over 1,386 cattle operations were in existence in the entire country, covering a total of approximately 100,000 ha (247,100 acres). Forty-five percent of this was in pasture (Hartshorne, 1984).

Originally, the growth of agriculture in the Cayo District was slow, being introduced from other districts. Only recently has agriculture began a rapid expansion (Day, 1993). Agriculture has a long history in Belize however, extending back more than 1000 years B.C. Milpa farming, using the traditional slash-and-burn technique is common in all of the districts. This system
involves the growing of seasonal crops such as corn or beans for three-four years, followed by three-four years of fallow. The ancient Mayan civilizations are credited with using this system on the very same limestone soils of the rolling and hilly landscapes as it is used today. Two other relatively sophisticated methods of soil conservation utilized by the Maya were the terracing of foot slopes and the construction of raised beds in valley bottoms where soil fertility could be enhanced by trapping alluvial deposits and adding organic supplements (Hartshorne, 1984).

After the collapse of the Maya civilization, sometime between 800 and 900 A.D., there was a breakdown of communal agricultural activities, which is believed to have led back to the practice of the individual or family milpas. The next milestone in the evolution of agriculture was after the 1700's with the arrival of non-Amerindian immigrants settling along the Caribbean coast. Like the Maya, one of their agricultural methods involved the use of slash-and-burn, thus causing a reintroduction and adoption of this method (Hartshorne, 1984).

Although what is termed 'agricultural production' began only a little over 100 years ago, Belize is almost 200 years behind its Caribbean and Central American cohorts. This is believed to be the reason why Belize, out of all tropical countries, has the least depleted soil resources. It is only recently that erosion has become a serious problem, aside from erosion that took place in some foothill regions involved in the practice of slash-and-
burn during the 1980's (Hartshorne, 1984).

Tourism/Ecotourism

The tourist/service sector had an employment rate of 18.2% in 1988, second only to the percentage of employment by agriculture which was 30% (BTIA News, 1988). Although agriculture still represents the most important economic activity in Belize, tourism has rapidly increased in recent years at a rate of more than 20% per year. Tourism promotions appear to have been the most successful in Germany and Italy, although about half of the arrivals continue to be from the United States (American Embassy Belize City, 1990).

Actual arrivals into Belize from all ports and for all reasons increased from 377,526 in 1988 to 494,048 in 1994. When broken down to just tourist, business, and official visitors, the total for 1988 was 142,021 with a dramatic increase by 1994 to 326,557 (BTB, 1995). Although it is difficult to calculate the precise amount of income generated by tourism in just the Cayo District, other factors are indicative of the volume and volume increases for the area. For example, the number of hotels have increased from 24 in 1988 to 60 in 1994, which is more than any other district. The number of rooms more than doubled from 232 in 1988 to at least 545 in 1994. The number of beds increased from 437 in 1988 to 910 in 1994. Although overall tourist expenditures in Belize increased from 37.05 million U.S. dollars in 1988 to 69.25 million in 1993, occupancy rates have remained
fairly stable, increasing only one percent from 27% in 1990 to 28% in 1994 (BTB, 1995).

**Reserves and Other Miscellaneous Land Uses**

Although local residents are using increasing amounts of wood for domestic purposes such as cooking and construction, timber or wood extraction is minimally pursued commercially. Domestic fuelwood accounts for 10-12 cords per household per year. Another 100 cords per year is used at the Hummingbird Hershey (located in Cayo) for furnaces used to dry cacao beans. The largest draw on the extraction of wood is for use in lime kilns. Although this problem has been recognized by the Forest Department, the enforcement of regulations is difficult because of low staffing and financing levels (Day, 1993).

With regard to reserves, there are several karst areas in the Cayo District under at least nominal protection. The majority of the Hummingbird Karst is contained in the 430 km² Sibun Forest Reserve, which is primarily dedicated to permanent forestry through sustained tree growth and regeneration. This reserve also serves to prevent soil erosion, retain water, and provide a habitat for wildlife. Management of this and many forest reserves is minimal however, and unfortunately land-use regulations are not enforced strictly (Day, 1993).

To date, figures on the dollar amounts brought in by visitors to protected areas and archaeological sites have not been readily accessible. Therefore, the increasing potential for
revenue production will not be discussed other than representations of actual number of visitors to all of Belize's protected areas managed by the Belize Audubon Society and just four of the major Maya Ruins. The total number of visitors to protected areas has increased from 15,958 in 1991 to 18,487 in 1994. The number of visitors to the Maya Ruins have increased from 23,998 in 1992 to 39,329 in 1994. Other miscellaneous uses of forests and forest plants are for herbs and medicines with isolated forest plots being used for illicit cultivation of marijuana (Day, 1993).

Located approximately 116 km (72 miles) west of the largest city in Belize, Belize City, is San Ignacio, the second largest metropolitan area in the country (Ulrich, 1995). Commonly called Cayo, San Ignacio and the Belize River Valley is where the majority of the 36,523 people in the Cayo district live (Demographic Division of Belize, 1994). Over half of the population is Mestizo (a mixture of Spanish and Maya). Other ethnic groups listed in demographic reports that are represented in the Cayo District are Creole, East Indian, Garifuna, Mayan, German/Dutch Mennonites, Chinese, Syrian/Lebanese, and White.

According to 1983 statistics from the Embassy of Belize, when the population of Belize was approximately 161,500, 60% of the people were of African and Afro-European origin; Mayan and Mestizo (Spanish-Maya) accounted for 27%; Garingu (Afro-Carib)
The number of Afro-Belizeans (Creoles and Garifuna) has decreased from 47% in 1980 to 37% in 1991 (Woods, et al, 1995). Though physically located in Central America, Belize is strongly tied to the Caribbean in both culture and economics (Hartshorne, 1984).

Between 1921 and 1970, differing from the majority of the other districts, Cayo experienced a decrease in urbanization. Between 1970 and 1991, Belize’s population went through a major redistribution, shifting from a predominantly urban pattern to a more rural orientation. This alteration is associated with international population migration flows, as well as changing the ethnic mix, which in turn promotes spatial isolation of ethnic groups and the distinct fostering of emerging patterns of economic specialization and regional concentrations of ethnic groups (Woods, et al, 1995). The proportion of the population that was foreign born rose from 8.11% in 1980 to 13.5% in 1991, with more than 72% of the total foreign born population originating in Guatemala (41%), El Salvador (22%) and Honduras (9%) [Woods, et al, 1995 (Ministry of Finance, no date)].

Continuing historic patterns, Cayo has a diverse mix of Creoles, Mestizos, Maya and Lebanese. In 1980, the highest concentrations of Mestizos were found in Orange Walk (64.55%), Corozal (58.4%) and Cayo (49%). Greater localizations of Amerindians are also found in the Cayo, Toledo, and Orange Walk Districts. The majority of these people tend to practice occupations relating to the geographic areas of their origin as
ethnicity is functionally related to geographic location (Woods, et al, 1995).

Aside from the cultural mix of the population, data from the 1991 Census of Belize, and the 1990 U.S. Census of Population and annual reports of the U.S. Immigration and Naturalization Services (INS) indicate that selective immigration and emigration patterns have been responsible for changes in demographic characteristics and settlement patterns in Belize. Belize’s geographic location and stable political system has provided a haven to displaced persons from the region, especially from the tumultuous Peten region of Guatemala and civil war ridden El Salvador, accounting for the majority of Spanish-speaking Central American refugees in Belize (Woods, et al, 1995).

The total number of immigrants and refugees are estimated to be approximately 30,000 which amounts to just under 18% of the original population. Communities of immigrants and refugees have been founded within Belize in the last ten years, and are generally located in large concentrations around Belmopan (Belize National Report, 1992).

Out of all the districts in Belize, the Cayo District, and two other districts, have been the most prominent in new community formation, stemming from the immigration of refugees from both El Salvador and Guatemala. Concerning overall population growth and community size in the Cayo District, San Ignacio has experienced the most rapid growth, largely due to the inclusion of the population of Santa Elena, its sister city in
Intensified rural settlement is the product of the founding of new villages and the growth of existing rural settlements. The average size of rural settlements grew most rapidly in the Cayo District, as did the average size of the villages which increased by 187% (Woods, et al, 1995). Based on farm families and the average family size of 6.6, the total rural population in Cayo is estimated to be close to 3,000. This is demonstrative of population statistics that show an 82% rural increase during the last 11 years (Pulver and Swift, 1994).

With respect to age, the structure of Belizean population has become a serious problem. Due to recent surges in population growth, emigration of labor-force-age Belizean Creoles to other countries, and immigration, the population is now dominated by youth. According to mid-year estimates, 30.9% of the population are nine years old or younger. Those less than 20 years of age are estimated to make up 54.9% with only 40.9% falling into the 20-64 year age group. Economically speaking, this means that from one-third to one-half of the population are economic dependants (Perry, et al, 1995).

Economics/Politics

Typical of many small developing economies, Belize's economy is based primarily on agriculture and merchandising (Hartshorne, 1984). It has been in gradual yet constant change in the last twenty years (Belize National Report, 1992). Economic growth for
Belize slowed from 9% in the latter part of the 1980's to 4.5% in 1993 (Belize Today, 1993), which is considered minor compared to many other developing states hit hard by debt (Belize National Report, 1992). Since 1975, Belize has run a substantial trade deficit, reaching $48.4 million in 1988, or 19.6% of GDP. It is expected that trade deficits will persist with continued economic growth (American Embassy Belize City, 1990).

Generally, the Belizean economy has shown a pattern of growth since 1969, slowed only by world conditions in 1974-1975 and being severely interrupted by a combination of United States recession and debt problems from 1981 to 1986. Despite those setbacks, since 1987, Belizean economic growth has been strong and continuous. The Gross Domestic Product, the best indicator of overall output in the Belizean economy, mirrors a general pattern of growth with substantial annual increases in GDP after 1986 continuing to present. This growth is primarily credited to the development of the increasingly important service sector (Perry, et al, 1995).

Despite an abundance of arable land, Belize imports a large share of basic foodstuffs. In 1987, 22% of total imports were food (American Embassy Belize City, 1990). In 1993, livestock products, and feeds for livestock accounted for 53% of the total food import bill (Belize Today, 1993). In addition to foodstuffs, Belize is highly dependent on foreign trade for importing virtually all machinery, fuels, manufactured goods, chemicals, construction materials and consumer goods. The United
States, the United Kingdom, Canada, the Caribbean Common Market, and Mexico purchase 45% of Belize’s exports which consists of sugar, apparel, citrus, seafood, bananas and lumber (American Embassy Belize City, 1990). Inflation, is not expected to severely impact Belize in the foreseeable future as Belize’s economy is closely tied to the United States which is pursuing anti-inflationary policies (Belize National Report, 1992).

Agricultural products account for over 30% of the GDP and 70% of export earnings (American Embassy Belize City, 1990). Thus, it is understandable why top priority economic projects involve livestock and agro-industries, followed by forest product processing, tourism, light manufacturing industries, mining and mineral exploration, handicrafts, assembly plants for garments, electrical components, and other goods (Hartshorne, 1984).

From 1980 to 1993, there has been a small but steady decrease in the importance of primary GDP activities (agriculture, forestry, fishing, and mining), as well as secondary GDP activities (manufacturing, utilities, and construction). The slack has been taken up by the services sector which includes transport, communications, and tourism services. Primary activities decreased from 26.8% in 1980 to 19.5% in 1993. Secondary activities decreased from 29.7% in 1980 to 25.6% in 1993, with an increase in services from 43.6% in 1980 up to 54.8% in 1993. Growth in this area is attributed to ‘eco-tourism’ and the ‘El Mundo Maya’ campaign (Perry, et al, 1995).

In the Cayo District, the strong presence of agriculture
provides a mean gross farm income of BZ $7,144 (BZ $2 is equal to US $1)/year. However, 52% of the farmers gross less than BZ $4,000. Vegetables and grain crops account for just over 50% of overall gross income, whereas livestock and perennial corps jointly account for about 45%. The relative breakdown, contributing to overall gross income for 1992 was: livestock 39%, vegetables 29%, grain crops 27% and perennial crops 5% (Pulver and Swift, 1994).

More than 50% of the farmers grow vegetables for the local market, bringing them an average of over BZ $4100/year. This, however does not satisfy the demand and vegetables have to be imported from the United States, Mexico, and some of the neighboring Central American countries. Approximately 30% of farmers grow perennial crops that bring in only about $500(U.S.)/year. Animal production accounts for 30% of gross income, with beef bringing in approximately $3,700(U.S.), and swine bringing in approximately $5,000(U.S.) per farmer. Unfortunately, the topography is unfavorable for cattle production, with shallow stony soils providing poor pasture. Because of these poor pasture conditions, overgrazing, exposure and associated soil erosion risks, damage takes place regardless of whether or not cattle are provided with large areas for grazing (Pulver and Swift, 1994).

Aside from agriculture, revenue producers that are generally regarded as being reserved for local entrepreneurs are for example, domestic transportation services, commercial
merchandising, beekeeping, restaurants and bars (Hartshorne, 1984). The service sector, particularly in the tourist sub-sector has continued to grow with construction booming (Belize National Report, 1992).

International investors usually dominate manufacturing, sugar and citrus processing, banking, insurance, tourism, mineral exploration and cattle ranching. Foreign investors, if they are granted a Development Concession under the Development Incentives Ordinance, can enjoy tax holidays of up to 15 years, exemptions from some import duties, liberal repatriation, and various other incentives. A few of the guidelines the investor must follow includes providing information regarding financial details, the number of created jobs expected, and to declare whether any noxious effluent will ensue from the operation, and whether plans and fiscal resources have been developed to provide for its disposal (Hartshorne, 1984). Another stimulant to foreign investment is the Caribbean Basin Initiative (CBI) which offers incentives for Belizean exports to European and Caribbean markets (American Embassy Belize City, 1990).

On the negative side, there is a lack of long-term credit, a small domestic market, expensive electricity, high import duties, inadequate infrastructure, and a shortage of skilled labor. Also, there are other detriments such as rural areas being without any electrical service, low labor productivity, relatively high labor costs compared to other countries in the region and shallow ports constraining international trade.
Despite all this, there was a fourfold increase in visitors, from 1985 to 1990, who were seriously considering Belize as a country in which to start overseas operations. Political stability and the absence of excessive government regulations is credited with being part of the rationale for considering investing in Belize. Other positive factors include English as the official language, less expensive labor costs than the United States, preferential access to European, Caribbean and United States markets, natural resources, land availability and climate. Many Americans are comfortable doing business with Belize as the Belizean legal system, like that of the United States was inherited from the British (American Embassy Belize City, 1990).

Land use and any associated environmental protection begins with the government. The government is in the perpetual process of acquiring and disposing of land and is, therefore, logically the major influence in the land market (McGill, 1994). The most dramatic institutional and legal changes came about after Belize was granted independence from Great Britain in 1981. Since then, governmental management of land use and the environment has gone through a series of changes. A major point was the Stockholm Conference on the Human Environment (commonly referred to as just Stockholm), in which the systematic analysis of the relationship of the environment to the rest of social, cultural and economic life began (Belize National Report, 1992).

Currently, authority for macro-management of the environment is consolidated in the Department of the Environment which has
its own Permanent Secretary and staff. The Department of the Environment maintains ties with the Cabinet and the Cabinet Subcommittee on Environment, receiving input directly from international donors, local and foreign non-governmental organizations (NGOs) and industry groups. It also has symbiotic relationships with the key ministries whose work impacts the environment, for example by providing guidelines for environmental assessments to the Ministry of Economic Development (Belize National Report, 1992).

Aside from national governmental controls on land use, there are also district, local village and various organizational requirements. On the small scale, the village political system in the Cayo District is not as strong as in other districts. Part of this is attributed to Cayo being a dynamic district that is in a state of rapid change due to immigration and overall pressure on the natural resources (Pulver and Swift, 1994).

A major program put in place to oversee and develop guidelines for land development in Belize is the Special Development Areas (SDA) program. This program was to incorporate as much government and nongovernment participation as possible, first by offering sub-regional strategic plans for the Land Utilization Authority (LUA). The LUA is legislation planned to follow what the United Kingdom has in place providing for the entire country to be classified, by parcel into a broad range of 'existing land uses' such as residential, commercial, industrial, agricultural, recreational, institutional, naturally vegetated,
and forest plantation, etc. Secondly, the LUA will assist other government departments, and thirdly, it provide a mechanism for working with the public. Serving as an intermediary, SDA, is planned to evolve into a system which represents the needs and ambitions of communities and individuals, and coordinates with government policy and capabilities (McGill, 1994).
Research Design and Methodology

To best answer questions about variations of perception among the three social categories designated for this study, and factors that influence these perceptions, it is necessary to determine what peoples' perceptions are about the environment. This was accomplished by using survey questionnaires. Surveys collect data by asking questions of respondents, usually at a single point in time, using either a questionnaire, an interview, or both (Sanders and Pinhey, 1983 and Gelledge and Stimpson, 1987). The questionnaires used in this study were standardized so that all the respondents were technically asked the same questions, although some of the questions were worded slightly different to enhance understanding (see Appendix II).

Survey/questionnaires can provide data regarding behavior, perceptions, attitudes and characteristics (Shaw and Wheeler, 1994) and were designed for this study to survey Tourists, Land Owners/Managers and Local Workers (see Appendices I and II). The questionnaire was also designed to be clear in presentation and format (Sanders and Pinhey, 1983; Canter and et al., 1988; Gelledge and Stimpson, 1987; Zube, 1980; Boal and Livingstone, eds., 1989; and Harvey and Bell, 1995) so that the participants from all of the three categories could understand and answer the questions.

