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RECOMMENDATIONS FOR TOURISM AND BIODIVERSITY CONSERVATION AT LAGUNA BAVARO WILDLIFE REFUGE, DOMINICAN REPUBLIC



June 2011

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TECHNICAL REPORT

RECOMMENDATIONS FOR TOURISM AND BIODIVERSITY CONSERVATION AT LAGUNA BAVARO WILDLIFE REFUGE, DOMINICAN REPUBLIC

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In cooperation with

Dominican Sustainable Tourism Alliance
La Altagracia Tourism Cluster
Fundación Ecologica y Social Natura Park, Inc.

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DISCLAIMER

The authors' views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.



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1.0 INTRODUCTION

A. Background

Several ecotourism initiatives have been developed in La Altagracia in order to diversify the touristic options in the area. To follow this trend, the government and the private sector have undertaken co-management of the Laguna Bavaro to provide new activities in the area.

The Laguna Bavaro offers a large number of nature tourism alternatives that will serve as a complement to the sun and beach type of tourism. See Photographs #1-18 that show general conditions of the Refuge.

B. Field Work

At the request of the La Altagracia Tourism Cluster we conducted a rapid assessment of the Refugio de Vida Silvestre Laguna Bavaro (the “Refuge”) to determine ecotourism potential and make recommendations on how to implement ecotourism activities while at the same time protecting the biodiversity and mitigating any negative effects from ecotourism. We conducted field assessments on land and water from November 2010 to April 2011 (specifically November 8-15, 2010, March 7-10 2011, April 26-29 2011).

The field work was conducted in cooperation with the La Altagracia Tourism Cluster, the Dominican Sustainable Tourism Alliance and the local community NGO Fundación Ecológica y Social Natura Park, Inc.



Map 1 – Location of Laguna Bavaro Wildlife Refuge.



2.0 DESCRIPTION OF THE LAGUNA BAVARO WILDLIFE REFUGE

A. Location

The Laguna Bavaro is located in the town of Cabeza de Toro in the province of La Altagracia (Map 1). The lagoon's area is 17 km², with a length of 2.5 km and a maximum width of 1.25 km. Its depth varies from 0.25 m to 1.50 m.

B. Flora and Fauna

Two hundred and twenty three species of native and endemic plants have been reported including 4 types of mangroves: (*Rhizophora mangle*, *Avicennia germinans*, *Laguncularia racemosa* and *Conocarpus erectus*), which are protected under national legislation. Also some species listed in the appendices of the Convention in Endangered Species were observed: Guayiga (*Zamia debilis*), mahogany, (*Swietenia mahogany*) and the banks (*Guaiacum sanctum*).

C. Birds

This assessment determined that a total of 86 species of birds have been reported for the Laguna Bavaro and its buffer area, doubling the previous observations (ECODE 2002, reported 44 species). Eight of the species are endemic to the island Hispaniola, Cigua Palmera (*Dulus dominicus*), Cuatro Ojos Cabeza Negra (*Phaenicophilus palmarum*), Carpintero (*Melanerpes striatus*), Perico (*Aratinga chloroptera*), Barrancolí (*Todus subulatus*), Lechuza Cara Ceniza (*Tyto glaucops*), Cigua Canaria (*Icterus dominicensis*) and Pájaro Bobo Grande o Taco (*Coccyzus longirostris*). The avifauna is represented mainly by Gallareta Pico Blanco Caribeña (*Fulica caribaea*), Garza Real (*Egretta alba*), Martín Pescador (*Ceryle alcyon*), Paloma Coronita (*Patagioenas leucocephala*), Pato de Orilla (*Anas bahamensis*), Petigre (*Tyranus dominicensis*), Pelicano (*Pelecanus occidentalis*), and Rey Congo (*Nycticorax nycticorax*).

Among the endangered bird species we observed Pollo de Manglar (*Rallus longirostris*), Charrán Menor (*Sterna antillarum*) and Canario de Manglar (*Dendroica petechia*). Except for the Canario de Manglar whose conservation status is undetermined, the others are included in the category of vulnerable (SEA/DVS 1990b). The Yaguaza (*Dendrocygna arborea*), Paloma Coronita (*Patagioenas leucocephala*), Perico (*Aratinga chloroptera*) Paloma Ceniza (*Patagioenas inornata*) are also present here and listed as vulnerable at both the national (SEA/DVS 1990b) and internationally (IUCN 2011).

The recovery of Paloma Coronita (*Patagioenas leucocephala*) population is major recent discovery. People in the area suggested that the population had left the site for the last 10 years but during this assessment we have found several nests in different areas of the mangroves.

Annex A lists all bird species observed in the Refuge.

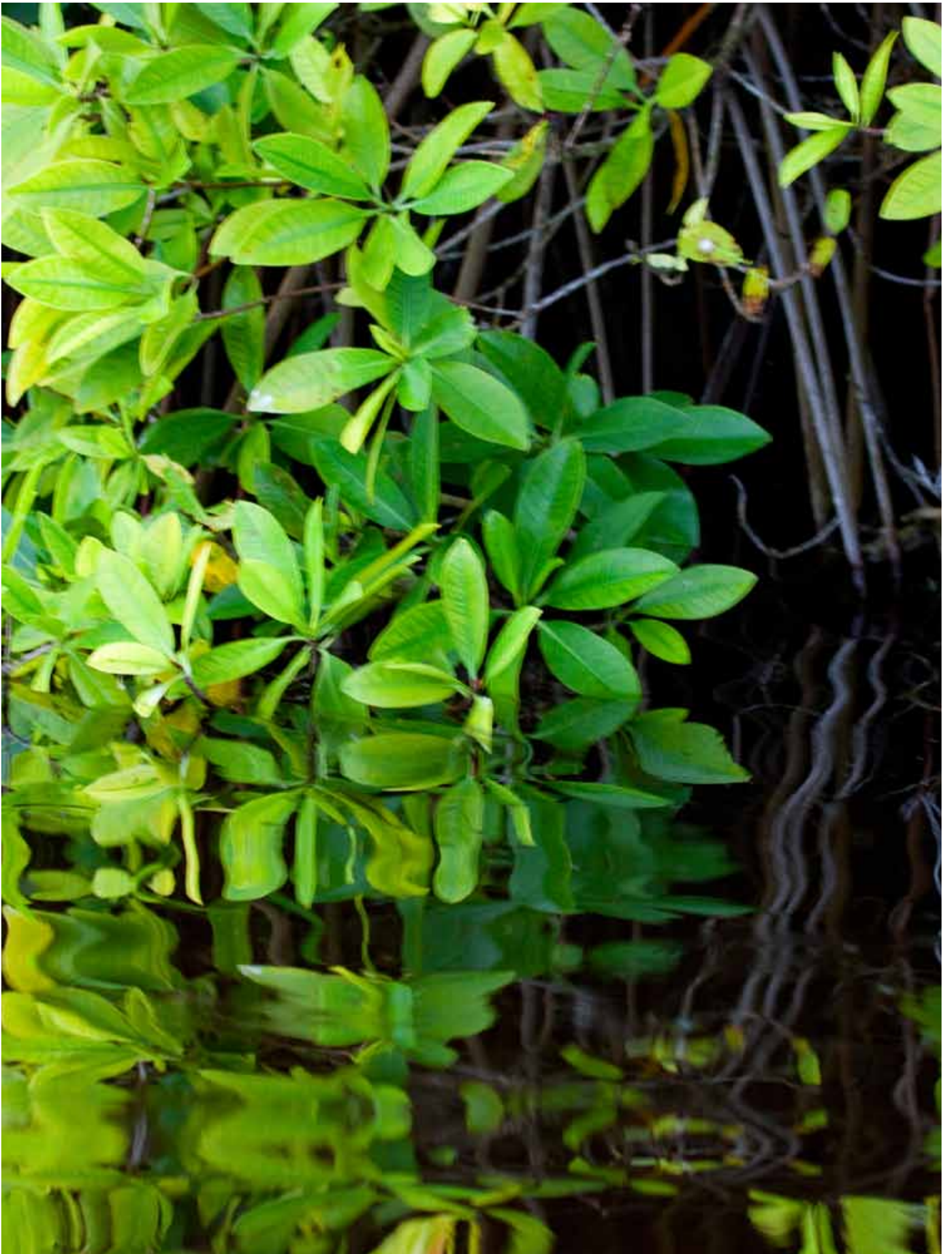
D. Fish

Freshwater fish are one of the most important attractions of the lagoon. A small fish *Cyprinodon higuey* (no common name for this species) was found mainly in the clearest areas monitored.

Additional species are present like jurel (*Caranx latus*), pargo (*Butianus cyanopterus*), aguja paladar (*Pylosuros crocodylus*), picúa (*Sphyaena picudilla*), róbalo (*Centropomus undecimalis*), sábalo (*Megalops atlanticus*), mojarras (*Diapterus olisthostomus*) and others.

E. Amphibians and Reptiles

Five species of amphibians and 11 species of reptiles are reported for the Laguna Bavaro and its buffer area, although Schuwarrt (1991) reported 27 species total from the area. Four species of amphibians and 10 species of reptiles are endemic to Hispaniola. Among reptiles, five species are considered threatened. These are Culebra Verde (*Uromacer catesbyi*), Culebra Verde (*Uromacer oxyrhynchus*), Culebra Sabanera (*Antillophis parvifrons*) and the Jicotea (*Trachemys stejnegeri*). These species are listed in the Vulnerable category in terms of their conservation status under natural conditions (SEA/DVS 1990). The species of turtle is also included as vulnerable in the Red List of the International Union for Conservation of Nature (IUCN 1998).



The frog, Coquí Amarillo (*Eleutherodactylus flavescens*) was heard in the mangrove forest, although not observed.

Annex B lists all amphibian and reptile species observed in the Refuge.

F. Geology

The soils in the refuge are mainly those occurring in the eastern coastal edge of the Coastal Plain of the Caribbean and are known as the Association Macao-Matanzas. They are flat and shallow soils, very rocky with low agricultural value. They have a high content of organic matter with high moisture holding capacity.

G. Climate

The climate is related to the Caribbean coastal plain. The area is relatively dry with an average annual rainfall between 1,000 to 1,700 mm. The dry season occurs from January to March. According to records from the meteorological station of Punta Cana International Airport (1995-2006) the area has an average temperature is 27.9°C, annual mean maximum temperature of 31°C and annual mean minimum temperature of 22.7°C. The winds are mainly East-West with an average speed of 12 km/hr.

H. Cultural Resources

Our field research and literature review of the refuge did not find evidence of aboriginal culture in the study area.

I. Land Use

The refuge and its buffer zone is mostly comprised of swampy, low lying land that was used for agriculture and cattle farming in the past. The area around the refuge has been developed with several large, multinational, all-inclusive resorts.





3.0 MANAGEMENT GOALS

The general goals of sustainable tourism are to maximize the positive benefits of tourism to biodiversity, ecosystems, and economic and social development, and of biodiversity to tourism, while minimizing negative social and environmental impacts from tourism (CBD Guidelines 2004).

