

**Recreation  
and Scenery  
Management  
For the  
San Lorenzo  
Protected  
Area,  
Panama**



April 2001

This work was completed for USAID/Panama by the USDA-Forest Service Heritage Design and the International Institute of Tropical Forestry, with assistance from USDA-Foreign Agricultural Service, Office of International Cooperation and Development under USAID-PASA No. 525-AG-98-00072-00. Report production and translation by Heritage Design



**RECREATION AND SCENERY MANAGEMENT  
FOR THE  
SAN LORENZO PROTECTED AREA, PANAMA**

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USDA Forest Service**

**In cooperation with the**

**Panamanian Center for Research and Social Action (CEASPA)  
National Environmental Authority (ANAM)  
Interoceanic Regional Authority (ARI)  
Panamanian Tourism Institute (IPAT)  
National Cultural Institute (INAC)  
Panama Canal Authority (PCA)**

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## **EXECUTIVE SUMMARY**

A team of experts from the USDA Forest Service, in cooperation with the U.S. Agency for International Development, conducted a workshop and field exercise on recreation and scenery management for the San Lorenzo Protected Area, Panama in November and December 2000. Participants were from a variety of local government and non-governmental organizations.

Two basic systems were employed, both developed by the USDA Forest Service: the Visual Management System (VMS) and the Recreation Opportunity Spectrum (ROS). The premise of the VMS is that scenic quality benefits society and enhances people's lives psychologically, physiologically, and economically through successful outdoor recreation and tourism programs. People want, need and value naturally appearing scenery, landscape diversity is important and desirable, and landscape character can be defined and managed like other resources. The premise of the ROS system is that you can facilitate or hamper visitor experiences by the way you manage settings, and that maintaining a broad spectrum of opportunities provides people with important choices. The two systems are closely integrated and supported by scientific studies.

Utilizing these two systems, a series of maps were produced by the workshop participants. They represent the first attempt to document the current situation and test the methodology of the ROS and VMS in a protected area in Panama. Due to time constraints and incomplete fieldwork, these should be considered provisional until they are verified by additional work.

Maps 1, 2, 3, 5 and 6 illustrate the ROS and VMS inventory process and are intended to represent the current situation. Map 4 shows Visual Quality Objectives and Map 7 illustrates the proposed Recreation/Management Zones. These last two are derived from the other maps and represent desired future conditions. The proposed Recreation/Management Zones contain specific prescriptions and recommendations for management developed from both the VMS and ROS systems.

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## I. INTRODUCTION AND BACKGROUND

### San Lorenzo Protected Area

Situated at the Caribbean or northeastern end of the Panama Canal, the heavily forested 12,000 hectare (30,000 acre) San Lorenzo Protected Area (SLPA) is slightly outside the limits of the Panama Canal watershed but is nonetheless an integral part of the Canal Area. The Gatun Locks are immediately to the east, the vast Gatun Lake forms the southwestern boundary and the majestic Chagres River—which provides the freshwater for the Canal system—flows through the heart of this area. Designated a “natural protected area” by Law 21 of July 1997 as part of conservation and development of the Canal Area, it is approximately 15 miles north to south, and 10 miles wide east to west.

This entire region was under the jurisdiction of the United States government beginning with the establishment of the Panama Canal in 1903. Beginning in 1910, Fort Sherman, a U.S. Army base, protected the northern entrance to the Panama Canal. It also preserved the SLPA’s natural and cultural treasures during the 20<sup>th</sup> century. In recent decades, the area was used for jungle training by the U.S. military because of its high diversity of environments and topography (beach, cliff, hills, rivers, forests, etc). Military operations ceased in March 1999 and the Fort Sherman Military Reservation reverted to Panama in mid-1999.

Currently, the area is under multiple jurisdictions including: the Interoceanic Regional Authority (ARI), the agency charged with coordinating the use of reverted lands; the Panama Canal Authority (PCA), which controls much of the area’s waterways including the Chagres River; the National Environmental Authority (ANAM), managing parks and protected areas; the Panamanian Tourism Institute (IPAT); and the National Cultural Institute (INAC), which is responsible for preservation of historic monuments. Other stakeholders include the Smithsonian Tropical Research Institute (STRI), which operates a canopy-level research crane, non-governmental organizations, and representatives of the local communities.

Because of the large number of players involved and their complicated and overlapping jurisdictions, a special collaborative effort has been launched to provide for the effective protection of San Lorenzo. The Panamanian Center for Research and Social Action (CEASPA), a local NGO, has the responsibility for this project, with funding from the Global Environment Facility and the World Bank. Project objectives include: 1) development of a management plan; 2) a program for community education, identity, and economic development; 3) financial mechanisms to ensure continued financial viability for environmental protection; 4) effective project management and evaluation; and 5) an appropriate institutional framework for the management of the area (CEASPA, 1999). Our recreation and scenery inventory is in

support of the first objective: a management plan being prepared by a local consulting group, Consultores Ecologicos Panamenos (CEPSA).

The area is of exceptional biological and cultural importance. It provides an important link in the Panama Atlantic Mesoamerican Biological Corridor as well as the northernmost section on the north-south biological corridor between the Atlantic and Pacific Oceans. It is the most biologically diverse part of central Panama, containing 9 different forest types, from coastal mangrove swamps and Cativo forests in freshwater wetland areas, to semi-deciduous and evergreen humid tall forests in the uplands. It also has major riverine zones, tidal lakes, coastal beach and reefs, and extensive freshwater lake (reservoir) shoreline.

The SLPA also has very high bird diversity. More than 450 species have been identified, and the Panama Audubon Society counted 357 bird species here in one 24-hour period, a Western Hemisphere record. Other key species include jaguars, tapir, monkeys, sloth, and crocodiles/caiman.

The area's historic resources are also impressive. At the mouth of the Chagres River is the magnificent Fort (or "Castillo") San Lorenzo, erected during the late 1500s to defend one of Spain's principal routes to the Pacific coast and Old Panama. The fort became the target of pirates and buccaneers, including Sir Frances Drake, Sir Edward Vernon, and Henry Morgan. Together with its sister site at Portobelo, it was declared a *World Heritage Site* by UNESCO in 1980. The area also contains remarkably well-preserved WWI defensive batteries designed to protect the Panama Canal, as well as remnants of France's attempt to dig a sea-level canal in the 1880s. Other historic sites include small farms and plantations along the coast and along the Chagres River, the town of Chagres near Fort San Lorenzo, and numerous banana plantations scattered throughout the interior (Weaver, Bauer and Jimenez, 2001).

### **Tourism and Recreation**

Because of these world-class natural and cultural resources, the SLPA has tremendous potential for tourism and recreation. Currently, Fort San Lorenzo is the primary attraction for visitors, followed by boat trips along the Chagres River. Some tour operators split large tours into two groups. One group will boat down the river, viewing wildlife, while the other is taken to the fort by bus. When the boat arrives at the river mouth, these groups switch places. The boat returns upriver and the land tour returns by bus.

A recent study of visitors to national parks in the Panama Canal watershed surveyed visitors to Fort San Lorenzo (Ham and Weiler, 2000). It showed that 60% of visitors to the parks were Panamanian, 15% were from the USA, 10% from South America, and 15% from other countries. Of the Panamanians, most were from Panama City

(75%), and surprisingly only 10% were residents of Colon; the remaining 15% were from other areas of Panama.

The SLPA has been identified as a key component of the new government strategy to integrate low-impact tourism with conservation and scientific research, and creating strategic alliances with local communities. A network of natural and historic attractions are envisioned, connected by travel routes. The foremost of these, the “*Route of the Treasures of the Americas*” consists of two principal trans-isthmian historic routes, including the Camino de Cruces/Rio Chagres to Fort San Lorenzo. Later, this same corridor included the Panamanian railroad and Panama Canal. Collectively, these sites create a critical mass of attractions for visitors and serious students of history which is unsurpassed in Panama and perhaps the world. This heritage corridor could easily link the SLPA with other parks, historic sites, and the world-famous canal system, and become a major tourist attraction.

Foreign tourist visits to the area increased in 1997 when cruise ships traveling through the Gatun Locks began anchoring overnight in Gatun Lake. Passengers could then disembark for a variety of tours, including helicopter flights, fishing, boating, and bus tours to historic San Lorenzo. Recent construction of two modern cruise ship terminals in the city of Colon are expected to dramatically increase this type of tourism.

One of the key challenges facing tourism and recreation in San Lorenzo is public access. After decades of being under the jurisdiction of the U.S. government, local residents do not have a history of free access to the area’s forests, beaches and historic sites. Even now, much of the area is restricted. Visitors to historic Fort San Lorenzo driving personal vehicles have to show identification and sign in with guards at the entrance to Fort Sherman, and parking along the road and hiking to the beaches is discouraged for security reasons. Visitation is permitted on a daily basis from 8:00 a.m. to 4:00 p.m. In addition, the Panama Canal Authority has a gate leading to the only road access to the Chagres River that is open from 4:00 a.m. to 6:00 p.m., and the Smithsonian Tropical Research Institute and ANAM have agreed to limit public vehicular access to the road leading to the STRI canopy research crane.

Moreover, access to the historic WWI defensive batteries may be prohibited due to health and safety risks. One large area, the Piña Range, has been completely off limits for years because it contains significant unexploded ordnance. This area is under separate administration from the SLPA and is patrolled to keep people out.

Another access issue is the delay caused by the Canal itself. The only road between Colon and San Lorenzo has to cross the Gatun Locks by way of a water-level swinging bridge. This bridge is frequently unavailable, for up to an hour or more,

when ships are transiting the locks. This can be a great opportunity to watch the ships here or at the nearby visitor center, but it certainly can cause problems for visitors with limited time.

### **Summary of Fieldwork and Workshop**

An initial planning trip was made to Panama October 25-30, 2000 by Jerry Wylie to organize materials and become familiar with the project area. Necessary maps and aerial photographs were identified and key offices were visited. With the assistance of Venicio Wilson, a local nature tour guide and member of the SLPA team, all major roads were driven and a short section of the coast was hiked about halfway between Sherman and Fort San Lorenzo. In addition, a half-day workshop was conducted on the Recreation Opportunity Spectrum (ROS) and Visual Management System (VMS). About a dozen representatives attended the session from CEASPA and partner organizations.

In addition to this initial planning trip, an earlier one-day visit was made to the SLPA in May 2000. At that time a Forest Service team paddled the entire lower Chagres River in kayaks.

The primary fieldwork and training session was conducted November 28 to December 3, 2000. The team consisted of Jerry Wylie, Francisco Valenzuela, and Frances Sosadeeter, all from the USDA Forest Service, with significant local support from Venicio Wilson. The team originally planned to work 10 days on this project, concentrating on producing maps for the CEPSA planning team. This was later reduced to 5 days due to problems with weather and travel. Because of overwhelming interest in this work among local agencies, the emphasis shifted from a field inventory with local assistance, to teaching ROS and VMS methods and producing maps as a byproduct of the workshop. As a result, the team's fieldwork was limited and much of the work was accomplished with the help of workshop participants.

Originally, the objective was to apply a simplified ROS/VMS approach adapted to local conditions. However, because of a lack of time to develop a localized version, as well as the need to involve a large number of local participants immediately in a workshop setting, much of the typical methodology as developed and used by the USDA Forest Service in North America was followed.

This turned out to be positive for the local partners. What may have lost in map accuracy and by not having a localized process was more than made up by a much better understanding of the methodology, local ownership of the products, and the ability of participants to utilize and *improve* upon the results. In other words, this is the beginning of the process, not the ultimate product. Therefore, the maps included

in this report should be considered provisional until they are validated by additional fieldwork.

After the other team members left, Wylie revisited the SLPA for 3 days to finish some of the mapping and conduct a kayak assessment of the lower Chagres River (Wylie, 2001).



## **II. VISUAL MANAGEMENT SYSTEM**

### **The Value and Management of Scenery**

Because humans enjoy and are sensitive to scenery or the visual environment, the management of the visual resource is key to providing quality recreation opportunities. Although landscapes are perceived by all senses, studies show that 87% of what is being viewed is absorbed by the eyes. The “picture” of the information seen is perceived by sight and processed by each individual through a paradigm of values and cultural traits. Studies also demonstrate that the natural environment has a soothing effect. The viewing and recreating in natural landscapes enhance the psychological and physical health of human beings.

For managers, planners and designers, all resources that can be viewed are visual resources. In the planning and design process, visual resources are carefully managed and designed for their aesthetic quality according to the characteristics of the surrounding landscape. The goal of the system is to create and maintain the distinguished visual characteristics of a landscape having high scenic values such as diversity, balance, harmony, color and unity for the benefit of present and future generations.