Open-ended questions were constructed to elicit a free response, rather than a limited response gained by providing alternatives. Closed-ended or fixed-choice questions were also
used, which limited the responses to specific choices, including yes and no questions as well as alternative choice type questions. Both types of questions were asked, usually in the form of contingency questions, thus producing a filter or screening method (Sanders and Pinhey, 1983 and Zube, 1980).

These types of questions were beneficial for gathering quantifiable and qualifiable data, and also helped avoid ‘socially desirable’ responses and to prevent mechanical choices or guesses rather than revealing individual feelings about the topic (Sanders and Pinhey, 1983). Usually, the majority of the contingency questions began with closed-ended ‘yes or no’ questions designed to obtain quantitative data. The contingent questions also assisted in gathering qualitative data. Aside from avoiding ‘socially desirable’ responses the contingency questions also served as a built-in reliability check. If the interviewee’s response to the second part of the question was unrelated to their response to the first part of the question, then the entire response was unreliable, requiring the question to be reworded, if deemed necessary. Responses ensured that the interviewee understood the initial question, as well as further defining the perceptions of that individual.

The survey/questionnaires were used in the Cayo District of Belize using face-to-face interviews. Questions were asked verbally. Both the questions and the answers were recorded using a tape recorder. To begin building a rapport with potential interviewees, I first introduced myself and then asked if the
potential interviewee would assist with a research project or school project which I then briefly described. This approach, combined with the specifically designed questionnaire, allowed the subjects to feel important, and to demonstrate that the interviewer was genuinely interested in them and their responses (Sanders and Pinhey, 1983 and Gelledge and Stimpson, 1987).

Upon gaining consent for an interview, a category type and number was assigned to each subject to provide a sense of security and an assurance of anonymity. During the interview, in addition to the use of a tape recorder (permission was always sought before use), written notes were also taken of each subject's responses. These notes served as backup in case of recorder malfunction, which did happen, and in several instances, the written notes were the sole source of response information when permission to tape record was denied.

A minimum of fifteen people from each category were interviewed. The Land Owner/Manager and Local Worker categories were subdivided based upon specific use of the land. These categories were as follows: 1) livestock/poultry, 2) agriculture and citrus production, 3) tourist resorts, 4) combination livestock/poultry and agriculture, and 5) other miscellaneous revenue production, such as archaeological sites, reserves, and small business.

Questions in the survey were divided into two sections for all three social construct categories of respondents. The first half of the questionnaire was to establish background and
individual characteristic information about the interviewees. For example, local workers and land owner/managers were asked about their ethnic background, age, and the types of work or management they like the best. The second half of the survey provided data about attitudes and levels of awareness regarding the environment and ecotourism. The survey was designed in this way to assist in determining what relationships exist between the individual’s background and their perceptions or awareness of land use and environmental problems.

Surveys and/or in-depth interviews such as this have been used successfully in the past. For example, Radcliffe and Westwood in 1993 used this technique to uncover social construction of gender, citizenship, and ethnicity in historical and geographic contexts as they structured political activism in Latin America (Lawson, 1995). In another study, a social forestry program in the Dominican Republic (Rocheleau, 1995) used a number of qualitative and quantitative data collection and analytical techniques. Part of this in-depth study, involved the use of both formal questionnaire surveys and qualitative interviews.

Data gathered in this manner are both qualitative and quantitative and quite advantageous in a number of ways, when used in social science type studies. Lawson (1995), for example, determined that questions about social relations raised by quantitative methods were best answered by qualitative methods which worked against ‘frozen’ categories that had been delineated
quantitatively. Also, qualitative methods are often employed in combination with quantitative methods to substantively document social power relations (Lawson, 1995).

Rocheleau (1995) used the combined quantitative and qualitative methodology to serve the interests of rural women and men. The resources of the rural women and men were at stake in a complex landscape subjected to rapid and dramatic change by sustainable development initiatives. The flexible combination of qualitative and quantitative methods in this study revealed the gendered structure of households and their linkages to the gendered landscape pattern of biodiversity and resource management, and the significance of women in future forestry policy (Rocheleau, 1995).

The number of sampling methods that could be used for this study was quite limited, as the target population of each category in this study was not easily recognized nor defined from just casual observation. Also, the actual statistical population for all three categories of interviewees was widely dispersed throughout the district, difficult to accurately identify without introductions, and was predominately mobile and inaccessible. Therefore, a non-probability sampling method, the snowball method, was determined to be most appropriate.

Snowball sampling, which is often used in “observational” and community studies, is conducted in several stages with interviewees being primarily obtained by direct questioning, introduction and/or word-of-mouth. In the first stage, I
introduced myself to a few local restaurant owners, employees and customers and then asked if they were a Tourist, Land Owner/Manager and/or Local Worker. After that, I explained my project and asked for their assistance in pointing out or introducing me to possible interviewees, and or if they would mind being interviewed if they fit into one of the categories. In most cases, if the subject was not a direct participant, they did provide 'leads' by identifying and/or introducing other possible candidates.

Once a candidate agreed to participate, the interview followed. The second stage took place upon completion of the survey-questionnaire, when the respondents were then used as 'informants', assisting me in identifying other individuals who might be interested in taking part in my study. This proved to be extremely beneficial in all, but one of the interviews with the field workers. Land Owners/Managers that had been interviewed allowed me to interview their employees, provided the workers were willing and it didn’t detract from their job. Although it is possible to select respondents randomly from within each stage of the snowball sampling process, making it a probability sample, in this study, that was not feasible (Sanders and Pinhey, 1983).

The form of snow ball sampling that was used for this study was somewhat related to quota sampling, because a quota was predetermined before the actual interviewing began. In quota sampling, the selection of interviewees is left to the
interviewer, and selection is based upon the availability of subjects, convenience and accessibility. Therefore, after my arrival in the study area, the appropriate number of individuals with the desired characteristics were sought out and included in the study (Sanders and Pinhey, 1983).

In using a non-probabilistic sampling method, descriptive statistics are best suited to quantitatively analyze the data gathered. The results from the quantitative analysis are graphically presented using charts, graphs and/or tables, and is supplemented with a written discussion. The data gathered from answers to the open ended questions in the survey questionnaires were qualitatively analyzed by interpretation (Sanders and Pinhey, 1983).

All data were analyzed by examining percentages and responses to determine linkages, patterns, and meaning. Linkages provide an overall theme or type of organization that ties everything together and makes sense out of diverse data. Patterns are a composite of traits in segments of society that stand the test of typical behavior, transsituationality (observed practices that are seen in more than a single situation) and transpersonality (patterns that transcend any single cohort). Meanings, the final feature of qualitative analysis, allows an understanding of social action/s in the same way as those who engage in the action (Sanders and Pinhey, 1983).

The chi square ($x^2$) test using 2x2 contingency tables was attempted. Although chi square is not powerful, it is often used
in research studies because of its simple data requirements (Shaw and Wheeler, 1994). This two-sample $x^2$ test was meant to measure and determine whether or not there was a significant dependence between 'yes' responses to the environmental questions analyzed in this study and their respective social category. However, there was insufficient data (number of yes responses) for all six of the questions in the calculation of expected responses. Thus, a significant dependence or independence of social class or category and 'yes' responses was not obtainable.
Results and Discussion

This section focuses on answering the research questions identified for this study. The Appendices contain the applicable survey results and a copy of the questionnaires for all three categories. For a complete copy of the transcriptions and all the results, please contact the author.

Each interviewee from the three categories of Tourist, Land Owner/Manager and Local Worker was asked six questions related to land use, the environment and this study. Their responses were accumulated categorically and calculated percentage wise. A fourth category, 'Combined', was created, combining all three categories' responses, to arrive at a combined percent as well. This was attempted to glean an overall general perception or awareness with regard to the six questions from the environmental portion of the survey questionnaire.

The results are presented question by question in the form of a table labeled accordingly so that variations can be easily recognized. After each table, quantitative and qualitative analysis with discussion follows so as to best answer the research question 'what variations of perceptions exist among three categories of the social construct; Local Workers, Land Owners, and Tourists in the Cayo District of Belize'. A profile of each category was also constructed, with related background factors, followed by discussion of the elicited individual characteristics involved in perception and relationship formation.
such as social status, ethnological makeup, age, personal experiences and individual attitudes towards local political and economic situations.

All the questions discussed in this section are a general contingency type question with the first part of the question being in the form of a fixed-choice. The best response would have been either 'yes' or 'no'. In many instances, the response did not fall within the proposed 'yes' or 'no'; therefore a third response category was established, the non-committal response. This category was used in cases when the interviewee was not sure, didn't know or didn't answer for any reason.

The second, open ended contingent portion of the question was used in support of the first part of the question. Within this contingency portion of the question, categories/distinctions were established to assist in understanding and clarification of perceptions, implications, attitudes and behaviors. Specific divisions or categories of responses are presented with their respective questions. These categoric divisions were best determined with respect to the collective responses and how these responses related to the questions and the entire study overall. This type of data was analyzed both qualitatively and quantitatively to provide percentages and quotes where applicable.

As noted in the methodology section, the Chi Square 2x2 contingency table or two-sample x² test was attempted. However, there were insufficient data (number of yes responses) for all
six of the questions in the calculation of expected responses. Thus, a measure of significance dependance or independence of social class or category and 'yes' responses was not obtainable.

There is physical scientific evidence of existing and potential future environmental problems in Belize which has already been discussed in the land use sections of the study area and literature review. The following analysis and discussion reveals new social science information related to perceived environmental conditions in Belize.
Question 1: Do you think Belize has any environmental problems?

<table>
<thead>
<tr>
<th>Social Category (# of respondents)</th>
<th>Yes</th>
<th>No</th>
<th>Non-Committal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined (47)</td>
<td>64%</td>
<td>23%</td>
<td>13%</td>
</tr>
<tr>
<td>Tourist (16)</td>
<td>81%</td>
<td>6%</td>
<td>13%</td>
</tr>
<tr>
<td>Land Owner/Manager (15)</td>
<td>73%</td>
<td>20%</td>
<td>7%</td>
</tr>
<tr>
<td>Local Worker (16)</td>
<td>37%</td>
<td>44%</td>
<td>19%</td>
</tr>
</tbody>
</table>

Table 1: Do you think Belize has any environmental problems?

Overall, the majority of the individuals interviewed, as reflected in the 'Combined' category, perceived Belize to have environmental problems. Also, two out of the three individual categories of people, Tourists with 81% and Land Owner/Managers with 73%, perceived Belize to have environmental problems. The third category of people, Local Workers, was the exception with only 37% perceiving that Belize has environmental problems.

If the respondents answered 'yes' to this question, the contingency portion of the question then asked what they considered the 'environmental problems' to be (see Appendix II). This gave both a clearer image of what the interviewees perceived as environmental problems and why there were differences in perceptions. The environmental problems were then placed into two categories, the first being 'directly related to land use'
such as the various forms of clearing the land and farming. The other category is ‘indirectly related to land use’ such as improper sewage/sanitation and misuse of agrichemicals.

Out of all the Tourists that responded ‘yes’ to this question, only 15% (see the Results Only Appendix) felt that environmental problems were directly related to land use such as clearing the forest for cattle and slash and burn agriculture. The majority, 85% (see the Results Only Appendix), perceived environmental problems as being indirectly related to land use, as demonstrated by the following responses:

“lack of proper waste disposal”

“there is this horrible exhaust from .... cars and also, I’m not sure what’s up here on top of the hill by San Ignacio Hotel, but there is like thick black columns of smoke coming out 24 hrs. a day....”

“Is there a place that doesn’t have environmental problems? Well, on a relative scale... Belize’s Environmental problems are ..... with development ......where they have the growth right now”

and

“I, I think there are a lot that, a lot of the environmental problems are like slash and burn agriculture, and well, burning of trash, I think a lot of air pollution from that... and from the cars, the car ... exhaust .. I guess a lot of the lack of sanitation ... are environmental”.

The distinction between the two types of environmental problems perceived by the Land Owner/Managers was not as clearly defined as it was for the Tourists; 48% cited the environmental problems as indirectly related to land use and 52% indicated it was directly related to land use (see the Results Only Appendix).
The indirectly related responses of the Land Owner/Managers were similar to the Tourists with a few exceptions of environmental problems cited as follows;

'lack of implementing the ... the laws of the ... environment. We have the laws, that's not the problem, ....'

and

'Let me think, then I'll tell you what I'm going to say. Yes, I think we do have here and .... one because we can not get the help that we need from government. Most of all, you know, most of the things we want to do. They only go on the radio and say we will help, we help but they just help the big ones, that have 3-4-500 head of cattle, 4-500 acres of land. Small people, small farmer we don't have a bank so I think that is one of our biggest problems. I don't know if it because we are not utilizing it the proper way or management, I don't know, I don't know what ....'.

These two quotes represent perceptions of what are considered to be environmental problems, different from the majority of the interviewees in the Tourist and Land Owner/Manager categories. Both are political in nature, with the first reflecting similar concerns about the government discussed in the literature review of Belize having a strong backbone of environmental laws without the ability to support and refine them. The second quote, in addition to having a political flavor, is economically related as well. This interviewee seems to perceive environmental problems to be directly related to his personal and financial well being, not the country as a whole.

The responses of the individuals in Land Owner/Manager category concerning environmental problems directly related to land use, were much more thorough and descriptive than those of the Tourists. Three prime examples are;
'every country has to have environmental problems. Not as serious as some others. I would think that there is still the practice of milpa farming on the steep slopes and hillsides, causing all the run off of basically causing erosion into the river system........ I think I don't know how serious it is, but I'm sure there is a certain amount of run off of insecticides and things from the citrus industry going into the river system. I don't know how bad it is, cause I don't know how carefully it is being monitored, to be honest with you.'

'one major one, the clearing of land right down to the edge of the river when they plant citrus and bananas. Slash and burn, mountains being cleared, misuse of agrichemicals.'

and

'something that really has to be stopped in some way is this land use. But, primarily to hill country and hill sides. Beyond a certain grade is just not worth to cut, cut the land and use it for anything. And, and it is kind of a waste when the rough, steep hillsides planted to grow single crop of corn and put down and it's not worth anything more after that. The trees have been logged and the erosion comes ...... If you can get rid of that will probably take care of many .... of what can be a wide range of problems.'

Not all the interviewees in the Local Worker category interpreted this question about environmental problems in Belize to mean problems about the degradation of their land and/or water resources. In the Local Worker category, the category with the lowest percentage of 'yes' responses for this question (37%), the majority, (63%) of the respondents, either answered 'no' (44%), or were noncommittal (19%). Out of the 16 people interviewed, five either admitted that they were not sure what the question was asking or asked for clarification. In one of the noncommittal cases, the interviewee appeared quite uncomfortable when this question was asked. There was a relatively long hesitation which was followed by the subject nervously admitting
they didn't want to answer the question. In another case, the subject answered the contingency portion of the question which asked what the environmental problem/s was, by answering 'changes in government'. Yet another subject answered 'some of our land could be improved' and a third answered 'Belizean environment is very good'. It therefore appears that the perceptions of 'environmental problems' by almost half of the people in this category compared to those of the other two categories are different and not as well developed or understood in the technically defined physical environmental sense. Thus, this explains why the majority does not perceive Belize as having environmental problems.

The responses of people in all three categories to this question appeared to reflect the land use that each category was most familiar/unfamiliar with, and the associated types of environmental degradation. Tourists may be familiar with cities and settlement type land uses in their own country, Belize and in some cases, other countries, along with the tourism related land uses in Belize in which they have participated. The respondents in the Land Owner/Manager category have a strong direct working relationship with the land, its use and their surrounding communities. The Local Workers are familiar with their work and habitation type land use.
Question 2: Do you think Belize has water pollution problems?

The general consensus as to whether or not Belize is perceived to have water pollution problems is presented in Table 2. Out of all the people in the Combined category, 55%, perceived Belize to have water problems/pollution as well as 50% of the Tourists and Local Workers. The category with the highest percentage was the Land Owner-Managers with 67%. Although only 37% of the Local Workers perceived Belize to have environmental problems (see Table 1) in question 1, an additional 13%, or a total of 50% of this same category perceived Belize to have water problems/pollution.

The intention of this question was to determine whether or not the interviewees perceived there to be water pollution problems in Belize. Considering the different levels of education, experience, command of the English language and familiarity with Belize of people in the different categories, I
worded the question slightly different for the Tourists survey than for the Land Owner/Managers and Local Workers. This allowed the individuals in each category to best understand and relate to what the question was asking. Since the Tourists were in Belize for a relatively short period of time, the question was worded to require a more direct observation response, 'Do you feel that there is a problem with water pollution in Belize'. For the Land Owner/Managers and the Local Workers, the question was worded to require an experience level perspective, 'Do you remember any time in Belize that the water tasted bad, smelled bad or was dirtier than usual?'.

To get a more accurate idea of the interpretations made by people in each category for this question, and why the resulting perception percentages differed, the responses from the second contingency portion of the question asking what they thought caused these problems will be examined. The responses were divided into two categories, the first being 'physical/pollution related', which included responses such as 'open sewers', 'wastes' and various rainy season related attributes. The second category was 'social/political/economic related' and included responses such as 'government and money', 'laws not being enforced' and 'lack of money'.

