CHAPTER 7 .CONSERVATION AND MANAGEMENT

In this chapter I summarize the basic problems of conservation regarding anacondas, and I discuss the findings of my research that apply directly to conservation of anacondas and their habitats. I present some possibilities for the rational use of the species with a discussion of how to implement these possibilities. Much of the information presented comes from my research, and some comes from my own experience working for the Venezuelan Fish and Wildlife Service (Profauna).

7.1 INTRODUCTION

The economic crisis of developing Latin American countries, compounded by constant population growth, has produced increasing pressures on natural resources and rural areas. The lack of official awareness about environmental issues, little public education in rural communities, and the virtual economic shutdown of many local economies is resulting in increasing damage to pristine habitats. This problem is even greater if we consider that most developing countries are located in the tropics where the most fragile and diverse ecosystems occur.

The sustainable use of natural resources has been offered as one potential solution to economic problems. The rational use of wildlife has also been proposed as an alternative to destruction and replacement of natural habitats by other uses of the land, such as timbering or agriculture (Balick and Mendelsohn 1992; Bodmer et al 1997; Robinson and Redford 1991; Shaw, 1991). The sustained harvest of wild populations has been implemented in several countries for subsistence (Silva and Strahl, 1991; Vickers, 1991) and for commercial uses such as harvesting wildlife for hides, flesh, or live pets (Beissinger and Bucher, 1992; Fitzgerald et al. 1991; Groom et al., 1991; Iñigo-Elias and Ramos, 1991; Joanen et al 1997).

Venezuela has been withstanding the economic crisis better than other Latin-American countries due to the fact that all the countries oil reserves belong to the government. However, from 1982 to the present there has been a slow but consistent decline in the economy (related to dropping oil prices) that is affecting the lifestyle of the people and, ultimately, the environment and wildlife. As the economy of the country worsens and the wages of the local people fall well below the minimum necessary to survive, people start using resources they would have disregarded otherwise. For instance, in the past the use of capybara meat was only restricted to the week before Easter when it was tradition to eat capybara in some cities of the country. Lately, illegal hunting of capybaras has expanded throughout the year, as people have resorted to capybara as a staple food source. Traditionally the ranch that produced most of the country's capybara meat was El Frío. For more than 30 years, El Frío sustained an estimated population of roughly 30,000 capybaras; of which 10,000 were harvested every year (see Ojasti 1991 for a full description of the harvest program). However, in 1986 I participated in a survey of El Frío capybaras where we counted slightly more than 4,000. Later surveys of the area indicate an even further decrease in the population, and poaching has been acknowledged as the leading cause of the population crash. Similar cases of significant poaching have occurred with other species including white-tailed deer, caiman, iguanas, side-necked turtles, and peccaries, among others. This trend is, not surprisingly, expected to continue and extended to other species as well.

Although any use of the green anaconda is forbidden by Profauna, they are currently being harvested illegally. There have been several seizures of anaconda skins in Venezuela. In two different years (1988 and 1990) Profauna confiscated a total of 2,138 anaconda skins (Profauna files). In 1992, I learned from some local people that the tanneries were paying Bs.1,000 ($16.67) per meter of skin. This is a significant amount for a worker who makes approximately $3.50 a day. Aside from the skins, anaconda meat can be used as a source of protein, and the live individuals are in demand for the pet trade.

I learned from conversations with some of the tanners that the scales of the anacondas were too large and inconvenient to use for luxury articles. They insisted that smaller-scaled skins such as boa constrictor, reticulated pythons, or tegus were of higher value in the skin trade. Due to the large sizes of the scales, the skins of anacondas can only be used in rustic articles such as cowboy boots, belts, or maybe in purses, but could not for higher quality (and pricier) items. I tried to learn the prices paid for anaconda skins in the international trade market, but tanners are very reluctant to talk about prices of animals that are not under legal management (perhaps for fear of being investigated). They often claimed not to know the prices or that the prices were very low and the skins were of little value. However, the confiscation of several anacondas skins in other countries suggest that they have some value. In light of these facts, what viable options are available regarding sustainable management of the species? It is clear that an illegal, uncontrolled market threatens the populations due to the likelihood of over-harvesting (Thorbjarnarson et al. 1992). The best way to combat the illegal, uncontrolled use of a resource is by developing a legal and rational market that outcompetes the black market. The rational use of wildlife has been used as an alternative to its destruction. For example, several populations of crocodilians that have been seriously threatened are now recovering due to effective harvesting practices (Thorbjarnarson et al. 1992 for a review). In the following section I will summarize the different forms of management and how they can be applied to anacondas.