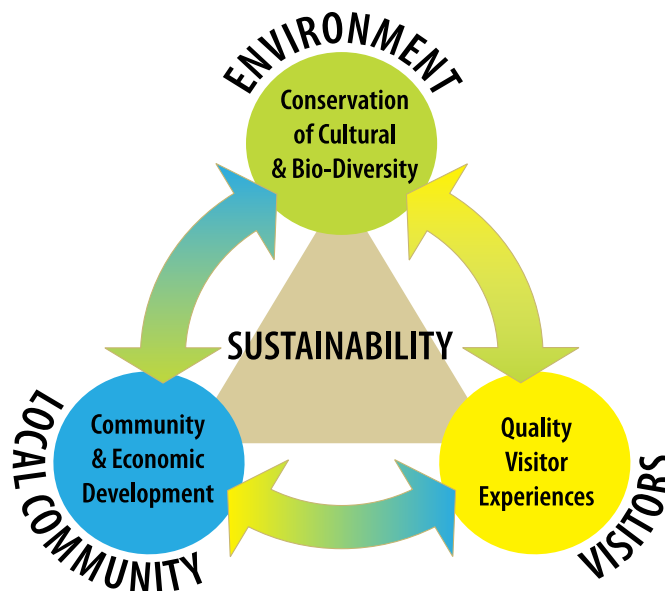
In addition, the agreement between the USAID/DR and USDA Forest Service to assist the DSTA lists these specific goals:

- Promote sustainable tourism, with an emphasis on biodiversity conservation.
- Support economic development of local communities in conjunction regional tourism clusters.
- Integrate tourism, interpretation, public education and conservation.
- Strengthen the Dominican Republic Protected Area Management System.
- Develop partnerships in the community.
- Strengthen the relationship of the clusters to other tourism activities in the region.
- Increase financial sustainability of regional clusters through income generation and promotion of an enabling operating environment.

A. Benefits-based Approach

Conservation must be integrated with development activities. However, the ultimate goal of integrating sustainable tourism and biodiversity conservation is not just to reduce threats or avoid impacts, it is the creation of sustainable benefits to the environment, the local community (GSTA 2009, UNDP 2007) and visitors, who are frequently overlooked.

To achieve this integration and meet the project objectives listed above requires a benefits-based model of sustainability that provides linkages and synergies between all three elements. Since they are directly linked, actions in one affect the other two (Figure 1 and Annex C). For more details of this model, see Wylie and Bauer 2008.



This model is not only a theoretical concept, it is a practical “compass” for providing direction at each stage of project planning, implementation and monitoring. For example, it can help:

- Define and expand the project vision and goals
- Focus the threats and opportunity assessments
- Develop integrated conservation/tourism targets
- Analyze positive “value-chain” linkages affecting tourism opportunities
- Create a conceptual model describing linkages among causal factors
- Develop specific actions with monitoring measures
- Select and prioritize activities with synergistic linkages

B. Refuge Goals and Objectives

The desired future outlined in the refuge management plan (Dominici 2007) include the following conditions and actions for tourism:

- Provide proper personnel and infrastructure to handle visitors
- Create public facilities for recreation compatible with biodiversity conservation
- Improve public access
- Develop a visitor center and interpretive programs
- Improve local economic opportunities
- Train local community members as ecotourism guides
- Encourage locals to provide ecotourism services
- Create an awareness of and appreciation for the refuge



4.0 MANAGEMENT ZONES

The management plan (Dominici, 2007) has defined the following zones, which identify the management goals and define the kinds of activities that are allowed, at least generally, in each area of the refuge.

A. Primitive Zone – Includes the mangroves along the north and east side of the lagoon. Conserve coastal marine ecosystem. Protect wildlife habitat, nesting sites and water quality.

B. Public Use Zone – Encompasses the lagoon, the administrative office and the road on the south side of the lagoon through the wetlands. Allow public access and use.

C. Restoration Zone – Covers the swampy areas west and southeast of the lagoon. Also the strip of mangroves and palms between the ocean and the lagoon. Restore vegetative communities and maintain wetlands.

D. Buffer Zone – Wetlands outside the refuge to the south and west and resorts and village to the east and north. Act as a buffer to the refuge.

No map has been developed to show these zones visually.

5.0 CRITICAL ISSUES

A. Strengths, Weaknesses, Opportunities and Threats (SWOT) Assessment

A rapid assessment of the area's strengths, weaknesses, opportunities and threats was conducted between November 2010 and April 2011 and is summarized in Table 1. A total of four visits were made by kayak at different times of the day in November 2010 to carefully examine all areas of the lagoon, with an emphasis on waterways immediately adjacent to the refuge administrative office and the resorts. In addition, team members drove the road leading to the southern shore, the entrance road leading to Hotel Natura Park, and explored the coast and Punta Los Nidos on foot.

The area's primary attractions are its pristine mangrove forests that form a solid visual and physical barrier around the lagoon, as well as the excellent wildlife viewing opportunities provided by birds, fish and fresh water turtles. These natural attractions are enhanced by their close proximity to three major resorts, a remarkable lack of trash and biting insects, and cooling breezes from the coast.

Thousands of resort tourists pass within 100 meters of the lagoon each year, totally unaware it exists. This potential source of visitors so close to a protected area is very rare and represents a tremendous opportunity to develop ecotourism products to supplement the typical "sun-sand-and-sea" resort experience. These opportunities are described in detail below.

However, before any tourism programs can be initiated, several issues need to be addressed. The primary concern is water quality. Although past problems of resorts dumping untreated sewage into the lagoon have apparently been resolved and water testing is being conducted, this needs to be carefully watched, especially if there is public contact with water.

Other easily remedied deficiencies are a lack of public facilities, access, signage, advertising, and law enforcement. Demolition or completion of the existing concrete "shops" would improve these current eyesores. The lack of an obvious entrance is confusing to visitors. Creation of a clearly marked portal would correct the problem, provide an attractive entrance and create a positive impression for visitors arriving by foot.

Table 1 – SWOT rapid assessment.

<p style="text-align: center;">Strengths</p> <ul style="list-style-type: none"> Pristine mangrove forests Attractive setting Viewable wildlife—birds, fish, turtles Proximity to major resorts No trash Few biting insects Cool breezes 	<p style="text-align: center;">Weaknesses</p> <ul style="list-style-type: none"> Uncertain water quality Shallow water Unattractive weeds & algae in places No public facilities with refuge No signage or marketing Limited access to water Limited law enforcement Noise from resorts & community Powerboats not suitable No swimming opportunities Unfinished concrete “shops” Lacks a psychological entrance
<p style="text-align: center;">Opportunities</p> <ul style="list-style-type: none"> Kayak tours Boardwalk Viewing tower Visitor center Interpretation of unique species & lagoon Future tour options in the refuge Re-use or recycle concrete “shops” 	<p style="text-align: center;">Threats</p> <ul style="list-style-type: none"> Pollution from resorts Water safety & limited emergency access Invasive species Illegal fishing Insecticides Wildfires Robberies along the beach Amphibious ultra-light plane conflicts Climate change

Things that cannot be changed include water with suspended organic debris and unusual colors, thick aquatic weeds and algae in some parts of the lagoon that are unattractive and impede boating, and some noise pollution from the resorts and nearby communities. However, these relatively minor problems can be mitigated by careful route planning or offering evening tours when weeds and algae are not obvious. They can also be interpreted as part of the lagoon’s unique ecosystem so that visitors understand that they are natural and not “pollution.”

Tourism and biodiversity in the refuge could be seriously impacted by sewage and insecticides from the neighboring resorts, invasive species, illegal fishing, wildfires, and boating accidents and injuries. Although the lagoon is relatively shallow, because of its tangled mangroves, aquatic weeds, and thick algae, it would be extremely difficult to evacuate an injured kayaker or for a victim to swim to safety after capsizing. In some places the weeds and algae are too thick to swim through and too thin to stand up or wade through. An emergency plan and training for kayak guides will be necessary to deal with these challenges.

B. Beyond Threats to Biodiversity

Threats-based analysis is a proactive approach and is not limited to environmental impacts. It should consider past influences while anticipating and planning for future threats and opportunities (USAID/ARD 2005a). Also, considering only quantitative biological information is insufficient; we must recognize the human dimension of ecosystem management, using social sciences to monitor social, economic, political, and cultural threats and opportunities where feasible and useful (Stem et al 2005).

C. Direct Threats

The current management plan for the refuge includes a thorough analysis of the area’s biodiversity and provides the overall environmental context for this project (Dominici 2007). Most importantly, it identifies the two primary threats to biodiversity conservation: the loss of forest habitat, including related species, and degraded water quality (Figure 2).

We do not anticipate any threats to biodiversity conservation from recreational use of the refuge. The number of visitors will be small and limited to short sections of developed trail and small groups of kayakers. The use of motorized boats should be prohibited on the lagoon to avoid disturbing wildlife and stirring up the suspended sediments.

D. Indirect Threats and Contributing Factors

To fully understand these direct threats, the “causal chain” of root causes or indirect threats must be understood. “Often, the most effective—and sometimes the only—way to reduce a direct threat to biodiversity is to carry out actions that address its root causes” (USAID/ARD 2005a; USAID/ARD 2005b). These contributing factors may be economic, political, institutional, social, or cultural.

Indirect threats in the project area include pollution and insecticides from the adjacent resorts, illegal hunting and fishing, introduction of invasive species, and wildfires.

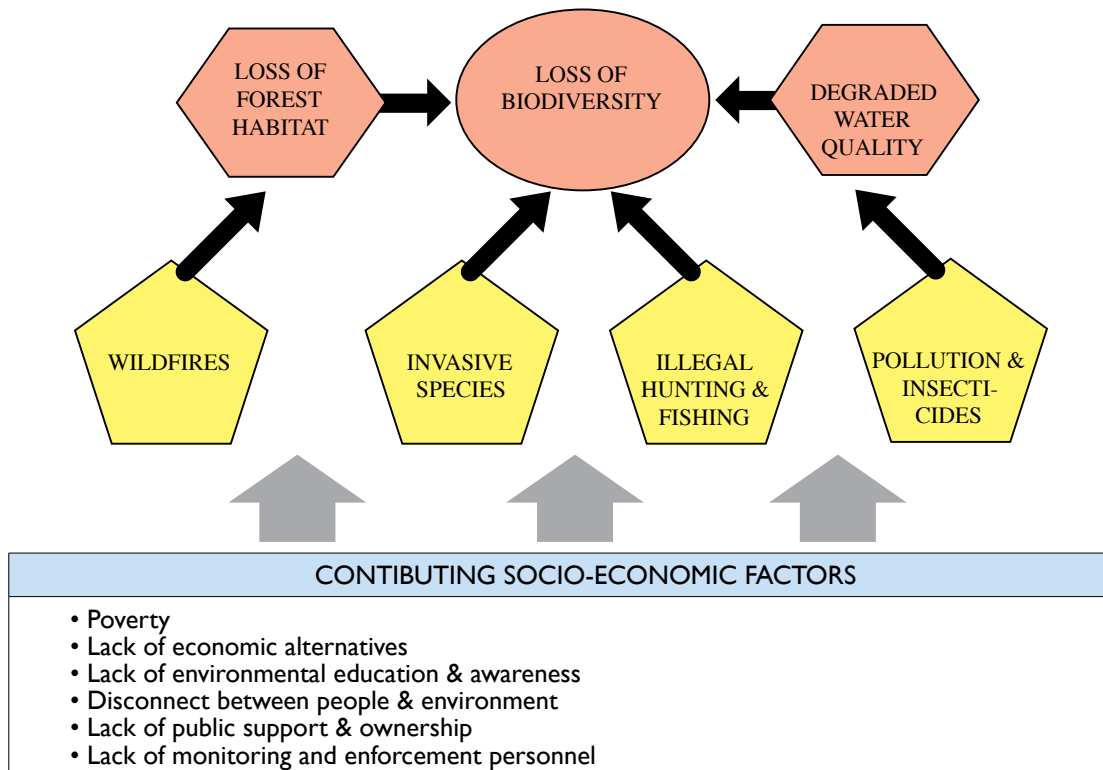
These threats affect the community of Cabeza de Toro and the potential public use of the lagoon and are considered in the conservation action plan by addressing the underlying socio-economic factors. These factors include poverty and the lack of economic alternatives for local fishermen, a general lack of environmental education and awareness, a disconnect between local resorts and residents and the environment, lack of public support and ownership of the refuge, and a lack of monitoring and law enforcement.

E. Coastal Climate Change

Coastal areas are especially vulnerable to climatic impacts. The effects of climate change/global warming could have significant effects to the refuge primarily through a rise in sea level and storms. Stronger and more frequent storms can seriously damage or even destroy the thick mangrove forest that serves as a solid buffer between the lagoon and the neighboring resorts and community. These storms and high waves could also breach the fragile sand bar that separates the lagoon from ocean, perhaps even changing the freshwater lagoon into a saltwater estuary. This would totally change the character of the refuge.