All three categories of people related water problems/pollution primarily to physical/pollution related causes. Tourists had the lowest percentage of responses, 84%, as to water problems/pollution being related to physical causes,
citing sewage and water treatment problems, and pollution by
improper disposal such as 'litter' or 'throwing everything into
the river' as the major causes. This leaves 16% of their
responses to the problems as being related to government and
money or lack of money as being the main causes of water
problems/pollution.

The Land Owner/Managers' perceptions varied somewhat from
that of the Tourists and the general concept of the question.
About 18% of the Land Owner/Manager respondents interpreted the
question different than the general concept as demonstrated by
their collective responses (see the Transcription Appendix). Out
of all the 'yes' respondents, 94% indicated physically related
causes for Belize's water problems/pollution. The 'yes'
respondents that interpreted the question differently than the
general gist of the question, related water problems/pollution to
only a cyclic part of nature. This was demonstrated in some of
their responses of causal factors;

'raining season'

'when it's raining and flooded from creeks and roads and
jungle river'

and

'yeah, in the very real dry season. The water from the
creek goes right down, like really heavy and you know,
not good for human consumption. Like for animal yes,
but not drinking.... you gotta have a tank, build a tank
or a well you know...... if you don't have ...... need a
tank or a 60 or 70 ...... well.'

In some cases, the other 'yes' respondents did relate
natural cyclic events in their responses;

'water washes objects and garbage down because of the
'And here, it was, it was helped about cause of the drought, because the water wasn’t moving and so there was a bacteria build up that wouldn’t ordinarily be here.'

However, the majority of the 'yes' respondents cited the majority of water problems/pollution causes to be deforestation (stemming from all types of land use) and farming practices. Dead cattle floating in the river and people washing their vehicles in the river are samples of miscellaneous causes listed.

With the Local Workers, it is not as easy to determine how many interviewees did not follow the general interpretation of the question. Out of the Local Workers who responded 'yes' (50%) to this question, all perceived water problems/pollution to be caused by physically related sources. Half of these respondents interpreted the question differently than the general concept, as indicated by the responses as to what causes water problems/pollution, such as 'dirty water' and 'water get dirty with dust when it rolls from the flooding'. Of the interviewees who responded 'no' to the question, it is difficult to determine how many, if any, did not have a full understanding of what the general concept of this question was. This interpretation was based upon the very limited voluntary dialog following the 'no' response. Almost half of the 'no' responses came from Spanish speaking immigrants who had to have the survey questionnaire interpreted for them.

The responses of the individuals from each of the three
categories appeared to reflect the land use that the people in that category were most familiar/unfamiliar with, and the associated types of water problems/pollution. Tourists may be familiar with water problems/pollution in their own country, Belize or and in some cases, other countries, Land Owner/Managers have a strong direct working relationship with the land and associated water phenomena, and Local Workers are familiar with water use related to their work and personal lives.

The similarity of perception levels of Land Owner/Managers and Local Workers may be attributed to having the same 66% reliance on fluvial systems used directly for at least one source of water, whether it be creek, stream, or river. Within both categories, 34% are indirectly reliant upon the fluvial system, obtaining their water primarily from wells, rain catchment, and/or piped/treated water systems (see the Results Only Appendix). Considering that Land Owner/Managers have a higher level of responsibility and working relationship with the land and associated water use than the Local Workers, this would perhaps explain the 17% higher percentage of yes responses of the Land Owner/Managers.
Question 3: Do you think Belize has air pollution problems?

<table>
<thead>
<tr>
<th>Social Category (# of respondents)</th>
<th>Yes</th>
<th>No</th>
<th>Non-committal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined (47)</td>
<td>28%</td>
<td>60%</td>
<td>13%</td>
</tr>
<tr>
<td>Tourist (16)</td>
<td>50%</td>
<td>31%</td>
<td>19%</td>
</tr>
<tr>
<td>Land Owner/Manager (15)</td>
<td>27%</td>
<td>60%</td>
<td>13%</td>
</tr>
<tr>
<td>Local Worker (16)</td>
<td>6%</td>
<td>88%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Table 3: Do you think Belize has air pollution problems?

The percentage of the people in all categories perceiving air pollution as a problem is quite low. This coincides with the physical scientific evidence discussed in previous sections denoting air pollution is not yet being a problem in Belize. The people in the Combined category have only a 28% yes response level, with the Land Owner/Managers at 27% and the Local Workers at 6%. The individuals in the category with the highest perception percentage was that of the Tourists with 50% yes responses.

As with the second question, the wording of this question was different for the Tourists compared to the Land Owner/Managers and Local Workers for the same reasons. Tourists were asked 'Do you think there is a problem in Belize with air pollution', once again requiring an observational perspective. The Land Owner/Managers and Local Workers were asked 'Do you
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As with the second question, the wording of this question was different for the Tourists compared to the Land Owner/Managers and Local Workers for the same reasons. Tourists were asked 'Do you think there is a problem in Belize with air pollution', once again requiring an observational perspective. The Land Owner/Managers and Local Workers were asked 'Do you
think there is a problem in Belize with air smelling bad, being smokey or with it being hard to breathe’, requiring an experience perspective.

The contingency portion of the question then asked what causes these problems. This was to determine how the question was interpreted, to elicit whether or not it is perceived that Belize has air problems/pollution, what the air problems/pollution is/are and the source. The causes were then separated into two categories, the first being physical/pollution related causes, and the second being social/political/economic related causes.

The Tourists had a 50% yes response level. In this category, 65% of the yes responders felt that air problems/pollution was physical/pollution related, primarily from cars, along with a few miscellaneous sources such as burning trash. The reason why this category had the highest ‘yes’ response percentage was probably because of a combination of personal observation while in Belize, and personal experience while in their home land. That is, if all the possible air problem/pollution sources observed in Belize by the interviewees were to take place in their home land, where the population density is much higher, there would be major air problems/pollution.

Both Land Owner/Managers and Local Workers seemed to perceive the question the same. Indicative of this, aside from the ‘yes’ response, was additional voluntary dialog offered by a
couple Local Workers after responding 'no' to this question;

'No, I haven’t feel that way. So we don’t have ..... factory’

and

'No, really for our problem, no. Some, sometimes they have it in the cane factory or some of that maybe five minutes or something’.

Voluntary dialog offered by the Land Owner/Managers after a 'no' response to this question was similar to that of the Local Workers as exemplified in the following quotes;

'Well, I could say no because especially Belize is a very small country which is like you know it is not too, not to compare like with Mexico or in Guatemala which Mexico for example a lot of companies you know machines, big machines and Belize is more safe in pollution. I think that way'

'Could be in some parts. Not everywhere. I think we have ..... we don’t have too much pollution because we don’t have no big industries around'

and

'only a very small problem which is caused from cars as there is no major factories.'

Out of both categories, only two 'yes' respondents took this question very literally, by stating the sources or causes of air problems/pollution as being 'around dumps' and 'something rotting'.

The responses of the people in all three categories to this question appeared to reflect the experiences and land use that each category was most familiar/unfamiliar with. Tourists are familiar with cities and settlement type air problems/pollution in their own country and in some cases, other countries. The Land Owner/Managers and Local Workers experience level is that of every day life living and working in Belize. All three
categories do appear to have the same concept of air problems/pollution, just different experience perspectives which helps to explain the different levels of perception.
Question 4: Do you think there are water pollution problems anywhere else in the world?

<table>
<thead>
<tr>
<th>Social Category (# of respondents)</th>
<th>Yes</th>
<th>No</th>
<th>Non-committal</th>
</tr>
</thead>
<tbody>
<tr>
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<td>87%</td>
<td>4%</td>
<td>9%</td>
</tr>
<tr>
<td>Tourist (16)</td>
<td>94%</td>
<td>0%</td>
<td>6%</td>
</tr>
<tr>
<td>Land Owner/Manager (15)</td>
<td>93%</td>
<td>0%</td>
<td>7%</td>
</tr>
<tr>
<td>Local Worker (16)</td>
<td>75%</td>
<td>12%</td>
<td>13%</td>
</tr>
</tbody>
</table>

Table 4: Do you think there are water pollution problems anywhere else in the world?

Perception of water pollution problems elsewhere in the world is quite high as indicated by the responders in the Combined Category which has an 87% yes response. All the individuals in the other categories also reflect high levels of agreement, with well over 50% yes responses. The people in the category with the lowest percentage was that of the Local Workers at 75%, compared to the Land Owner/Managers with 93% and Tourists at 94%.

This question was worded only slightly different for people in each category so they could best understand and relate to what the question was asking. For the Tourists, it asked 'Do you think there is a problem in the rest of the world with water pollution'. For the Land Owner/Managers and the Local Workers it
asked, 'Do you think there is a problem in the rest of the world with bad water'.

For the people in all three categories, the contingency question asked what they thought caused these problems. This was to get a more accurate idea of the interpretation of this question by the people from each category and why the resulting yes response percentages differed. The responses related to causes were divided into two categories that correspond with question two, asking about water problems/pollution in Belize. The first causal category is 'physical/pollution related' and the second is 'social/political/economic related'.

Judging from the interviewees that responded 'yes' to this question, most of the subjects from all three categories seemed to interpret the question the same. The exceptions to this became apparent, based upon some of the physical/pollution related causes the interviewees gave. From the category of Tourists, two subjects cited 'dirty water' as causes. A few Land Owner/Managers cited similar causes of 'dirt' and 'not many clear streams'. The Local Workers cited 'volcanoes', 'too much flooding', 'earthquakes', 'hurricanes' and 'some water can’t drink out of' as causes.

The lower number of yes responses by that of the Local Workers compared to that of the Land Owner/Managers and Tourists probably stems from a lack of geographic mobility and lower levels of global education and familiarity than that of the other two categories. This may skew the Local Workers' concept of the
world, as well as their perceptions of the water problems in the rest of the world.

To the Local Workers, the world was smaller conceptually and revolved around their experiences as reflected in some of their responses to the contingency portion of this question. When they talked about other places in the world, it was about adjacent countries and/or other districts or parts of their own country. For example, two interviewees cited the causes of water problems/pollution in the rest of the world as being, "limestone makes the water salty and big ships" and "river water in Dangriga is bad". Belize has both limestone and big ships. Dangriga is the name for both a town and a district in Belize. Therefore, to these two subjects, the 'rest of the world' meant other parts of their own country.

Others talked about Guatemala, a neighboring country when they responded;

"man made ponds get dirty from cattle getting in there in the dry season and messing it up and people get water from dirty lakes that don’t have running water into them because the water just sits there"

and

"flood came from Guatemala and brought some type of disease, cholera", and "in Guatemala, people get cholera from the river cause they don’t have holes (for human excrement), they dump everything into the river".

a couple years prior to this study, there had been problems with cholera contaminated river water that came from Guatemala. This event directly affected their friends, family and everyday life. Therefore, when asked this question, over a third of the responses referenced this problem/pollution.
The Land Owner/Managers, with a higher number of yes responses, 93%, than the Local Workers with 75%, related to water problems/pollution and the concept of the world on a larger scale. Through informal discussion (most of which is included in the transcripts) during the interview, it was revealed that several of the subjects had been in other countries and/or had received college educations. This alone would have provided them with a wider geographic knowledge and reference base than that of the Local Workers.

The responses of the Land Owner/Managers did reflect more of an expanded global concept than that of the Local Workers as they incorporated water problems/pollution with countries other than their own, as well as countries outside of the Central American region. Two responses giving general causes of water pollution that could have taken place, not just in Belize, but in any country, exemplifies this are;

"sewage problems when people don't use facilities" and
"people live in the rivers and throw dead dogs".

Other quotes that demonstrate how water problems/pollution sources were related to countries on more of a global scale are simply put as;

"pollution, dirt, big barges they move from country to another"
"industrialization"
"oil spills, dumping of medical supplies and garbage"
"chemical plants"
"plants that run wastes right into the rivers and all the fish die"
and
"economics on both ends, the rulers and....., and lack of real concern for others".

Out of the 94% of the Tourists that perceived water pollution in the rest of the world, all gave causes that were global in nature, such as:

"lack of education..., use that affects the soil..., too much density of population in one area...., logging"

"water very dirty and tastes very bad...., salinization...., as the ground water table decreases .... the pollution hazards increase"

"money, sale of nature to get money"
and
"industry, ignorance, and habit".

All of the Tourists interviewed were from the developed countries of the United States, Germany, and England. And, most people from developed countries that travel tend to have a much broader global concept and knowledge base than do the Local Workers. Part of this is because of the research travelers have a tendency to do before, during and after they choose a destination. During the interview, the majority of the subjects from this category discussed various references they had themselves used for Belize, whether it was word of mouth, written reference books or formal geography classes. Being better traveled than the Local Worker and having the opportunities of a higher education also contribute to a broader world outlook and awareness.
Question 5: Do you think there are air pollution problems anywhere else in the world?

<table>
<thead>
<tr>
<th>Social Category</th>
<th>Yes</th>
<th>No</th>
<th>Non-committal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined (47)</td>
<td>83%</td>
<td>6%</td>
<td>11%</td>
</tr>
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<td>87%</td>
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<td>19%</td>
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</tbody>
</table>

Table 5: Do you think there are air pollution problems anywhere else in the world?

The perception overall for this question is that the majority feel there is air pollution problems elsewhere in the world, as demonstrated by the 83% yes responses of interviewees, in the Combined category. Similar to the previous question, the category with the lowest level of awareness for this question is Local Workers with 69%. The Land Owner/Managers had a 93% percentage of yes responses and the Tourists had 87%.

There are other similarities between this question, asking about air pollution elsewhere in the world, and the previous question asking about water problems/pollution elsewhere in the world. For the sake of consistency, this question was also worded only slightly different for Tourists than Land Owner/Managers and Local Workers. For Tourists it was asked, "Do
you think there is a problem in the rest of the world with air pollution" and for the other two categories it was worded, "Do you think there is a problem in the rest of the world with bad air".

The contingency portion of the question for all three categories, just like previous question, asked what they thought caused these problems. Both parts of the question were asked in order to get a more accurate idea how people in each category interpreted this question, and why the resulting yes response percentages differed. To keep this portion of the question consistent with the previous question, the causes were divided into two categories, physical/pollution related and social/political/economic related.

Only 2 responses out of 23 from the Land Owner/Managers were indicative of interpretations of the question differing from the general concept, denoting 'factories in the north exploding' and 'astronauts, Germans, Americans doing things that interfere with the atmosphere' as causes of air problems/pollution. However, at least 3 out of 12 (25%) causal responses by the Local Workers reflected a difference of interpretation, listing 'because of sickness', 'some places that burn up and the bad air floats around', and 'war and accidents' as causes of air problems/pollution.

The differing interpretations and lower number of yes responses of the Local Workers compared to that of the Land Owner/Managers and Tourists, as with the previous question,
probably stems from a lack of geographic mobility and lower levels of global knowledge and familiarity compared to the other two categories. This would skew the Local Workers' concept of the world, as well as their perceptions of associated air problems/pollution.

As stated in the previous question, the Local Worker's world is conceptually smaller and it revolves around their more limited experiences. This is reflected in some of their responses as listed below;

'Well, I would think like those big cities where they have those big uh, those companies that have those big uh, places you know. Where they have a lot of place all around, even in Guatemala, Mexico'

'Yeah, a lot of places around the world, but .... I can't .... air pollution there is in Mexico'

and

'In Guatemala, they can hardly breath from factories'.

As these examples depict, when the Local Worker talked about other places in the world, it was usually about adjacent countries.

The Land Owner/Managers, with the highest percentage of yes responses, 93%, related to air problems/pollution and the concept of the world on a larger scale. Many responses were not specific and could take place any where in the world. They included such general causes of global air problems/pollution as big or huge countries, factories, industries, and cars. Other interviewees however, were much more specific and mentioned countries other than those adjacent to Belize;

'I would imagine there has to be when you can't see
across ... you know, Los Angeles on ... the you know, you know ... on a Sunday you can sometimes see quite nicely across the whole of the city, but when Monday comes you have an absolute nightmare again. There has to be a problem doesn't there'

'It depends on the country. Well, by and large American country .... but around here, ... Guatemala, most countries are zoning properly. You got industrial areas .... you know ... and some environmental laws ... because of the heavy environmental laws in the States there, they are inviting all the manufacturing to come down and do what they damn well please'.

and

'I read recently that Argentina and ... I read ... where the ozone layer is getting a little thinner. Recently I read an article of sheeps going blind in the mountains because ... from pollution of course. And the layer was so thin so .. that would be a problem, no?'

As stated in the discussion of the previous question, through conversation, most of which took place during the interview and is included in the transcripts, it was revealed that several of the subjects had been in other countries and/or had received college educations. Thus, having had more actual geographic experience, education and exposure, it would provide a larger base of knowledge which would influence the perceptions of the Land Owner/Managers.

Tourists, with an 87% of yes responses about air problems/pollution, also gave causes that were global in nature. Like the Land Owner/Managers, many generalized, giving cars, industry, and factories as the primary causes of air problems/pollution in the world. Other causes dealt with lack of regulations/restrictions, money and not utilizing technology. a couple examples cited more specific geographic location as follows;
'Yeah. In the world? Yeah, lots of countries don’t have restrictions on manufacturing. Mainly I think that there is a lot of cities. Mexico City, yeah, even L.A. for that matter.'

and

'Yeah, like in Bangkok .... overpopulation ... public transport .... like in London, .... more in developed countries...... cars .... overpopulation .......