7.2 Wildlife management as a tool for conservation: Harvesting vs farming

The most common methods of extractive wildlife management are farming, harvesting, or a combination of both. In a farming model, animals are kept in captivity, and all their needs are provided for y the keepers. This is a relatively expensive activity, preferable for those animals that have large growth rates, low maintenance expenses, and can be housed in large densities. Wildlife farming has been practiced successfully with the green iguana (*Iguana iguana*) in Panama (Werner 1991). Farming does not represent a threat to the wild population since only a few animals are originally collected from the wild, and if the project fails, only the animals that were in the farm are in jeopardy. Also, due to the localized nature of the activity, it is potentially easy to monitor and enforce the existing regulations. Farming, however, is an activity that benefits the few people working on the farm, and does not constitute a real incentive for conservation of habitats (Thorbjarnarson 1999).

Another possible management method is ranching or open farming. It involves collection or eggs or juveniles from the wild, growing them in captivity for a relatively short time, and commercializing them after they reach a certain size. In some cases, a specific percentage of the animals must be released into the wild to compensate for the extraction. This method is used often in species that have a high mortality in early ages, and the extraction of neonates can be compensated for by the later released of a number of

larger individuals into the wild (Thorbjarnarson et al 1992). The fact that the adults are not being kept in captivity decreases food and facility expenses significantly. Also, because this method relies on natural populations, it has a great potential to promote conservation among local communities (Thorbjarnarson 1999).

On the other end of the spectrum is harvesting or cropping. In a cropping system, animals are harvested from the wild; thus a direct link exists between the economic activity and the conservation of the species and its habitats. This activity is better for animals that occur in high densities and are easy to find and catch. It requires a much lower overhead since the only investment involves finding and catching the animals that are going to be harvested. However, due to the more extensive nature of the harvest, it has a much greater potential to have a detrimental effect on the natural population. Monitoring and control of the harvesting activities are a great priority, but it can be very expensive and troublesome. A representative example of this model in a reptile is the harvest of spectacled caiman (*Caiman crocodilus*) in Venezuela (Thorbjarnarson 1991**;** Thorbjarnarson and Velasco 1999). This was an important source of revenue for the country and for the local economy for several years, and some long term investment in conservation was encouraged. Sadly, this program's success eventually deteriorated due to international drops in the prices of the skins (Thorbjarnarson and Velasco 1999) and to difficulties in the management that resulted in local population crashes in the areas where cropping was occurring (personal observations).

7.3 CROPPING ANACONDAS: pros and cons

By far the main economic activity in the llanos is cattle ranching. Most of the land is devoted to low density cattle ranching. This is perhaps due to the fact that the poor soils and extreme seasons prevent much agriculture and most other such activities. The management of the land for cattle ranching in the llanos utilizes dikes to hold the water during the dry season. This has extended the time that the savanna is flooded, increasing the carrying capacity for many species dependent upon relatively large bodies of shallow water, such as fish, waterfowl, herons and other wading birds, capybaras, and caimans. It may have also enhanced the carrying capacity for anacondas, both by increasing the available habitat and enhancing the number of prey. Here I consider the different stages of harvesting and how they can be applied to anacondas.

Population estimations

Before attempting the management of any species, it is important to understand its basic life history. Even modest success at wildlife management depends upon a knowledge of the population parameters, demography, and the maximum sustainable yield a population can support (Caughley 1977). The main population parameters are: abundance, rate of increase, fecundity, mortality, recruitment, and dispersal. First, population size followed by the intrinsic rate of increase of the population should be determined. These statistics should enable us to calculate the maximum sustainable yield (MSY) which is the maximum amount of individuals that can be removed from the population while keeping the population essentially constant (Caughley 1977; Caughley and Sinclair, 1994).

The first problem encountered when attempting to harvest anacondas is their secretive nature. To harvest a population rationally, we must be able to count how many animals there are in order to propose a sustainable harvest rate. Not having a total number of animals available, the alternative is to have some estimate of the population size in the

form of an index of relative abundance (e. g. number of snake seen per km of road, or per hour traveled). This way we can make an educated guess about the MSY, and refine it by monitoring its impact on the population by changes in the index of abundance. In this way we detect any problem and fix it in a timely fashion (Caughley 1977).