A fully functioning and healthy ecosystem in the refuge, supported by a successful community-based ecotourism program, can help protect the vulnerable coastal zone and associated coral reefs from the effects climate change/global warming. It can protect human health and safety by ensuring the lagoon water remains clean and unpolluted; its forests prevent erosion, keep sediments from smothering fragile reefs and protect the built environment during storms; and its ecotourism maintains livelihood opportunities and diversify economic options. Consequently, the refuge will play a key role in any strategy by the community to adapt to coastal climate changes (see USAID 2007).

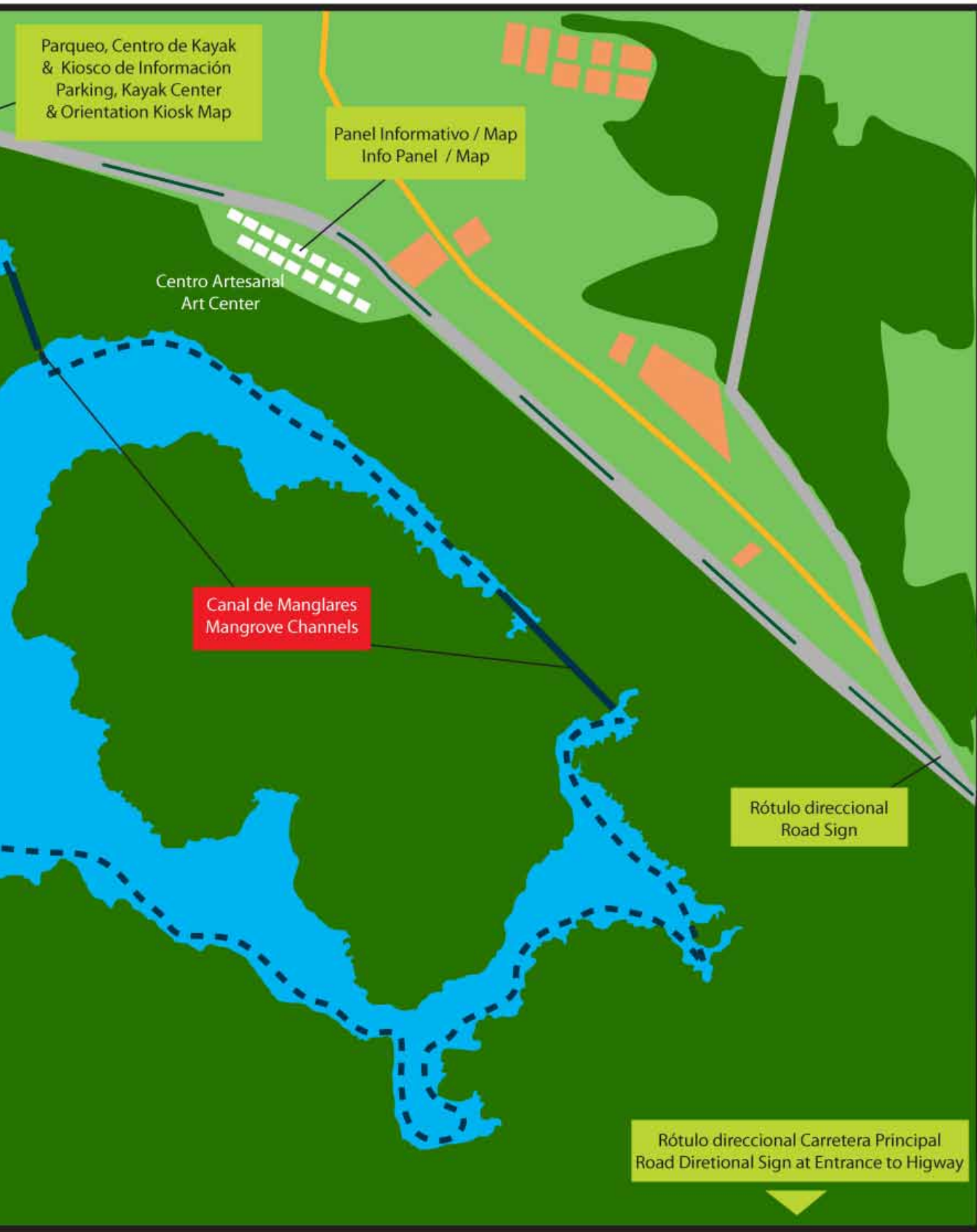
Figure 2 – Direct and Indirect Threats and Contributing Factors to the Laguna Bavaro Wildlife Refuge.



Map 2 – Detail of the Laguna Bavaro Recreation Area.



- Infraestructura Existente
Existing Infrastructure
- Infraestructura Propuesta
Proposed Infrastructure
- Señalización Propuesta
Proposed Signs
- Kayaking





6.0 ECOTOURISM OPPORTUNITIES

A. General Opportunities

Access to the refuge and views of the lagoon are extremely limited and visitation is very small. The biggest opportunities for recreational development in the refuge are for trails through the mangrove and kayaking in the lagoon.

Currently, the only access to view the mangroves and see the lagoon is by walking a short trail, recently constructed through the mangroves from the current ranger station to the lagoon (Photo 4). This trail has a gravel base placed on top of the forest floor. The trail can be converted into a boardwalk trail meandering along the edge of the lagoon and through the mangroves that would provide a water-level view of the lagoon and the fish in its shallow waters and access to view the mangrove forest from within. A boardwalk trail system is more environmentally friendly than the current trail and also a more enjoyable experience for the visitor. A viewing tower about 10 meters high with a platform above the mangroves could offer views of the entire refuge and aquatic birds (see concept in Illustration #8). Map 2 shows the location of existing and proposed infrastructure.

Other opportunities for visitors to the refuge could include construction of a visitor center/museum/gift shop for local products and the possibility of providing additional trails and boardwalks in more remote sections of the refuge. The existing cement “shops” that were partially constructed in the last year or so are currently being reconstructed for visitor use, although we have not seen a plan that describes how these structures will be used.

The most convenient access to the refuge by foot and by boat is primarily in the southeastern corner near the resorts. The visitor experience can be enhanced through the development of high-quality interpretation of the area’s mangroves, unique species of animals, and the lagoon’s unusual aquatic ecosystem. See recommendations below for more detail.

Punta Los Nidos on the coast just outside the northern boundary of the refuge is a particularly attractive area. Here, many resort tourists enjoying horseback riding, swimming in the “natural swimming pool” in the bay, or hiking along the beach, completely unaware of the lagoon nearby. At the closest point the lagoon is less than 200 meters away and the mangrove swamp starts just 10 meters from the trail.

On the western side of the point are two old channels that originally connected the ocean to the lagoon, about 360 meters away. Although choked with sand and mangroves, storms could open these waterways again. In the future it may also be possible to construct an elevated boardwalk, viewing platform, or narrow channel to the lagoon to provide public access and create new ecotourism programs in north end of the refuge.

Aerial tours are occasionally offered along the coastline with an amphibious ultra-light aircraft that takes off and lands in the ocean near the resorts. These tours could over-fly and even land in the lagoon, providing a unique way to see the Refuge. However, this would impact the solitude of other visitors and disturb wildlife and should be prohibited.

B. Kayak Tourism Potential

As mentioned previously, the assessment team spent time kayaking the entire lagoon to determine if there is a potential to develop kayak tourism. We used a simple rating system to determine the level of kayak potential in the Refuge and compared this to kayak areas in other locations in the Caribbean that our assessment team has evaluated over the years.

This numerical system rates the area's potential for successful sea kayak tourism based on 12 criteria. The scale is 0-None, 1-Low, 2-Moderate, 3-Good, 4-Excellent, 5-Best in world (rare). Points are subtracted for serious negatives such as trash, conflicts with other users, and poor access to water. The maximum value is 37 points for truly "world-class" paddling destinations. Scores for Laguna Bavaro include the following:

- A. Watchable wildlife (includes birds, fish and turtles). Score = 4 points.
- B. Water Quality is fair to good. Score = 2 to 3 points.
- C. Scenic Quality (includes an interesting shoreline). Score = 3
- D. Safety and Comfort is good. Score = 3
- E. Cultural and Historic Attractions are limited. Score = 0
- F. Natural Attractions (lagoon, mangroves and wildlife) are excellent. Score = 4
- G. Diversity of paddling opportunities is good. Score = 3
- H. Other recreational opportunities are currently limited. Score = 0
- I. Conflicts with other users are not a problem. No deduction
- J. Accessibility to water is very limited. Minus 1 point (easily fixed)
- K. Trash is not a problem. No deduction.

TOTAL SCORE = 18-19 points **Comparison with Other Kayak Destinations**

32 points -	San Blas Islands, Panama
20 points -	Culebra Island, Puerto Rico
19 points -	Glover's Reef, Belize
19 points -	Laguna Bavaro, Republica Dominicana
18 points -	La Caleta, Republica Dominicana
14 points -	Pearl Lagoon, Nicaragua
9 points -	Utila Island, Honduras

A score of 18 to 19 points for Laguna Bavaro shows that it has good potential for the development of kayak tourism. What it lacks in cultural and historical attractions, swimming opportunities, and water quality, it makes up for with an attractive overall setting and excellent wildlife viewing very close to major resorts. In addition, the lagoon's tourism potential can be increased significantly through environmental interpretation and the creation of better kayaking access.

C. Kayak Tour Routes

A two or three-hour guided kayak tour would provide an intimate experience for those who want to explore the lagoon. This would require very little new infrastructure except for a place launch kayaks and store boats and equipment (Annex D). An easy loop tour to explore the nearby coves could be 4.2 kilometers in length.

A perfect location for a kayak staging/launch area is about 50 meters from the refuge office on the edge of the lagoon and about 65 meters from the closest concrete block "shop" structure (also a possible kayak office or storage space). It is 7 by 14 meters in size and constructed with rock and gravel. All that would need to be added is a short stone and gravel ramp into the water wide enough to launch and land kayaks, and widening the path through the reeds to make a convenient access to the lagoon (see concept Illustration #2). A ramp is better than a wooden dock because it is easier to launch kayaks and does not need to be adjusted for different water levels.

Potential kayak tour routes are shown on Map 2. Cutting new channels to connect neighboring bays would simplify and enhance these routes. This also shows the location of two new channels. Approximately 65 and 90 meters long, they would create interesting tunnels through the thick mangrove and provide visitors a unique perspective on this ecosystem, as well as welcome shade on sunny days. They would also shorten the tour by about 1,300 meters and avoid having to turn around and double back in two dead-end bays.

A longer tour to visit the other end of the lagoon is also possible. This would be 7.3 kilometers in length and take at least three hours. However, other than seeing the entire lagoon from end to end, it does not really provide a significantly different or better experience for the extra effort. Windy conditions would also make this a more difficult tour because it is less protected.

7.0 RECOMMENDATIONS

As previously mentioned, the refuge currently has very little recreational infrastructure and receives little visitation. There are no local small businesses or entrepreneurial activities in the refuge. Thus, we recommend that ecotourism activities be undertaken in “phases”, starting with developing activities closest to the current headquarters and with a greater opportunity for success, and then over time expand to other areas of the refuge if visitation increases to a level that the developed areas cannot handle. This report will address what is needed for “Phase I” which could correspond to the next 1-2 years of development. See Illustrations #1-8 for conceptual drawings of site develop for Phase I.

Recommendation #1- Environmental Interpretation

Visitor experiences will be enhanced through high-quality interpretation of the area’s mangroves, lagoon ecosystem, wildlife, and history. This can be done through personal interaction with trained guides or through interpretive signs. We recommend a plan be prepared to define interpretive objectives, identify a central message and supporting messages, and determine where and how these can best be presented. In addition, interpretive training should be provided for all guides who conduct tours in the Refuge.