As discussed in the previous question, all the Tourists interviewed were from the developed countries of the United States, Germany, and England. And, most people from developed countries that travel tend to have a much broader global concept and knowledge base than that of the Local Workers. Part of this is because of the research travelers have a tendency to do before, during and after they choose a destination. When answering questions not being used for this study, the majority of the subjects from this category discussed various references they had themselves used for Belize, whether it was word of mouth, written reference books or college level geography classes. Being better traveled than the Local Workers and having the opportunities of a higher education also contribute to a more worldly outlook and awareness.
Question 6: Have you heard of ecotourism?

<table>
<thead>
<tr>
<th>Social Category (# of respondents)</th>
<th>Yes</th>
<th>No</th>
<th>Non-committal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined (47)</td>
<td>85%</td>
<td>11%</td>
<td>4%</td>
</tr>
<tr>
<td>Tourist (16)</td>
<td>81%</td>
<td>6%</td>
<td>13%</td>
</tr>
<tr>
<td>Land Owner/Manager (15)</td>
<td>93%</td>
<td>7%</td>
<td>0%</td>
</tr>
<tr>
<td>Local Worker (16)</td>
<td>81%</td>
<td>19%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Table 6: Have you heard of ecotourism?

Note: In the Local Worker Category, 38% of the yes responses had heard the term but was not sure of the meaning.

The people in the Combined category with an 85% of yes responses demonstrate the overall high level of awareness of the ‘ecotourism’ concept. The high levels of yes responses by the Land Owner/Managers, 93%, and the Local Workers, 81%, probably reflects the success of a public relations program on ecotourism completed by numerous organizations and governmental departments in Belize.

As discussed in the study area and literature review sections, this type of land use has become the second highest source of revenue for the economy. Therefore, in order to reach out and increase the level of awareness of as many locals as possible, many avenues of mass media has been pursued. Ecotourism is taught in schools, is continuously presented in local and international publications, and is presented in
training classes and public meetings throughout the country. One resort owner even has informal discussions with all employees about the environment, preserving their culture and ecotourism as well as taking an active part in working with surrounding villages to do the same.

Although, the Tourists had a relatively high number of yes responses, 81%, this awareness of the term 'ecotourism' may have been higher had the term been used more commonly worldwide. The term originated in the United States and has been a 'buzz-word' in travel and tourism now for over six years. But, 38% of the Tourists were not from the United States.

To determine whether or not the interviewees actually understood the concept of 'ecotourism' or had just heard the word, the contingency portion of the question asked what their definition of the word was or what they knew about it. The responses were then divided into two categories. The first category was 'responses not incorporating environmental protection and tourism together'. The second was 'responses incorporating environmental protection and tourism together'. As far as perception of the basic concept, judged by definitions incorporating environmental protection and tourism together, Tourists had the highest percentage rate (88%) of yes responses, followed by Land Owner/Managers (77%) and the Local Workers with 61%.

The Local Workers' percentage however, may be skewed somewhat because of the translation situation. Three out of four
interviewees from this category had the same translator. After the interpreter asked the question exactly as it appeared on the Spanish questionnaire, the interviewees appeared confused (each was interviewed separately), so the translator reworded it in his own way (it had already been predetermined that the translator was knowledgeable of the ecotourism concept).

All three of the subjects then responded 'yes' to the first portion of the question. The responses given by the interviewees for the contingency portion of the question as they were translated from Spanish to English by the interpreter and are as follows;

"not cut too much mountains and so on, more environment is better"

"minding trees and not cutting them down"

and

"I have heard on the news, not to cut down too much, to take care of the forest".

If the responses had not been so similar, there would not be a question as to the reliability of the results. Unfortunately, the taped interviews for these subjects in question could not be relied upon. During the interview, there had been too much background noise recorded along with the responses to allow later deciphering.
Social Category Perception Comparison

<table>
<thead>
<tr>
<th>Question</th>
<th>Tourist</th>
<th>Land Owner/Manager</th>
<th>Local Worker</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 1</td>
<td>81%</td>
<td>73%</td>
<td>37%</td>
</tr>
<tr>
<td>Question 2</td>
<td>50%</td>
<td>67%</td>
<td>50%</td>
</tr>
<tr>
<td>Question 3</td>
<td>50%</td>
<td>27%</td>
<td>6%</td>
</tr>
<tr>
<td>Question 4</td>
<td>94%</td>
<td>93%</td>
<td>75%</td>
</tr>
<tr>
<td>Question 5</td>
<td>87%</td>
<td>93%</td>
<td>69%</td>
</tr>
<tr>
<td>Question 6</td>
<td>81%</td>
<td>93%</td>
<td>81%</td>
</tr>
</tbody>
</table>

Table 7: Social Category Perception Comparison

By comparing the percentage of yes responses from the people of each category for the first five questions related to the environment, a trend appears. One implying that an association exists between the people in each social category and the percentage of yes responses about environmental problems/pollution or degradation. In three out of the five environmental related questions, the Tourists had higher levels of yes responses compared to those of the Land Owner/Managers and four out of the five environmental questions with the Local Workers (the fifth being tied at 50%). Thus, the Tourists had higher overall percentages of yes responses than both the Land Owner/Managers and the Local Workers. In the case of the Land Owner/Managers compared to the Local Workers, the Land
Owner-Managers had a higher percentage of yes responses for all five of the environmental questions.

Another implication is that there is a bond between the people in each social category and the type of land use that category is most associated with. As discussed within the individual questions, people have a tendency to perceive things dependent upon life experiences. All of the Tourists are from developed countries with high population densities, large industrialized cities, factories, technologically sophisticated agriculture, and a large number of cars. Therefore, they are most familiar with land uses found in developed countries and their experiences with those land uses.

A prime example of this is with question three which asked about air pollution in Belize. The Tourists had the highest percentage of yes responses, 50%, compared to Land Owner/Managers with 27% and the Local Workers with 6%. Their perception of Belize having air problems/pollution was contrary to the physical scientific evidence denoting a lack of air problems/pollution. Just as discussed with the question, however, the experience of the Tourists observing what they considered to be sources of air problems/pollution in Belize was combined with their experience in their home land. Thus, if all the perceived possible air problem/pollution sources observed in Belize by the interviewees were to take place in their home land where the population density is much higher, there would be major air problems/pollution.
Even though both the Land Owner/Managers and the Local Workers are involved in the same types of land use, the Land Owner/Managers had a consistently higher percentage of yes responses than did the Local workers. This is probably due to a combination of both the social implications of social category association and the land use experience bond. The Land Owner/Managers deal with land use in a different capacity which is more involved than the Local Workers. The Local Workers takes orders from Land Owner/Managers without having to take into consideration other influences. Also, the Land Owner/Managers have to take more responsibility, not only for themselves, but for their workers and stewardship of the land. Thus, it is their responsibility to have a closer working relationship with the land, and to be more aware of environmental degradation. This differentiates their social category from that of the Local Workers.

Other factors affecting social category differentiation and the land use experience bond were also involved. As discussed previously, several Land Owner/Managers had been in other countries and/or had received college educations. This provided them with more actual geographic experience, education and exposure than Local Workers.

The spatial geographic land use experience bond of the Local Workers was especially limited. As a working class, most of the subjects live either at or within close proximity (walking distance) to where they work, and usually can’t afford to travel
to other parts of the country. This would therefore limit their concept of the world, as discussed previously. The Local Worker category related and referred directly to their experiences when asked about water problems/pollution in both Belize and globally. Some of their specific responses were as follows:

"I haven't gone no place"

"When I walk about Belize (Belize City), I know that they have dirty water sometimes"

and

"the only place I know, the river is bad and smell bad is in Orange Walk (the subject had worked there previously).....you know, and the river doesn't run like Macal River (in the Cayo District where they work now)".

The biggest contributing factor of these social category differences just discussed above is economics. Economics or the lack of, influences the immigrants to come to Belize in order to work and send money back to their families or to bring them to Belize. Their main concentration is on the basics of physical survival for their families; putting food on the table and having shelter. Most of them work at least six days a week. This does not allow for leisure time or the financial means to experience or be exposed to much more than their immediate surroundings. Aside from the mass media of local Belizean publications and limited radio and television, there are many other mediums that could cause an increase in their perception percentage of environmental situations.

On the other side of the local Belizean spectrum, the Land Owner/Managers main concentration is not as basic as that of
meager existence. Their families are older, they have a more upscale life style in which they can afford to travel occasionally, and they usually possess both radios and televisions. Thus, their main focus, although still economically related, is on a higher financial plane. Only 7% of those interviewed were a single person operation that did not afford at least some temporary workers to hire as needed.

As discussed in various previous sections of this paper, Tourists, being from developed countries, are at a financial advantage compared to Local Workers and Land Owner/Managers. Hence, their lifestyle affords them more accessibility to various environmental conditions. Mass media is overflowing in developed countries compared to developing countries, continuously discussing world conditions. Higher education is more of the norm in developed countries compared to developing countries. People from developed countries also have much more discretionary income in which to travel and broaden their spatial geographic experiences.
Category Profile

Other background characteristics pertinent to perception and relationship formation that were uncovered in the first part of the survey questionnaire will now be examined. The various characteristics scrutinized for each category have been combined to form a characteristic profile of each social category.

This profile gives the highest percentage component of the individual characteristics listed about each category. In parenthesis is the number of characteristic responses divided by the total number of responses to give the respective percentage. In some cases the questions required a multiple item response which is reflected by the higher numbers in parenthesis.

Tourists:
1) 62% were U.S. citizens (10/16)-100% were from developed countries
2) 50% were college students (8/16)-88% is a combination of both college students and professionals
3) 37% were less than 25 years of age (6/16)
4) 80% were in Belize to visit environmental type attractions (including Mayan ruins) (56/70)
5) 95% were in the Cayo District to visit environmental type attractions (including Mayan ruins) (46/48)
6) 46% liked the natural history and or environmental type aspects best about Belize (21/46)
7) 86% like current culture or social aspects the least about Belize (38/44)
8) 56% had already seen the Belizean rain forest (9/16)
9) 100% felt rain forests should be conserved or protected (16/16)

Land Owner/Managers:
1) 46% were 41 years of age or older (7/15)
2) 33% had a white ethnical type background (also not born in Belize) (5/15)
3) 40% did not have Belizean parentage (6/15)
4) 93% were totally Belizean owned without any foreign association (28/30)
5) 73% were owners or a combination of owners/managers (11/15)
6) 60% have worked their land by either owning it or operating it for at least six years or more (9/15)
7) 53% of their businesses were directly related to tourism (10/19) which includes tourist resorts and/or tourist attractions
8) 33% chose the type of land use based upon personal decisions (5/15)
9) 66% had owned land before their current holding/s (10/15)

Local Workers:
1) 37% were less than 25 years of age (6/16)
2) 75% were born in Belize (12/16)
3) 94% had been at their current jobs 5 years or less (15/16)
4) 57% of those that had worked at other jobs, preferred jobs directly related to tourism (4/7)
The first component of the profile from the Tourist category is nationality or ethnicity. The United States had the largest representation at 62%. However, 100% were from developed countries thus having the same social implications of the land use/experience bond and social category as discussed earlier in this section.

The second component is that of job or position in the economic strata. Although 50% were college students, 88% were a combination of college students and/or professionals. This supports the social implications discussed with the previous environmental questions that Tourists have been exposed to geographic education, wide varieties of land use in their country and in other countries which broadens their concept of the world and influences their perception levels.

The third component of age, is one that is shared among all three categories, so therefore will be discussed at this point for all three categories. The median age for the Tourists was 29 years, for the Land Owner/Managers, it was 40 years, and for the Local Workers, it was 29 years. Although both the Tourists and the Local Workers median age was the same, their level of perception was quite different. As presented in the social category discussion, the number of yes responses of the Tourists were higher for all five of the environmental questions than that of the Local Workers. Actually, the yes response percentages were closer between the Tourists and Land Owner/Managers for all five of the questions, than it was between the Tourists and Local
Workers or between Land Owner/Managers and Local Workers. Therefore, it is implied that in this study age was not a factor affecting perception levels.

Category profile components 4 & 5 for the Tourists had high percentages, 80% and 95% respectively (see the Category Profile above). These two components represent the type of land use in both Belize and the Cayo District, that attracted the Tourists to the country and the District. Both the yes response percentages of the Tourists with regards to the five environmental awareness questions and these two components were relatively high. Thus, the social implications for these two components is that there is a relationship between the type of land use drawing the Tourists to Belize and the Cayo District, and the high level of environmental problem/pollution awareness.

The sixth component represents what the Tourists liked the best about Belize. These items were broken down into three categories; current culture/society related, natural history/environment related, and miscellaneous/unable to categorize. The highest percentage, 46%, liked the natural history/environment related items the best. Thus, for this component, there is a relationship between the type of land use preferred in Belize by the Tourists, and the high level of environmental problem/pollution awareness.

For the next component representing what the Tourists liked the least about Belize, the response items were broken down into the same three categories. With this component, the highest
percentage, 86%, disliked current culture/society related aspects the most. This implies that a relationship does exist between high percentage levels of negative land use experience and high levels of environmental problems/pollution perception.

The last two components deal with whether or not the Tourists have visited the rain forest and/or if they feel rain forests should be conserved and/or protected. Although 56% had already seen the Belizean rain forest, 100% felt that they should be protected. This implies that a relationship does exist between land use experience, with the majority having already visited the rain forest, and the high level of perception about environmental problems. Another implication is that a relationship exists between high perception levels of environmental problems/pollution, and the viewpoint that land should be used for rain forest preservation and/or conservation.

The first component of the category profile for the Land Owner/Managers and Local Workers, age, has already been discussed. Therefore, the second and third components for the Land Owner/Managers and the second component for the Local Workers related to ethnicity will be discussed. Out of all the ethnic categories used by the 1991 Demographic Division Statistics, the predominant one for the Land Owner/Managers, 33%, was 'white'. The five members making up this category consisted of three Americans, one British and one German. In regards to parentage, 60% had either Belizean or part Belizean parentage. For the Local Workers, 75% of them were born in Belize with 56%
of their parents being Belizean or part Belizean. Therefore, the social implications for these two categories is that a relationship exists between direct Belizean ancestry and lower perception percentages about environmental problems/pollution. However, due to the limited data and small number of responses, further research should be conducted before drawing any concrete conclusions.

Profile components four and five for the Land Owner/Managers reflect a 93% Belizean ownership out of all the interviewees for this category that own land, and a 73% representation of owners and/or owner/managers out of all the interviewees for this category. The high percentage of both of these components seems to imply that from both categories of local Belizeans, the Land Owner/Managers and the Local Workers, those that own land tend to have a higher perception level of environmental problems/pollution than those that do not.

Component six from the Land Owner/Managers' category profile represents duration of current social/economic status, that of having owned or operated land. This compares with component three of the Local Workers' category profile representing their current social/economic status of duration at their current job. The percentage of Land Owner/Managers that owned or operated their current land holding for six years or more was 60%. The percentage of Local Workers that had been at their place of employment for five years or less was 94%. Only 6% of the Local Workers had been in their current position for six years or more.
Thus, the social implications for this component is that longer durations of work experience, responsibility and/or ownership raised the level of environmental problems/pollution.

For the seventh component of the Land Owner/Managers' category profile, 53% of the interviewees' businesses were directly related to tourism. This includes land uses directly related to tourism such as tourist resorts and/or tourist attractions including archaeological sites, national parks and natural history sites. Land use for this component was broken down into three categories. The first is livestock, poultry, citrus, agriculture related. The second is tourist resort with the third being miscellaneous revenue production which included land uses such as a plant nursery, combination store, restaurant, gas station and bar, archaeological sites, and a combination poultry, citrus, used cars and cash crop farming.

The predominance of land use related to tourism is probably influenced to a lesser degree than the actual case, as it was not determined whether any of the other types of land use were indirectly related to tourism. Therefore, even though there is only a slight majority of the land uses related to tourism, the type of land use may have influenced the perception level of this category. This would be due to the necessity of having a healthy environment and being environmentally aware of any existing or potential problems/pollution that would otherwise have a negative impact on the draw of tourist to Belize and the Cayo District.

Although the next component of how the type of land use was
determined is not really related to perception of environmental problems/pollution, it does have social implications vital to the preservation and/or conservation of the environment. Out of the five categories related to how decisions were arrived at for the current type of land use, personal choice had the highest percentage level at 33%. The social implications thus reflect that personal choice and experience predominantly influences actual behaviors related to land use. Therefore, supporting the widely held concept that if land is to be preserved and/or conserved, environmental protection efforts must be geared to the individuals' experiences and existing relations with the land.

The last component of the Land Owner/Managers category profile represents the percentage of interviewees, 66% that has previously owned land before their current holding/s. This figure itself does not reflect any social implications. However, it does support the implications discussed above that yes response percentages are higher for the Land Owner/Manager category than the Local Workers because of higher responsibility levels.

The first three components of the Local Workers category profile have already been discussed. Therefore, the last component to be presented is the percentage of those that had worked at other jobs, and how many preferred jobs directly related to tourism, which is 57%. This does not have any direct social implications with regards to the level of perception about environmental problems/pollution. It simply implies that job
preferences are based upon past work experience.
By examining the percentages of yes responses for the five environmental questions, social trends have appeared. One is an association between levels of environmental awareness and social category. The Tourists had consistently higher number of yes responses than both the Land Owner/Managers and the Local Workers in the majority of the questions. In three out of the five environmental related questions, the Tourists had higher numbers of yes responses compared to that of the Land Owner/Managers. Compared to the Local Workers, the Tourists had higher percentages of yes responses in four out of five environmental questions with the fifth being tied at 50%. In turn, the Land Owner/Managers had higher percentages of yes responses for all five of the environmental questions than did the Local Workers.