The Visual Management System (VMS) is a planning tool that facilitates inventory, analysis and management of visual resources to measure the impact of any change in the landscape through the use of measurable standards (USDA Forest Service, 1974). The premise of VMS is that scenic quality benefits society and enhances people’s lives psychologically, physiologically, and economically through successful outdoor recreation and tourism programs. People want, need and value naturally appearing scenery; landscape diversity is important and desirable -- in fact, alteration to provide diversity may be desirable in some cases -- and landscape character can be defined and managed like other resources. For example, vistas can be created or improved by careful removal of trees and degraded views can be rehabilitated by moving buildings, use of paint color, and by planting vegetative screens.

## VQOs

The Visual Management System (VMS) is a process used to inventory, analyze, and classify the visual resources and provide measurable standards or objectives for the visual management of the landscape. The Visual Quality Objectives (VQO) are established for this purpose. The VQOS are determined based on the landscape's inherent visual quality, the distance and position from which the landscape is viewed, and the importance given to the landscape. This importance is based on the number of people viewing the landscape and their sensitivity to its changes. This process incorporates the perception of visitors and is designed to assess the level of visual impact any activity or development is allowed to produce on a landscape. Also, where appropriate, VQO's can be assigned to signify that a particular landscape will be improved or enhanced.

## The Visual Management Process

### *Step 1: Identify the Characteristic Landscape*

Characteristic landscapes are those that represent the natural features —such as basic vegetation patterns, landforms, rock formations, and water forms— as well as the biological and cultural attributes that make each landscape unique and give it a special “sense of place.”

The team was fortunate in having detailed maps of existing vegetation, geology, physiography, and general life zones from previous scientific studies, as well as an excellent summary of these materials (Weaver, Bauer and Jimenez, 2001). From these data it was possible to quickly outline the most obvious landscapes from the perspective of the average visitor. Since this was a relative small area containing a remarkably large diversity of micro-environments, the team focused primarily on the most visually distinctive *vegetative* differences, but also included those areas easily defined by water features, cultural modification and present day use. These do not, however, reflect all biological diversity.

The results are presented in Map 1. A total of 11 distinct landscapes are identified, including:*Urban, Drop Zone, Rural* (farms), *Chagres River, French Canal, Internal Lakes, Mojinga Swamp, Caribbean Beaches, Caribbean Coast, Mangroves, and Humid Forest*. See Annexes A and B for definitions and detailed visual descriptions of each characteristic landscape.

## **Step 2: Determine the Variety Classes**

Visual variety represents the range of scenic importance based on the diversity of natural resources, including: water, vegetation, geology, cultural features, and a combination of form/line/color/texture. Those areas with the most variety or diversity have the greatest potential for high scenic value. Annex C illustrates how an assessment for each of these variables was used to determine an overall or average variety class for each Characteristic Landscape. Variety Classes assigned for the San Lorenzo Protected Area are illustrated in Map 2.

There are three variety classes in the VMS that identify the scenic quality as follows:

**CLASS A – Distinctive.** Features of water bodies, landform, vegetative patterns, geology, and form, line, color and texture which are of unusual or outstanding visual quality. Characteristic Landscapes identified as Class A include: Urban (Sherman), Chagres River and tributaries, Caribbean Beaches, Caribbean Coast, and most Humid Forests.

**CLASS B – Common.** Features vary in form, line, color and texture or combinations thereof, but tend to be common or not outstanding in visual quality. Characteristic Landscapes identified as Class B include: Rural (farms), Urban (Gatun Dam and Locks), Mangroves, Internal Lakes, French Canal, and Cativo (*Prioria capoifera*) areas of Humid Forest.

**CLASS C – Minimal.** Features have little change in form, line, color, or texture. Characteristic Landscapes identified as Class C include: Mojinga Swamp, “Ploughed” or disturbed areas of Humid Forest, Urban areas along the south side of Limon Bay, and the Drop Zone. (However, there is concern that the Mojinga Swamp should be at least Class B. See the Recommendations section for more discussion.)

### ***Step 3: Identify Sensitivity Levels***

Sensitivity levels are determined for the users who travel on the roads or walk on the trails, those who use the recreation facilities and for those who recreate in the lakes, rivers and other water bodies. A simple three-step process was used to identify these levels.

***Step 3a: Identify the primary and secondary routes, use areas, and bodies of water.*** The classification of primary and secondary is based on the amount of use and visitors' perceptions and concerns (Table 1). Primary areas are those with maximum movement of people, unique access to key attractions, primary human use, and main navigation and varied uses of water bodies. For example, the road to Fort San Lorenzo is considered a primary route because it leads directly to a major area of interest and has high volume of use. The concerns of visitors traveling on this road are major. Secondary routes or areas have little use, connect places of less interest, have sporadic or seasonal use, use with limitations, and less diversity of use. These routes and areas were identified and mapped (see Table 2).

Although they are primary travel routes and receive high levels of use, the main highway to the communities of Escobal and Achioite are less critical visually because people are moving quickly to and from jobs and home and have generally less concern for scenery. They also have fewer opportunities to see into the forest because of the lack of vistas, a situation which could be corrected with the development of pull-outs and scenic overlooks. Other secondary routes and use areas include the Caribbean coast, Piña River, the coast of Limon Bay, and Chicken Landing.

**Table 1. Criteria for Defining Primary and Secondary Routes Use Areas and Water Bodies**

	<b>Primary</b>	<b>Secondary</b>
<b>Routes</b>	Maximum movement and/or unique access to the attractions of the SLPA	Little use or limited use due to the rustic conditions of the paths. Connect places of less interest.
<b>Use</b>	Main human presence and activities	Use is sporadic or seasonal.
<b>Water bodies</b>	Main navigation and varied uses	Uses are with limitations Few users Uses not too diverse

**Step 3b: Identify the major vistas and seen areas.** Landscape visibility is a function of the context of viewers, duration of view, degree of discernable detail, seasonal variations, the number of viewers, and distance. Therefore, a large number of viewers with high concern for scenery, who view a landscape carefully for a long period of time, increase the scenic importance of that landscape. Distance zones are used as point of reference to determine the sensitivity of landscapes.

Distance zones are areas of landscapes denoted by specified distances from the observer. The distances are classified as Foreground, Middle ground and Background. The standard distances were modified to fit the physiographic characteristics of the SLPA. The standards used were Foreground (0-50m), Middle ground (50-1000m), and Background (>1000m). It should be noted that these distances are significantly reduced from what is usually applied in North America. This is because vertical relief is limited and opportunities for long distance viewing are very rare in the project area. Most views are typically less than one mile and are often obscured by vegetation, humidity and rain.

**Table 2. Sensitivity Levels for the San Lorenzo Protected Area**

Use	Major Sensitivity	Average Sensitivity	Low Sensitivity
<b>Primary</b>	Road to Ft. Sherman Caribbean Coast Chagres River Road to Ft. San Lorenzo Ft. San Lorenzo Chicken Landing	Sherman	Road to Escobal Road to Achiote Escobal
<b>Secondary</b>	Gatun Hill Trails Small Rivers STRI Crane	French Canal Caribbean Playas Gatun Dam	Batteries Farms Drop Zone Limon Bay Coast

The visible areas as seen from Gatun Hill and Fort San Lorenzo are a bit deceptive. Although extensive, the areas identified as “background” are not all visible from these viewpoints. There are many areas within these zones that are blocked from view. Only the tree tops on the higher points are visible, and not the low-lying areas in between. For example, from Gatun Hill you cannot see the highway, or even the corridor cut through the forest, along the roadway leading to Sherman.

Seen areas and vista points are shown in Map 3. This map shows all seen areas from most identified primary and secondary routes, use areas, and water bodies. The vistas include: San Lorenzo, Chagres River (various points), the road into Sherman, Gatun Dam bridge, Gatun Dam, Gatun Hill, and the Achiote road corridor.

**Step 3c: Determine sensitivity levels.** Sensitivity levels are people’s concerns for scenic quality of the routes, use areas and water bodies.

#### **Step 4: Determine the visual quality objectives**

The compilation of layers of information from Tables 1 and 2 and Maps 2 and 3 help determine the Visual Quality Objectives for the SLPA. These tabulations are shown in Table 3 below.

The Visual Quality Objectives (VQOs) are a tool to establish the degree of visual sensitivity of a landscape. These objectives are based on the degree of acceptable alteration of the landscape. There are five VQOs on a scale from Preservation to Maximum Modification. These are considered goals for the management of visual resources. The VQOs are: Preservation (P), Retention (R), Partial Retention (PR), Modification (M), and Maximum Modification (MM). In some circumstances short term goals will be needed to meet the designed objective. These are referred to as Rehabilitation and Enhancement.

**Preservation** only allows for ecological changes to occur. Preservation areas are determined by management once the area is inventoried. Therefore, Preservation is not identified as a VQO in the *inventory* phase.

**Retention** allows for management activities that are not visually evident.

**Partial Retention** requires management activities to remain visually subordinate to the characteristic landscape.

**Modification** allows for management or development activities to dominate the original characteristic landscape but still remain visually compatible.

**Maximum Modification** allows for management activities to dominate the characteristic landscape but still remain compatible when viewed as background (may be incongruent with natural occurrences as seen in the foreground or middle ground.)

**Rehabilitation** allows for alteration, concealment, or removal of obtrusive elements to obtain the designated visual objective.

**Enhancement** allows for the addition, subtraction, or alteration of vegetation, water, rocks, earth forms, or structures to obtain more variety of forms, edges, colors, textures, patterns, or spaces where it is needed.

**Table 3. Visual Quality Objectives for the San Lorenzo Protected Area**

Variety Classes	P1S1	P2S1	P3S1	P1S2	P2S2	P3S2	3
A	R	R	R	PR	PR	PR	P
B	R	PR	PR	PR	M	M	M
C	PR	PR	M	M	M	MM	M

Distance Zones	Sensitivity Levels	Variety Classes	VQOs
P1 = Foreground	S1 = Major	A = Distinctive	PR = Partial Retention
P2 = Middle ground	S2 = Average	B = Common	M = Modification
P3 = Background	S3 = Low	C = Minimal	MM = Maximum Modification
3 = Areas which do not meet the criteria for levels 1 and 2			

Map 4 illustrates the end result of the VMS analysis. It identifies the preliminary VQOs for each characteristic landscape. Additional analysis may be needed to refine some areas. For example, it may be important to have a Partial Retention VQO along the southern side of Limon Bay, to screen the area of Maximum Modification from the view of passing boaters. Another possible improvement is to extend the Retention VQO along the highway all the way to Sherman, as this entrance corridor is visually sensitive.

The next step is to develop VQOs for logical management areas. This will be done after we incorporate the results of the ROS inventory in the next section. Final recommendations for VQOs for each management areas are included in Section IV Recommendations.

The visual impacts of proposed projects for the SLPA can be analyzed using the VQOs as standards. This will be the implementation phase, the final step in the planning process, which is not covered in this report. (Implementation is the responsibility of those government agencies who approve the final management plan and oversee the management of the SLPA).

## **Preservation and Buffer Zones as Management Tools**

“Preservation,” the Visual Quality Objective that allows only ecological changes, is used as a management tool to protect areas which are considered of unique environmental, scientific, cultural, or political importance. It is essential for managers to determine if there are such areas in the SLPA. Section IV provides some recommendations.

Once such areas are identified, their sizes and the kind of activities that will be allowed in the surrounding areas should be defined. In order to have preservation, there should be a buffer zone around the preservation area of minimal management activities or management activities which will remain visually subordinate to the landscape. These transitional areas that have a visual, recreational, or ecological purpose will help protect the resources further.

The size of the buffer zone will depend on the reason for designating the area with a Preservation VQO and in the existing characteristics and surrounding landscape. On occasion, managers find that the areas where no development should occur adjoin roads. Managers have the prerogative to decide to designate these areas as preservation regardless of the lack of a transitional area.



### **III. Recreation Opportunity Spectrum**

#### **The Provision of Recreation Opportunities**

The goal of the visitor to a protected area is to obtain satisfying experiences; the goal of the recreation resource manager becomes one of providing the opportunities for obtaining these experiences while protecting the resource. By managing the natural resource setting, and the activities which occur within it, the recreation manager is providing the opportunities for recreation experiences to take place. Therefore, for both the manager and the visitor, recreation opportunities can be expressed in terms of three principal components: the setting, the activities, and the experience.

Several models have been developed to address the need the manager has to inventory and develop standards that assure a range of quality recreation opportunities. The team selected the Recreation Opportunity Spectrum system used by the USDA Forest Service and the USDI Bureau of Land Management in the United States. While first developed in North America, it is now used in the tropical forests of Puerto Rico and in other countries. The premise of the ROS system is that you can facilitate or hamper visitor experiences by the way you manage settings, and that maintaining a broad spectrum of opportunities provides people with important choices. Setting indicators include: access, remoteness, social encounters, naturalness/scenic qualities, facilities, site management, visitor impacts, and visitor management (including interpretation).

