

## APPENDIX 2

### **A PRELIMINARY MANAGEMENT PLAN FOR SITTEE POINT**

Preservation Through Use of an Old-Growth Mangrove Forest

## INTRODUCTION

The mangrove forest and deltaic landform at the mouth of the Sittee River in central Belize (here after called Sittee Point) is an important resource to the people in nearby communities (such as Sittee River, Hopkins and Dangriga) and, moreover, to the country as a whole. Because of its relative isolation from past population centers and because of optimal conditions for tree growth, Sittee Point has a mature, old-growth forest vegetation with the tallest mangroves that have been recorded in the scientific literature for the entire Caribbean bioregion (Kangas, unpublished). Thus, Sittee Point has special ecological significance that warrants preservation status. The creation, recognition and implementation of a management plan for the social and economic use of Sittee Point on a sustainable basis is a first step towards achieving this status. The intention of preserving Sittee Point is not to lock up the land or set it aside from economic development. Rather, Sittee Point should be preserved in its old-growth state so that it can provide multiple benefits to people. Some of these benefits will be economic (eg. Generate income for people) but other benefits will be realized in other currencies (ecosystem services, community pride, educational advancement, recreation and cultural enrichment). This approach is an example of the "use it or lose it" philosophy that has emerged as a foundation for conservation throughout the tropics (Janzen ).

The purpose of this paper is to outline elements of a management plan or, in other words, to outline ways that people can benefit from a preserve at Sittee Point. The exact legal form of preserve is not dealt with here. Many types are possible candidates: forest reserve, national park, community sanctuary, wildlife refuge, etc. The legal status is of critical importance and needs to be worked out, but the focus of this paper is to outline how Sittee Point might be managed once it is protected in some way.

## THE SITE

Sittee Point is located at the mouth of the Sittee River on the coast in the Stann Creek District. The river is approximately 30 km long and it drains a watershed that extends from the Maya Mountains to the Caribbean Sea. The dominant vegetation of the watershed consists of hardwood forest in the mountains, pine savannah in the coastal plain and mangroves along the coast. The watershed is rural and the dominant land use is citrus plantations along with some pasture and small farm plots. Two villages are on the river: Kendal is located where the Southern Highway crosses the river approximately \_\_\_\_ km upstream from the river mouth and Sittee River, which is named after the river, is located approximately \_\_\_\_ km upstream from the river mouth. The Possum Point Biological Station is located near Sittee River Village on the river. The station served educational groups from the U. S. that come to Belize to study tropical ecology and resource management. Sittee Point is about 25 km south of Dangriga and about 30 km north of Placencia. The nearest settlement is Hopkins which is located on the coast about 2 km north of the point.

Sittee Point is a delta that extends into the Caribbean Sea. This extension is geographically significant and is noticeable on any map of the country. It has built up from inorganic sediments eroded and washed down from the Maya Mountains and from organic sediments deposited by the mangrove forest itself. These rich deltaic soils

contribute to the optimal growth conditions for mangrove tree vegetation along with energy subsidies of tidal flushing from the sea and flooding from the river. Sittee Point has a riverine mangrove forest, which is the most productive of the several forest types that mangroves form. Mangroves dominate the coastline around Sittee Point and they extend upriver as part of the riparian forest, reaching nearly to Sittee River Village. Bird life is abundant and diverse at Sittee Point including marine and freshwater aquatic species along with songbirds found in the interior of the forest.

The need for preservation of Sittee Point comes from two nearby developments. The north side of the river mouth is owned by the Belize Development Company of Austin, Texas, which is selling land for housing. The advertisement of the company indicates that they intend to save some of the land including the extreme end of the north side of Sittee Point as an "eco-preserve"; but they have dredged and filled much mangrove land along an artificial canal that they dug through the forest (said to be 50' wide and 12' deep). This development already has reduced the area of mangroves and has altered the hydrology of the remaining forest. These environmental impacts are significant and they are cause for concern about the ecological integrity of Sittee Point. The other development is being undertaken by a different company about 2 km south of Sittee Point at the All Pines site. This is a new initiative to build a resort hotel, commercial shrimp ponds and other facilities on the coast. Land clearing has begun and development pressure is building. Of note, this company also has expressed an intent to establish ecological buffers or preserves with some of its land. Although the impacts are of much less concern here, since the site is some distance down the coast from Sittee Point, this development may exert an influence in the future.

## USES/BENEFITS

In this section beneficial uses of Sittee Point are outlined in a management context. Some uses are already occurring while others will take some effort to develop. The point of this paper is to begin the process of imagining, articulating, planning and coordinating the uses. It is hoped that uses could be developed in a sustainable way but some degradation of the resource is inevitable. A balance between use and degradation is a goal that must be sought. Management will be a continuous process of trial and error conducted by interested people to find which uses and users are most appropriate for the site. To begin, this plan will only directly consider uses of the southern side of Sittee Point, which is assumed to be owned by the government of Belize. However, all of the ideas outlined also will be applicable to the northern side of the point, which is privately owned. Eventually, it is hoped that some form of management agreement can be reached with the owners of the northern side so that Sittee Point can exist and be utilized as a whole ecosystem.