To date, we do not have any of these surveying tools with respect to anacondas. To estimate the abundance of the population necessitates long term mark and recapture studies that are too time consuming to apply to the large scale management of the species. We do not have any index of relative abundance either. Due to their secretive nature none of the traditional methods of counting anacondas by transects can be applied in a simple manner. A possible method of developing an index of relative abundance for the population of anacondas may be by using the sighting of pregnant females at the river banks or edges of roads. Because pregnant females bask frequently along river banks and near the roads, it might be possible to use the frequency of sightings related to distance and duration of surveying to develop an index of relative abundance. Since we cannot monitor the impact of the program, harvesting of anacondas should not be implemented due to the risk of over harvesting.

Harvesting

Capturing the animals for harvest offers another challenge for several reasons, aside from the problems of finding the animals. One of them is that local people feel very strong fear and dislike for the snakes; this would make it very difficult to find a crew to do the harvest. In some instances when I needed extra help catching some of the anacondas, it was very difficult to find a volunteer willing to help me. The other problem is the number of hours needed to find only a few animals. Paying a crew to look for anacondas might not be cost effective considering the low frequency of capture that I encountered. One alternative strategy to overcome the low encounter rate with anacondas is to put together a crew that harvests other species as well; such as caimans, turtles, iguanas, and tegus (Thorbjarnarson and Velasco 1999). All of these reptiles occur in relatively high density and are potentially manageable. Indeed, the word “tropics” normally brings up the word “diversity” to many biologists’ minds, yet surprisingly those involved in wildlife management and decision making have failed to take advantage of the high diversity of these areas. However, in order to implement sustainable management there is much that has to be learned about the species, as well as improvement in the organizational skills of Profauna in their attempts to manage all of these species correctly (see below).

Other problems that would be encountered with anaconda harvesting are related to SSD and the enforcement of the harvest. Hunters typically tend to target the largest individuals first, which are usually males in many game species. In polygynous species this is potentially sustainable since most of the matings are performed by a few males, and there is a theoretic surplus of males that are not breeding at a given time. In anacondas, however, it is certain that harvesting larger animals will involve harvesting the females that make the largest contribution to the population. Females larger than 340 cm are responsible for 59.5% of the new offspring every year (Chapter 5), and females larger than 300 cm contribute to 74.8% of the total number of newborns in every generation. In other words, any harvesting of large females would impact dramatically the population numbers, making cropping extremely risky to implement.

It could be argued that harvesting males is a more feasible alternative as they are easier to find (Chapter 3) and can be gathered in greater numbers in the breeding aggregations

(Chapter 6). Having smaller size and feeding on less dangerous prey, males tend to have better hides with fewer scars (Chapter 3) thus increasing the quality of the product. If the program is created in a manner to encourage the collection of smaller animals, the odds of success are better, since they are more likely to be males and thus will have skins with less wounds (Chapter 3) and smaller scales. Even this alternative might be unfeasible given the practical problems mentioned earlier. Furthermore, if females that are courted by several males have higher reproductive success (Chapter 6), the quota of males for the harvest would have to be assessed very carefully.

Commercial use of large snakes is practiced in Sumatra where reticulated pythons (*Python reticulatus*), blood pythons (*Python brongersmai*), and short-tailed pythons (*Python curtus*) are harvested serendipitously near plantations and villages. The snakes are kept alive in bags and taken to slaughter houses where the animals are processed (Shine et al 1999*a*). This method targets mostly males due to their higher mobility, and produces a variable rate of harvest that changes with snake abundance. Given the nature of this kind of harvesting, in which the hunters are not going out just to catch snakes, this method of hunting has the potential to be self-regulating. A drop in the population will produce a lower encounter rate with people that will result in a lower harvest. Given the cryptic nature of these species, it is unlikely that they can be hunted out or driven to extinction by harvesting. In the cases of *P. curtus* and *P. bongersmai*, the animals feed heavily on rats in the plantations, and are thus also perceived as performing a pest control role, which helps the survival of local populations.