Overall percentages for the five environmental questions were relatively close between the Tourists and the Land Owner/Managers. That is, there was only an average of 10.8% per question difference between the Tourists yes responses and that of the Land Owner/Managers. The difference between the Tourists and the Local Workers had a much larger difference at 25% per question. The yes percentage differences between the Land Owner/Managers and the Local Workers at 23.2% per question was similar to the difference between Tourists and the Local Workers.

Another implication that can be ascertained is that of a bond existing between the social category and the type of land
use that category is most familiar with. As demonstrated throughout this study and discussed in the results and discussion section, people have a tendency to perceive things they can relate to, which is primarily dependant upon their experiences in life.

Tourists for example, are all from developed countries with high population densities, large industrialized cities, factories, technologically sophisticated agriculture, and masses of cars. Therefore, they are most familiar with land uses found in developed countries and their experiences are with those land uses. The land use they are most familiar with in Belize is associated with tourism. An example of the Tourists relating to both land uses in their country and land uses in Belize was found with the question about air pollution in Belize. Contrary to physical scientific evidence, at least 50% of the Tourists perceived Belize as having air problems/pollution. The high level of yes responses for this question was probably arrived at by the Tourists by relating the sources of air problems/pollution in Belize to their home lands which have much higher population densities.

The Land Owner/Managers and the Local Workers are primarily involved in the same types of land use. Considering that the Land Owner/Managers had a consistently higher percentage of yes responses, than did the Local Workers, this may indicate that other factors may be influential. This has been credited to a combination of two social implications, a social category
association and a land use experience bond.

The Land Owner/Managers have land use experiences on a different level than that of the Local Workers. The Land Owner/Managers have the responsibility of giving instructions and supervision to the Local Workers as well as for the stewardship of the land. Thus, the Local Workers' responsibility is primarily limited to following instructions set forth by the Land Owner/Managers, doing a good job so they can remain employed, and to support themselves and their families. Thus, the Land Owner/Managers usually have more responsibilities in working with the land and are more aware of environmental degradation. This I consider to be the primary difference between the Land Owner/Managers and the Local Workers.

Other background factors and individual characteristics involved in perception and relationship formation were examined in this thesis as well. Through informal conversation, relationships were found to exist between higher levels of education and travel experience, and higher levels of perception. A similar relationship existed between social categories and the level of education and travel experience. This became apparent by examining the social category's respective concept of the world. For the Tourists and the Land Owner/Managers, it took on a much more global perspective than that of the Local Workers. For the Local Workers, the concept of 'world' was relatively much smaller, and related to local and regional geographic spatial entities. This was exemplified in the previous discussion of
questions when they related environmental problems elsewhere in the world as taking place in other areas or districts within their own country and/or to adjacent countries.

Economics was found to be a limiting factor with regard to land use experiences. This was especially true for the Local Worker category. Their financial situation did not afford them the luxury of the same type of lifestyle as that of the Tourist and Land Owner/Managers. Therefore, their exposure was also more limited with respect to travel and even mass media, both of which can be very influential in perception formation.

The first background characteristic examined from the Category profile of age, did not appear to have any influence on the perception levels. However, for the Tourists, a different type of relationship was revealed; that of a parallel between natural history types of experiences and attractions they liked the best about Belize and the Cayo District, and high perception percentages of environmental problems/pollution. Another Tourist related implication is that a relationship exists between high levels of environmental problems/pollution with the viewpoint that land should definitely be used or set aside for rain forest preservation/conservation.

Social implications with regard to ethnicity were examined for the Land Owner/Managers and Local Workers. Local Workers had a much higher percentage of Belizean parentage and/or ethnicity than that of the Land Owner/Managers. The Local Workers had the lowest percentages of yes responses. As it appears, the higher
the percentage of Belizean parentage and or ethnicity, the lower the awareness level. More research should be done in this area however, to determine whether or not this would hold true with further testing.

Land ownership and duration of the social/economic status of job type of the Land Owner/Managers and Local Workers also appeared to have a direct influence on awareness levels. The Land Owners had much higher levels of land ownership, duration at their current job type and awareness levels. Therefore, the higher the level of land ownership and duration at job type, the higher the level of awareness.

Considering that land in the Cayo District of Belize was quite often used for a multitude of uses, it was extremely difficult to develop well defined categories of land use as was originally intended. A slight majority of Land Owner/Managers were directly involved in tourism related land uses. There was also a small percentage of Local Workers that had held down more than one type of job that preferred working with direct tourism related land uses. Neither of these considerations involved land use indirectly related to tourism. Therefore, it was determined that an association between land use and awareness levels was not indicated.

In summation, perceptions and levels of awareness were found to be affected by many factors and background characteristics. Thus, this thesis successfully answered the research question of what variations of perceptions exist among three categories of
the social construct; Local Workers, Land Owners/Managers, and Tourists in the Cayo District of Belize'. Specific factors revealed in this study related to background and individual characteristics, also answered the part of the research question requiring examination of various characteristics involved in perception and relationship formation such as social status, ethnological makeup, age, level of environmental awareness, personal experiences and individual attitudes towards local political and economic situations.

Considering that the studies discussed previously in the literature review have shown that the success or failure of any program is dependent upon the perception of the people, especially the locals, the intentions of this study was to provide an understanding of the perceptions that exist about the environment, how they vary according to social position, and what some of the factors are that affect perception formation in the Cayo District of Belize. It is vital for individuals, and the society they live in, to become aware of environmental situations, and to understand that relationships to environmental issues are directly related to personal experiences and/or knowledge. It is also important to determine the action needed to conserve natural resources, as it all affects our very existence as humans. This study was meant to serve, and support Belize and to assist them with their goal of accomplishing sustainable development and environmental preservation.

This research design and results, will hopefully be utilized
in the future as a tool for accomplishing their goal and to assist in land use management, resource conservation and environmental protection. This tool can be used in many ways. For example, the results from this study can be used to guide the design and enhancement of future land use management programs and public relations efforts needed to reach the various sectors of social structure about environmental issues. It can also be used by the Government of Belize and the various NGOs as a design method to determine what the people of Belize perceive their problems to be and how they can best be helped. Nothing can be more defeating, worthless, or counter-productive, than an outsider coming into a country and telling the locals what their problems are, what they need, and how they, the outsiders, can fix it. Belize is a beautiful country filled with many interesting people and I can only hope that in some small way, I have been able to provide a positive contribution.
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Maps
Appendix I

Results Only

Note: A copy of the complete transcriptions are available upon request
Responses From Questions Asked of All Three Categories
(47 Total Responses)

Demographic/Individual Background Information Questions

The only relevant question and responses not pertaining to the environment that was asked of all three categories, was that of age:

**Question:**
How old are you?

**Answer:**

**Tourists:**
36/22/22/19/19/27/30/39/40/44/49/26/27/25/21/21
Median age: 29.19

**Land Owner/Managers:**
29/35/51/47/31/46/55/55/42/33/16/36/36/39/52
Median age: 40.20

**Local workers:**
54/16/28/32/29/25/21/52/46/17/20/24/25/26/33/18
Median age: 29.13

Total Combined Median Age: 32.68

**Categoric Responses According to Age Groups**

**Tourists:**
Under 25: 6(37.50 or 38%) 25-30yrs: 5(31.25 or 31%)
31-40yrs: 3(18.75 or 19%) 41 and over: 2(12.50 or 12%)

**Land Owner/Managers:**
Under 25: 1(6.67 or 7%) 25-30yrs: 1(6.67 or 7%)
31-40yrs: 6(40.00 or 40%) 41 and over: 7(46.66 or 46%)

**Local workers:**
Under 25: 6(37.50 or 38%) 25-30yrs: 5(31.25 or 31%)
31-40yrs: 2(12.50 or 12%) 41 and over: 3(18.75 or 19%)
Total Combined Responses According to Age Groups

Under 25: 13 (27.67 or 28%)  
25-30yrs: 11 (23.40 or 23%)  
31-40yrs: 11 (23.40 or 23%)  
41 and over: 12 (25.53 or 26%)

Environmental Questions and Responses

The questions and responses pertaining to the environment that were asked of all three categories, are stated as follows:

Note: The Non-committal response is considered as the interviewee being not sure, didn’t know or didn’t answer for any reason.

Total Combined Responses

Questions and Responses:

Do you think Belize has any environmental problems?
Yes: 30 (63.83 or 64%)  
No: 11 (23.40 or 23%)  
Non-committal: 6 (12.77 or 13%)

Do you think Belize has water pollution problems?
Yes: 26 (55.31 or 55%)  
No: 15 (31.92 or 32%)  
Non-committal: 6 (12.77 or 13%)

Do you think Belize has air pollution problems?
Yes: 13 (27.66 or 28%)  
No: 28 (59.57 or 59%)  
Non-committal: 6 (12.77 or 13%)

Do you think there is water pollution problems anywhere else in the world?
Yes: 41 (87.23 or 87%)  
No: 2 (4.26 or 4%)  
Non-committal: 4 (8.51 or 9%)

Do you think there is air pollution problems anywhere else in the world?
Yes: 39 (82.98 or 83%)  
No: 3 (6.38 or 6%)  
Non-committal: 5 (10.64 or 11%)

Have you heard of ecotourism?
Yes: 40 (85.10 or 85%)  
No: 5 (10.64 or 11%)  
Non-committal: 2 (4.26 or 4%)

Of the yes, those not sure of the meaning: 10 (21.28 or 21%)
### Demographic/Individual Background Information Questions

<table>
<thead>
<tr>
<th>Age Category</th>
<th>Yes Response</th>
<th>No Response</th>
<th>Non-committal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 25</td>
<td>6 (37.50 or 38%)</td>
<td>1 (6.25 or 6%)</td>
<td>2 (12.50 or 13%)</td>
</tr>
<tr>
<td>25-30 yrs</td>
<td>5 (31.25 or 31%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31-40 yrs</td>
<td>3 (18.75 or 19%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41 and over</td>
<td>2 (12.50 or 12%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median Age</td>
<td>29.18</td>
<td></td>
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</tr>
</tbody>
</table>

### Environmental Questions/Responses

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes Response</th>
<th>No Response</th>
<th>Non-committal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you think Belize has any environmental problems?</td>
<td>13 (81.25 or 81%)</td>
<td>1 (6.25 or 6%)</td>
<td>2 (12.50 or 13%)</td>
</tr>
<tr>
<td>Do you think Belize has water pollution problems?</td>
<td>8 (50.00 or 50%)</td>
<td>2 (12.50 or 12%)</td>
<td>6 (37.50 or 38%)</td>
</tr>
<tr>
<td>Do you think Belize has air pollution problems?</td>
<td>8 (50.00 or 50%)</td>
<td>5 (31.25 or 31%)</td>
<td>3 (18.75 or 19%)</td>
</tr>
<tr>
<td>Do you think there is water pollution problems anywhere else in the world?</td>
<td>15 (93.75 or 94%)</td>
<td>0 (00.00 or 0%)</td>
<td>1 (6.25 or 7%)</td>
</tr>
<tr>
<td>Do you think there is air pollution problems anywhere else in the world?</td>
<td>14 (87.50 or 88%)</td>
<td>0 (00.00 or 0%)</td>
<td>2 (12.50 or 12%)</td>
</tr>
<tr>
<td>Have you heard of ecotourism?</td>
<td>13 (81.25 or 81%)</td>
<td>1 (6.25 or 6%)</td>
<td>2 (12.50 or 13%)</td>
</tr>
<tr>
<td>Of the yes, those not sure of the meaning:</td>
<td>0 (00.00 or 0%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Demographic/Individual Background Information Questions

#### How old are you?
- 29/35/51/47/31/46/55/55/42/33/16/36/36/39/52
- Under 25: 1 (6.67 or 7%)  
- 25-30yrs: 1 (6.67 or 7%)  
- 31-40yrs: 6 (40.00 or 40%)  
- 41 and over: 7 (46.66 or 46%)
- Median Age: 40.20

### Environmental Questions/Responses

#### Do you think Belize has any environmental problems?
- Yes: 11 (73.33 or 73%)
- No: 3 (20.00 or 20%)
- Non-committal: 1 (6.67 or 7%)

#### Do you think Belize has water pollution problems?
- Yes: 10 (66.67 or 67%)
- No: 5 (33.33 or 33%)
- Non-committal: 0 (0%)

#### Do you think Belize has air pollution problems?
- Yes: 4 (26.67 or 27%)
- No: 9 (60.00 or 60%)
- Non-committal: 2 (13.33 or 13%)

#### Do you think there is water pollution problems anywhere else in the world?
- Yes: 14 (93.33 or 93%)
- No: 0 (00.00 or 0%)
- Non-committal: 1 (6.67 or 7%)

#### Do you think there is air pollution problems anywhere else in the world?
- Yes: 14 (93.33 or 93%)
- No: 1 (6.67 or 7%)
- Non-committal: 0 (00.00 or 0%)

#### Have you heard of ecotourism?
- Yes: 14 (93.33 or 93%)
- No: 1 (6.67 or 7%)
- Non-committal: 0 (00.00 or 0%)

Of the yes, those not sure of the meaning: 4 (26.67 or 27%)
Demographic/Individual Background Information Questions

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 25</td>
<td>6</td>
<td>37.50%</td>
</tr>
<tr>
<td>25-30 yrs</td>
<td>5</td>
<td>31%</td>
</tr>
<tr>
<td>31-40 yrs</td>
<td>2</td>
<td>12.50%</td>
</tr>
<tr>
<td>41 and over</td>
<td>3</td>
<td>18.75%</td>
</tr>
<tr>
<td>Median Age</td>
<td>29.13</td>
<td></td>
</tr>
</tbody>
</table>

Environmental Questions/Responses

Do you think Belize has any environmental problems?
Yes: 6 (37.50 or 37%)  No: 7 (43.75 or 44%)  Non-committal: 3 (18.75 or 19%)

Of the seven (7) no responses, their water sources were:
- Piped water: 2 (28.57 or 29%)
- Creek: 2 (28.57 or 29%)
- River: 2 (28.57 or 29%)
- Well: 1 (14.29 or 13%)

Do you think Belize has water pollution problems?
Yes: 8 (50.00 or 50%)  No: 8 (50.00 or 50%)  Non-committal: 0 (0.00 or 0%)

Do you think Belize has air pollution problems?
Yes: 1 (6.25 or 6%)  No: 14 (87.50 or 88%)  Non-committal: 1 (6.25 or 6%)

Do you think there is water pollution problems anywhere else in the world?
Yes: 12 (75.00 or 75%)  No: 2 (12.50 or 12%)  Non-committal: 2 (12.50 or 13%)

Do you think there is air pollution problems anywhere else in the world?
Yes: 11 (68.75 or 69%)  No: 2 (12.50 or 12%)  Non-committal: 3 (18.75 or 19%)

Have you heard of ecotourism?
Yes: 13 (81.25 or 81%)  No: 3 (18.75 or 19%)  Non-committal: 0 (0.00 or 0%)
Of the yes, those not sure of the meaning: 6 (37.50 or 37%)

Note: Considering that the word ecotourism is an American-coined 'term', it is questionable as to whether or not the translation was understood by three (3) of the Spanish-speaking interviewees.
Tourists Category Questions/Responses
(16 Total Interviewees)

Note: The total number of responses, if different than the number of interviewees, is stated directly under the corresponding question and before the results.

| Demographic/Individual Background Information Questions/Responses |
|-------------------------------------------------------|-----------------------------|
| 1. What country are you from?                         |
| U.S.: 10(62.50 or 63%)                                |
| Germany: 4(25.00 or 25%)                              |
| England: 2(12.50 or 12%)                              |
| 2. What is your profession?                           |
| Student: 8(50.00 or 50%)                              |
| Professional: 6(37.50 or 38%)                         |
| Misc./Nonprofessional: 2(12.50 or 12%)                |
| 3. How old are you?                                   |
| How old are you?                                      |
| Under 25: 6(37.50 or 37%)                             |
| 25-30yrs: 5(31.25 or 31%)                             |
| 31-40yrs: 3(18.75 or 19%)                             |
| 41 and over: 2(12.50 or 13%)                          |
| Median Age: 29.18                                     |
| 10. What attractions are you going to visit while in Belize? (Total of 70 Responses) |
| Environment Dependant Attractions                     |
| (Nature or Outdoor Related): 56(80.00 or 80%)        |
| Countryside/jungle/wildlife: 7 Beaches: 3 Nature Hike: 2 |
| River/boat/canoe trips: 8 Ruins: 11 1000' Falls: 2    |
| Interior Blue Hole: 2 Panti Medicine Trail: 4         |
| 5 Scuba/snorkeling/reef: 4 Fishing: 2 Horse-back      |
| riding: 4 Mountain Pine Ridge: 2                      |
| Nonenvironment Dependant Attractions                  |
| (Non Nature or Outdoor Related): 8(11.43 or 11%)      |
| Nothing too touristy: 2                               |
| Other towns: 6                                        |
| Misc. Unable to Categorize                             |
| (Could Fall into Either Category): 6(8.57 or 9%)      |
| Cayes: 6                                              |
11. What attractions are you going to visit while in the Cayo District?