The Recreation Opportunity Spectrum is used to establish planning criteria, generate objectives for recreation, evaluate public issues, and integrate management concerns, project recreation needs and demands, and coordinate management objectives. The ROS system develops standards and guidelines to describe recreation opportunities and allows for coordination with other recreation suppliers.

The ROS system divides the landscape into six major classes representing possible combinations of activities, settings and probable experience opportunities. These possible combinations can be arranged along a continuum from very natural areas, remote from vehicle access and development, to intensively managed recreation sites which cater to large numbers of people in highly developed areas. This continuum is divided into six classes: Urban, Rural, Roaded Natural, Semi-Primitive Motorized, Semi-Primitive Non-Motorized, and Primitive.

**Figure 1. Recreation Opportunity Spectrum**

**Primitive, Semi-Primitive Non-Motorized, Semi-Primitive Motorized, Roaded Natural, Rural, Urban**

Maintaining a broad spectrum of these classes is very important. A range of ROS setting provides people with choices and increase their ability to select satisfying recreation opportunities. ROS is also flexible; it can be further subdivided into subclasses as the need arises.

Visitors to the SLPA currently have a limited range of settings based on the previous military use of the area. Developed facilities are lacking for recreation in general, and more primitive recreation opportunities are threatened by potential unplanned development and competing recreation activities. By carrying out the ROS inventory and planning effort and establishing different recreation/management zones, the protected area manager can provide a wide range of opportunities and thereby satisfy a wider range of recreation visitors while minimizing use conflicts.

### **Recreation Opportunity Spectrum Process**

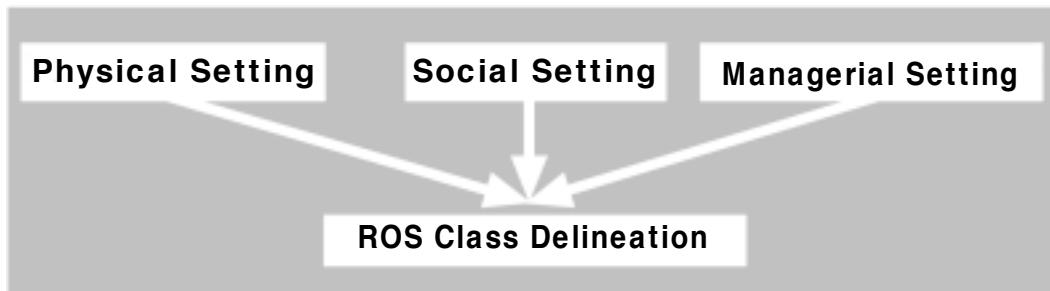
The Recreation Opportunity Spectrum process begins with inventorying and mapping the environmental attributes. The combinations of each setting component predict the kind of recreational experience obtained by visitors. The criteria used were adjusted from USA standards to reflect local vegetative and social conditions and are summarized in Annex D. Inventoried ROS classes are shown on Map 5.

The first set of criteria involve the physical setting: how remote areas are from developed roads, the size of an area, and the level of existing human modification. For example, areas classified as Primitive should be at least 1.5 miles from all roads or trails with motorized use, be at least 2,500 acres in size, and be essentially an unmodified, natural environment.

The second set of criteria involve the social setting: how intensively an area is being used and the potential for groups to interact with each other. Again, using the Primitive ROS class, evidence of primitive trails may exist, but structures are extremely rare. Also, usually fewer than 6 parties per day would be encountered on trails or at points of interest.

The third criterion used was the level of existing managerial control, both physical and regulatory, placed on peoples' actions. With Primitive classification, on-site regulation is low and most controls are off-site through such things as posted regulations at key entry points.

**Figure 2. Recreational Opportunity Spectrum Components**



### **Recreational Opportunities**

Recreation is expressed on-site as an activity of some type. Different kinds of recreation activities occur in different recreation settings, and recreation activities generally have preferred settings. For example, most hikers want more primitive settings while most picnickers want a more developed settings with picnic tables, water and toilet facilities. During the ROS inventory process the entire team inventoried the existing and potential recreation activities, determining what the preferred settings are for each activity and identifying the most probable origin of the participant of that activity. This information is documented in Annex E.

This information was used to match the desired settings with recreation activities. The exercise also provides insight into the potential market segments for the protected area (Annex F). In the guidelines for the proposed management areas, Section IV, recreation activities are addressed to assure that the desires of the majority of the visitors are met in the most appropriate part of the protected area.

**Recreational Points of Interest.** The team also identified presently known recreational points of interest or potential (Map 6). These range from the most developed areas, such as the Shimmey Beach at Sherman, to those offering some of the most primitive recreation opportunities along the Rio Chagres and the Caribbean coastline. Clearly, the most popular attraction is the historic ruins at Fort San Lorenzo, followed by wildlife viewing along the Chagres Road leading to the old fort and along the Chagres River. Sites with high potential for future development include Gatun Hill, Chicken Landing, Devil's Beach, some of the WWI batteries, a roadside vista along the road to Escobal, and the reef pools near the entrance to Sherman.

These sites are opportunities for visitors and areas of special management concern. In the planning process these special places need to be considered in order to avoid conflicts that may degrade these areas or as opportunities for enhancement through the development of access or facilities. They also suggest what kind of recreation activities would be most likely to occur and what recreation setting may be most appropriate for the protection and enjoyment of that opportunity.

### **Primitive ROS Areas**

The inventory process found no opportunities for truly primitive recreation. The primary reason for this is the size and remoteness of the existing undeveloped areas. To achieve primitive recreation opportunities, many existing roads would have to be closed and restored to natural conditions. This would in turn remove the existing opportunities to easily access to pristine areas. Hopefully, other protected areas in the system of protected areas in Panama can provide this kind of recreation opportunity.

### **Recreation Demand**

Recreation demand was not studied in depth but was considered in the recommendations for the ROS designations and in specific recommendations in Section IV. Information on local recreation participation rates, recreation preferences and recreation demand for the SLPA was limited or non-existent. Observation of use during our short trip would indicate relatively low patterns of recreation use when compared to observed use in similar tropical environments elsewhere. When compared to North American participation rates the observed use was extremely low.

The reasons for this low use maybe due to several factors. The first may be the perception that these areas are closed to use or that use is discouraged. This perception may affect the SLPA, as well as the entire former Canal Zone. This is reinforced by existing visual clues such as guard stations, the presence of military personnel, and fencing.

The second factor may be the lack of cultural experience, knowledge and tradition of recreation in wildland settings. With several generations of local citizens living in a restricted outdoor recreation environment, the skills and traditions may not be in place that would normally be expected in such a rich outdoor recreation location.

The third element may be the economic condition of the local population. This may limit some of the water-based recreation activities requiring purchase or rental of expensive boats. However, low cost activities also appear depressed for some reason.

The final reason may involve issues of security, safety and environmental stress (heat and humidity) that discourages participation. This can explain some of the reduced use but not all. Facilities that mitigate some of the environmental factors, such as shelters and the presence of field rangers to provide a greater sense of security, may reduce these perceptions. Presently the physical barriers to use, such as crossing the Canal, the entry gates, and lack of signing may also inhibit use. Lack of information may also be playing a role as well.

Conversations with the local participants and observations of their response during our field trips revealed very little experience in outdoor activities such as hiking. While the experience seemed new to them, they enjoyed the feelings of adventure, discovery and the natural history aspects of the experience.

These social observations and assumptions by their nature are antidotal and very limited. What is needed is further social science inquiry into the nature of local recreation demand, barriers to use, perceptions and the social economic dimensions of the population. Fees and the effect of fees on use, expectations, and behavior change should also be explored. Any additional information would greatly aid future recreation planning. One element not discussed is the desired benefits of tourism and recreation for the country, region, local communities and individuals. Understanding these desired outcomes will also aid future recreation planning.

Why is this important? First, there is the need to not just overlay a North American recreation use pattern on to the SLPA. To better utilize limited funding, understanding how to best meet the needs of the anticipated users is critical. Secondly, the assumptions about future recreation use greatly affects the transportation design and scale, parking lot sizes, building sizes, and the general scale of development and infrastructure needs. Understanding use also anticipates the need for future regulations and issues of user conflict, crowding and the need to mediate visitor interactions.

Projections of use may over estimate highly developed forms and international tourism and under estimate the potential of more passive local forms of recreation. Early involvement in educating the public on how to recreate with minimum impacts now, while use is low and users have not developed impacting patterns of use, is an opportunity that will pay great dividends in the future. There is a great potential that local use will explode, and laying the groundwork

for this growth will be important. Environmental education and youth conservation employment should be initiated. (Youth conservation employment in the USA successfully combines job training with natural resource conservation on publicly administered lands).

### **Integration of the Recreation Opportunity Spectrum and the Visual Management System with Protected Area Planning**

The VMS and the ROS are compatible systems and both integrate well with protected area planning. VMS focuses more on the external, visual environment. ROS identifies the attributes of the environment that provide a range of recreation settings and focuses more on the internal recreation experience outcomes.

Recreation planning, as an integral part of resource management planning, must be able to manage the impacts of recreation use and provide long-term recreation benefits. The objective of recreation planning is to inventory, analyze and propose levels and types of uses to meet Panama's outdoor recreation needs within the capability of the resource. Because scenery is the basic background and setting for recreation, the inventory and development of direction for this resource was accomplished in this report by the use of the Visual Management System.

Recreation prescriptions allow the planners to integrate recreation objectives with other conservation objectives. Areas of intensive scientific research, plant and animal communities that are very sensitive to human disruption, or rare and endangered species, would be reasons to manage for very low use levels and minimal disruption by construction activities. Areas that have low habitat values and are highly resistant to damage from use are more ideal for intensive recreation. This can be thought of as developing compatible management.

The VMS also provides direction for integration (Table 4). By protecting the natural or cultural visual character of the landscape you also protect the elements that allow the character to exist. In areas where conservation objectives require preservation, it would be beneficial to manage them with a visual quality objective of "Preservation." Likewise, areas with highly modified environments, hidden from view make great sites of utility where modifications are expected and acceptable.

**Table 4. Recreation Opportunity Spectrum and Visual Management System Compatibility**

<b><i>ROS Classes</i></b>	<b><i>Preservation</i></b>	<b><i>Retention</i></b>	<b><i>Partial Retention</i></b>	<b><i>Modification</i></b>	<b><i>Maximum Modification</i></b>
Primitive	FC+	MC	NC	NC	NC
Semi-Primitive Non-Motorized	FC	FC	MC	NC	NC
Semi-Primitive Motorized	MC	FC+	FC	NC	NC
Roaded Natural	NC	FC	FC+	MC	NC
Rural	NC	MC	FC	FC	MC
Urban	NC	NC	FC	FC	MC

FC+, Fully Compatible, the norm

FC, Fully Compatible

MC, Marginally Compatible

NC, Not Compatible



## **IV. RECOMMENDATIONS**

### **Area-wide Recommendations**

The current recreation and visual inventory is preliminary and would benefit greatly from further analysis. At the earliest possible opportunity, additional fieldwork should be undertaken to validate and improve this analysis. In the meantime, the current maps illustrate the ROS and VMS methodology and provide a strong theoretical framework and foundation for the development of management direction.

A similar recommendation is also made for reviewing and strengthening the descriptions of the proposed Recreation/Management Zones below. These zones are based primarily on published North American standards and guidelines and are presented as a starting point for the development of locally-defined zones. Future work should include up-to-date information on local conditions and more details on compatible or incompatible activities. Final management zones need to take into account other management goals and administrative realities.

We also recommend that after the Visual Quality Objectives and Recreation Opportunity Spectrum Classes are established, that there be a process developed for the enforcement of the management objectives. Park Guards will be instrumental in the maintenance of developed recreation areas, the monitoring of their use, and enforcement of regulations, and they must become familiar with each zone and its standards for management.

### **Proposed Recreation/Management Zones and Specific Recommendations**

Management areas or zones are a useful tool for protected area managers. These zones define where different management activities may be carried out and where different kinds of public use can occur. The visual and recreation analysis provide consistent and logical guidance that inform the delineation of management areas. Each zone is defined by a primary emphasis or “theme,” and a desired condition and area prescriptions in the form of standards and guidelines.

Each management zone has specific recreation opportunities and guidelines for management that includes the results of the VMS inventory process and the ROS delineation process. The proposed 10 zones provide different recreation settings and opportunities. The guidelines provide direction that will promote harmonious developments and management within each area while providing a diversity of management options and recreation experiences within the larger area. The

recommendations are offered for consideration during the development of the comprehensive management plan. Other resource concerns not fully addressed in these prescriptions may be added to provide adequate direction in the future.