For example, the central message could focus on the importance of mangroves, with various supporting sub themes, such as:

1. Mangroves protect the shoreline
2. Mangroves are a nursery for fish and birds
3. Mangroves clean the water
4. Birds and mangroves support each other

Possible interpretive objectives could include the following:

Intellectual

- Understand how mangroves are important (at least 3 ways)

Emotional

- Lose fear of mangrove
- Appreciate mangroves
- Have fun in mangroves
- Feel mangroves are beautiful

Behavioral

- Get people to visit the mangroves
- Tell friends about their experience
- Repeat visits
- Purchase gifts/souvenirs
- Tip the tour guides
- Make donations (monetary or equipment) to the refuge

Recommendation #2 – Refuge Headquarters, Visitor Center and Kayak Center Infrastructure

Currently the cement “shop” structures that were partially constructed and then left abandoned are being rebuilt by the Ministry of Environment. Some of the original buildings have been destroyed. A three-room building is being finished. Adjacent to these buildings, there are two partially constructed cement structures (they lack a roof, floor, doors, windows and finished walls) that we understand will not be finished under the current plan. A restroom facility is also being finished (Photos #13-18).

Although we have not seen the plans for these buildings we recommend that:

- The 3 connected buildings be used for a small interpretive/information center and a gift shop where only locally made products are sold.
- The two remaining structures that under current plan will not be finished be dedicated as a kayak center.
- The site where the cement structures were destroyed be used as the primary visitor entrance to the Refuge and that an entrance portal, flower/local plant garden and walkways to the other facilities be constructed here. Local plants that attract birds and butterflies should be planted in this area in raised gardens designed to hide the remaining concrete slabs and debris.

Recommendation #3 - Signage and Maps

Because there are no signs of any kind for the refuge, it is invisible to the tens of thousands of tourists who come to the nearby resorts every year. Therefore, we recommend the following signs be installed immediately to properly identify the Refuge and assist visitors.

- Roadway directional signs at or near each of the five intersections leading to the refuge: the Varon-Bavaro highway intersection, the highway entrance to the community of Cabeza de Toro, at the beginning of the town, the last “Y” near the entrance to the Refuge, and at the beginning of the road leading to the Refuge office (Map 2). These will be standard metal highway signs, although in slightly different sizes. Each will identify the full name of the refuge “REFUGIO DEVIDA SILVESTRE LAGUNA BAVARO.”
- Orientation maps showing Laguna Bavaro and the Refuge at the artisans shops near the entrance to the village, near the new information center, and at the start of the trail.
- Stone monument and sign welcoming visitors to the Refuge along the entrance roadway.
- Welcome sign for the pedestrian portal, with a “Thanks for Your Visit”, on the backside.
- Parking sign near the Refuge office.
- Sign for the Kayak Center so it can be easily read from the parking area.
- Waterproof trail map for kayak tours (this item can be sold as a souvenir).

Draft designs for the signs are presented in Annex E and proposed locations are shown in Map 2.

Recommendation #4 – Boardwalk Trails and Viewing Towers

We recommend development of a boardwalk trail system with wildlife viewing decks and towers and facilities to facilitate kayak tours. These are urgently needed to develop a viable ecotourism program. Illustrations #1-8 show an artists concept of the recreation site infrastructure development recommended in this report.

First, the existing limestone rock trail should be converted to a boardwalk to help mitigate site damage and to make the trail more attractive and safe for visitors. This trail should then be extended 200 meters through the mangroves to the main lagoon, and supplemented with a 150-meter boardwalk and viewing towers along the shoreline. In addition, the old dock at the end of the new trail should be rebuilt. Possible locations for these improvements are shown in Map 2.

The boardwalk should be at least 1.2 meters wide with extensions where visitors can stop and enjoy the lagoon. Railings are necessary for those sections that are over water or more than 40 centimeters above the ground. The viewing towers should be a simple design to provide a clear view of the lagoon but not too high or close to the water to avoid disturbing wildlife or the viewshed. Their height will depend upon the height of the mangroves, which range from 4 to 12 meters, so that visitors are about waist-high to the top of the trees. Specific architectural plans and estimated costs should be developed.

Construction design specifications for the boardwalk and viewing towers should be developed by a qualified architect. The examples presented in Annex F and published guidelines on wetlands interpretive trails (Kusler, 2006) can provide helpful suggestions for these designs. Exact locations for other improvements need to be identified on the ground in consultation with local officials and environmental specialists. All design specifications should include environmental mitigation guidelines. A minimal amount of mangroves should be cut when constructing these structures.

As the tourism program evolves in the refuge, future infrastructure projects (Phase II) could include a viewing tower at Punta Nido, an expanded trail/boardwalk system –perhaps even a loop from the beach— and more detailed interpretive signage along the trails and at the towers, and a refuge gift shop.

Illustration 1 – Aerial view of the planned developed recreation complex.



Illustration 2 – Boardwalk view.



Illustration 3 – Boardwalk with bump out for visitor observation at lagoon.



Illustration 4 – Kayak launch site.



Illustration 5 – Boardwalk cross section view with handrails.



Illustration 6 – Boardwalk cross section view without handrails.



Illustration 7 – Boardwalk cross section view with and without handrails and with dimensions.

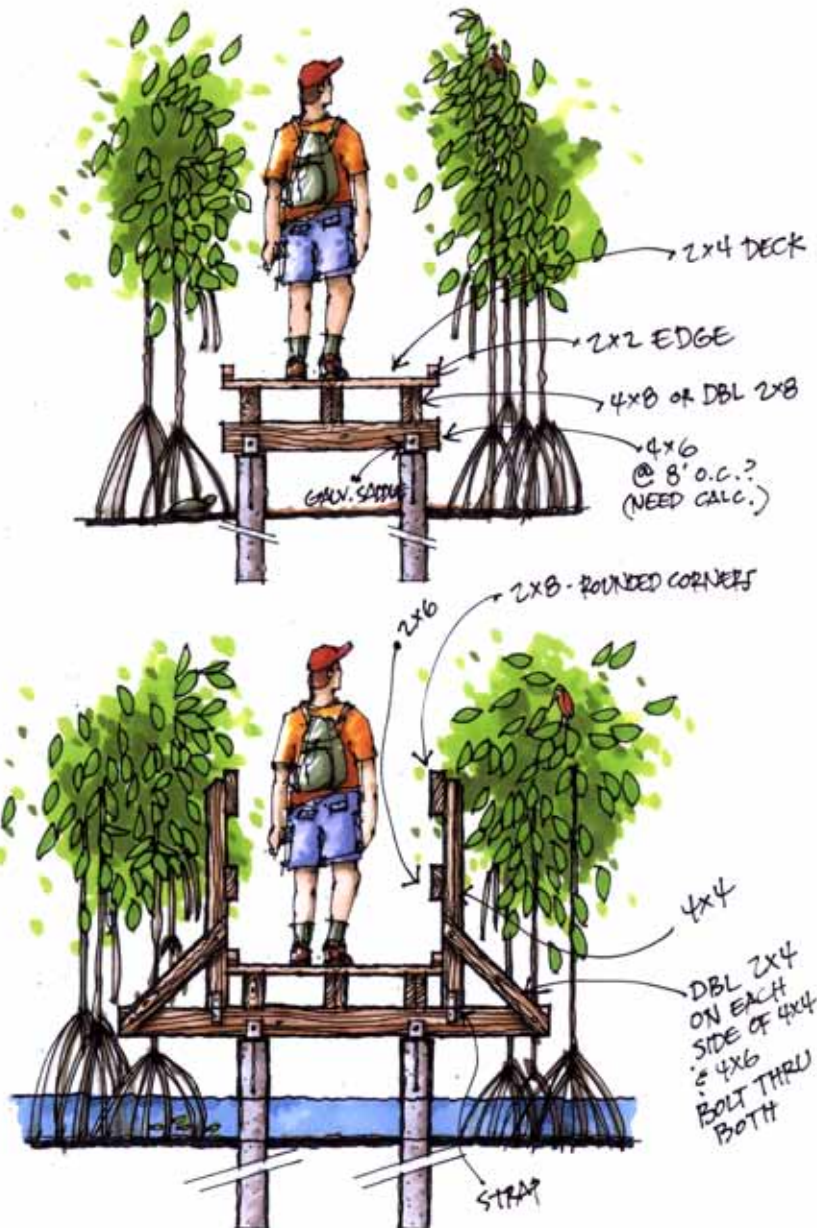
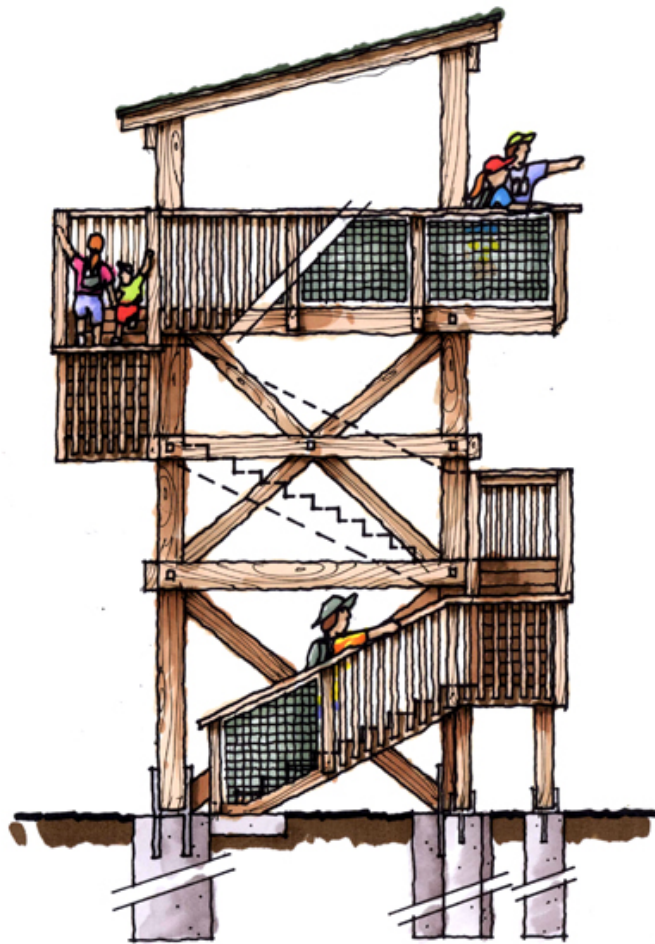


Illustration 8 – Observation tower.



Recommendation #5 - Kayak Tourism

Since kayaks are the only practical way to experience the lagoon and thousands of international tourists are visiting the area each year literally a few hundred feet from the refuge entrance, we recommend the refuge immediately develop guided and perhaps self-guided kayak tours through a concessionaire. A request for proposals can be based on the information in this report. Suggested kayaks and equipment that will be needed to start a kayak tour program are presented in Annex D.

To accommodate this use, a simple kayak staging area should be developed on the shore of the lagoon near the Refuge parking area. This site has an existing prepared surface that is perfect for such use. It can include a stone and gravel ramp for launching, loading, and unloading kayaks, which is the best way to launch and recover kayaks, as well as secure storage for kayaks and equipment (see Illustration #2 for concept of this kayak staging area).

One or two new kayak trails could be cut to create interesting circular routes through the mangroves (Map 2). We recommend group size be limited to 6 single kayaks or 4 doubles for each tour until the effects of kayaking on birds can be assessed.

The refuge should develop information, materials and presentations for guided and self-guided kayak tours, such as waterproof fish and bird identification guides and trail maps (see souvenirs section below).

Before starting the kayak tours a training program for local guides and instructors needs to be established. We recommend a 3-day training program patterned after the American Canoe Association's Day Trip Leader (guide) and Basic Coastal Kayak Instructor programs.