A similar method is used in British Guyana with green anacondas. Fishermen gather snakes opportunistically and keep them in bags to take to the tanners where the snakes are killed for skins. If the tanner considers an individual snake to be inappropriate for the market (too small, too many scars, too large), the animal may be turned loose (Quero personal communication). Although this has the potential to disrupt local genetic structures, this risk might not be very high since the tanneries are generally near the places where the animals are caught. Similar to the python harvest, this method seems to be sustainable since this low rate of cropping is not expected to threaten the population. However, any harvest based on encounter rate with people must still be regulated by a quota since increases in human density or in the prices of the skin could dramatically increase the harvest rate and eventually reach a level which might not be sustainable.

7.4 FARMING ANACONDAS

Farming anacondas in a closed system is unlikely to be successful. The cost of facilities and maintenance is probably prohibitively high. It is unlikely to be cost effective to maintain a species that takes several years to reach adulthood, and where females will not breed every year but every other year at best (Chapter 5). However, the possibility of an open farm system exists. Large pregnant females can be found along the riverbanks (Chapter 3 and 5), caught and kept in captivity, and released after they deliver. Due to their high fertility (Chapter 5), a large number of individuals can be produced in short-term farming or in the pet trade. Neonates have a high natural mortality in the field (Chapter 3), and protecting them in captivity and releasing some later would result in the same proportion that would have survived to that age and should not affect the natural population. Neonates can have a relatively fast growth rate (Holmstrom 1982), and, after a short time, can provide excellent, scar-free, small-scaled skins that would have a high

value on the legal market. In addition, young individuals have a sharper pattern and more attractive skin.

Throughout my field research I tried to promote experimental farming of neonate anacondas to study its feasibility. For two years Profauna experimented with neonate farming, but both times it was implemented poorly and gave inconclusive results. Future attempts should be made to more adequately assess whether it is feasible and what is necessary to ensure cost effectiveness without over-exploiting the resource.

With respect to the use of anacondas in the pet trade, anacondas do not make good pets. They quickly outgrow their cages, and become a risk to other pets and even people. The have an aggressive temperament and never become an easy (or safe) animal to handle. They also release an aversive musk when handled and disturbed. However, due to the popularity of the animal, anacondas are in large demand in the pet trade (approximately $250/neonate, retail). The illegal import of live reptiles for the pet trade is a growing market in the US (Hoover 1998). The number of pet keepers and the demand for reptiles for pets grows with increases in the human population and also with the increasing trend in smaller housing for people in large cities that makes conventional pets more troublesome. Because most reptiles can survive for many hours without water or food the animals can be smuggled into the country in many ways. This market is very hard to control and the number of animals being extracted is difficult to quantify (Hoover 1998). Thus a legal source of neonates that come from a sustainable system would be a way to promote protection of the wild population.

7.5 CONSERVATION OF THE ANACONDA: PRESENT AND FUTURE.

Anacondas and other boids are in appendix II of CITES. This means that they cannot be the subject of commercial trade unless local permits are obtained. In Venezuela, anacondas are still relatively abundant due to the large expanses of wetland habitat that lack human development, are relatively undisturbed, and have low human density. There is no legal commercial trade of anacondas in the country, however, there is an illegal local market for the skins. Due to the low profile of this activity, the pressure on the population is not too high and, at the moment, does not constitute a threat to the population.

The flesh of the anaconda, although edible, is not preferred by the local people and the anacondas are not killed for it. Other than the skin, the only product of the anaconda that people seek (and more so than the skin) is the fat. Anaconda fat, melted under the sun in a closed container or in a fire, is considered as a medicine for throat problems, asthma and other respiratory problems, but at present the demand is not very high.

Selling anaconda skins is illegal and troublesome for the campesinos, so most people do not engage in this activity. The main reason that local people kill anacondas is because they fear and dislike them so much that they will kill them on sight. Arguments that anacondas eat poultry, livestock, pets, or even people are often used to justify killing the snake. The truth is that people traditionally dislike and kill snakes even when they are nowhere near any of their livestock or houses. On some live animals that I studied, I observed straight, long scars or wounds that could only have been made by a machete. This was especially true in the ranches that offer less protection to wildlife.