Proposed Recreation/Management Zones are shown in Map 7. They include the following:

1. Sherman
2. Fort San Lorenzo
3. Caribbean Coast
4. San Lorenzo Road
5. Primary Entry Corridor
6. Chagres River
7. Drop Zone
8. Core Forest
9. Achiote-Escobal Travel Corridor
10. Agroforestry

Recreation/Management Zones are not identified for areas along the southern coast of Limon Bay and from the Gatun locks to Gatun Dam primarily because they are entirely outside the boundary of the San Lorenzo Protected Area.

## **1. Sherman Zone (previously Fort Sherman)**

**Theme:** The unique opportunity of this zone is to enjoy a safe, social experience with comfortable facilities while enjoying the tropical forest backdrop and learning about the area. This zone has tremendous potential for highly developed recreation, visitor orientation to the SLPA, protected area administration, and interpretation of U.S. military history and defense of the Panama Canal.

**Desired Condition:** Long-term protection and public enjoyment of this unique cultural landscape and surrounding natural areas.

**Visual Management:** The area is characterized by a substantially urbanized environment, although the background has natural-appearing elements. Vegetation is primarily exotic and manicured. This is a special cultural landscape made up of two primary parts: the WWI batteries and the newer military facilities. It is primarily viewed from the sea and from roadways within the zone. The visual quality objective for this area is *Partial Retention*, which requires management activities to remain visually subordinate to the characteristic cultural landscape.

**Recreation Opportunities:** The area could be managed to provide *Urban* and *Rural* recreation opportunities. Compatible recreational activities could include: visitor center, traditional sports, picnicking, outdoor eating, playground games, youth camps, food services, and boat tours. Other activities traditional to the previous use of the facility as a U.S. military base, and which may or may not be compatible with protected area status, include a shooting range and use of the airstrip for recreational flying, sightseeing, and parachuting.

Currently, access is by personal vehicle and bus passing through the zone on the way to Fort San Lorenzo. Access to the administrative area is limited to authorize personnel only. Future visitor access by boat from Colon is possible. Controls over visitors are significant and obvious through the Panamanian Maritime Service. Use restrictions and on-site controls are stringent. Currently there is no public use of the zone's beach or picnic facilities.

There is no interpretation at present, but there certainly could be if visitor orientation for the SLPA is conducted at this location. There is an IPAT sign directing visitors to Fort San Lorenzo, although it has an inappropriate scale and character. Physical risk and challenge in this area is low. In the future there could be a high concentration of users at this location.

**Recommendations:** In general, because of its highly developed infrastructure, this zone has the greatest potential for serving large numbers of people, acting as the primary staging area and orientation for visitors to the SLPA, as well as containing the majority of administrative facilities.

1. Consider the reuse of an existing facility or the construction of a new facility for a visitor center. *This is only location in the SLPA where a highly developed visitor facility would be fully consistent with ROS standards.*
2. Interpretation of the WWI batteries is a unique opportunity that would attract tourism.
3. Entry signs and sign-in procedures to this area need to be made simpler and more user-friendly.
4. New signing should be installed to provide visitor orientation to the area and specific buildings.
5. Those areas which are open to the general public should be made fully accessible to persons with disabilities.
6. If hiking or biking trails are built in the future, they should be fully handicapped accessible and highly developed.
7. Consider concessions for food services and rental of recreation equipment here.
8. This would be a good location for a parking area for shuttle buses to Fort San Lorenzo.
9. Ensure that any new construction matches or is compatible with the existing architectural style.

## **2. Fort San Lorenzo Zone (also known as “Castillo” San Lorenzo)**

**Theme:** The unique theme of this zone is understanding and appreciation of Spanish Colonial history.

**Desired Condition:** The long-term protection and public enjoyment of the remains of early Spanish exploration and settlement of the Americas.

**Visual Management:** This is a primary use area with major visual sensitivity. The natural environment is culturally modified yet attractive and the backdrop is natural appearing. Modifications range from the historic ruins and associated parking areas and groomed landscape, to the forested roadways, to second-growth forest containing less obvious but equally important historic materials and introduced plant species from relict gardens. The visual quality objective for this zone is *Partial Retention* of the ruins, which requires management activities to remain visually subordinate to the natural and cultural landscape. The remainder of the zone is *Retention*, which allows for management activities that are not visually evident.

**Recreation Opportunities:** The ROS classification for this zone is *Rural*. The opportunity to observe and affiliate with other users is important, as is convenience of facilities. Self-reliance on outdoor skills is of little importance and there is little challenge and risk. Interactions between users may be high, as is evidence of other users. Site controls can be obvious and prevalent. Land access is by large tour buses and private passenger vehicles. Water access is by motorized tours on small powerboats on the Chagres River and occasional yachts that anchor at the mouth of the river. Access for people with disabilities is “easy.” Some facilities are designed primarily for user comfort and convenience and there is moderate to heavy site modification. Interpretation could be through more complex wayside exhibits and kiosks, which may be staffed part-time.

### **Recommendations:**

1. The view of the Chagres River and coastline should be carefully protected to represent the same view seen by the early Spanish colonists.
2. Avoid the development of new facilities that detract from the historic landscape.
3. Limit other recreation activities in this area to reduce distractions, for example prohibit using the parking lot for soccer and other games.

4. Preserve the views of the fort as a focal point when entering the site. Avoid any obstructions to the views of the fort.
5. Replace metal tubes, railing and the fencing around the property to create a safe place with an aesthetically appealing architectural style.
6. Improve access to make the site available to all people by providing a direct and safe route to the main area of the fort as an alternative to the existing steps. Design a barrier-free bridge at the entrance to provide for this improved access and to work with the pedestrian traffic flow of the area.
7. Remove the caretaker's house. If such a facility is needed, build it in another location and carefully design the architecture to blend in with the surroundings and be more appropriate to the time period and cultural significance of the site. If it cannot be moved, paint it green and screen it with vegetation so that it is less obvious.
8. Expand the interpretive opportunities at the site, including the ruins of the adjacent town.
9. Design a new parking out of view of the fort. This will preserve the rural ROS class of the fort. Avoid the introduction of urban elements and facilities on the site that are not natural and could dominate the existing character of the fort. Provide any urban-type facilities at Fort Sherman.
10. Indispensable facilities such as restrooms could be built at the entrance outside the views of the fort.

### **3. Caribbean Coast Zone**

**Theme:** The unique opportunity of this area is to hike and explore a near pristine, uncrowded coastline from Fort San Lorenzo to Sherman.

**Desired Condition:** The long-term protection and public enjoyment of this unique and attractive environment.

**Visual Management:** The visual quality objective for this zone is *Retention*, which allows for management activities that are not visually evident. This area is primarily viewed from the sea and from trails and old military roads from the main road toward the coast. Devil's Beach has a different VQO, *Partial Retention*, which allows for development that must remain visually subordinate.

**Recreation Opportunities:** Although it currently has limited access by 4-wheel drive vehicles at several points (which could easily be blocked), the ROS classification of this zone is *Semi-Primitive Non-Motorized*. As a result, the probability of experiencing solitude, closeness to nature, tranquility, self-reliance, challenge and risk is moderate to high and access for people with disabilities is "difficult." On-site administrative controls should be minimal and subtle, and interpretation should be through self-discovery (brochures).

Current use is low, though there are tremendous opportunities here for developing dispersed recreation along the coast and down the numerous streams to the sea. This highly scenic 6-mile coastline contains cliffs, an unusual reef platform, numerous small beaches, and many streams, some ending in small waterfalls or cascades. It would be perfect for hiking, wildlife viewing, picnicking, fishing, and even swimming at carefully selected sites. However, this entire section of coast has a serious trash problem from passing ships. The mostly plastic debris degrades the immediate foreground and must be removed if this area is recommended for public use.

The most significant recreation site is Devil's Beach, an area once popular with U.S. military personnel. There are no toilets or other recreational facilities and the gate is currently locked at the road to Fort San Lorenzo. Although it is one of the best beaches in this region, the waves and undertow make it less than perfect for swimming. A local hotel has a concession to use the beach, but it currently receives little or no use.

**Recommendations:**

1. Non-motorized recreation like hiking, swimming, exploring, and nature study should be encouraged in this zone.
2. Trails should be constructed and trailheads established at several locations along the San Lorenzo Road corridor. Primitive signing should be installed to provide visitor orientation to the trails.
3. Avoid the development of intensive facility-dependent beach recreation at Devil's Beach. If toilets are installed, be sure to place them so that they are not visually intrusive.
4. Convert the access road to Devil's Beach to pedestrian use. Allow motorized use of the road for administrative purposes only.
5. The existing suspension bridge at Devil's Beach could be rehabilitated and a costal trail developed.
6. Consider a group reservation system for Devil's Beach, with regular site maintenance and garbage pickup.
7. Establish a coast trail from Devil's beach to Fort San Lorenzo.

#### **4. San Lorenzo Road Corridor**

**Theme:** For the vast majority of the visitors to the SLPA, this zone provides the most important opportunity to experience nature from the comfort and safety of a motorized vehicle.

**Desired Condition:** Long-term protection of this natural corridor and enhancement of the recreation and educational experience for visitors.

**Visual Management:** The visual quality objective for this zone is *Retention*. To maintain desired visual and recreational characteristics, vegetative alternations and management should not be visually evident. This is a primary route with major visual sensitivity, because people have entered a protected area and are anticipating seeing a World Heritage Site. Views from the roadway are extremely limited due to the dense forest, which enclose the road at places to form a cool, green tunnel. Currently, the only partial opening is at the bridge over Rio Arenal. Creation of a new pull-out and vista along the road would enhance the viewing opportunities.

**Recreation Opportunities:** This zone should be managed to provide *Roaded Natural* recreation opportunities. It includes a natural appearing environment, access and travel by conventional automobiles and larger tour buses, and little challenge and risk. The road currently receives a relatively high level of use by people visiting Fort San Lorenzo. However, few people stop along the way to appreciate the forest or view the abundant wildlife. In the future, there could be moderate to high concentration of users long the highway and at parking pullouts providing non-motorized access into the forest. A picnic area is also possible on the upper end of the Rio Arenal where there is a small concrete dam and pond.

### **Recommendations:**

1. Driving for pleasure and viewing scenery and wildlife should be encouraged in this area.
2. Provide pull-outs at appropriate locations for safe parking zones, wildlife viewing, and to provide access to side roads converted to hiking and biking trails into the Core Forest zone.
3. Create a pullout and vista at an appropriate location, perhaps with a small interpretive display. An excellent candidate is located about 300 meters north of the road to the microwave tower, on the east side of the roadway. Careful removal of a few smaller trees could open up a dramatic view into the canyon to the east. (An elevated “canopy” trail at this location might be considered at some point in the future.) However, care should be taken to avoid violating the VQO here; all changes and additions should not be visible to passing motorists. Interpretive signs should only be seen by visitors who stop and get out of their vehicles.
4. Signing should be installed to provide visitor orientation to recreation opportunities in the area. Signing and interpretation should be by simple wayside signs made of native-like rustic materials.
5. Consider developing a landscape visual corridor plan and designating this as a scenic byway.
6. Create a picnic area on the side road that ends at Rio Arneal. This area could also be used as a trailhead for hiking tours into the Core Forest zone.
7. Develop a loop trail from the roadway into the Core Forest zone.
8. Consider interpreting some of the military structures within short walking distance of the roadway. The concrete gun towers at the microwave site could be developed as a vista point.
9. Screen the roadside metal power boxes with plantings.

## 5. Primary Entry Corridor

**Theme:** The Theme of this area is to welcome visitors to the area and manage transition from developed areas to the more natural protected area.

**Desired Condition:** The creation of a welcoming entry corridor into the protected area and the protection of the visual condition along this corridor.

**Visual Management:** The visual quality objective for this zone is *Retention*, which only allows management activities that are not visually evident. This is a primary route with major visual sensitivity, because people are anticipating entering a protected area.

**Recreation Opportunities:** This zone should be managed to provide *Roaded Natural* recreation opportunities. It includes a mostly natural appearing environment as viewed from the roadway, access and travel by conventional automobiles and larger tour buses, and little challenge and risk. The road currently receives a relatively high level of use by people visiting Sherman and Fort San Lorenzo. Because of the speed of vehicles on this relatively straight, paved highway, however, very few people stop to appreciate the forest or view the wildlife. On the gravel side road to the west, however, there are some interesting caves and an underground stream, and there is access to reefs and swimming areas near the gate to Sherman.

**Recommendations:** Although most of this zone is outside the SLPA boundaries, it is critical because it serves as the entrance to the protected area, and thus sets the stage for the visitors' experience. It also contains important opportunities for recreation.