We recommend that the project purchase four to six kayaks and associated equipment and train the local guides to help start the local entrepreneurial business (Annex D).

Recommendation #6 - Marketing and Souvenirs

As previously mentioned, the Refuge currently receives very little visitation. As infrastructure is developed and ecotourism activities are initiated it will be necessary to develop marketing strategies and products to create a greater awareness about the Refuge and to attract local and international visitors. We recommend the use of the internet and social media (facebook, blog, etc) to promote the Refuge and ecotourism activities such as kayaking in the lagoon, birdwatching or other economic generating activities.

In the short-term we recommend the following marketing actions:

- Logo - Use a standard logo or icon in all graphic designs that gives the site a unique and attractive marketing identity.
- Webpage - Develop a simple website to promote the refuge and ecotourism activities.
- Social-media – Develop a facebook page and blog site to promote ecotourism in the area.
- Develop a multimedia CD on the refuge's attractions.
- Printed/Electronic advertising - rack card, promotional poster, sales kit, and promotional flyer to advertise the park at hotels and other businesses in the area.
- Guidebooks - Update existing descriptions of the park in published guidebooks.
- Internet advertising - Upload a selection of high-quality photographs (available in the Altagracia Cluster Photo Bank) to suitable internet photo sharing websites such as Google's "Panoramio."

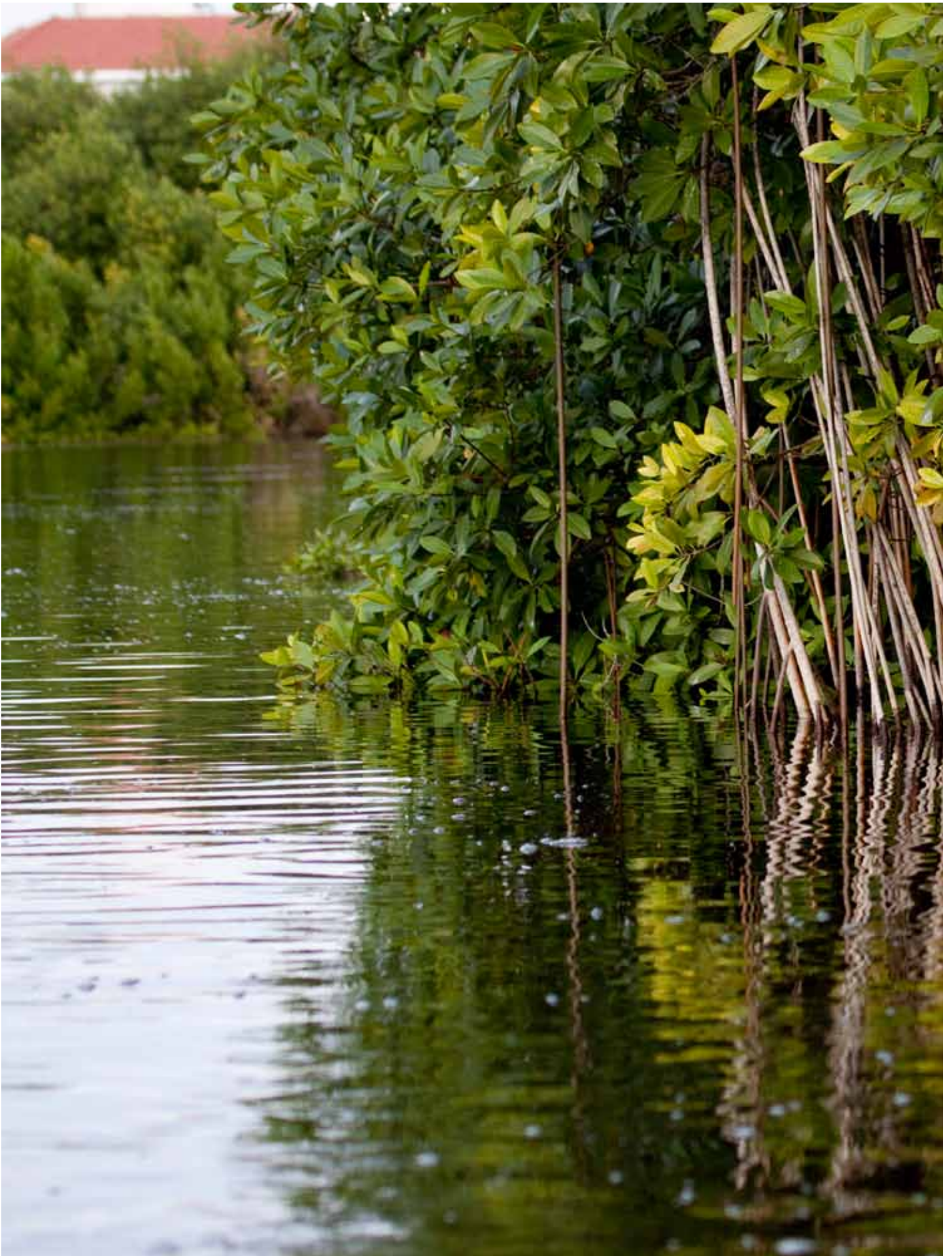
In addition to the marketing materials, souvenirs can be developed as a means to help create awareness and to raise funds for the Altagracia Tourism Cluster or local NGOs. All souvenirs offered for sale at the refuge should be locally produced, support the goals of biodiversity conservation and environmental education, and help promote ecotourism. Before souvenirs are produced it must be decided between the Altagracia Tourism Cluster, the Ministry of Environment and the local NGOs who will be the "owner" of such materials, who will market the souvenirs, and how the funds will be managed and used.

In the short-term we recommend the following souvenir items:

- Post card set
- Bookmark
- Poster
- Note cards
- Matted photos (4"x6" photo in 5" x 7" matt frame)
- Logo on T-shirts and baseball caps
- Waterproof trail map for kayak tours

As funds are generated other souvenir products can be produced, including calendars, bird identification guides, multimedia presentations, etc.

Annex G gives examples of some promotional and souvenir products that can be developed to start marketing the Refuge as an ecotourism site.



8.0 MONITORING AND EVALUATION

The following socio-economic indicators are proposed to measure the success of the community's tourism program and to serve as indirect indicators for mitigation of conservation threats. They are easy to collect and closely linked to biodiversity conservation, community and economic development, and quality visitor experiences.

A. Biodiversity Conservation Indicators

- Money collected for the community conservation fund
- Number of community volunteers for conservation projects
- Number of conservation projects completed
- Less illegal hunting and fishing (qualitative)

B. Community and Economic Development Indicators

- Money donated by visitors
- Money earned from souvenirs and sales
- Number of people with new tourism jobs
- Money collected from refuge entrance fees
- Number of new private tourism businesses operating in the refuge
- New or improved recreational infrastructure for locals and visitors

C. Visitor Demand and Satisfaction Indicators

- Number of total customers
- Number of website hits
- Number of visitor complaints
- Number of visitor compliments

Data for each of these indicators should be gathered by the community and used to measure how goals for being met and to help refine conservation activities.

D. Visitor Impacts

Consider applying a simple Limits of Acceptable Change (LAC) methodology to assess visitor impacts within the refuge. Potential issues to be monitored include

- Overcrowding
- Trash
- Vandalism
- Noise pollution from flight seeing tours
- Disruption of bird nesting behavior

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LAGUNA BAVARO PHOTOGRAPHS



Photo 1 – Palmas Cana, from which Punta Cana gets its name, grow in the swampy area along the southern edge of the refuge.



Photo 2 – The Atlantic shore along the northeastern side of the refuge is a popular area for hiking, horseback riding, and ultra-light aerial tours. The lagoon is visible in the background.



Photo 3 – The shoreline immediately west of Punta Los Nidos is very attractive and popular with tourists. In the future it may be possible to provide access to the northern end of the lagoon from this area.



Photo 4 – The newly constructed trail from the office to the lagoon is constructed on the mangrove forest floor and covered with limestone rock.



Photo 5 – Bird-watching will be a major attraction for visitors to the refuge.



Photo 6 – Eighty-one species of birds can be observed in Laguna Bavaro, 8 of which are endemic to the Dominican Republic.



Photo 7 – The lagoon is an important nesting area. Care will need to avoid disturbing birds during nesting season.



Photo 8 – Some mangrove channels should be trimmed to improve access.



Photo 9 – The smooth calm water of the lagoon makes kayaking easy and enjoyable.



Photo 10 – Thick mats of floating algae clog portions of the lagoon, especially along the southern and western (downwind) shore.



Photo 11 – The water in some areas has a rusty color from the vegetation. Here there is also a layer of suspended sediments within a foot of the surface.



Photo 12 – The existing Ministry of Environment Laguna Bavao Headquarters.



Photo 13 – Access road leading to Refuge entrance. The existing cement structures that are being rebuilt are on left. A small bus (Coaster) parking area could be developed along the road at lower left of this photo.



Photo 14 – The 3 partially constructed cement structures and a restroom facility (on left) are being finished.



Photo 15 – Inside view of the 3 attached units. These separate spaces could be used for a small gift shop and visitor information center.



Photo 16 – The site of the demolished buildings, could be landscaped with local plants to attract birds and butterflies and designed to be the entrance to the Refuge.



Photo 17 – The two abandoned cement buildings could be finished and used as a Kayak Center.



Photo 18 – This grassy area could be designed to be a visitor parking lot.

ANNEX A

LIST OF BIRDS OBSERVED IN LAGUNA BAVARO
TAXONOMY BASED ON AMERICAN ORNITHOLOGICAL UNION, 2005
(COMPILED BY JORGE BROCCA, MAY 2011)

ANNEX A. List of Birds Observed in Laguna Bavaro / Taxonomy Based on American Ornithological Union 2005
(Compiled by Jorge Brocca, May 2011).


N°	Orden	Familia	Nombre Científico	Nombre Común	Brocca	Ecode & Sirl	Stolz	Categoría de amenaza			Abundancia relativa	Gremios tróficos	
								SEA/DVS	UICN	CITES			
1	Anatiformes	Anatidae	<i>Dendrocygna arborea</i>	Yaguaza			X	V	VU		E	C	
2			<i>Anas discors</i>	Pato de la Florida			XN		LC		C	C	
3			<i>Anas bahamensis</i>	Pato de la Orilla				X		LC		C	
4			<i>Aythya affinis</i>	Pato Turco				X		LC		C	
5			<i>Oxyura jamaicensis</i>	Pato Espinoso				X		LC		C	
6	Podicipediformes	Podicipitidae	<i>Podilymbus podiceps</i>	Zaramagullón			X		LC		E	C	
7	Pelecaniformes	Fregatidae	<i>Fregata magnificens</i>	Tijereta			X	V	LC		O	C	
8		Pelecanidae	<i>Pelecanus occidentalis</i>	Pellicano			X	V	LC		E	C	
9			<i>Ixobrychus exilis</i>	Martinillo			X		LC		E	C	
10	Ciconiiformes	Ardeidae	<i>Ardea herodias</i>	Garzón Cenizo			X	I	LR		E	C	
11			<i>Ardea alba</i>	Garza Real				X	I	LC		C	
12			<i>Egretta thula</i>	Garza de Rizos				X		LC		E	C
13			<i>Egretta tricolor</i>	Garza Tricolor				X		LC		O	C
14			<i>Bubulcus ibis</i>	Garza Ganadera				X		LC		C	C
15			<i>Butorides virescens</i>	Crá-Crá				X		LC		PC	C
16			<i>Nycticorax nycticorax</i>	Rey Congo				X		LC		O	C
17			<i>Nyctanassa violacea</i>	Yaboa				X		LC		PC	C
18		<i>Egretta caerulea</i>	Little Blue Heron			X		LC		E	C		
19		Threskiornithidae	<i>Plegadis fasinellus</i>	Coco Prieto			X	V	LC		PC	C	
20		Cathartidae	<i>Cathartes aura</i>	Aura Tífoza			X		LC	AP-II	A	Cr	
21	Falconiformes	Pandionidae	<i>Pandion haliaetus</i>	Guincho			X?		LC	AP-II	PC	C	
22		Accipitridae	<i>Buteo jamaicensis</i>	Guaraguao			X		LC	AP-II	E	C	
23			<i>Falco sparverius</i>	Cuyaya			X		LC	AP-II	A	C	
24		Falconidae	<i>Falco peregrinus</i>	Halcón Peregrino			XN		LC	AP-II	PC	C	
25	Gruiformes	Rallidae	<i>Porzana carolina</i>	Sora			X		LC		E	I,F	
26			<i>Porphyrio martinica</i>	Gallareta Azul			X		LC		O	I,F	
27			<i>Gallinula galeata</i>	Gallareta Pico Rojo				X		LC		A	I,F
28			<i>Fulica americana</i>	Gallareta Pico Blanco				X		LC		A	I,C
29			Aramidae	<i>Aramus guarana</i>	Carrao			X	V	LC		E	I,C
30	Galliformes	Numididae	<i>Numida meleagris</i>	Guinea			XI				E	I,F,G	
31		Charadriidae	<i>Charadrius vociferus</i>	Tiño			X		LC		E	I	
32	Charadriiformes	Recurvirostridae	<i>Himantopus mexicanus</i>	Viuda			X		LC		C	I	
33		Jacaniidae	<i>Jacana spinosa</i>	Gallito de Agua			X		LC		C	I	
34			<i>Sternula antillarum</i>	Charrán Menor			X		LC		PC	C	
35		Laridae	<i>Thalasseus maximus</i>	Charrán Real			X	V	LC		E	C	
36	Scolopacidae		<i>Tringa flavipes</i>	Patás Amarillas Menor			XN		LC		E	I	
37			<i>Actitis macularia</i>	Playero Manchado				XN		LC		E	I
38			<i>Arenaria interpres</i>	Playero Turco				XN		LC		E	I