   (Total of 48 Responses)

   Environment Dependant Attractions
   (Nature or Outdoor Related): 46(95.83 or 96%)
   Ruins: 13  River/boat/canoe trips: 7  Nature Hike: 2
   Countryside/jungle/wildlife: 5  Panti Medicine Trail: 4
   1000' Falls: 2  Caves: 3  Horse-back riding: 4
   Mountain Pine Ridge: 2  Interior Blue Hole: 2
   Waterfalls: 2

   Nonenvironment Dependant Attractions
   (Non Nature or Outdoor Related): 2( 4.17 or 4%)
   Benque Festival-2

18. What three things do you like the best about Belize?
   (Total of 46 Responses)

   Current Culture/Society Related: 18(39.13 or 39%)
   People: 9  English Speaking: 1  Food: 2
   Multicultural: 1  Multinational environ/Wide Belizean History: 1
   Relaxed Environment: 2  Diversity of People/Land: 1
   Experiencing Different cultures: 1

   Natural History/Environment Related: 21(45.65 or 46%)
   Weather: 1  Nature/Natural surroundings: 3  Ruins: 5
   Jungle: 3  Ecotourism Efforts: 2  Fairly Intact Rainforest: 3
   Flora/Fauna: 1  Coral Reef: 1  Ocean: 1
   Beautiful Country: 1

   Misc./Unable to Categorize: 7(15.22 or 15%)
   Makeup, Infrastructure and Landscape: 2  Compact country: 1
   Concentration of things to see and do: 1  Lobster: 1
   It’s not touristy: 2

19. What three things do you like the least about Belize?
   (Total of 44 Responses)

   Current Culture/Society Related: 38(86.36 or 86%)
   Crime: 4  Poverty: 2  Expensive/harassing taxis: 2
   Language Barrier: 2  Drugs: 2  Rubbish/trash: 4
   Infrastructure: 3  Expensive Car Rentals: 2  Belize City: 6
   Food: 2  Service People need training: 2  Begging: 2
   Buses: 1  Time frame not as punctual: 1  Cultural adjustment: 1
   Prices higher than Guatemala/expensive: 2

   Natural History/Environment Related: 6(13.64 or 14%)
   Mosquitos: 6

20. How do you think the sanitary conditions are in Belize?
Good, have not observed any negative: 0 (0%)
Okay, have seen both good and bad: 11 (68.75 or 69%)
Bad for the most part: 2 (12.50 or 12%)
Non-committal: 3 (18.75 or 19%)

Note: Non-committal in this case will take into account those that do not have an opinion, don't know and/or don't want to say.

21. Do you drink bottled water?
Yes: 16 (100 or 100%)  No: 0 (0%)
Non-committal: 0 (0%)
(If yes), why?
(Total of 12 Responses)
Safety/health: 10 (83.33 or 83%)  Habit: 2 (16.67 or 17%)

22. Have you seen the Belizean rainforest?
Yes: 9 (56.25 or 56%)  No: 7 (43.75 or 43%)
Non-committal: 0 (0%)

23. Do you think the rainforest should be conserved?
Yes: 16 (100.00 or 100%)  No: 0 (0%)
Non-committal: 0 (0%)
(If yes), what do you think is the best way to do it?
(Total of 18 Responses)
Land-Use Related: 13 (72.22 or 72%)
Set aside reserves/preserves/ecosystems: 6 Limit development: 3
Limit land for cattle: 1 Live in harmony: 2
Educate not to overdevelop: 1
Social Related: 5 (27.78 or 28%)
Educate locals: 2 Boycott wood products: 2
Communal effort w/ gov & Locals: 1
(If yes), how do you think it should be funded?
(Total of 19 Responses)
Tourist Related Funding: 9 (47.37 or 47%)
Charge money to see: 2 Resort Owners Give Something Back: 1
Concentrate on other sources of income like tourism: 6
Combination Tourist/Non-Tourist Related Funding: 2 (10.53 or 11%)
Taxes, tourist income, and some from locals: 2
Non-Tourist Related Funding: 7 (36.84 or 37%)
Have revenue from rainforest products go to local people: 1
From other countries that can afford it: 1 Fund raisers: 1
Government funded: 2 Outside organizations: 1
Volunteers to teach: 1
Misc. Responses: 1 (5.26 or 5%)
Environmental Questions/Responses

24. Do you think that Belize has any environmental problems?
Yes: 13(81.25 or 81%) No: 1( 6.25 or 6%)
Non-committal: 2(12.50 or 13%)

(If so), what are they?
(Total of 46 Responses)

Directly Related to Land Use: 7(15.22 or 15%)
Tourist density: 1 Cutting forests for cattle: 1
Clearcutting forests: 1 Sensitive reef: 1
Development: 2
Slash and Burn Agriculture: 1

Indirectly Related to Land Use or Social Related: 39(84.78 or 85%)
Note: Sub-categories are in parenthesis with the percentage of this category listed first followed by overall percentage for this question.

(Population Related: 5/12.82 or 13% and 10.87 or 11%)
Population density: 3
(Pollution in some form: 33/84.62 or 85% and 71.74 or 72%)
Pollution: 3 Water pollution: 1 Trash: 2 Open Sewers: 2
Litter: 4 Not being able to recycle: 2 Haulover Creek: 2
Waste disposal systems: 1 Throwing trash/things in river: 1
Car exhaust: 4 Air Pollution: 1 Fuel generation: 1
Smoke from smoke stack in San Ignacio: 2 Lack of plumbing: 2
Dumping in ocean: 2 Burning of trash: 1
Lack of sanitation: 1 Laundry in rivers: 1

(Strictly Social: 1/2.56 or 3% and 2.17 or 2%)
Government/Money: 1

(If so), what/who is responsible for these problems?
(Total of 24 Responses)

Economic Related: 9(37.50 or 38%)
Industry development: 2 Ones making money off of them: 2
Rich individual/greedy: 2 Those needing to survive: 2
Lack of money: 1

Political/Control Related: 7(29.17 or 29%)
No control/need better control: 3 Government: 2
Needs environmental agency to oversee: 2

Socially Related: 8(33.33 or 33%)
The world: 2 Need education: 4 Lack of sanitation: 1
People don’t care: 1
25. Do you feel that there is a problem with water pollution in Belize?
Yes: 8 (50.00 or 50%)  No: 2 (12.50 or 12%)
Non-committal: 6 (37.50 or 38%)

(If yes), what do you think causes these problems?
(Total of 19 Responses)
Physical/Pollution Related: 16 (84.21 or 84%)
Open sewers: 2  Not being able to recycle: 2  Pollution: 2
Haulover Creek: 2  Throwing everything in river: 2
Water spills over reservoir and doesn’t get treated: 2
Belize City water looks bad: 2  Sewage drainage: 2  Litter: 2

Social/Political/Economic Related: 3 (15.79 or 16%)
Government and money: 1  Lack of money: 1
Money not being used for improvements: 1

(If yes), what do you think can be done to make this problem better?
(Total of 12 Responses)
Physical/Anti-Pollution Related: 6 (50.00 or 50%)
Plumbing: 3  Sanitation: 1
Provide alternative to releasing sewage in ocean/water: 2

Social/Political/Economic Related: 6 (50.00 or 50%)
Government control: 2  Educate people: 2  Fines for corporations: 1
Try finding energy alternatives: 1

26. Do you think there is a problem in Belize with air pollution?
Yes: 8 (50.00 or 50%)  No.: 5 (31.25 or 31%)
Non-committal: 3 (18.75 or 19%)

(If yes), what do you think causes these problems?
(Total of 17 Responses)
Physical/Pollution Related: 11 (64.71 or 65%)
Pollution: 2  Car exhausts: 2  Cars: 3  Burning trash: 2
Smoke from smoke stack in San Ignacio: 2

Social/Political/Economic Related: 6 (35.29 or 35%)
No regulations/requirements: 4  Slash and burn agriculture: 2

(If yes), what do you think can be done to make this problem better?
(Total of 11 Responses)
Physical/Anti-Pollution Related: 2 (18.18 or 18%)
Better cars-2

Social/Political/Economic Related: 9 (81.82 or 82%)
Limit the industry-2  Clean up manufacturing: 2
Smog control: 2  Overhaul development and main streets: 1
Provide different farming methods: 1
Regulate cars per area: 1

27. Do you think there is a problem in the rest of the world
with water pollution?
Yes: 15(93.75 or 94%) No: 0(00.00%)
Non-committal: 1(6.25 or 6%)

(If yes), what do you think causes these problems?
(Total of 31 Responses)

**Physical/Pollution Related:** 19(61.29 or 61%)
- Dirty water: 2
- Bad tasting water: 2
- Salinization: 1
- Water table lowering w/ pollution increasing: 2
- Land use: 1
- Logging: 1
- Dumping in oceans: 2
- Raw Sewage: 2
- Fertilizers/pesticides: 1
- Industry: 2
- Sewage Drainage-2
- Mismanagement of waste products: 1

Note: Industry in this research is considered in the
Physical/Pollution category due to the physical nature of its
production by-products.

**Social/Political/Economic Related:** 12(38.71 or 39%)
- Lack of education: 1
- Population density: 1
- Money(selling off nature to get money): 2
- Greed: 2
- Ignorance: 2
- Habit: 2
- Lack of resources/money: 2

(If yes), what do you think can be done to make this problem
better?
(Total of 26 Responses)

**Physical/Pollution Related:** 4(15.39 or 15%)
- Treat sewage: 1
- Better sewage treatment: 1
- Waste management: 2

**Social/Political/Economic Related:** 22(84.61 or 85%)
- Education: 7
- Making sanitary conditions available to all: 1
- Have private companies treat sewage: 1
- Regulations: 2
- More awareness: 2
- Help from government: 2
- Prioritize: 2
- Charities: 2
- Better Control: 2
- More Management From Companies that Produce Waste: 1

28. Do you think there is problem in the rest of the world with
air pollution?
Yes: 14(87.50 or 87%) No: 0(00.00 or 0%)
Non-committal: 2(12.50 or 13%)

(If yes), what do you think causes these problems?
(Total of 32 Responses)

**Physical/Pollution Related:** 22(68.75 or 69%)
- Cars/trucks: 8
- Industry: 4
- Steel Industry: 1
- Factories: 3
- Traffic jams: 1
- Combustion engines: 1
- Burning coal: 2
- Smoke stacks: 2
Social/Political/Economic Related: 10 (31.25 or 31%)
Money (Selling Nature to get Money): 2  Population Density: 3
No Car Restrictions/Manufacturing Controls: 2
Car Industry Not Using Technology: 2  Don't Use Train Enough: 1

(If yes), what do you think can be done to make this problem better?

(Total of 23 Responses)
Physical/Pollution Related: 2 (8.69 or 9%)
Cleaner Cars: 1  Cleaner burning engines: 1

Social/Political/Economic Related: 21 (91.30 or 91%)
Some ideas, all talk no action: 2  Stricter controls: 1
Regulations/More regulations: 4  Ozone alert days: 1
Education: 4  Use neutral technology (like golf carts): 2
Elimination of use of PFCs: 2  Not using single cars: 2
Discourage use of a/c because of PFCs: 1  More awareness: 1
Taking different measures to control: 1

29. Have you heard of ecotourism?
Yes: 13 (81.25 or 81%)  No: 1 (6.25 or 6%)
Non-committal: 2 (12.50 or 12%)

(If so), what do you know about it?

Responses not incorporating environmental protection and tourism together: 2 (12.50 or 12%)

It is necessary to do something to come into countries: 2

Note: This, more than likely is attributed to the exact verbiage of the response without taking into consideration the context of the immediately previous questions and verbiage which was related to environmental issues and the interviewee's concern for protection of the environment.

Responses incorporating environmental protection and tourism together: 14 (87.50 or 88%)

People attracted to natural areas: 1
Things that don't disrupt resources, environmentally friendly activities, things that don't deplete the natural resources: 2
Joint venture between tourism and protecting natural resources: 2
Inviting tourism without damaging the environment, ecology in the area, awareness of how you can enjoy the country w/out disturbing it: 1
Inviting tourism without damaging the environment, ecology in the area, awareness of how you can enjoy the country w/out disturbing it and promoting tourism in a way that requires the tourist to accommodate him or herself to the location rather than the location accommodate the tourist: 1
Travelers to help preserve rainforests: 1
An attempt to allow people to come and see the rain forests, in natural, in it's natural setting, but at the same time let them have all the nice things they have back home, like a canoe trip and coming back to a nice cabin with hot water: 1.
Having touristy things to see, environment in natural setting and more of going into the environment rather than cities: 1
Making people more aware of resources, giving an opportunity to visit, usually for profit. A problem though is money not going to locals and locals being exploited: 1
1. How old are you?

29/35/51/47/31/46/55/55/42/33/16/36/36/39/52
Under 25: 1(6.67 or 7%) 25-30yrs: 1(6.67 or 7%)
31-40yrs: 6(40.00 or 40%) 41 and over: 7(46.66 or 46%)
Median Age: 40.20

2. What is your ethnic background?
(Belizean or foreign born - if Belizean, what descent, i.e. Spanish, Creole, Mayan, Garifuna)

Creole: 1(6.67 or 7%)  Indian: 0 (0%)  Garifuna: 0 (0%)
Mayan: 1(6.67 or 7%)  Mennonite: 0 (0%)  Chinese: 1(6.67 or 7%)
Mestizo: 3(20.00 or 20%)  Syrian/Lebanese: 0 (0%)
White: 5(33.33 or 33%)  Other: 4(26.66 or 26%)

Note: The above ethnic categories are as found in the 1991 Demographic Division Statistics.
The 'Other' category includes 1 Guyanese, 1 Mayan/English mix, 1 Belize/Lebanese mix, 1 Belize/Creole mix
The 'White' category includes 3 American, 1 British, 1 German,

3. Are your grandparents Belizean?

Yes: 8(53.33 or 53%)  No: 6(40.00 or 40%)
Part Belizean: 1(6.67 or 7%)

**Belizean:** 8(53.33 or 53%)
Belize: 2  Mayan: 1  Mestizo: 1  Belize Mix: 1
Creole/English: 1  Creole/Indian: 1  Belize/Creole: 1

**Non-Belizean:** 6(40.00 or 40%)
German: 1  British: 1  American: 3  Chinese: 1

**Part Belizean:** 1(6.67 or 7%)
Mestizo/Arab: 1
Note 1: The above categories were derived from "The Rhythm of Belize" in which Belizeans are considered to be broken down into four primary categories; Mestizo (Spanish and Mayan descent), Creoles (African and European), Mayan, and Garifuna (Amerindian Caribs and African).

Note 2: Although the original question was designed to ask about grandparents, responses were given by interviewees as to parentage. Therefore the question and responses reflect the informal (without retyping the survey questionnaires) change to parentage.

4. Is this property locally owned or foreign owned and individual or corporate owned?

Local individual: 3 (20.00 or 20%)
Local independent: 3

Local corporate: 11 (73.33 or 73%)
Local government: 2 Local family owned: 7
Local corporation: 1 Local limited: 1

Foreign individual: 0

Foreign corporate: 0

Combination Local and foreign owned: 1 (6.67 or 7%)
Local Canadian corporation: 1

(If not self-owned, then are you the manager?)
Manager: 4 (26.67 or 27%)
Owner: 11 (73.33 or 73%)

5. How many years and months have you owned/managed this land?

Less than one year: 1 (6.67 or 7%)
7mos.: 1

One - five years: 5 (33.33 or 33%)
1yr: 1 4yr/4mo: 1 5yr/3mo: 1 4yr/2½ resort: 1
4yr(3yr/10mo): 1

Six - ten years: 3 (20.00 or 20%)
9yr lease/2yr own: 1 10yr: 1 7yr(6yr/6mo): 1

Eleven - fifteen years: 2 (13.33 or 13%)
14yr Land/12yr business/9yr processing and retail: 1 14yr: 1

More than fifteen years: 4 (26.67 or 27%)
22yrs/3yr resort: 1 18yrlmo: 1 20yr: 1 28yr: 1
Note: Considering that the question asked about the duration of land owned and or managed, the responses have been categorized by the longest temporal term whether it was owned or managed.

7. What type of business/land use is this?

Livestock, poultry, citrus, agriculture related: 6(40.00 or 40%)
Cattle only: 1  Citrus only: 1  Citrus/cattle: 1
Agriculture/livestock: 1  Livestock/farming: 1
Farming/livestock/citrus/meat processing/sales: 1

Tourist resorts: 4(26.67 or 27%)
Resort only: 4

Miscellaneous revenue production: 5(33.33 or 33%)
Archaeological: 2  Nursery only: 1
Store/restaurant/gas station/bar: 1
Poultry/citrus/used car lot/cash crop farming: 1

Note: The original subcategories of 1) livestock/poultry, 2) agriculture and citrus production, 3) tourist resorts, 4) combination livestock/poultry and agriculture, and 5) other miscellaneous revenue production has been changed to better reflect the categories found during the actual interviews.

Is the entire property used for this every season?
Yes: 10(66.67 or 67%)(Regardless of mixture or single use)
No: 5(33.33 or 33%)

(If not), what are the other uses?
Note: This part of the question was combined with the responses to the following question and listed thereafter.