1. Manage this zone primarily for motorized recreation (driving for pleasure) and viewing scenery and secondarily for hiking, wildlife viewing, and swimming.
2. Provide access, signs, and off-road parking, for the swimming holes just before the entrance to Sherman. This could also provide access for kayaking along the coast of Bahia Limon. However, the shoreline suffers from considerable plastic debris, which should be cleaned up. In addition, rehabilitation should be done here to remove the tar on the exposed reef, mask its color with sand, or cover it entirely with a wooden walkway.

3. Enhance the vista of Bahia Limon by carefully trimming the small mangrove trees along the roadway. While we do not endorse the large-scale disturbance of this important species, it would be appropriate to enlarge the existing opening where the highway passes closest to the small cove. This would open up a dramatic vista into this remarkable forest, as well as out across the bay toward Colon.

## **6. Chagres River Zone**

**Theme:** The unique theme of this area is the opportunity to travel along the river in much the same condition as it was during the Spanish Colonial period.

**Desired Condition:** The long-term protection of the river and adjacent forest and public enjoyment of this natural and historically significant river.

**Visual Management:** This area is primarily viewed from the sea, Fort San Lorenzo and along the river itself. The visual quality objective for this area should be *Retention* because it is a primary water route with high visual sensitivity. Retention only allows for management activities that are not visually evident.

**Recreational Opportunities:** This zone should be managed to provide *Semi-Primitive Motorized* recreation opportunities along the main river and *Semi-Primitive Non-Motorized* opportunities for the tributaries. *Semi-Primitive Motorized* recreation on the main river would involve a moderate probability of experiencing solitude, closeness to nature, and tranquility and provide a high degree of self-reliance, challenge and risk in operating a powerboat. Interpretation would be through maps, brochures and guidebooks and very limited use of signs. *Semi-Primitive Non-Motorized* recreation on the smaller streams would provide a higher probability of experiencing solitude, closeness to nature, tranquility, self-reliance, challenge and risk. Interpretation would be through self-discovery, with some use of maps, brochures and guidebooks, but no signs.

There are low concentrations of users but often evidence of other boaters, especially at the put-in or take-out points. Potential conflicts are anticipated between kayakers and motorized boats in the small tributaries. Most controls over visitors are through commercial boat and bus tours. Currently, use restrictions and on-site controls are minimal.

Sharks at the mouth of the river and large caiman and crocodiles in the tributaries may present seasonal hazards to visitors. There are no dangerous rapids or rocks in the main river.

### **Recommendations:**

1. Specific recommendations for the development of flatwater kayaking in this zone are provided in a separate report (Wylie, 2001) and are not repeated here, except the prohibition of powerboats in some or all side tributaries to avoid conflicts with wildlife and kayakers.

2. Consider limitations on the size of boat engines or boat speed to reduce noise pollution and shoreline erosion caused by large boat wakes.
3. Consider prohibiting jet skis, water-skiing, and motorboat racing, as these are incompatible uses.
4. Avoid the development of visually intrusive facilities along the river to preserve the area's semi-primitive character.
5. Remove trash and the occasional military debris (old tires, etc.) from the water and shoreline.
6. As boating use increases on the lower Chagres River, more attention will need to be given to the scenic values of Chicken Landing. The two large banyan trees here should be protected at all costs. The boats presently used for river tours should be kept in good condition and not stored in areas where they block critical views of the river. Also remove old equipment and trash at the water's edge and around the shack.

## **7. Drop Zone**

**Theme:** The theme of this area is utilization for highly developed, commercial recreation or industrial facilities to support the economic development of the area.

**Desired Condition:** Careful development of commercial recreation or industrial uses without degrading the visual quality of the surrounding zones.

**Visual Management:** This zone is only visible from within, and if the road is gated and locked, it would not be visible to the general public at all. Since it is completely disturbed (all trees removed), the visual quality objective for this area is *Modification*, allowing for management or development activities to be visually dominant. This could be changed to *Maximum Modification* if public access was blocked and the area was not visible to the passing public.

**Recreation and Development Opportunities:** There is currently little or no recreational use, with the possible exception of bird-watching. (The Panama Audubon Society considers this a good place for seeing owls.) This highly-modified zone could either be developed for intensive use for commercial recreation, such as a golf course, marina or boat yard, or it could be developed as an industrial site.

### **Recommendations:**

1. The vegetation along the highway needs to be managed to ensure this area is completely screened from view.
2. If the area is developed for intensive recreation, the boat landing at the end of the French Canal should be improved with some parking and small boat launching facilities.



## **8. Core Forest Zone**

**Theme:** The Theme of this area is the opportunity to explore an undeveloped and unroaded forest by foot, bike, or human-powered watercraft.

**Desired Condition:** The long-term protection and public enjoyment of this primitive forest area and the maintenance of wildlife species that need undisturbed forest habitat.

**Visual Management:** This zone is viewed from a limited number of vistas, including the Chagres River, the highway to Sherman, and Gatun Hill. The vast majority of this area is hidden from view. The visual quality objective is *Partial Retention*, which requires management activities to be visually subordinate. The one exception is Mojinga Swamp, which was identified by workshop participants as having a “C” (minimal) variety classification and therefore a visual quality objective of *Maximum Modification*. This would allow for management activities to dominate the natural landscape. However, due to its ecological sensitivity, we recommend changing its VQO to *Partial Retention* to ensure that management activities will not negatively impact water quality, critical drainage functions, soil stability, unique habitat and other significant ecological features of this land type. The other area of *Maximum Modification* within the Core Forest zone is disturbed forest not visible from roadways. (Although not included in the Core Forest Zone, the southern edge of Limon Bay should perhaps be changed to *Partial Retention* in the future updates.)

**Recreation Opportunities:** The area should be managed to provide *Semi-Primitive Non-Motorized* recreation opportunities in a natural-appearing forest setting with very little evidence of human use or modification. This will assure a high probability of experiencing solitude, closeness to nature, tranquility, self-reliance, challenge and risk. Access is primarily by kayaks and canoes along small numerous small rivers and by foot or bike along numerous trails developed by the U.S. Military. Access for people with disabilities is “difficult” and challenging.

### **Recommendations:**

1. Maintain low levels of use in this zone and avoid the development of any facilities except for trails. Prohibit motorized access.
2. Trails should be primitive and maintained by limited clearing of undergrowth. Bridges should be rustic and made of natural materials.

3. Signs are few, limited to directional information, and made of natural materials. Most interpretation should be through maps, brochures, guidebooks and guides.
4. The area immediately surround the STRI research crane is within this management area and needs to be treated as an special use zone closed to recreation.
5. Although the Piña Range is located within this zone, entry is prohibited due to the presence of unexploded ordnance.
6. Perhaps the best viewpoint of this zone, or at least the one most accessible to the public, is from Gatun Hill (sometimes known as Camp Rock.) From here you can see from Sherman to Colon, and from Escobal out to many of the islands in Lake Gatun. However, to do this you have to stand on your toes in the high grass or climb onto the roof of your vehicle. A solution would be to erect some kind of viewing tower or, baring that, cut down some of the undergrowth. Simple interpretive signs would also enhance the visitor experience at this location.

## **9. Achiote-Escobal Travel Corridor**

**Theme:** The theme of this area is the opportunity to drive through the southern portion of the protected area from Gatun Dam to Achiote, while enjoying the views into the forest and a world-famous birding area.

**Desired Condition:** The long-term protection and public enjoyment of this important highway corridor and protection of the natural habitat and opportunities for interpretation and bird-watching.

**Visual Management:** This area is primarily viewed from the highway and from homes and minor roads within the area. The visual quality objective for this area is *Retention*, which allows for management activities that are not visually evident. Further analysis may recommend this be changed to *Partial Retention*.

**Recreation Opportunities:** The area should be managed to provide *Roaded Natural* recreation opportunities. Further investigations may show that the road corridor between Gatun Dam and the rural Agroforestry zone north of Escobal should have a different classification, due to its greater degree of alternation. Currently, the primary use of this zone is by locals traveling to and from their homes and work in Colon. There is little recreational use except for bird watching near the community of Achiote. However, there are opportunities for developing pull-outs and scenic overlooks along the shore of Lake Gatun. Some points along the road at the edge of the lake are particularly interesting, such as Punta Mala, Punta Macu, and the aquaculture program at La Treinticinco.

### **Recommendations:**

1. Open views to Gatun Lake by pruning trees and clearing some brush. Cutting of any vegetation should be prudent as to avoid opening the view completely. Views should be suggestive, causing intrigue and surprise while preserving the natural look of the forest along the road.
2. There are a few pull-offs that might be suitable for development as viewpoints and picnicking. They could be designed for a few vehicles to park safely off the road, with trash cans and interpretive or informational signs. However, this type of development would only be compatible with a VQO of Partial Retention.
3. A sign for garbage disposal violation should be placed along the road if authorities will monitor and enforce it.

4. Consider developing a landscape visual corridor plan and designating this as a scenic byway.
5. Parking, interpretive signage and regular trail maintenance should be considered for the world-famous birding area near Achiote.

## **10. Agoforestry Zone**

**Theme:** The unique opportunity of this area is to practice traditional agroforestry.

**Desired Condition:** The preservation and restoration of tree cover and the management of this area in a cooperative manner with local residents.

**Visual Management:** The area's natural environment is culturally modified and is primarily viewed by local residents. The VQO is *Modification* for those areas not visible from the highway, which allows human activities to be visually dominant. Future analysis may find that this VQO is not practical because of the current and future level of human use and modification by farming and home construction.

**Recreation and Traditional Use Opportunities:** Other than recreational activities by local residents, such as sports, there is little opportunity for recreation and this zone is not recommended for use by visitors at this time. However, it might also be possible to develop an environmental education program for both locals and visitors focused on sustainable agroforestry in this zone.

### **Recommendations:**

1. Encourage sustainable agroforestry, including planting commercially valuable trees and conserving and utilizing existing forest cover whenever possible.
2. Explore the feasibility of developing an environmental education program focusing on sustainable agroforestry practices.



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## ANNEX A – Definitions of Characteristic Landscapes

The **Humid Forest** is composed of a wide variety of tree species in both flat lowland and upland settings. With additional fieldwork, the **Mojinga Swamp** might also be included as part of the *Humid Forest* (we were unable to determine if the swamp had open water or a tall forest canopy.) Other possible subdivisions of the Humid Forest are the freshwater wetland Cativo forest and “Ploughed” or disturbed areas once used for small farms. Although biologically distinct, these areas would not appear much different to the casual visitor. Another possible addition would be the freshwater shoreline of Lake Gatun. However, this is essentially *Humid Forest* right to the water’s edge, and the lake itself is outside the SLPA.

The only other forest type which we show separate from the *Humid Forest* is the **Mangroves**. This is because even to the uneducated visitor, these trees are different in size and location than others. They are much shorter and grow out onto the tidal flats along the road leading to Fort Sherman, in an area that is highly visible to passing motorists. Other minor areas of mangroves are found along the coastline near Fort Sherman, but these are not shown as separate landscapes at this time. The mangroves of the French Canal are visually subordinate to the canal itself and are only briefly seen by passing motorists as they cross the bridge (the view is partially obstructed by the solid guardrail.)

Modified areas that have lost some or all of their natural appearance include, in descending order: *Urban*, *Drop Zone*, and *Rural*. **Urban** areas are those which are dominated by the human or “built environment.” These include Fort Sherman, Gatun Dam, Gatun Locks, and a cluster of small industrial zones on Limon Bay just north of the Gatun Locks. These areas are dominated by lawns and landscaping, roads, buildings, and other major infrastructure. These “military/industrial” zones are clearly not natural-appearing.

The **Drop Zone** was used by the military as a parachute landing area. All trees have been removed and the ground leveled and ditched to promote drainage. When it was in use, the reeds and tall grasses were kept trimmed. Currently it has become somewhat overgrown, but is still very much an unattractive, cultural landscape.

The **Rural** landscape immediately adjacent to the community of Escobal is dominated by small farms with their gardens, orchard trees, rustic homes, and animals. Roads are few and of dirt and electrical lines are beginning to appear. Overall, it has an attractive appearance, but one which is clearly cultural. (Note that the term “Rural” here has a different meaning than the term “Rural” in the ROS system.)

The coastal zones along the Caribbean are split into two types. The ***Caribbean Beaches*** west of the Chagres River have broad sandy beaches backed up with coconut trees and low coastal shrubs. The ***Caribbean Coast*** zone is much different, with reef platforms and tiny beaches limited to river mouths, against a backdrop of low cliffs covered with forest.