Three direct, active uses are envisioned for a management plan of Sittee Point: education, ecotourism and research. All of these involve people visiting the site more-or-less frequently to make use of the land for different valuable and productive purposes. The attraction is the old-growth mangrove forest with its tall trees forming a cathedral-like habitat, but in another conception it is a dynamic ecosystem with complex geomorphology and hydrology and a diverse flora and fauna.

## Education

The most critical use of Sittee Point is as an educational resource for the local schools. It is an educational resource because it is the best, or at least one of the best, examples of an old-growth mangrove forest in the entire Caribbean. It needs to be used for the same reasons that teachers in Washington DC use the museums of the Smithsonian Institution – because they are world class resources that are close by! Teaching children about the ecological significance of the mangrove forest will contribute to their sense of community awareness and pride and to their understanding of the environment and natural history. These are biocultural values that will add to the local peoples' quality of life. The educational challenge is to translate the natural capital of the rich, old-growth forest into the social capital of the students' perceptual world.

To meet this challenge, the Sittee Point ecosystem will need to be included into lesson plans of the local schools. This is not a simple or easy task since teachers already have full curricula and inserting new environmental education will mean that something else must be left out of the teaching plan. For this to happen teachers need to see the value of Sittee Point as an educational resource. However, based on past experience local teachers are open-minded about incorporating environmental themes in their lesson plans.

Utilizing Sittee Point as an educational resource should involve both a field trip to the site plus some traditional class lecture time. Field trips can be arranged by using boats available from the Possum Point Biological Station and/or local ecotour operations. Some teacher training and new interpretative materials will be needed to support these lesson plans. Topics might include biology of mangroves, estuarine ecology, bird identification and ecosystem services.

One approach for teaching might be the "driver's ed" model using an air photo of Belize City with its dense housing along the Haulover Creek river mouth (available on postcards for example). Belize City must have looked like Sittee Point before it was developed as an urban center on the coast. Problems with this example of over-development of a Belizean river mouth can be discussed including risk of hurricane damage, pollution and loss of biodiversity. More sustainable and environmentally sensitive development strategies can be suggested, using Sittee Point as a focus. Teaching about Sittee Point may also serve as a starting point for broader issues of either biology, environment or even history. This starting point might integrate with other field trips such as to the Serpon sugar mill or to Cockscomb. For young students field trips will probably need to be passive visits (eg., show and tell) but for older students field trips should be more active with students involved in making ecological measurements, collecting biota or carrying out experiments.

## Ecotourism

Ecotourism is a major force for tropical conservation. Tourists are interested in visiting intact ecosystems and these visits generate income for local people and thereby create direct incentive to preserve important habitats and landscapes. A number of small and large ecotourism companies have operated around Sittee River over the past decade because of the cultural and natural qualities in the area. These companies have ranged in size from individuals who work as guides out of their own homes to full-service resorts

that advertise internationally and employ a number of local people in different jobs. The proximity of major (Cockscomb, the barrier reef) and minor (Maya ruins at Mayflower, Serpon sugar mill, beaches at Hopkins) also contribute to the attraction of ecotourists to the area. Boat tours can be seen on a daily basis transporting tourists for wildlife observations (birds, iguanas, crocodiles, an occasional manatee, etc.) and for general enjoyment of the more-or-less pristine state of the river-riparian forest system. The new developments on the north and south side of Sittee Point, mentioned earlier, will only increase the number of tourists who come to the area.

The creation of a preserve at Sittee Point will directly benefit all of the ecotourist companies that operate on the river. Preservation status at the point will bring extra recognition to the area that will increase the attractiveness of the river as a tourist destination. The chance to see an old-growth tropical forest with the tallest mangroves in the entire Caribbean can be used as a motivation to visit the Sittee River area. Thus, a preserved and interpreted Sittee Point will draw in more ecotourists, which will in turn generate more income for the local people. These benefits will range from marginal to significant depending on the extent to which the ecotourist companies capitalize on the unique natural qualities of Sittee Point. Some training will probably be necessary to generate the greatest use of the site in the tours. Furthermore, the experience of viewing the tall mangroves at Sittee Point will be enhanced by visiting nearby dwarf mangrove sites where whole forests of knee-high trees of the same mangrove species can be seen.

## Research

The only recorded research that has been carried out at Sittee Point is the forest structures measurements that quantified the old-growth characteristics of the mangroves (Kangas unpublished). This work was done by students that were working from the Possum Point Biological Station in a travel-study course. Probably most research at Sittee Point will be done in this way, by individuals or groups working from the station. This approach is appropriate and should be encouraged since many different school groups from the U. S. utilize Possum Point from travel-study programs. As research on the point becomes published perhaps other groups, with special interest in mangroves, will be attracted to the site.