9. How was it decided how the land would be used?
   (i.e. governmental influence/family influence/influenced by foreign investors/influenced by friends)

Personal decision: 5(33.34 or 34%)
Personal intention/choice: 2
Personal choice to join brothers and start their family corp.: 1
Personal decision/loves farming: 1
Self determined, felt cattle is good investment, not labor intensive, and ready cash: 1

Family related decision: 3(20.00 or 20%)
Family/business venture/love to farm: 1
Inherited from father: 1
Family came to Belize to look for land, seemed interesting and found their place: 1
Government related decision: 2 (13.33 or 13%)
Government: 2

Previously established business: 3 (20.00 or 20%)
Part of it was already a nursery: 1
It was established business: 1
Poultry already established/put in citrus instead of farming: 1

Misc.: 2 (13.33 or 13%)
Used to work for resorts/building houses: 1
Necessity (personal/fiances): 1

10. How long has the property been used the way it is now?

Less than one year: 0 (0%)

One to five years: 4 (26.66 or 27%)
3yr: 2  2½ yrs: 1  2-3yrs: 1

Six to ten years: 6 (40.00 or 40%)
8-10yrs: 1  10yrs: 1  9yrs: 1  7yr: 2  6yr/6mo: 1

Eleven to fifteen years: 1 (6.67 or 7%)
15yrs: 1

More than fifteen years: 3 (20.00 or 20%)
Over 40yrs: 1  17yrs-citrus/3 yrs citrus/cattle: 1
24yrs: 1

Not sure: 1 (6.67 or 6%)

12. Have you owned or managed land before this?
Yes: 10 (66.66 or 67%)  No: 4 (26.67 or 27%)
NA: 1 (6.67 or 6%)

(If so), were you the owner or manager?
Worker-manager: 1 (10%)  Manager: 3 (30%)
Owner/manager: 1 (10%)  Owner: 4 (40%)  No response: 1 (10%)

Environmental Questions/Responses

17. Do you think that Belize has any environmental problems?
Yes: 11 (73.33 or 73%)  No: 3 (20.00 or 20%)
Non-committal: 1 (6.67 or 7%)

(If so), what are they?
(Total of 34 Responses)
Directly Related to land use: 18 (52.94 or 53%)
Slash and burn: 4    Complete degradation of the land: 1
Clearing forest too close to river/creek: 2    Deforestation: 4
Land should be reserved for animals in certain areas: 1
Mountains being cleared/farming on too steep of slopes causing erosion and runoff into the river system: 4    Erosion: 1
Low cut: 1

Indirectly Related to Land Use or Social Related: 16(47.06 or 47%)  

Note: Sub-categories are in parenthesis with the percentage of this category listed first followed by overall percentage for this question.

(Population Related: 0 or 0)

(Pollution in some form: 11/68.75 or 69% and 32.35 or 32)
Litter: 1    Rivers are running brown and muddy: 1
Chemical related, pesticide runoff and misuse of agri-chemicals: 3
Problems w/ waste disposal/no sanitary land fill: 4
Lack of proper sewage plants: 1    Fires south of Hummingbird: 1

(Strictly Social: 5/31.25 or 31% and 14.71 or 15)
Lack of implementing/enforcing environmental laws: 2
Small farmers can’t get help from the government: 1
Government needs to make arrangements to replant forests: 1
Lack of zoning for land use: 1

(If so), what/who is responsible for these problems?
  (Total of 15 Responses)
Economic Related: 1(6.67 or 7)
Tourism industry: 1

Political/Control Related: 4(26.67 or 26)
Should define a certain grade of hill that can’t be touched and some kind of regulatory vehicle to determine the steepness of the hill and where the cut off line is: 1
The ministries: 1    No proper disposal for all types of chemicals: 1
Land should be reserved: 1

Socially Related: 10(66.66 or 67)
To change must have workshops through Forestry Dept.: 1
Mayans and immigrants: 1    Lack of knowledge: 1
Cleaning up, but not spoiling what is there: 1
Not contouring land: 1    Not split farming: 1
Erosion from everybody including corporations farming: 1
Wrong priorities including the politicians lack of knowledge and wrong priorities: 1
Everybody wants to get their money out today instead of looking at it in the long term: 1
People disregard environmental issues by just looking at today and not worrying about tomorrow: 1

18. What is your water source?

**At least one source from the natural fluvial system:** 10 (66.67 or 67%)
- Spring and 2 reservoirs: 1
- Rain water/drinking and water from river: 1
- River: 3
- Rivers/wells/ and ponds w/ storage tanks: 1
- Creek, running irrigation and storage tank: 1
- Barton Creek and rain catchment: 1
- Rain water and Macal River: 1

**Wells, rain catchment or piped/treated water systems:** 5 (33.33 or 33%)
- Water catchment: 1
- Deep ground well: 1
- Piped water: 1
- Wells: 2

19. Do you remember any time that the water tasted bad, smelled bad or was dirtier than usual?

Yes: 10 (66.67 or 67%)
No: 5 (33.33 or 33%)
Non-committal: 0 (0%)

(If yes), when?
- A couple years ago: 1
- When there are floods: 1
- Rainy season: 1
- Every dry season: 1
- All the time: 1
- May ('95) before the rainy season started: 1

(If yes), what do you think causes these problems?

**Physical/Pollution Related:** 16 (94.12 or 94%)
- Rainy season: 1
- Farming clear up to the river banks: 1
- Water washes objects and garbage down because of flood: 1
- When it's rainy and flooded from creeks and roads and jungle river: 1
- When it floods/rainy season: 1
- Rain: 1
- Farm runoff: 1
- Rivers dirty from the runoff/erosion: 1
- Drought: 1
- Bacteria build up: 1
- Animal waste: 1
- People washing vehicles in the river: 2
- Farmers farming right up to the river cause it's their only water source: 1
- When people cut down forests right beside the river and then it washes down: 1

**Social/Political/Economic Related:** 1 (5.88 or 6%)
- Laws not being enforced: 1

(If yes), what do you think can be done to make this problem better?
Physical/Anti-Pollution Related: 5 (35.71 or 36%)
- Cleaning up sewage problems: 1
- Stop washing vehicles in river: 1
- Get good wells and big pump or good tanks: 1
- Not getting water directly from the rivers but from wells: 1
- Farming further from the rivers: 1

Social/Political/Economic Related: 6 (42.86 or 43%)
- Involve the community: 1
- Enforce existing laws: 1
- Through the agriculture officer in every town have him talk to all the people and their families: 1
- Create laws: 1
- Combination education and law enforcement and fines: 1
- Making sure that we pay attention to the problems: 1

Misc: 3 (21.43 or 21%)
- NA: 1
- Nothing can be done: 1
- Nothing because it's a natural phenomena (algae in river): 1

20. Do you think there is a problem in Belize with air smelling bad, being smokey or with it being hard to breath?
Yes: 4 (26.67 or 27%)
No: 9 (60.00 or 60%)
Non-committal: 2 (13.33 or 13%)

(If yes), when?
All the time: 1

(If yes), what do you think causes these problems?

Physical/Pollution Related: 5 (100%)
- Small amount from cars: 1
- Burning to clear the land: 1
- Slash and Burn: 1
- Burning garbage: 1
- Something rotting: 1

Social/Political/Economic Related: 0

(If yes), what do you think can be done to make this problem better?

Physical/Anti-Pollution Related: 0

Social/Political/Economic Related: 0

21. Do you think there is a problem in the rest of the world with bad water?
Yes: 14 (93.33 or 93%)
No: 0 (00.00 or 0%)
Non-committal: 1 (6.67 or 7%)

(If yes), what do you think causes these problems?
Physical/Pollution Related: 21 (87.50 or 88%)
Sewage problems when people don’t use facilities: 1
Pollution: 1
Dirt: 1
Big barges move from one country to another: 1
Erosion: 1
People live in rivers and throw dead dogs: 1
Chemical plants: 1
Not many clear streams: 1
No vegetation: 1
Garbage: 1
Things going into the river that don’t belong: 1
Pesticides: 1
Industrialization: 1
A lot of pollution: 1
Heavily cropped: 1
Clearing too close to the road: 1
Ozone getting thinner: 1
Oil spills: 1
Dumping of medical supplies: 1
Not clean water: 1
Plants that run wastes right into the rivers and all the fish die: 1

Social/Political/Economic Related: 3 (12.50 or 12%)
Control population: 1
Lack of real concern for others: 1
Economics: 1

(If yes), what do you think can be done to make this problem better?
(Total of 17 Responses)
Physical/Pollution Related: 7 (41.18 or 41%)
Have facilities available: 1
When one tree is cut, plant 10: 2
Burn everything (but then smoke would go up): 1
Stop putting things in the river that doesn’t belong: 1
Control vegetation and if no roots, can not hold water in the soil: 1
Making disposal and recycling facilities accessible: 1

Social/Political/Economic Related: 8 (47.06 or 47%)
Education: 3
Government policy: 1
Strong governmental commitment: 1
Enforcement: 1
Train chairmen in the villages and or mayors to train the people: 1
Cracking down on regulations and clamping down on lifestyles: 1

Misc: 2 (11.76 or 12%)
Don’t know: 2

22. Do you think there is problem in the rest of the world with bad air?
Yes: 14 (93.33 or 93%)
No: 1 (6.67 or 7%)
Non-committal: 0 (0%)
(If yes), what do you think causes these problems?
(Total of 23 Responses)

**Physical/Pollution Related**: 17(73.91 or 74%)
- Factories/manufacturing: 5
- Smoke/fire: 2
- Machinery: 1
- Cars: 2
- Industrialization/industries: 3
- Factories in the north exploding: 1
- Chemicals/chemical plants: 2
- Smog from exhaust fumes: 1

**Social/Political/Economic Related**: 5(21.74 or 22%)
- Huge countries: 1
- Economics on both ends: 1
- No proper zoning: 1
- Companies moving to developing countries because of lower standards: 1
- Astronauts (Germans, Americans doing things that interfere with the atmosphere): 1

**Misc.**: 1(4.35 or 4%)
- Hard to control: 1

(If yes), what do you think can be done to make this problem better?
(Total of 14 Responses)

**Physical/Pollution Related**: 2(14.29 or 14%)
- Cleaner industries: 1
- Close the factories: 1

**Social/Political/Economic Related**: 7(50.00 or 50%)
- Laws must grow with industries: 1
- Enforcement: 1
- Technology: 1
- Control population: 1
- Cracking down on regulations and clamping down on lifestyles: 1
- Put tons of pressure on big companies and government: 1
- Need to look more closely (probably the United Nations) whenever they want to explore something: 1

**Misc.**: 5(35.71 or 36%)
- NA: 1
- Never ends, can’t stop it: 1
- Have to get used to it: 1
- Don’t know because of costs and money: 1
- No way to stop it: 1

23. Have you heard of ecotourism?
- Yes: 14(93.33 or 93%)
- No: 1(6.67 or 7%)
- Non-committal: 0(0%)

(If so), what do you know about it?
(Total of 14 Responses)

**Note sure of definition**: 4(28.57 or 29%)
- Don’t know exactly, need more education of planning of that worldwide: 1
Responses not incorporating environmental protection and tourism together: 1 (7.14 or 7%)
Try to plan and work for more and more ideas, work together to make it better, same as tourism: 1

Responses incorporating environmental protection and tourism together: 9 (64.29 or 64%)
Sustainability of life through the promotion of travel, to the benefit of all people and life in the country: 1
It is the next big thing in Belize, keeping the environment as it is in a natural state and being able to see animal in their environment: 1
Ecological tourism: 1
New man era, learn to live with the environment and it is shifty, terrible, a bandwagon of nomenclature that everybody wants to get in on that is not good: 1
Putting the tourist in as natural of an environment as possible so they can enjoy the natural environment in a safe manner, maybe an education, but still be pleasurable: 1
Using natural surroundings to get people more in touch with nature. A lot of people are misusing the term, calling themselves ecotourist attractions: 1
It will be ecotourism until they start spoiling it and it will happen. You cannot go into a place and expect to leave it the same way every time you leave it. Just your presence will cause a reaction of whatever is around there. But, we do need to keep the word for the good of Belize so that the more people hear it the more they think about the environment: 1
Trying to get back to earth, tourist getting back to earth, no big fancy recreational places: 1
Mainly when the tourist says that tourists are concerned about what’s happening in the world and that they go and have some understanding and appreciation of other cultures and also of their environment maybe they can see stuff that needs to be done: 1
## Local Workers Category Questions/Responses
16 Total Interviewees

### Demographic/Individual Background Information

#### Questions/Responses

1. **How old are you?**

   How old are you?
   54/16/28/32/29/25/52/17/20/24/25/26/33/18
   Under 25: 6(37.50 or 38%) 25-30yrs: 5(31.25 or 31%)
   31-40yrs: 2(12.50 or 12%) 41 and over: 3(18.75 or 19%)
   Median Age: 29.13

2. **Were you born in Belize?**
   Yes: 12(75%) No: 4(25%)

   **(If so), did you grow up here?**
   (Total of 12 Responses)
   Yes: 11(91.67 or 92%) No: 0 (0%)
   Non-committal: 1(8.33 or 8%)

   **(If so), what is your ancestry? (i.e. Spanish, Creole, Mayan, Garifuna)**

   Creole: 2 Indian: 1 Garifuna: 0 Mayan: 0
   Mennonite: 0 Mestizo: 6 Chinese: 0 Syrian/Lebanese: 0
   White: Other: 3

   Note: The above ethnic categories are as found in the 1991
   Demographic Division Statistics.
   Other includes: Belizean(Spanish), Spanish, and Indian/Spanish mix
   White includes

   **(If not), where were you born?**
   Guatemala: 4

   **(If not), where did you grow up?**
   Belize: 1 Guatemala/El Peten: 3

   **(If not), what is your ancestry? (i.e. Spanish, Honduran)**
3. Are your grandparents Belizean?

Yes: 7(43.75 or 44%)  No: 7(43.75 or 44%)
Part Belizean: 2(12.50 or 12%)

**Belizean:** 7(43.75 or 44%)
Belizean: 5  Mestizo: 1  Belizean/Creole: 1

**Non-Belizean:** 7(43.75 or 44%)
Guatemalan and Spanish: 1  Spanish: 1  Guatemalan: 2
Honduras and Dutch: 1  Indian and Spanish: 1
Mexican and Guatemalan: 1

Part Belizean: 2(12.50 or 12%)
Spanish and Mestizo: 1  Spanish and Creole: 1

Note 1: The above categories were derived from "The Rhythm of Belize" in which Belizeans are considered to be broken down into four primary categories; Mestizo (Spanish and Mayan descent), Creoles (African and European), Mayan, and Garifuna (Amerindian Caribs and African).

Note 2: Although the original question was designed to ask about grandparents, responses were given by interviewees as to parentage. Therefore the question and responses reflect the informal (without retyping the survey questionnaires) change to parentage.

5. How many years and months have you worked there?

**Less than one year:** 8(50.00 or 50%)
5 wks: 1  6mo: 1  7mo: 2  8 mo: 1  9mo: 2  10mo: 1

**One - five years:** 7(43.75 or 44%)
1yr: 1  1yr. 8 mo.: 2  2yrs. 6mo: 2  3yrs: 1  5yr 6mo: 1

**Six - ten years:** 1(6.25 or 6%)
6yr: 1

**Eleven - fifteen years:**

**More than fifteen years:**

6. What kind of work do you do?

**Livestock, poultry, citrus, other agriculture related:** 7(43.75 or 44%)
Farming overseer: 1  Working w/ cattle: 2
Citrus and Cattle: 1  Agriculture: 1  
Everything and transplanting: 1  In field transplanting: 1

Tourist related: 4(25.00 or 25%)  
Transfer people: 1  Kitchen help(resort): 1  Run Canoes: 1  
Foreman/supervise(resort): 1

Miscellaneous revenue production related: 5(31.25 or 31%)  
Work in the back(nursery): 1  Propagation(nursery): 1  
Cook, kitchen, waitress(misc.): 1  Secretary: 1  
Assistant head caretaker: 1

Note: The original subcategories of 1)livestock/poultry, 2)agriculture and citrus production, 3)tourist resorts, 4)combination livestock/poultry and agriculture, and 5) other miscellaneous revenue production has been changed to better reflect the categories found during the actual interviews.