Primary waterways include the ***Chagres River*** from Gatun Dam to the Caribbean, three ***Internal Lakes***, and the ***French Canal***, which although man-made, is cloaked in mangroves and is quite natural appearing after 120 years. Although the tidal lakes cannot be seen from the main road and can only be accessed by small boat, they are a unique landscape within the overall forest zone. Future assessments may want to consider combining them with other landscapes. For example, the lake at Chicken Landing with the ***Rio Chagres***, the basin or “cuenca” with the ***French Canal***, and the small lake on Quebrada Paulino with the tributaries of the Rio Chagres.

## ANNEX B - Visual Descriptions of Each Characteristic Landscape

<i>Landscape</i>	<i>Water</i>	<i>Vegetation</i>	<i>Geology</i>	<i>Cultural</i>	<i>Form, line, Color, texture</i>
<b>Urban Area (Sherman)</b>	Lagoon Artificial canals Sprinklers	Grass Low Ornamental trees Structural	Liable to flooding Flat No rocks Fill	1918 Military Quiet Big	Open space Horizontal White buildings w/ orange tile roofs Widespread
<b>Urban Area (Canal Zone, Gatan Dam, Hydro Plant)</b>	Controlled Fresh	Cut grass Very few trees Artificial	Fill Flat No rocks	Operational buildings Artificial landscape Industrial development	Regular Horizontal Green Soft Focal point (dam)
<b>Chargres River and Tributaries</b>	Tidal Green Calm 10-15 m. deep Tributaries clear, milky or muddy	Humid Forest "gallery" effect Very dense	60-75 m. wide No rocks	Very historic route Cultural remains	Sharp turns, shoreline very close Horizontal Dark green Water-soft, vegetation-coarse
<b>Rural (Farms)</b>	None	Open Spaces Vegetables Coffee Root crops	Gentle slopes Fine sand Approx. 10 m. of sandy beach No stones/reefs Gray sand	Old road Old town	Elongated, homogenous Soft lines, vertical lines Gray, blue, green Soft
<b>Caribbean Beaches</b>	Very dynamic Saltwater Strong waves Color: blue No waterfalls Tides	Palms and shrubs	Gentle slopes Fine sand Approx. 10 m. of sandy beach No stones/reefs Gray sand	Old road Old town	Elongated, homogenous Soft lines, vertical lines Gray, blue, green Soft

<b>Landscape</b>	<b>Water</b>	<b>Vegetation</b>	<b>Geology</b>	<b>Cultural</b>	<b>Form, line, Color, texture</b>
<b>Caribbean Coast (cliffs)</b>	Saltwater Strong waves Color: blue Waterfalls Tides	Humid Forest Some palms and mangroves Color: green	Abrupt Limestone Reefs Rocky Small beaches	Fort San Lorenzo WWI defensive batteries	Dynamic Vertical Golden Rigorous
<b>Mojinga Swamp*</b>	Fresh Stagnant Cloudy	Shrubs Low Dense	Muddy soil	Alleged Spanish stone causeway	Open with small spaces Horizontal Green Soft
<b>Mangroves (Limon Bay)</b>	Saltwater Calm Shallow	Dense Tangled Medium height Green	Sedimentation Flooding Low tide	None	Round (from a distance) Tangled, irregular Green Dense
<b>Internal Lakes</b>	Mixed fresh and saltwater No current Shallow	Humid Forest Mangrove Palms	No visible rocks	Boat ramp "Cuenca" may be part of the French Canal excavation	Horizontal & vertical on the perimeter (gallery effect) Green Soft
<b>French Canal</b>	Dark green/brown Cloudy Little current Sediment	Perimeter Mangroves	Excavated 30 to 40 m. wide	Artificial 1890 to 1900	Flat Linear Dark green Calm, soft
<b>Humid Forest ("Ploughed")</b>	Some small streams	Disturbed Second growth Old plantations and gardens	Soft hills Clay Few rocks	Few families Huts Paths/trails	Irregular Horizontal and vertical Green Fragmented

\*Note: These are assumed; no firsthand information available

<i>Landscape</i>	<i>Water</i>	<i>Vegetation</i>	<i>Geology</i>	<i>Cultural</i>	<i>Form, line, Color, texture</i>
<b>Humid Forest (Cativo, <i>Priaria</i> <i>capoifera</i>)</b>	Freshwater wetlands Calm Dark Shallow Fluctuates as it rains	Cativo only (Little understory vegetation, orchids and epiphytes)	Flooded area Sedimentation	None	Spectral Close Vertical Green/dark Varied texture Tall
<b>Humid Forest (Other)</b>	Small rivers & streams Ravines Waterfalls Abundant	High biodiversity 3 layers Dynamic Ground covered with organic matter Big leaves	Very broken Clay soil and limestone Hills with steep slopes	Military training camps & debris Trails Spanish colonial sites	Rolling Vertical Evergreen Very dense
<b>Drop Zone</b>	Canals/ditches Stagnant ponds	Flooded grasslands Tall reeds	Flat Swamps	Previous military use	Flat, open Horizontal Green Homogenous, fine texture

## ANNEX C - Variety Classes for Characteristic Landscapes

Features						
Characteristic Landscapes	Water	Vegetation	Geology	Cultural	Form, line, color, texture	Average
Urban (Sherman, Dam)	A A	B B	C C	A A	A B	A A
Chagres River & Tributaries	A	A	B	A	B	A
Rural (Farms)	C	B	C	B	A	B
Caribbean Beaches	A	A	B	B	B	A
Caribbean Coast	A	A	A	A	C (overall) A (Ft. San Lorenzo)	A A
Mojinga Swamp*	C	B	C	C	C	C
Mangroves	C	A	C	C	A	B
Internal Lakes	A	B	C	C	B	B
French Canal	B	B	C	A	C	B
Humid Forest: Ploughed Cativo Other	C C A	C A A	C C B	B C B	B B B	C B A
Drop Zone	C	C	C	B	C	C

\*This area may have more scenic importance than indicated here.

### KEY:

Class A – Distinctive (unusual or outstanding visual quality)

Class B – Common (not outstanding)

Class C – Minimal (little variety)

## ANNEX D – Recreation Opportunity Spectrum Criteria

<b>Primitive</b>	<b>Semi-Primitive Non-Motorized</b>	<b>Semi-Primitive Motorized</b>	<b>Roaded Natural</b>	<b>Rural</b>	<b>Urban</b>
An area designated at least 1.5 miles from all roads, or trails with motorized use.	An area designed at least 1/4 mile but not further than 1.5 miles from all roads or trails with motorized use; can include the existence of primitive roads and trails if usually closed to motorized use.	An area designed at within 1/4 mile of primitive roads or trails used by motor vehicles including boats; but closer than 1/4 mile from better than primitive roads.	An area designated within 1/4 mile from better than primitive roads.	No distance criteria.	No distance Criteria.
2,500*	1,200**	1,200	No size criteria.	No size criteria.	No size criteria.

\*May be smaller if contiguous to semi-primitive Non-motorized class.

\*\* May be smaller if contiguous to Primitive Class.

<b>Primitive</b>	<b>Semi-Primitive Non-Motorized</b>	<b>Semi-Primitive Motorized</b>	<b>Roaded Natural</b>	<b>Rural</b>	<b>Urban</b>
Essentially an unmodified natural environment.	Natural Appearing setting may have subtle modifications that would be noticed but not draw the attention of an observer wandering through the area.	Natural Appearing setting may have moderately dominant modifications that would be noticed but not draw the attention of an observer wandering through the area.	Natural Appearing setting may have modifications which range from easily noticed to strongly dominant to an observer wandering through the area.	Natural Appearing setting is culturally modified to the point that it is dominant to an observer wandering through the area.	Setting is strongly structure dominated. Natural elements are visually subordinate.
Evidence of primitive trails may exist.	Little or no evidence of primitive roads and motorized use.	Strong evidence of primitive roads and trails and their motorized use.	Strong evidence of roads and highways.	Strong evidence of roads and highways.	Strong evidence of roads, streets and highways.
Structures are extremely rare.	Structures are rare and isolated.	Structures are rare and isolated.	Structures are generally scattered, remaining visually subordinate.	Structures are generally scattered, remaining visually subordinate.	Structure and structure complexes are dominant and may include major resorts and marinas.
Usually less than 6 parties per day may be encountered on trails or at points of interests.	Usually 6 to 15 parties per day may be encountered on trails or at points of interests.	Frequency of contact is low to moderate in developed areas and on trails and roads.	Frequency of contact is moderate to high in developed areas and on trails and roads.	Frequency of contact is moderate to high in developed areas and on trails and roads.	Large numbers of people.
On-site regulation is low with controls off site.	On-site regimentation and controls present but subtle.	On-site regimentation and controls present but subtle.	On-site regimentation and controls noticeable but in harmony with the natural environment.	Regimentation and controls obvious and numerous.	Regimentation and controls obvious and numerous.

## ANNEX E – Recreation Activities by ROS Class

EXISTING RECREATION ACTIVITIES	SOCIAL ENCOUNTERS	ACCESS	Urban	Rural	Roaded Natural	Semi-primitive Motorized	Semi-primitive Non-motorized	Primitive*
Fishing	1	1-2			X	X	X	
Swimming	2-3	3	X	X	X	X	X	
Bird watching	1	2-3	X	X	X	X	X	
Hiking/trekking	1-2	1-2			X	X	X	X
Hunting	1	1-2				X	X	X
Surfing/Windsurfing	2-3	3	X		X			
Kayaking	1-2	1	X		X	X	X	
Sailing	2	1-2			X	X	X	
Snorkeling/diving	1	1			X	X	X	X
Bicycling	2	3	X	X	X	X	X	
Target Shooting	1	3				X		
Visiting historic places	3	3	X		X	X		
Training	3	1-3	X	X	X	X	X	
Volunteering	3	3	X	X	X	X		
Sunbathing, going to the beach	3	3	X	X	X	X		
Traditional sports	3	3	X	X				
Picnicking	2-3	2-3	X	X	X	X		
School field trips	3	3	X	X	X	X		
Auto sight-seeing driving for pleasure	3	3	X	X	X	X		
Photography	1	1-3	X	X	X	X	X	X
Outdoor eating	3	3	X	X	X			
Motor boating	3	3	X	X	X	X		
Landscape viewing	2	2-3	X	X	X	X		

POTENCIAL RECREATION ACTIVITIES	SOCIAL ENCOUNTERS	ACCESS	Urban	Rural	Roaded Natural	Semi-primitive Motorized	Semi-primitive Non-motorized	Primitive*
Camping	2	1-2			X	X	X	
Caving	2	1				X	X	X
Horse riding	2	2		X	X	X	X	
Playground games	3	3	X	X	X			
Children/youth camps	3	3	X	X				
Ultra-light flights	1	3	X					
Parachuting/gliding	3	3	X	X	X			
Mushroom/fruit picking	1	1			X	X	X	
Jet skiing	2-3	3	X	X	X	X		
Tree climbing	1	1				X	X	X
Canopy walk	1	1				X	X	

KEY: 1 = low      2 = medium      3 = high

Studies show that 60% of the visitors are recreating for the first time and 90% are traveling in private vehicles (Ham and Weiler, 2000).

\*Note: These activities are illegal and shown here for planning purposes only.

## ANNEX F – Recreation Use and Potential Market Segments

EXISTING RECREATION ACTIVITIES	Panamanian			USA	South American	Other International Visitors
	Panama City	Colon	Other			
Fishing	2	3	1	3	0	0
Swimming	1	3	0	1	0	0
Bird watching	1	0	0	3	0	0
Hiking/trekking	2	1	0	3	0	0
Surfing/Windsurfing	1	0	0	0	0	0
Kayaking	0	0	0	2	0	0
Sailing	0	0	0	2	0	0
Snorkeling/diving	1	1	0	2	0	0
Bicycling	3	3	0	1	0	0
Visiting historic places	3	3	3	3	3	3
Training	2	3	0	1	0	0
Volunteering	2	2	0	1	0	0
Sunbathing, going to the beach	1	3	1	1	2	2
Traditional sports	1	2	0	0	0	0
Picnicking	0	3	2	0	0	0
School field trips	3	3	1	1	0	0
Auto sight-seeing driving for pleasure	3	3	0	2	0	0
Photography	1	0	0	3	0	0
Outdoor eating	2	3	1	1	3	1
Motor boating	2	3	0	0	0	0
Landscape viewing	1	1	1	1	2	2

POTENTIAL RECREATION ACTIVITIES	Panamanian			USA	South American	Other International Visitors
	Panama City	Colon	Other			
Hunting*	3	3	3	0	0	0
Target shooting*	0	3	0	0	0	0
Camping	1	0	0	1	0	0
Caving	1	0	0	1	0	0
Horse riding	1	1	0	2	0	0
Playground games	1	2	0	0	0	0
Children/youth camps	3	2	2	0	0	0
Ultra-light flights	3	1	0	0	0	0
Parachuting/gliding	2	0	0	0	0	0
Mushroom/fruit picking	1	3	0	0	0	0
Jet skiing	2	2	0	1	0	0
Tree climbing	2	1	0	1	0	0
Canopy walk	2	1	0	3	0	0

Key: Social Encounters 1 = low      2 = medium      3 = high      X = Present

Access 1= less accessible to 3 most accessible

\*Note: There is no Primitive ROS class in the SLPA; this exercise was conducted prior to that determination.