ANNEX A. List of Birds Observed in Laguna Bavaro / Taxonomy Based on American Ornithological Union 2005
(Compiled by Jorge Brocca, May 2011).


N°	Orden	Familia	Nombre Científico	Nombre Común	Brocca	Ecode & Srf	Stotz	Categoría de amenaza			Abundancia relativa	Gremios tróficos	
								SEADVS	UICN	CITES			
39	Columbiformes	Columbidae	<i>Patagioenas inornata</i>	Paloma Ceniza			X	I	VU		E	G	
40			<i>Patagioenas leucocephala</i>	Paloma Coronita			X	V	VU		C	G	
41			<i>Zenaida asiatica</i>	Rolón Aliblanca			X			LC		A	G
42			<i>Zenaida aurita</i>	Rolón Turco			X			LC		PC	G
43			<i>Zenaida macroura</i>	Rabiche			X			LC		C	G
44	Psittaciformes	Psittacidae	<i>Columbina passerina</i>	Rolita			X		LC		C	G	
45			<i>Geotrygon montana</i>	Perdiz Colorada			X		LC		O	G	
46			<i>Aratinga chloroptera</i>	Perico			XR		I	VU	AP-II	E	G,F
47			<i>Coccyzus americanus</i>	Pájaro Bobo Pico Amarillo			X			LC		O	C,I
48			<i>Coccyzus minor</i>	Pájaro Bobo Menor			X			LC		C	C,I
49	Cuculiformes	Cuculidae	<i>Coccyzus longirostris</i>	Pájaro Bobo			XR		LC		A	C,I	
50			<i>Crotophaga ani</i>	Judio			X		LC		A	A	C,I
51	Strigiformes	Tytonidae	<i>Tyto glaucops</i>	Lechuza Blanca			XR		LC	AP-II	PC	C	
52			<i>Tyto alba</i>	Lechuza Cara Ceniza			X		LC	LC	AP-II	E	C
53	Caprimulgiformes	Caprimulgidae	<i>Chordeiles gundlachi</i>	Querebebé			X	I	LR		PC	I	
54	Apodiformes	Apodidae	<i>Streptoprocne zonaris</i>	Vencejo de Collar			X		LC		C	I	
55			<i>Tachornis phoenicobia</i>	Vencejito Palmar			X		LC		C	C	I
56		Trochilidae	<i>Anthracoceros dominicus</i>	Zumbador Grande			X		LC	AP-II	C	I,N	
57			<i>Mellisuga minima</i>	Zumbadorcito			X		LC	AP-II	A	I,N	
58		Todidae	Todidae	<i>Todus subulatus</i>	Barrancoll			XR		LC		E	I
59	Coraciiformes	Alcedinidae	<i>Ceryle alcyon</i>	Martín Pescador			XN		LC		E	C	
60	Piciformes	Picidae	<i>Melanerpes striatus</i>	Carpintero			XR		LC		A	G,F,I	
61			<i>Myiarchus stolidus</i>	Manuelito			X		LC		E	E	I
62	Passeriformes	Tyrannidae	<i>Tyrannus dominicensis</i>	Petigre			X		LC		A	I	
63			<i>Vireo griseus</i>	Vireo de Ojo Blanco			XN		LC		E	E	I
64		Hirundinidae	<i>Vireo altiloquus</i>	Julían Chiví			X		LC		C	I,F	
65			<i>Hirundo rustica</i>	Golondrina Cola de Tijera			XN		LC		E	E	I
66			Turdidae	<i>Turdus plumbeus</i>	Chua-chuá			X		LC		O	O
67	Mimidae	<i>Mimus polyglottos</i>	Ruiseñor			X		LC		C	O		
68	Dulidae	Dulidae	<i>Dulus dominicus</i>	Cigua Palmera			XR		LC		A	F	

N°	Orden	Familia	Nombre Científico	Nombre Común	Brocca	Ecode & Siri	Stotz	Categoría de amenaza			Abundancia relativa	Gremios tróficos	
								SEA/DVS	UICN	CITES			
69	Passeriformes	Parulidae	<i>Setophaga americana</i>	Cigüita Setophaga			XN			LC		I	
70			<i>Setophaga petechia</i>	Canario de Manglar			XN				LC		I
71			<i>Setophaga tigrina</i>	Cigüita Tigrina				XN			LC		I
72			<i>Setophaga caerulescens</i>	Cigüita Azul				XN			LC		I
73			<i>Setophaga discolor</i>	Cigüita de los Prados				XN			LC		I
74			<i>Setophaga palmarum</i>	Cigüita Palmar				XN			LC		I
75			<i>Mniotilta varia</i>	Pegapalo				XN			LC		I
76			<i>Setophaga ruticilla</i>	Bijirita				XN			LC		I
77			<i>Seiurus aurocapilla</i>	Cigüita Saltarina				XN			LC		I
78			<i>Parkesia motacilla</i>	Cigüita del Río				XN			LC		I
79			<i>Geothlypis trichas</i>	Cigüita Enmascarada			XN			LC		I	
80	Coerebidae		<i>Coereba flaveola</i>	Cigüita Común			X			LC		N,I	
81	Thraupidae		<i>Phaenicophilus palmarum</i>	Cuatro Ojos			XR			LC		A G,F,I	
82	Emberizidae		<i>Tiaris olivaceus</i>	Cigüita de Hierba			X			LC		G	
83		<i>Loxigilla violacea</i>	Gallito Prieto				X			LC		F	
84		<i>Quiscalus niger</i>	Chinchilin				X			LC		O	
85	Icteridae		<i>Icterus dominicensis</i>	Cigua Canaria			XR			LC		A G,F,I	
86	Ploceidae		<i>Ploceus cucullatus</i>	Madam Sagá			XI			LC		G	

LEYENDA

 JB Especies registradas en el trabajo de campo por Jorge Brocca y equipo

 TR: Especies señaladas en estudios de Ecode & Siri

 BDATA (Stotz) República Dominicana

Abundancia Relativa
A: Abundante
C: Común
Pc: Poco Común
E: Escaso
O: Ocasionales

Categorías de Amenaza
X: Especies reproductor / Breeding species
XN: Especies regular no-reproductor / Regular non-breeding species
XR: Especie endémica reproductora / Endemic breeding species
X?: xxxxx / Regular species, breeding status uncertain
XI: Especie introducida / Introduced species
XD: Dubious species
XF: Formerly bred
V: Vagrants
SX: Breeding species, sight records only
SN: Regular non-breeding species, sight records only
S?: Uncertain breeding status

Key to Codes in Table

I. Especies amenazadas

De acuerdo con la clasificación de las categorías de especies amenazadas de la IUCN se tienen en cuenta las siguientes categorías:

- **Extinto (EX):** Cuando no ha queda duda alguna que el último individuos ha muerto.
- **Extinto en Estado Silvestre (EW):** Cuando una especie sólo sobrevive en cultivo, en cautiverio o como población naturalizada completamente fuera de su distribución original.
- **En Peligro Crítico (CR):** Cuando enfrenta un riesgo extremadamente alto de extinción en estado silvestre en el futuro inmediato.
- **En Peligro (EN):** Cuando no estando “En Peligro Crítico”, enfrenta un alto riesgo de extinción o deterioro poblacional en estado silvestre en el futuro cercano.
- **Vulnerable (VU):** Cuando la mejor evidencia disponible indica que enfrenta un moderado riesgo de extinción o deterioro poblacional a mediano plazo.
- **Casi Amenazado (NT):** Cuando ha sido evaluado según los criterios y no los satisface para las categorías anteriores, pero está cercano a calificar como “Vulnerable”, o podría entrar a dicha categoría en un futuro cercano.
- **Preocupación Menor (LC):** Cuando habiendo sido evaluado, no cumple ninguno de los criterios que definen las categorías anteriormente expuestas. Equivale a fuera de peligro.

2. SEA/DVS, 1990

- **Extinto (ex)** - Una especie está extinta cuando su reporte no ha sido confirmado en los últimos 50 años.
- **En Peligro (e)** - Un taxón está En Peligro cuando su supervivencia es improbable si los factores causales continúan operando. Se incluye en este taxón aquellos que tienen números reducidos a nivel crítico y cuyo hábitat ha sido tan drásticamente reducido.
- **Vulnerable (v)** - Una especie es Vulnerable cuando existe la posibilidad de que se mueva a la categoría de En Peligro de Extinción en el futuro cercano, si los factores causales continúan operando.
- **Rara (r)** - Un especie se considera Rara cuando tiene poblaciones mundiales pequeñas que no se encuentran actualmente En Peligro de Extinción o Vulnerable, pero en riesgo. Generalmente se encuentran localizadas en áreas geográficas o hábitats restringidos o son de escasa distribución sobre un territorio amplio.
- **Indeterminado (i)** - Taxa que se sospecha pertenece a una de las siguientes categorías: Extinto, En Peligro o Vulnerable, pero para los cuales la información actual disponible es insuficiente.

3. Especies Reguladas por (CITES)

Apéndice (I)

Incluye todas las especies En Peligro de Extinción que son o pueden ser afectadas por el comercio. El comercio de especímenes de estas especies deberán estar sujetas a una reglamentación particularmente estricta a fin de no poner en peligro aún mayor su supervivencia y se autorizará solo bajo circunstancias excepcionales.

Apéndice (II) incluirá:

A. Todas las especies que, si bien en la actualidad no se encuentran necesariamente En Peligro de Extinción podrían llegar a esa situación a menos que el comercio en especímenes de dichas especies este sujeto a una reglamentación estricta a fin de evitar utilización incompatible con su supervivencia; y

B. Aquellas otras especies no afectadas por el comercio, que también deberán sujetarse a reglamentación con el fin de permitir un eficaz control del comercio en las especies a que se refiere el subpárrafo (a) del presente párrafo.