Habitat degradation in the llanos has not yet been a serious problem, since much of the land management for the cattle involves increasing the surface of land that contains water for a longer time. The impact of this extensive cattle ranching on wildlife is much lower

than the impact found in the US or other countries where cattle are kept in higher densities. However, old-fashioned ranching practices involve cutting the gallery forests to ease the handling of the cows (that often hide in the forest and become feral) and to allow easy access for the animals to water in dry season. Federal laws prohibit gallery forests from being cut up to 50 meters from the river, on both sides, but this regulation is seldom enforced. Deforestation in the llanos was not an important trend in the past, but it has been increasing dramatically in the last few years, and it is encountering an unsettling leniency with government authorities. The river banks often develop caves that are supported by the roots of the trees in the forest; frequently these caves are used by anacondas to hide and spend the dry season (Chapter 3). In the treeless savanna, anacondas have fewer places to hide and protect themselves from extreme drought. This might be very significant in atypical years where the anacondas may be exposed to extreme heat or droughts (Chapter 3). The caves found in the segments of the rivers without forest are considerably less abundant and smaller than the caves found in other areas because without the roots the river erodes and destroys the caves. Cutting of the gallery forest does represent a direct threat to the anaconda's welfare. Or course, this is additive to the obvious effects that deforestation has on the populations of prey species and other components of the ecosystems including all the forest-dwelling species.

Information on the international illegal trade in anacondas is difficult to obtain, but the trade may not be too high since the animals are hard to find and the demand for skins with larger scales is limited. Perhaps the dynamics of the market is that the tanners buy skins that hunters occasional bring them, and when they accumulate a sufficient number, they smuggle them out of the country or use them in national products that are exported later. At the present, anaconda population numbers are high and there is no immediate threat to their survival in the llanos. However, the safety of the anaconda relies heavily on the low likelihood of encounters with humans and the low degree of degradation of the habitat. The increase in the human population will produce increased encounters with anacondas that will invariably lead to more snakes being killed. The struggling economy will lead to an increase in the degree and intensity of land use and development, and this will undoubtedly have a negative effect on the life of the anacondas by decreasing suitable habitat for them and their prey.

7.6 WILDLIFE MANAGEMENT AND CONSERVATION: A TROPICAL PERSPECTIVE

The possibility of management as a method to incorporate anacondas into economic development is not easy, and much more research is needed. Harvesting males, as well as farming of neonates, are possible alternatives that can be explored. However, both of these possibilities involve many practical problems as well as ethical issues that cannot be ignored. Killing animals for human comfort and leisure is a theme of heated debate on several levels between those concerned with conservation and those who manage wildlife for profit (Joanen et al 1997; McLarney 1999; Medellín 1999; Robinson, 1993; Struhsaker 1998). Changes in fashion or drops in economies around the world can dramatically affect the demand for, and prices paid for the animal products along with the faith in conservation measures based on it (Thorbjarnarson 1999). New regulations adopted by the international community regarding import of exotic wildlife, either in the name of conservation or in the name of animal welfare, can further limit the market and put in jeopardy all the investment made by the producers. Importing live animals leads to even harder ethical issues regarding the welfare of the animals as pets that might end up in the

hands of novice pet owners who will not keep the animals in optimal conditions. In the case of larger reptiles, the problem will always be raised of what to do with the animal after it reaches a size where it cannot be kept in the facilities where it used to live. Frequently the animal is turned loose in an exotic environment where it will, at best, die in a short time from exposure or starvation; although sometimes it survives and reproduces causing further problems as an exotic invader in a foreign ecosystem (Atkinson 1989).

The rationale for harvesting programs as an appropriate way to achieve the goals of conservation is that the use of wildlife for profit can invigorate local economies. Inhabitants of rural areas would then realize that the species being used can produce some profit for them, and they should then protect the resource and use it in a rational manner. This approach often fails to consider the philosophy and customs of the people that are supposedly targeted. To develop this point I will use the example of caiman harvesting in Venezuela, which has been thoroughly described in the literature (Thorbjarnarson 1991; Thorbjarnarson and Velasco 1999), and of which I am personally familiar.

This program operates on private lands, where the owners hire a technician to survey the population size, and, based on the population size estimate (or other surveys of the area), Profauna gives a license for a given quota. The owner then hires people to harvest and process the animals. This program provides some benefit to the land owner, to the local worker that performs the harvest and works in the processing, to the biologist that does the survey, and to the tanners that commercialize and export the hides. It is based on a very prolific species that had a very high commercial value, is very easy to count and harvest, and belongs to a group that has proven to be fairly resilient (Thorbjarnarson 1999). In short, a "perfect" species for sustained management.