## **ANNEX G – Explanation for Maps**

### **Map 1. CHARACTERISTIC LANDSCAPES**

A characteristic landscape is the natural landscape being viewed. There are 11 basic types of landscapes that are visually distinctive to an average viewer. (These do not reflect all biological diversity). Types include Urban, Chagres River, Rural (finca), Playas del Caribe, Costa Caribeña (cliffs/reefs), Mojinga Swamp, Mangroves, Internal Lakes, French Canal, Humid Forest, and Drop Zone.

### **Map 2. VISUAL VARIETY**

This shows the range of scenic importance based on diversity of natural resources. Those areas with the most variety or diversity have the greatest potential for high scenic value. Visual variety is based on physical features of the land classified in three main classes. CLASS A - Distinctive (outstanding), CLASS B - Common (not outstanding), and CLASS C - Minimal (little change). In the Distinctive Class, features of water, vegetation, geology, cultural, and form, line, color and texture are of unusual or outstanding visual quality. In the Common Class, features vary in form, line, color and texture or combinations thereof, but tend to be common or not outstanding in visual quality. Features in the Minimal Class have little change in form, line, color and texture.

### **Map 3. VISTAS AND SEEN AREAS**

This map shows all the seen areas from the identified primary and secondary routes. The vistas include: San Lorenzo, Chagres River (various), road into Fort Sherman, Gatun Dam spillway bridge, Gatun Dam, Gatun Hill, and Achiole road corridor. The map also depicts the distance zones which are classified as foreground (0-50m), middle ground (50-1000m), and background (>1000m). Distance zones are used as points of reference to determine the sensitivity of landscapes. Distance zones are areas of landscapes denoted by specified distances from the observer.

### **Map 4. VISUAL QUALITY OBJECTIVES**

The Visual Quality Objectives (VQOs) are a tool to establish the degree of visual sensitivity of a landscape. They are based on the degree of acceptable alteration of the landscape. There are five VQOs on a scale from Preservation to Maximum Modification. The VQOs are: Preservation (P), Retention (R), Partial Retention (PR), Modification (M), and Maximum Modification (MM). In some circumstances, short-term goals will be needed to meet the designed objective by modifying the areas having potential for visual quality. For example, pruning the vegetation to open-up a vista. These short-term goals are called Rehabilitation and Enhancement and they are recommendations for management to consider during the planning process. All VQOs, short and long term, are adjusted, refined during the planning process.

### **Map 5. ROS CLASSES**

The Recreation Opportunity Spectrum is a land classification system designed to provide a wide range of choices of activities and settings in recreation. The spectrum ranges from Primitive to Urban. The 6 classes include: Primitive (P), Semi-Primitive Non-Motorized (SPNM), Semi-Primitive Motorized (SPM), Roaded Natural Rural (R), and Urban (U).

### **Map 6. POINTS OF INTEREST**

These are areas with high recreation use or potential. For example, Rio Chagres, Fort San Lorenzo, beaches, caves, etc. Activities in these areas are described to determine what ROS Class will best provide, or is most compatible with, the activities and experiences desired.

### **Map 7. RECREATION/MANAGEMENT ZONES**

This map illustrates 10 potential recreation zones, each with its own management prescriptions based on the ROS and VMS standards. Each zone addresses optimal resource setting and naturalness, access and remoteness, trail construction and maintenance, signage and interpretation, administrative facilities, traditional use activities, physical risks and challenge, social encounters, and visitor management.