Estatus poblacional

- A: Abundante, registrado en gran número durante todo el tiempo de muestreo en todos o casi todos los tipos de hábitat o muy abundante en un tipo de hábitat.
C: Común, sólo en algunos tipos de hábitat y registrado durante el 75% del tiempo de muestreo.
Pc: Poco Común, en números bajos, registrado durante el 50% del tiempo del muestreo en algunos tipos de hábitat.
E: Escaso, registrado sólo algunas veces, 30% del tiempo de muestreo y en números muy bajos (unos pocos individuos durante todo el tiempo de muestreo).
O: Raros o ocasionales, Menos de dos registros totales durante todo el tiempo de muestreo.

Para cada especie caracterizamos el estatus de población utilizando la metodología descrita por Stotz:

- X: Especie reproductor
XN: Especie regular no-reproductor
XR: Especie endémica reproductora
XI: Especie introducida

Para la identificación de la avifauna se usaron las siguientes guías:

1. Latta S. 2006, Aves de la República Dominicana y Haití Princeton University Press.
2. Raffaele H, 1998, A guide to the birds of the West Indies Princeton University Press.
3. National Geographic Society, 2002, Field Guide to the Birds of North America
4. Jon Dunn / Kimball Garret, 1997 Peterson Field Guides "Warblers".

Gremio trófico: Grupo de especies que explota la misma clase de recursos alimentarios de forma similar (Baillie et al, 1986).

Criterios de Amenaza

I. Gremios tróficos




G: Granívora ; F: Frugívora | I: Insectívora ; N: Nectivoro ; O: Ovívoro

ANNEX B

LIST OF HERPETOFAUNA OBSERVED IN LAGUNA BAVARO
(COMPILED BY JORGE BROCCA, MAY 2011)

ANNEX B. LIST OF HERPETOFAUNA OBSERVED IN LAGUNA BAVARO (COMPILED BY JORGE BROCCA, MAY 2011)

No.	Familia	Especie	Nombre Común	Estatus	Ocurrencia	Estudio			Categoría de Amenaza
						ECODE 2002	Schwartz 1991	Brocca 2011	
Anfibios									
1	Bugonidae	Bufo marinus	Maco Pempen	Introducida	Común				
2	Hylidae	Osteopilus dominicensis	Rana Arboricola	Endémica	Común				
3	Leptodactylidae	Eleutherodactylus abbotti	Calcalí	Endémica	Común				
4		Eleutherodactylus flavescens	Calcalí	Endémica	Común				
5		Eleutherodactylus inoptatus	Calcalí	Endémica	Rara				
6		Eleutherodactylus probolaeus	Calcalí	Endémica	Rara				
7		Eleutherodactylus ruthae	Calcalí	Endémica	Rara				
Reptiles									
8	Emydidae	Trachemys stejnegeri	Jicotea	Endémica	Común				Vulnerable
9		Ameiva chrysolema	Lagartija	Endémica	Rara				
10		Ameiva taeniura	Lagartija	Endémica	Rara				
11	Anguidae	Celestus costatus	Lucio	Endémica	Común				
12		Celestus curtissi	Lucio	Endémica	Rara				
13		Celestus stenurus	Lucio	Endémica	Común				
14		Celestus sepsoides	Lucio	Endémica	Rara				
15	Gekkonidae	Sphaerodactylus difficilis	Salamanquejita	Endémica	Común				
16		Sphaerodactylus savagei	Salamanquejita	Endémica	Común				
17	Polychrotidae	Anolis baleatus	Saltacocote	Endémica	Rara				
18		Anolis chlorocyanus	Lagartija	Endémica	Común				
19		Anolis cybotes	Lagartija	Endémica	Común				
20		Anolis distichus	Lagartija	Nativa	Común				
21	Tropiduridae	Leiocephalus personatus	Mariguanita	Endémica	Rara				
Culebras									
22	Boidae	Epicrates striatus	Boa de la Hispaniola	Nativa	Rara				
23	Colubridae	Antillophis parvifrons	Culebra Sabanera	Endémica	Común				Vulnerable
24		Uromacer catesbyi	Culebra Verde	Endémica	Común				Vulnerable
25		Uromacer oxyrhynchus	Culebra Verde	Endémica	Común				Vulnerable
26	Tropidophidae	Tropidophis haetianus	Falsa Boa	Nativa	Rara				Vulnerable
27	Typhlopidae	Typhlops pusilla	Víbora	Endémica	Rara				

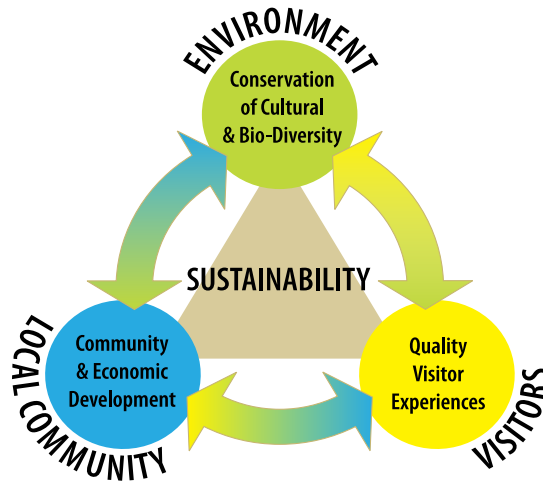
 ECODE 2002
 Schwartz
 Jorge Brocca

ANNEX C

SUSTAINABLE TOURISM AND BIODIVERSITY CONSERVATION MODEL

ANNEX C. SUSTAINABLE TOURISM AND BIODIVERSITY CONSERVATION MODEL

This is a model of sustainable tourism development that provides linkages and synergies between visitors, communities, and the environment so that benefits in one area create benefits in the other two.



Conservation relates to the overall health of the environment, as measured by biodiversity and preservation of historic sites. It also ensures high-quality settings for residents and visitors and the product base for tour providers. Indicators include:

- Acres/hectares protected or restored
- Historic and cultural sites protected or restored
- Scenic vistas enhanced
- Number and types of species observed
- Reduction of depreciative behavior (litter, looting, wildfires, graffiti, etc.)
- Political support for conservation agencies and programs
- Hours and money donated
- Entrance fees collected

Community and Economic Development enhances the quality of life for residents and creates business opportunities. Successful tourism businesses and communities provide infrastructure and services, financial and volunteer support for conservation projects, and political support for conservation projects and agencies. Benefits include increases in:

- Numbers of jobs related to conservation
- Economic diversification and % of jobs conservation-related
- Income
- Profits
- Taxes
- Infrastructure for locals and visitors

Quality Visitor Experiences are the foundation for successful tourism. They depend upon properly managed, resources, settings and attractions (including scenery), professional tourism services and infrastructure, and adequate visitor information and interpretation. Without a quality visitor experience there will be no sustainable tourism and no public or financial support for parks and conservation. Potential benefits include:

- Increased customer satisfaction and loyalty
- Longer stays and willingness to pay
- Repeat visits
- Word-of-mouth advertising
- Positive psychological, social, and physiological changes for the individual
- Education and appreciation
- Changes in visitor attitudes and behavior

ANNEX D

RECOMMENDED KAYAKS AND EQUIPMENT FOR LAGUNA BAVARO

ANNEX D. RECOMMENDED KAYAKS AND EQUIPMENT FOR LAGUNA BAVARO

This is a model of sustainable tourism development that provides linkages and synergies between visitors, communities, and the environment so that benefits in one area create benefits in the other two.

Sit-on-top kayaks are well suited for tropical areas such as Laguan Bavaro. They are stable and easy to paddle. Single kayaks would be easier to maneuver in tight mangrove channels.

A minimum of two double kayaks and two single kayaks are recommended to start the program. This would accommodate up to five clients plus a guide. Additional equipment is listed below.

The total retail cost of equipment is about \$5,000 US. However, it might be possible to obtain wholesale or discount prices depending on quantity of the kayaks purchased. Typical discounts to nonprofits or professionals are 25-30%. Taxes and shipping are extra.

Item	Cost
• 2 single person sit-on-top ±13 ft kayak @ \$849 each (similar or equal to the Ocean Kayak Prowler or Scubba Pro)	\$1698
• 2 double Seat sit-on-top ±13-16 ft kayak @ \$949 (similar or equal to the Ocean Kayak Zest Two Exposition or Malibu IIXL)	\$1898
• 6 paddles @ \$105 each	\$630
• 6 life jackets (Type III) of various sizes @ \$46 each	\$276
• 6 safety whistles @ \$5.50 each	\$35
• 1 rescue tow belt	\$45
• 2 small dry bags @ \$12 each	\$24
• 2 first-aid kits @ 25 each	\$50
• 2 waterproof map cases	\$20
ESTIMATED TOTAL	\$4,676

Examples of Kayaks that will be suitable for Laguna Bavaro. Single seat kayak is for guides or tourists and the double seat if for tourists.



Double sit-on-top kayak



Single sit-on-top kayak



Kayak and canoe launch at the John Pennekamp Coral Reef State Park in Key Largo, Florida. It is easier to launch and land kayaks from the ramp in the foreground than from a dock.

ANNEX E

RECOMMENDED SIGNS



Dimensiones

Panel	Ancho	Largo	Espesor
Panel A	60"	12"	2"

Texto

Tamaño	Fuente	Puntos
2.25"	Futura Demi	280.00 pt
4"	Futura Demi	438.24 pt

Colores

Marrón (C: 0%) (M: 70%) (Y: 100%) (K: 78%)
 Blanco (C: 0%) (M: 0%) (Y: 0%) (K: 0%)

Materiales

Base: Metal galvanizado no-oxidante, Calibre 16
 Laminado reflectivo de fondo: Blanco, "Diamond grade GD reflective sheeting"
 Laminado del frente: Marrón, "Electrocut reflective sheeting"
 El material blanco debe ser laminado en el metal, con un film marrón (con letras de cortes) vía procesos computarizados.

Opciones de Colores Pantone Recomendados



Pantone 4625 C



Pantone 469 C



Brown 1179

3M ElectroCut Film

Instalación

La señalización de carretera debe ser instalada en postes de metal. La parte inferior debe tener 45 pulgadas desde la tierra, con 3 pulgadas entre paneles.

ROAD SIGNS



1. CRUCE VERON - BULEVARD TURISTICO DEL ESTE



1. CRUCE VERON - BULEVARD TURISTICO DEL ESTE
2. CRUCE CARRETERA CABEZA DE TORO - CALLE MARLIN AZUL
3. CRUCE CARRETERA CABEZA DE TORO - ENTRADA DEL HOTEL DREAMS
4. CRUCE CARRETERA CABEZA DE TORO - CARRETERA DE ACCESO HOTEL NATURA PARK
5. FRENTE A LA ENTRADA DE LAGUNA BÁVARO

ENTRANCE MONUMENT



ANNEX F

EXAMPLES OF BOARDWALK TRAILS AND OBSERVATION TOWERS

The following photos give examples of boardwalk and observation tower designs that are used in mangrove and marine protected areas in different countries. These are shown here as examples of the type of designs that can be used.

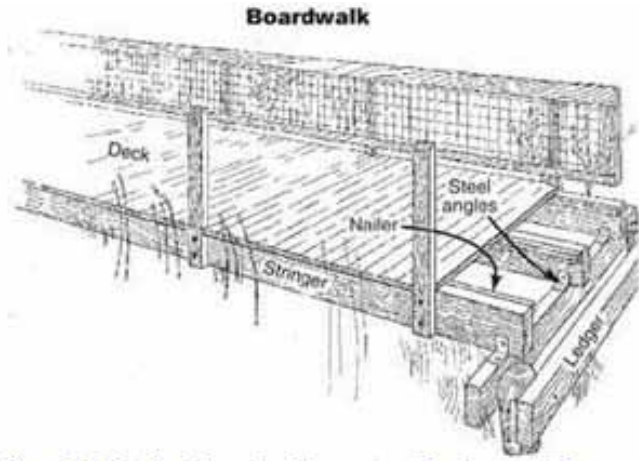


Photo 1 – Drawing of a boardwalk trail design.



Photo 2 – Wood poles used as the pylon to support the boardwalk trail.