The first priority for research may be to confirm the forest structure measurements that indicated that Sittee Point has the tallest mangroves in the Caribbean. The original data were based on a small number of sample plots so more data is needed to confirm the claim to the tallest mangroves. The physical-chemical conditions which have led to the tall trees should also be studied to aid in understanding the basis of the old-growth forest structure. Presumably, this work should focus on soil chemistry initially. A number of pools are found in the forest, which also merit study. There are reports from student groups that the pools contain a unique fish community and may serve as nursery areas for tarpon. Size, depth and physical-chemical water quality of the pools should be described along with sampling of aquatic biota.

Of course many other topics could be researched at Sittee Point. Quantifying the ecosystem services that the forest provides would especially useful. For example, to what extent does the forest attenuate high winds and tidal surges from the sea during severe storms and thereby provide protection for people living upriver? Also, to what

extent does the forest dissipate energy and absorb turbid, fresh waters from the mountains during severe floods and thereby provide protection for the off-shore coral reef?

All of the kinds of research described above will add to the value of Sittee Point for education and ecotourism, while contributing to the larger, international scientific community. However, the research must be written up and made available for use by teachers and ecotour operators. The Possum Point Biological Station may facilitate the distribution of research by acting as a repository for student papers and other research. The libraries at local schools should also have copies of all research.

#### Access

All of the uses outlined above require access to the site. Access by boat is probably the most reasonable way to enter the forest and convenient landing spots are already used by staff from Possum Point for student group visits. These spots may require more site preparation to accommodate other users, such as children from local schools and ecotourists. Wooden docks and short boardwalks into the forest may be needed to facilitate access and for easy viewing of the forest. Some users will move away from the landing spots for recreation, study or research. Levels of useage should be monitored to avoid overuse through trampling effects from foot traffic. However, this is a world-class swamp, with muddy soils, biting flies and difficult walking due to extensive aboveground roots and hidden water holes. Only the most motivated users will move very far into the forest and impacts from foot traffic are expected to be minimal, at least in the near future. Other impacts, such as destructive harvesting or plant biomass or specimen collection, are regulated by conventional permits through the appropriate government agencies.

#### WHAT NEEDS TO BE DONE

##### 1) People need to become involved

Sittee Point needs to be preserved to benefit people, so those interested need to become involved in the management of the site. Help is needed immediately to start the process of achieving some form of preservation status. In the 1990s local people from Sittee River have composed and signed petitions voicing concerns about environmental impacts caused by developments. This kind of activity is needed again to be focused on achieving preservation status for the point. Help from the Belize Audubon Society, which is recognized as the authority on conservation issues for the country, should also be solicited. All interested people should become involved, including the ecotour operators and especially the owners of the developments on both sides of Sittee Point. A final set of interested people should come from the faculty and students of U. S. schools and universities who visit the area through the Possum Point Biological Station. A group of University of Maryland students, who wrote letters to government officials about the ecological significance of Sittee Point in 2002, started the preservation process and more of this kind of effort is needed.

##### 2) Development of interpretative materials

Interpretative materials in the form of flyers, brochures, trail guides, lists of species, maps, booklets and books are needed to provide information about Sittee Point to the various user groups. Much of the information is already available to create these materials from ecological knowledge published on similar systems elsewhere and from data gathered on the Sittee River ecosystem by the U. S. travel-study programs. Some materials are being developed (a book about the biocultural organization of the river) but more effort is needed. Some materials can easily be developed by class projects in the travel-study courses. Examples of interpretative materials already developed for other sites in Belize and elsewhere can be used as models to develop materials appropriate for Sittee River users.

### 3) Teacher training

Some training of teachers from local schools may be needed to facilitate the incorporation of the Sittee Point ecosystem into their lesson plans. This can be done by faculty of U. S. schools and universities who visit the area with travel-study groups. In fact, some of these groups have been composed of teachers and the training can become part of the travel-study course itself. There have already been many different kinds of interactions between the local schools and the travel-study groups visiting Possum Point so teacher training can be accomplished. The challenge will be scheduling time for the training. The content of the training should probably involve information about the significance of the Sittee Point ecosystem and examples of classroom and field trip activities that can be used to teach about the importance of the ecosystem. The training could focus on Sittee Point but be presented in a larger context of environmental and natural history education.

### 4) Construction for improved access

Docks and boardwalks into the forest at Sittee Point are needed to facilitate access by users. Most users will stay on the construction and only a few will venture further into the forest because of the difficulties of walking through the swamp. Some financial support will be needed to cover the costs of materials and labor, but the total amount of money required should not be very large. Thus, some grant writing will be required. The owners of Possum Point have experience with this kind of construction and they can make cost estimates. Perhaps donations from local businesses who will benefit from ecotourism at Sittee Point can cover costs for some initial construction. All materials and labor for construction can be obtained from the nearby villages so the local economy will be supported by the building of docks and boardwalks at Sittee Point.