However, in this program no consideration was given to the philosophy and customs of the local people. I will use a blooming mango tree to illustrate a piece of philosophy that is very common in Venezuela and perhaps throughout the tropics. For those that did not have the privilege of growing up in a tropical country I will explain what it is all about. When the mangos mature in the middle of the dry season, there are 40-50 foot tall mango trees with their extended canopies loaded with juicy mangos. At this point everybody, kids and adults alike, climb up the trees or reach with poles to knock over mangos by the dozens. Everybody gets to enjoy the delicious fruit that is incredibly abundant at this time of the year. Such is their abundance that people are unable to eat all that are available, and one month later the soil is covered by a carpet of mangos rotting in the baking tropical sun. A month later all the mangos are gone, and whoever did not feast on them will have to wait until the following year in order to enjoy this wonderful fruit. No one saves mangos or stores them for later. The people simply eat what they can, and when the mango season is over, the guajaba fruit comes into season! This is, essentially, the philosophy that the local people on the llanos had regarding the sustainable use of caimans in the llanos.

Regardless of the well intended efforts of Profauna in running a biologically sound program, from the beginning Profauna was involved in an battle of wits with the poachers and other sectors that took advantage of the loopholes in the regulations. After the word got out that every square foot of caiman skin was worth $40, there was no safe haven for the animals. Every improvement in the legislation was matched immediately by new ways to circumvent the law. One of the problems that the program had was that landowners would kill and market the caimans on other lands to keep their own populations high for future surveys, or simply because they did not have enough animals to meet their quota

(typically they would have filed manipulated survey results to get a higher quota). Profauna then decided to count the skulls and carcasses of the caimans that were harvested and match it with the number of skins as a way to ensure that the caimans were actually killed on the lands of the producer (and thus within the permitted quota). This regulation immediately spawned a new breed of small businessmen in the llanos. Their business consisted of carrying a truck loaded with rotting caiman carcasses that were then rented out to crooked landowners who had hunted caimans illegally and needed the carcasses to match the skins they had poached (carcasses are too heavy to carry on a burro's back, which is the reason that poachers only retrieve the skins from the site of the kill). Eventually Profauna decided to burn the carcasses that they counted to prevent recounting them in other ranches. This is only one example of the many tricks that Profauna had to uncover in their effort to implement the program. Most of the people that were supposed to get involved in management and start protecting the resource for sustainability never perceived it as something different than an ephemeral source of wealth that, not unlike the blooming mango, was there to take advantage of while it lasted. Of course, this uncontrolled rate of harvest resulted in a population decline that (along with a drop in international prices) decreased the profit of the harvest, bringing the program to "the brink of extinction" and reinforcing the idea that the caiman harvesting was indeed ephemeral!

This is one example of a program that had, on paper, a perfect profile for sustainable harvest, but which failed to consider other aspects just as important as the species biology: the culture and education of the people being targeted. Although I believe that there are many species that can be harvested in an integrated conservation plan (see above), I have serious doubts that, after failing to manage one species with such fine management prospects, we can realistically expect to succeed managing several species at once. Perhaps the "blooming mango philosophy" can be overcome with education, but we must be aware that a short campaign stating the benefits of a rational harvest will not change a lifestyle that may be engrained in the culture for many generations past. Finally, we should study how common this "blooming mango philosophy" is in other tropical countries, and how their government agencies can overcome them if they do exist. For the long term, it is likely that people involved in management will learn that they must use the resource rationally, but the resource must last beyond the first stage of learning! Furthermore, to learn to use one or a few species does not really constitute a tool for conservation if this is not also extended towards other species and involves some respect or feeling for the integrity of the ecosystem (Rivas and Owens 1999).

In my opinion, the most clear and least controversial benefit that local communities can gain from anacondas is from the lure that anacondas, as "charismatic mega-fauna," present for ecotourism. The llanos has a tremendous and unrealized potential for ecotourism due to the large abundance and diversity of wildlife comparable to the diversity of the rain forest (Rodriguez and Rojas 1996). Unlike the rain forest, in vast savannas of the llanos the animals can be readily spotted and appreciated due to the lack of trees and the forest's patchy distribution. However, for tourism to become a leading economic force, a very strong environmental awareness program must be implemented in all levels of the population with emphasis in the rural areas especially, at grade school levels (Rivas and Owens 1999). Sadly, this does not seem to be the path that governmental institutions or other conservation institutions are taking.