7. Why do you work here?
Predominately Economical: 5(31.25 or 31%)
Has a family: 2  Needs a job: 1  
Only place I can find a job: 1  Not many other jobs to choose from: 1

Likes the work: 8(50.00 or 50%)
Likes the work: 2  They needed help and I just stayed here: 1  
Owners are good to him: 1  This is his field: 1  
I like to work in the field: 1  Likes to work in Belize: 1  
Likes to work and likes to work at that place: 1

NA: 3(18.75 or 19%)

9. Have you worked any place else?
Yes: 7(43.75 or 44%)  No: 9(56.25 or 56%)

10. What type of work do you like to do the best?

Tourism Related: 4(25.00 or 25%)
Driving: 1  Cooking, kitchen, waitress: 1  
Cleaning: 1  Canoeing(outfitting): 1

Non-tourism Related: 3(18.75 or 19%)
Citrus: 1  Farm supervisor: 1  Cement work: 1

NA: 9(56.25 or 56%)

Environmental Questions/Responses
11. Do you think that Belize has any environmental problems?  
Yes: 6 (37.50 or 37%)  No: 7 (43.75 or 44%)  
Non-committal: 3 (18.75 or 19%)  
(If so), what are they?  
(Total of 6 Responses)  
Directly Related to Land Use: 2 (33.33 or 33%)  
Some of our land could be improved: 1  
People cutting too much rain forest for building and some cut forests and don’t use it here: 1  
Indirectly Related to Land Use or Social Related: 4 (66.67 or 67%)  
Note: Sub-categories are in parenthesis with the percentage of this category listed first followed by overall percentage for this question.  
(Population Related: 0)  
(Pollution in some form: 3-75%/50%)  
River: 1  Water pollution: 1  Wastes: 1  
(Strictly Social: 1-25%/17%)  
Changes in government: 1  
(If so), what/who is responsible for these problems?  
(Total of 5 Responses)  
Economic Related: 0 (0%)  
Political/Control Related: 0 (0%)  
Socially Related: 5 (100%)  
Usually foreigners: 1  The government: 2  Leadership: 1  
People abuse it: 1  
12. What is your water source?  
At least one source from the natural fluvial system: 9 (56.25 or 56%)  
Creek: 2  Creek for misc./rain water for drinking: 1  
Piped water from river: 1  Tank and the river: 1  River: 3  
Treated river water: 1  
Wells, rain catchment or piped/treated water systems: 7 (43.75 or 44%)  
Piped water from reservoir: 2  Well: 3  
Pump and well: 1  Piped water: 1  
13. Do you remember any time that the water tasted bad, smelled bad or was dirtier than usual?  
Yes: 8 (50.00 or 50%)  No: 8 (50.00 or 50%)  
Non-committal: 0 (0%)  
(If yes), when?
When it floods: 2    When the river is very high: 1

(If yes), what do you think causes these problems?
(Total of 8 Responses)

**Physical/Pollution Related:** 8(100%)
- Erosion: 1
- Too much cattle ranchers, dead cattle: 1
- Dirty water: 1
- The river doesn’t run like the Macal: 1
- Wastes: 1
- Water get dirty w/ dust when it rolls from the flooding: 1
- Because the water goes on the bank and hauls trees and everything down the river: 1
- A lot of rain, can’t drink because of bad people upstream: 1

**Social/Political/Economic Related:** 0

(If yes), what do you think can be done to make this problem better?
(Total of 7 Responses)

**Physical/Anti-Pollution Related:** 2(28.57 or 29%)
- Leave trees 66 ft. from the water: 1
- Landings better for the animals to reach the river with: 1

**Social/Political/Economic Related:** 1(14.25 or 14%)
- Try to prevent some of these contaminants: 1

**Misc.:** 4(57.14 or 57%)
- Nothing can stop the rain from coming down like that: 1
- Don’t know if anything can be done: 1
- Can’t do anything: 1
- Could be done but very hard: 1

14. Do you think there is a problem in Belize with air smelling bad, being smokey or with it being hard to breathe?
Yes: 1(6.25 or 6%)
No: 14(87.50 or 88%)
Non-committal: 1(6.25 or 6%)

(If yes), when?

(If yes), what do you think causes these problems?

**Physical/Pollution Related:**
- Around dumps: 1

**Social/Political/Economic Related:**

(If yes), what do you think can be done to make this problem better?

**Physical/Pollution Related:**
- Try to keep dumps out from the city: 1

**Social/Political/Economic Related:**
15. Do you think there is a problem in the rest of the world with bad water?
Yes: 12(75.00 or 75%) No: 2(12.50 or 12%)
Non-committal: 2(12.50 or 13%)

(If yes), what do you think causes these problems?
(Total of 14 Responses)
Physical/Pollution Related: 14(100%)
Volcanoes: 1
Too much flooding: 1 Earthquakes: 1 Hurricanes: 1
Big ships: 1 Wastes: 1 Limestone makes the water salty: 1
Sickness and cholera: 1 Some water can’t drink out of: 1
Sickness from cholera: 1 Problems w/ contamination: 1
Flood came from Guatemala and brought some type of disease, cholera: 1
People get cholera from the river cause they don’t have holes, they dump everything into the river: 1
Man-made ponds get dirty from cattle getting in there in the dry season and messing it up, then people get water from dirty lakes that don’t have running water into them because the water just sits there: 1

Social/Political/Economic Related: 0(0%)

(If yes), what do you think can be done to make this problem better?
(Total of 9 Responses)
Physical/Pollution Related: 5(55.56 or 56%)
Not use too many chemicals: 1
Try to protect the water more: 1
Cure the water before you drink it: 1
Take care of water and treat water better: 1
Lessen the stuff that gets in the sea that kills all the fishes: 1

Social/Political/Economic Related: 2(22.22 or 22%)
Guatemala has to do something: 1
If people would realize what they are doing it would be better: 1

Misc.: 2(22.22 or 22%)
Don’t think anything: 1 Don’t know: 1

16. Do you think there is a problem in the rest of the world with bad air?
Yes: 11(68.75 or 69%) No: 2(12.50 or 12%)
Non-committal: 3(18.75 or 19%)

(If yes), what do you think causes these problems?
(Total of 12 Responses)
Physical/Pollution Related: 8(66.67 or 67%)
Factories: 5 Burning: 1 Because of sickness: 1
Some places that burn up and the bad air floats around: 1

**Social/Political/Economic Related:** 3 (25.00 or 25%)
Government: 1  Big buildings: 1  War and accidents: 1

**Misc.:** 1 (8.33 or 8%)
Don't know: 1

(If yes), what do you think can be done to make this problem better?  
(Total of 8 Responses)

**Physical/Pollution Related:** 4 (50%)
Purify and pipe water: 1  Put litter in correct place: 1  
Reduce use of factories: 1  
Build factories far away from the cities: 1

**Social/Political/Economic Related:** 0 (0%)

**Misc.:** 4 (50%)
Be more careful: 1  Not sure: 1
Don't think there is anything you can do: 1
Hard to prevent because it goes up into the air (smoke): 1

17. Have you heard of ecotourism?
Yes: 13 (81.25 or 81%)  No: 3 (18.75 or 19%)
Non-committal: 0 (0%)

(If so), what do you know about it?  
(Total of 13 Responses)

**Not sure of definition:** 6 (46.15 or 46%)
I don't know, because I just a month ago heard about it, but I never ask what it is all about, it's about tourists or environmental concern, I am not familiar: 1

**Responses not incorporating environmental protection and tourism together:** 5 (38.46 or 39%)
Tourist come to Belize, spend money and help Belize: 1  
Minding trees and not cutting them down: 1  
Not cut too much mountains and so on, more environment is better: 1  
People come and visit the country, Mayan ruins, and maybe mountains: 1  
Take care of forest, not to cut down trees and such: 1

**Responses incorporating environmental protection and tourism together:** 2 (15.38 or 15%)
Tourist can come and know our nature and Belize, and hear about our stories and our Mayan temples and stuff like that: 1  
People come in the country and want to see trees and rainforests and learn about it and locals want to earn a little money: 1
Appendix II

Survey Questionnaires
Tourist Questionnaire  Subject #___  Date:__________

1. What country are you from?
2. What is your profession?
3. How old are you?
4. Why did you choose to come to Belize?
5. Why did you choose to come to the Cayo District?
6. How long are you going to stay in Belize?
7. How long are you going to stay in the Cayo District?
8. What other part/s of the country are you going to visit?
9. What place/s are you staying at in each district?
10. What attractions are you going to visit while in Belize?
11. What attractions are you going to visit while in the Cayo District?
12. Do you feel that there should be an entrance fee to visit the reserves and Maya ruins in Belize?
   (If yes), why?
13. If a fee is charged, do you feel that the fee is reasonable?
14. What would be the most money you would pay to visit a reserve or Maya ruin?
15. How do you think these fees should be used?
16. Did you make a reservation before you left?
17. How did you decide to stay where you are staying?
18. What three things do you like the best about Belize?
19. What three things do you like the least about Belize?
20. How do you think the sanitary conditions are in Belize?
21. Do you drink bottled water?
   (If yes), why?
22. Have you seen the Belizean rainforest?
23. Do you think the rainforest should be conserved?
   (If yes), what do you think is the best way to do it?
   (If yes), how do you think it should be funded?
24. Do you think that Belize has any environmental problems?
   (If so), what are they?
   (If so), what/who is responsible for these problems?
25. Do you feel that there is a problem with water pollution in Belize?
   (If yes), what do you think causes these problems?
   (If yes), what do you think can be done to make this problem better?
26. Do you think there is a problem in Belize with air pollution?
   (If yes), what do you think causes these problems?
   (If yes), what do you think can be done to make this problem better?
27. Do you think there is a problem in the rest of the world with water pollution?
   (If yes), what do you think causes these problems?
   (If yes), what do you think can be done to make this problem better?
28. Do you think there is a problem in the rest of the world with air pollution?
   (If yes), what do you think causes these problems?
   (If yes), what do you think can be done to make this problem better?
29. Have you heard of ecotourism?
   (If so), what do you know about it?
Land Owner/Managers Questionnaire  
Subject # Date

1. How old are you?
2. What is your ethnic background?
   (Belizean or foreign born - if Belizean, what descent, i.e. Spanish, Creole, Mayan, Garifuna)
3. Are your grandparents Belizean?
   (If Belizean), what district are they from?
   (If not), what country are they from?
4. Is this property locally owned or foreign owned and individual or corporate owned?
   (If not self-owned, then are you the manager?)
5. How many years and months have you owned/managed this land?
6. What is the name of this business/property?
7. What type of business/land use is this?
   Is the entire property used for this every season?
   (If not), what are the other uses?
8. How many acres are involved in each use?
9. How was it decided how the land would be used?
   (i.e. governmental influence/family influence/influenced by foreign investors/influenced by friends)
10. How long has the property been used the way it is now?
11. What was it used for before that?
12. Have you owned or managed land before this?
   (If so), were you the owner or manager?
   (If so), for how many years and months?
   (If so), what type of land use was it?
   (If so), how was it decided how the land would be used?
   (If so), how long was the land used that way?
   (If so), is it still being used for that?
13. How much was the initial investment for the land?
14. How much was the initial investment for everything but the land?
15. How much do you usually pay your workers per week (BZE $)?
16. How much profit (after expenses) is/was there after
   the first six months:
   the first year:
   at three years
   at five years

17. Do you think that Belize has any environmental problems?
   (If so), what are they?
   (If so), what/who is responsible for these problems?
18. What is your water source?
19. Do you remember any time that the water tasted bad, smelled bad or
   was dirtier than usual?
   (If yes), when?
   (If yes), what do you think causes these problems?
   (If yes), what do you think can be done to make this problem better?
20. Do you think there is a problem in Belize with air smelling bad,
   being smokey or with it being hard to breath?
   (If yes), when?
   (If yes), what do you think causes these problems?
   (If yes), what do you think can be done to make this problem better?
21. Do you think there is a problem in the rest of the world with
   bad water?
   (If yes), what do you think causes these problems?
   (If yes), what do you think can be done to make this problem better?
22. Do you think there is problem in the rest of the world with bad air? (If yes), what do you think causes these problems? (If yes), what do you think can be done to make this problem better?

23. Have you heard of ecotourism? (If so), what do you know about it?
Local Workers Questionnaire  Subject #__  Date:__________

1. How old are you?
2. Were you born in Belize?
   (If so), did you grow up here?
   (If so), what is your ancestry? (i.e. Spanish, Creole, Mayan, Garifuna)
   (If not), where were you born?
   (If not), where did you grow up?
   (If not), what is your ancestry? (i.e. Spanish, Honduran)
3. Are your grandparents Belizean?
   (If so), what district are they from and have they always lived there?
   (If not), where are your grandparents from?
4. Where do you work?
5. How many years and months have you worked there?
6. What kind of work do you do?
7. Why do you work here?
8. How much money do you make every week (BZE $)?
9. Have you worked any place else?
   (If worked before this), what type of work was that?
   (If worked before this), where did you work?
   (If worked before this), how many years and months did you work there?
10. What type of work do you like to do the best?

11. Do you think that Belize has any environmental problems?
    (If so), what are they?
    (If so), what/who is responsible for these problems?
12. What is your water source?
13. Do you remember any time that the water tasted bad, smelled bad or was dirtier than usual?
    (If yes), when?
    (If yes), what do you think causes these problems?
    (If yes), what do you think can be done to make this problem better?
14. Do you think there is a problem in Belize with air smelling bad, being smokey or with it being hard to breath?
    (If yes), when?
    (If yes), what do you think causes these problems?
    (If yes), what do you think can be done to make this problem better?
15. Do you think there is a problem in the rest of the world with bad water?
    (If yes), what do you think causes these problems?
    (If yes), what do you think can be done to make this problem better?
16. Do you think there is problem in the rest of the world with bad air?
    (If yes), what do you think causes these problems?
    (If yes), what do you think can be done to make this problem better?
17. Have you heard of ecotourism?
    (If so), what do you know about it?
Land Owner/Managers Questionnaire in Spanish Subject #

Date

1) Cuantos anos tienes?
2) Cual es tu origen? Belizeno o extraniero?
   a) Si eres de Belize---Cuál es tu desendencia?
3) Son tus abuelos de Belize?
   Si----de que distrito son tus abuelos?
   No----De que pais son tus abuelos?
4) Esta propiedad le pertenece a un Belizeno o le pertenece a un extranero?
   Le pertenece a un individuo o a una corporacion?
5) Cuantos anos o meses tienes de administrar o ser propietario de esta tierra?
6) Cual es el nombre del negocio o la propiedad?
7) Que tipo de uso le da a la tierra o que tipo de negocio realiza con la tierra?
   a) Toda la propiedad es usada para eso?
   No---a) Cuales son los otros tipos de uso que le da a la tierra?
8) Cuantas acres o kilometros son destinados para cada uno de los diferentes usos?
9) Como se decidió el uso de la tierra o la propiedad? (Influencia del gobierno, influencia familiar, influencia de inversionistas extranjeros, o influencia de algunos amigos).
10) Cuanto tiempo ha sido la propiedad usada de la misma manera como es usada actualmente?
11) Como fue la propiedad o la tierra usada antes de el uso que se le da ahora?
12) Fue usted propietario o administrador antes de adtener o administrar esta tierra?
   Si---Fue usted el dueno o el administrador?
   Si---Cuantos anos o meses?
   Si---Que tipo de uso le daba a la tierra?
   Si---Como se decidió el uso de la tierra?
   Si---Cuanto tiempo la tierra fue usada para eso?
   Si---Esta la tierra siendo usada para eso?
13) De cuanto fue la primera inversion en esta tierra?
14) De cuanto fue la primera inversion de toda la propiedad excluyendo la tierra?
15) Cuanto le paga a sus trabajadores por semana?
16) Despues de pagar todos los gastos cuanta ganancia obtuvo en los primeros 6 meses?
   a) Despues de un ano?
   b) Despues de tres anos?
   c) Despues de cinco anos?

17) Piensas que Belize tiene problema con el medio ambiente/problema ambiental?
   Si---a) Que tipo de problemas?
   b) Que o quien es responsable de estos problemas ambientales?
18) De donde proviene el agua que usas?
19) Recuerdas alguna ves el agua con mal gusto , con mal olor o que estuviera sucia?
   a) Cuando?
   b) Que piensas que cuasa estos problemas?
   c) Que piensas que puede hacerse para mejorar estos problemas?
20) Piensas que Belize tiene problemas con mal olor en el aire, con humo o que el aire es dificil de respirar?
   a) Cuando?
   b) Que tu piensas que causa estos problemas?
   c) Que tu piensas que puede hacerse para mejorar estos problemas?

21) Piensas que en el resto del mundo la contaminacion del agua es un problema?
   a) Que tu piensas que causa estos problemas?
   b) Que tu piensas que puede hacerse para mejorar estos problemas?

22) Piensas que la contaminacion del aire es un problema en el resto del mundo?
   a) Que tu piensas que causa estos problemas?
   b) Que tu piensas que puede hacerse para mejorar estos problemas?

23) Has escuchado acerca de ecoturismo?
   Si---Que tu sabes acerca de ecoturismo
**Local Workers Questionnaire in Spanish**

**Date:**

1) Cuántos años tienes?
2) Naciste en Belice?
   a) Sí, creció aquí?
   b) Cuál es tu origen?
3) Son tus abuelos de Belice?
   a) Sí, de qué distrito son tus abuelos? Han vivido ellos siempre ahí?
   b) No, de dónde son tus abuelos?
4) Donde estás trabajando?
5) Cuántos años o meses has trabajado ahí?
6) Que tipo de trabajo tu haces?
7) Porque trabajas aquí/ ahí?
8) Cuánto dinero ganas a la semana?
9) has trabajado en algún otro lugar?
   a) Sí, que tipo de trabajo realizabas?
   b) Donde trabajabas?
   c) Cuántos años y meses trabajaste ahí?
10) Que tipo de trabajo te gusta más hacer?
11) Piensas que Belice tiene problemas con el medio ambiente/problema ambiental?
   a) Sí, que tipo de problemas?
   b) Que o quien es responsable de estos problemas ambientales?
12) De donde proviene el agua que usas?
13) Recuerdas alguna vez el agua con mal gusto, con mal olor o que estuviera sucia?
   a) Cuando?
   b) Que piensas que cuasa estos problemas?
   c) Que piensas que puede hacerse para mejorar estos problemas?
14) Piensas que Belice tiene problemas con mal olor en el aire, con humo o que el aire es difícil de respirar?
   a) Cuando?
   b) Que piensas que causa estos problemas?
   c) Que piensas que puede hacerse para mejorar estos problemas?
15) Piensas que en el resto del mundo la contaminacion del agua es un problema?
   a) Que piensas que cuasa estos problemas?
   b) Que piensas que puede hacerse para mejorar estos problemas?
16) Piensas que la contaminacion del aire es un problema en el resto del mundo?
   a) Que piensas que cuasa estos problemas?
   b) Que piensas que puede hacerse para mejorar estos problemas?
17) Has escuchado hacerca de ecoturismo?
   a) Que tu sabes acerca de ecoturismo?