Photo 3 – Boardwalk trail with a handrail



Photo 4 – Boardwalk trail without a hand rail.



Photo 5 – Example of a low-level wildlife viewing tower without a roof.



Photo 6 – Example of a high-level wildlife viewing tower with a roof.



Photo 7 – Example of observation tower without a roof.



Photo 8 – Example of observation tower with a roof.

The following seven photos shows a boardwalk through the mangrove forest surrounding the Laguna Granda in the Cabezas San Juan Protected Area in eastern Puerto Rico. This lagoon and protected area is very similar to the Laguna Bavaro Refuge. A boardwalk similar to this one will function well in Laguna Bavaro.



Photo 9 – Distance view of boardwalk in the mangrove forest.



Photo 10 – Close view from the boardwalk platform, notice the handrails.



Photo 11 – Guide and visitor on the boardwalk. This photo gives a perspective of the platform width and the height of the handrail.



Photo 12 – Guide and visitor on the boardwalk.



Photo 13 – Visitor group on the boardwalk. The height from the ground of this section is much lower than that in Photo 1. Height should be adjusted depending on site specific conditions.



Photo 14 –Visitors from the Dominican Republic Ministry of Environment on the boardwalk during a site visit to the Cabezas San Juan Protected Area.



Photo 15 – Park guide and international visitors on the boardwalk.

ANNEX G

RECOMMENDED PROMOTIONAL AND MARKETING MATERIALS

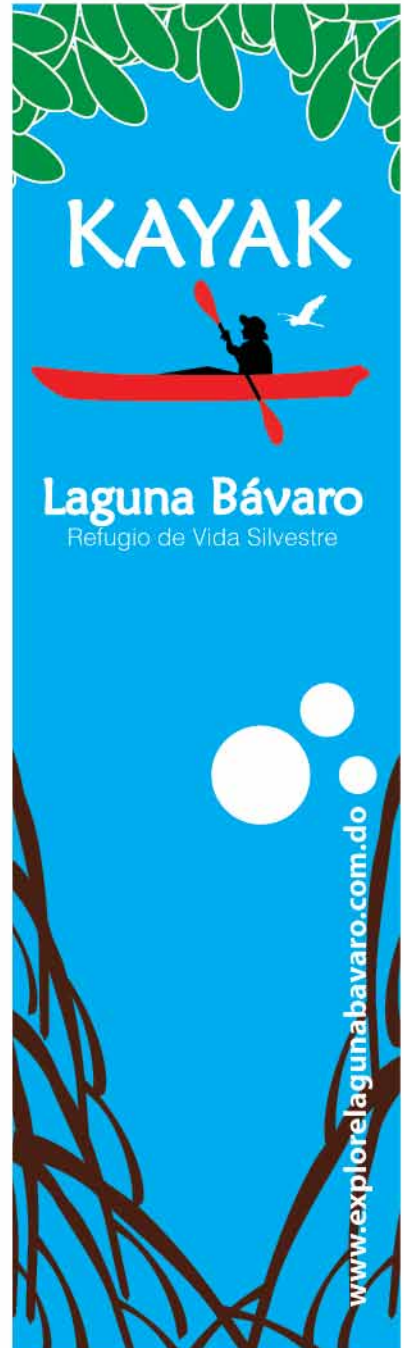
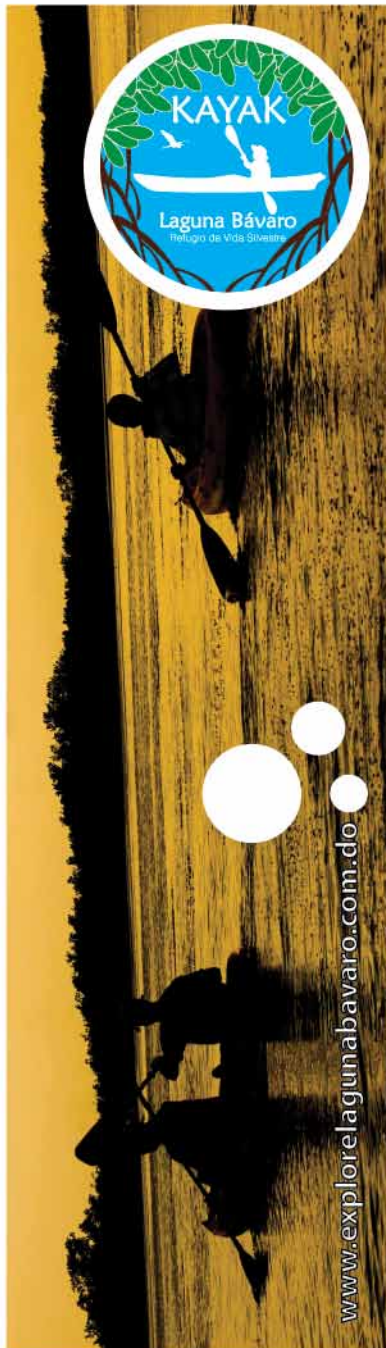
LOGO LAGUNA BAVARO



LOGO KAYAK LAGUNA BAVARO



MARCADORES DE LIBROS / BOOKMARKS



Dimensions / Dimensiones: 2 x 7 inches / pulgadas.

TAZAS / COFFE MUGS



BOTELLA DE AGUA /



LLAVEROS / KEY FOBS



SUETERS Y GORRAS / T-SHIRTS AND CAPS



SOMBREROS / HATS

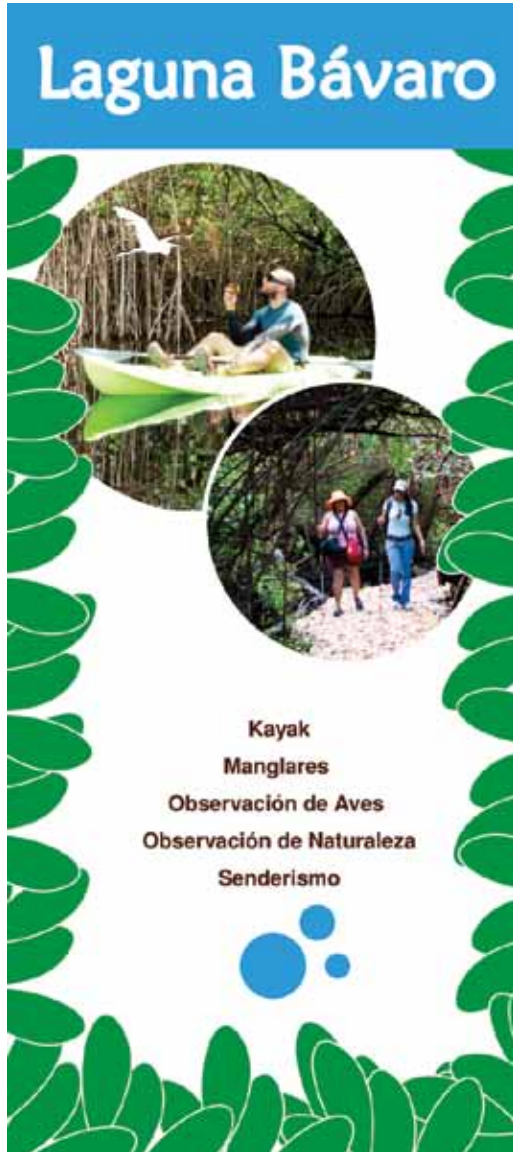


CONCEPTO GUÍA DE AVES / BIRD GUIDE CONCEPT



Dimensions / Dimensiones: 1.5 x 5 inches / pulgadas.

RACK CARD



Cover / Portada

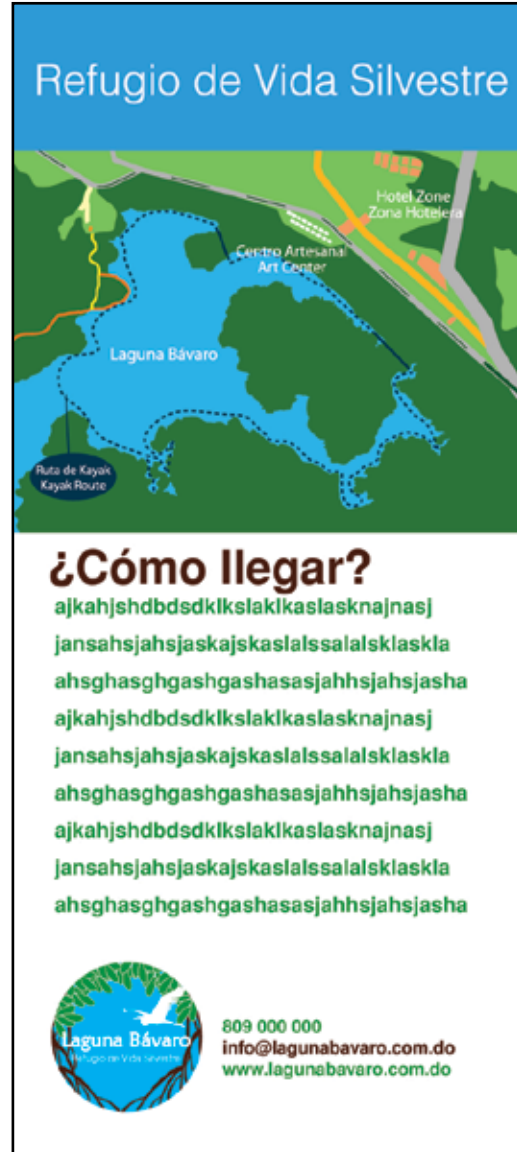


Back / Contraportada

RACK CARD



Cover / Portada



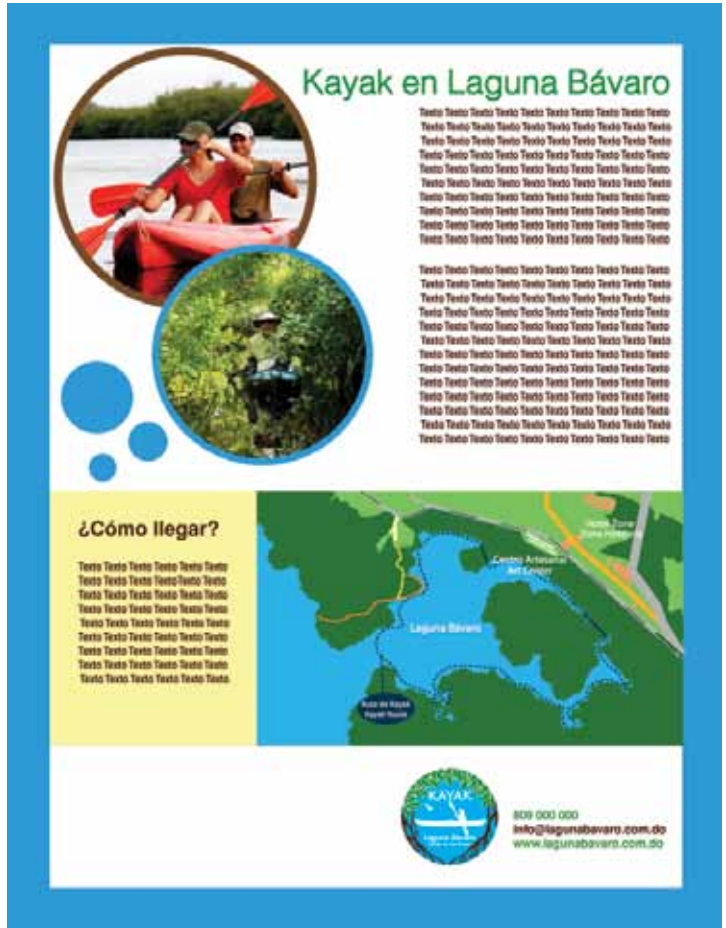
Back / Contraportada

Dimensions / Dimensiones: 4 x 9 inches / pulgadas.

FLYER



Cover / Portada



Back / Contraportada