# **MAPS**

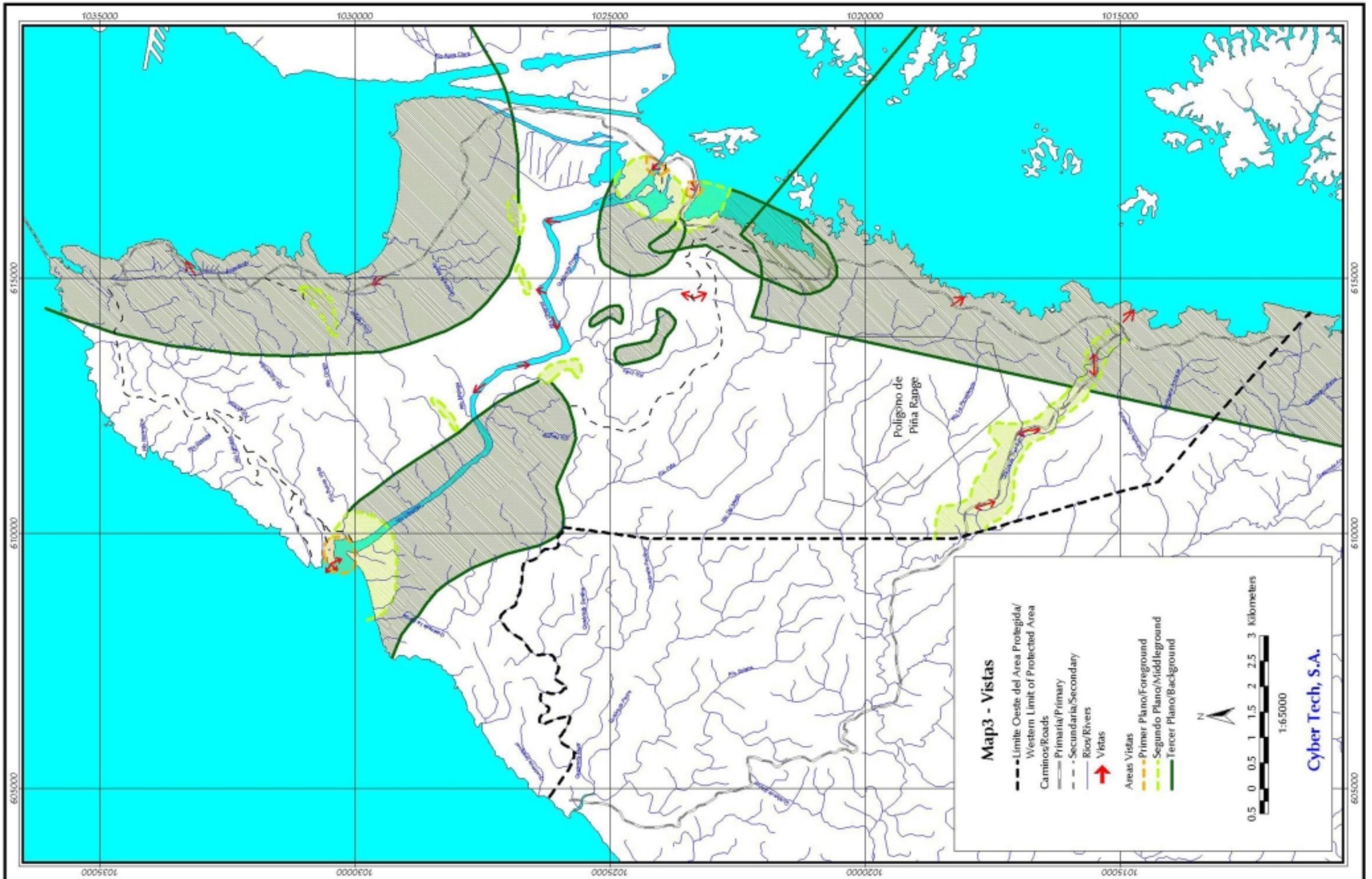




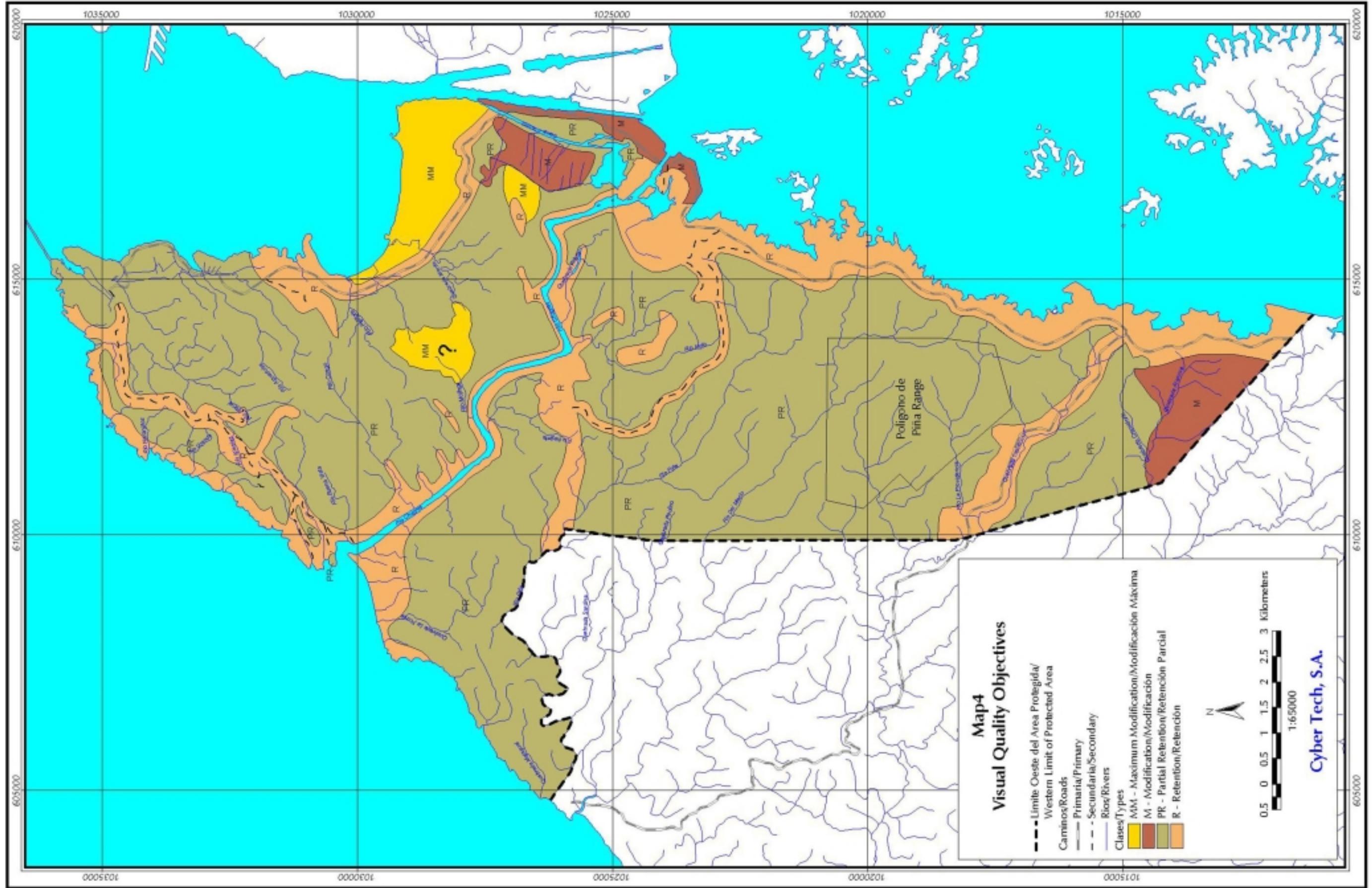




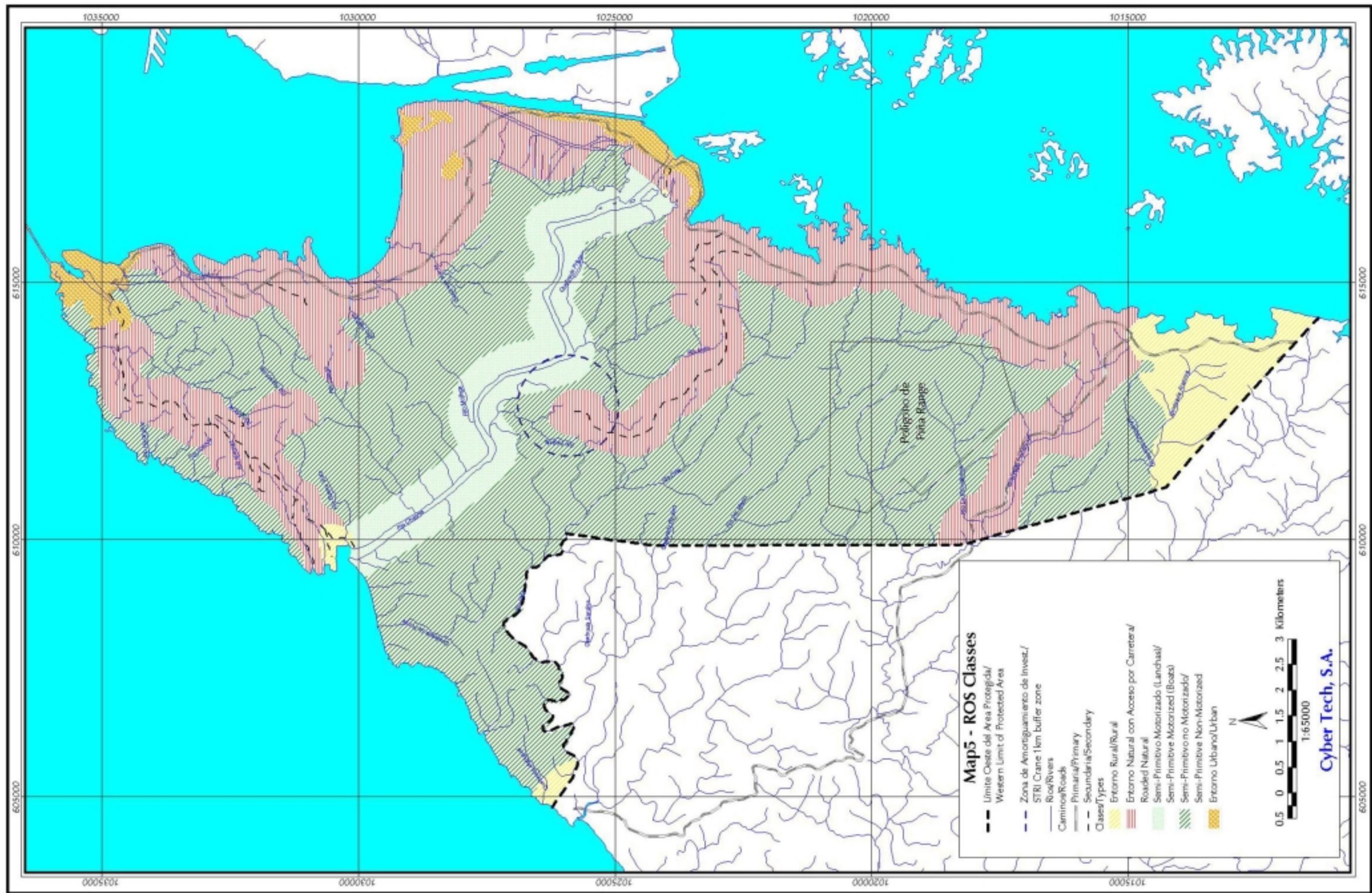




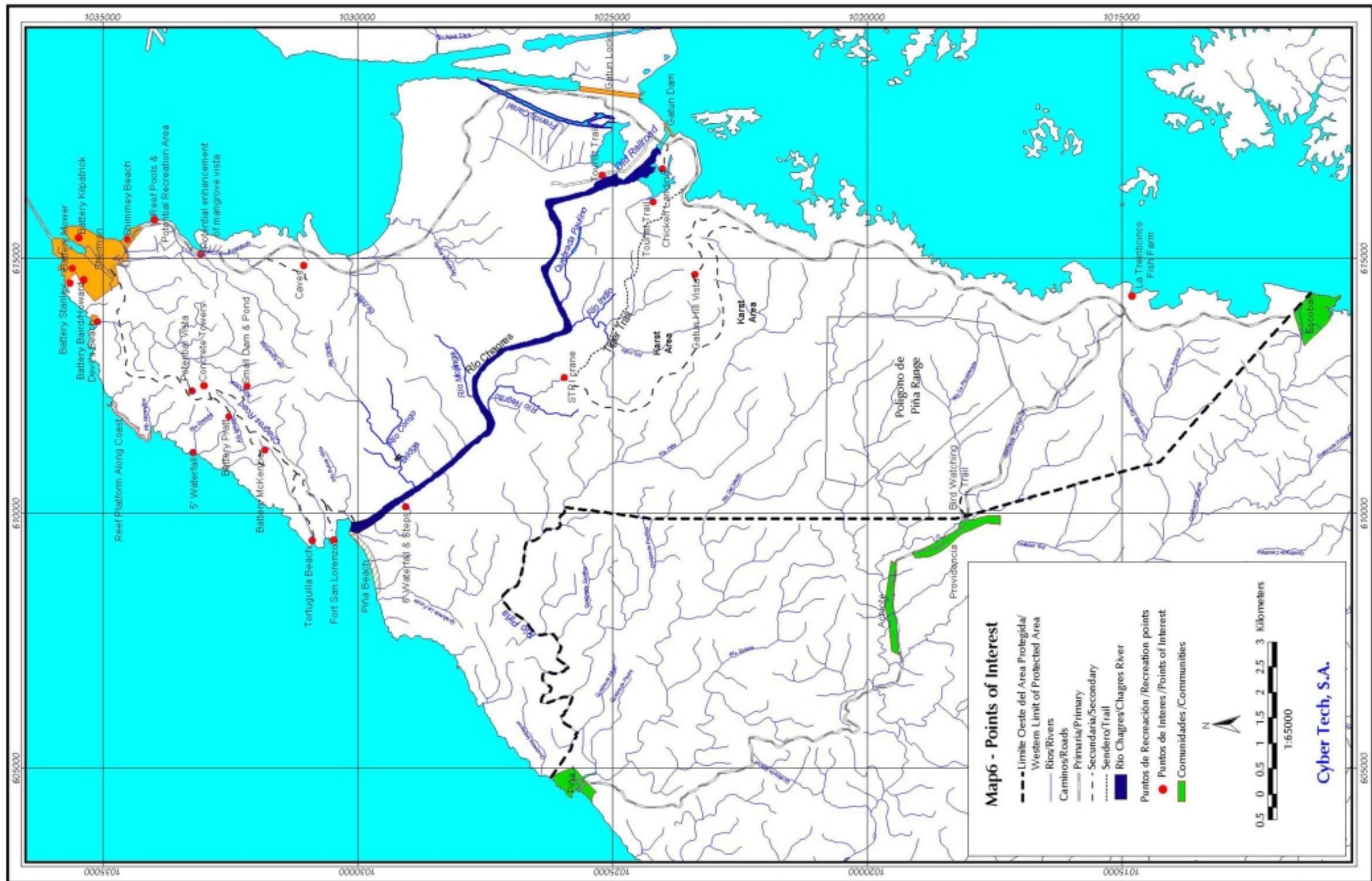




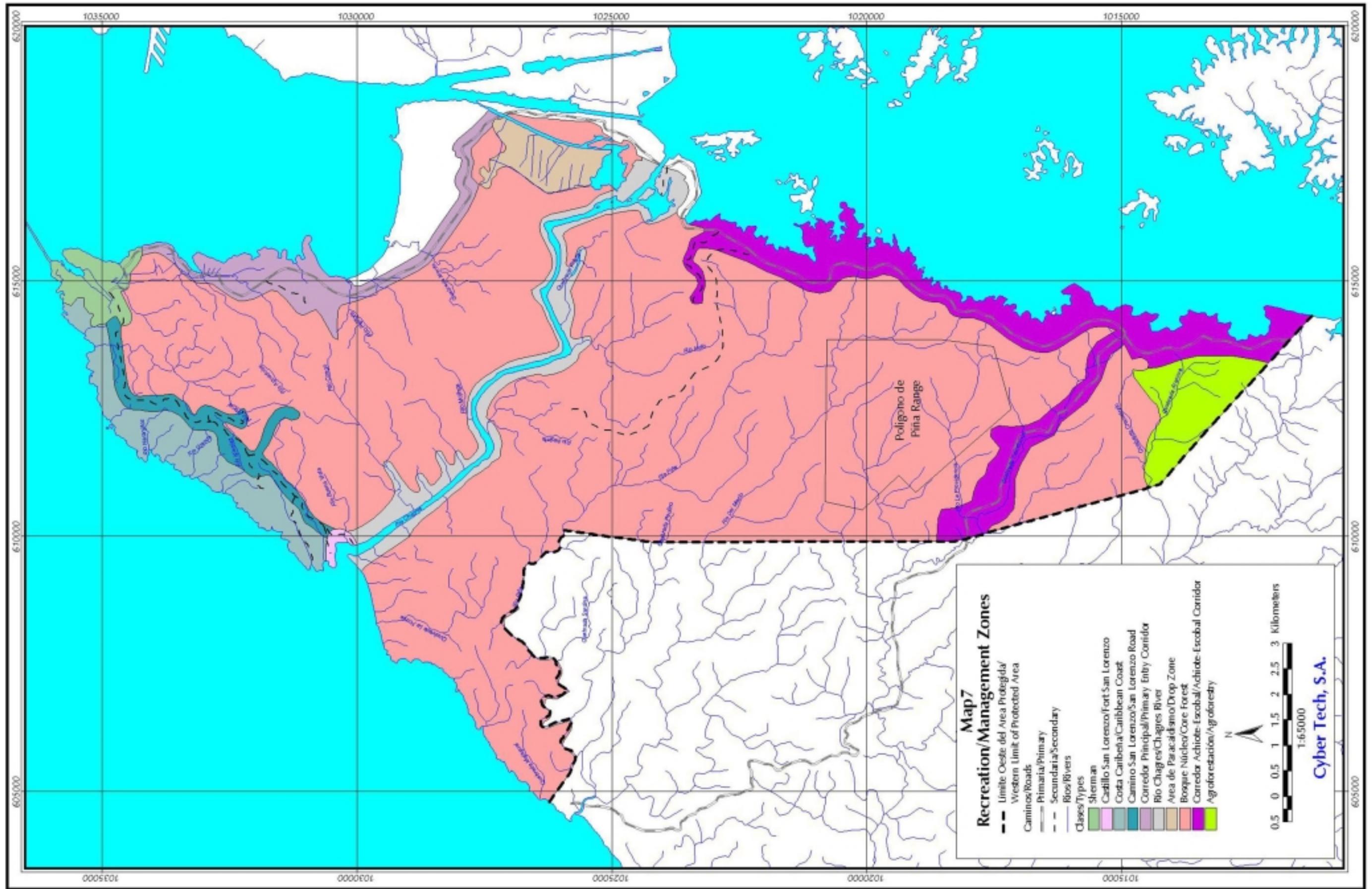














# **PHOTOGRAPHS**





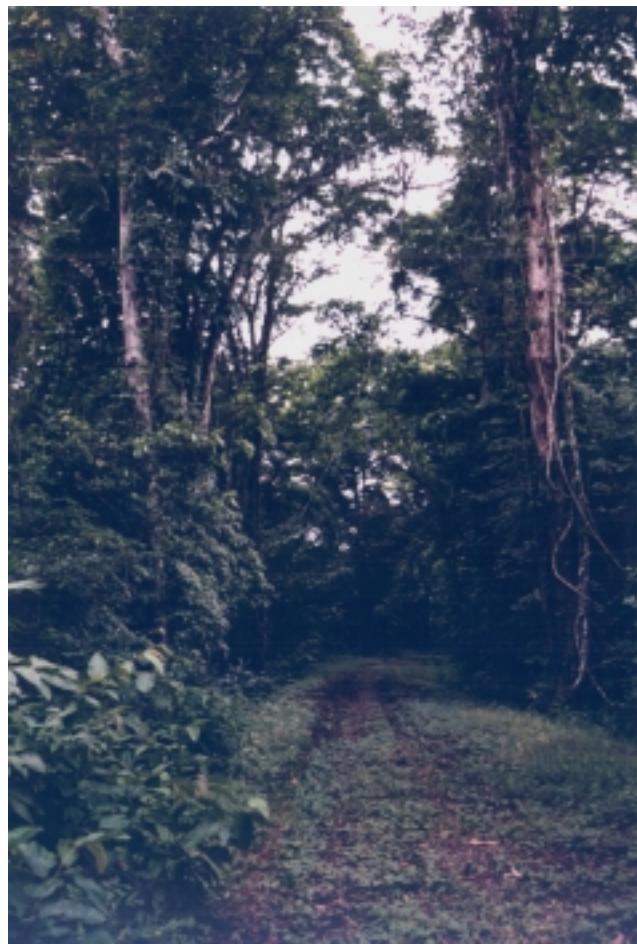
Photograph 1. The Chagres River is an example of *Semi-Primitive Motorized* classification.



Photograph 2. Chicken Landing, near the Gatun Dam, provides the only access to the up-river portion of Chagres River.



Photograph 3. The San Lorenzo Road is classified as *Roaded Natural*

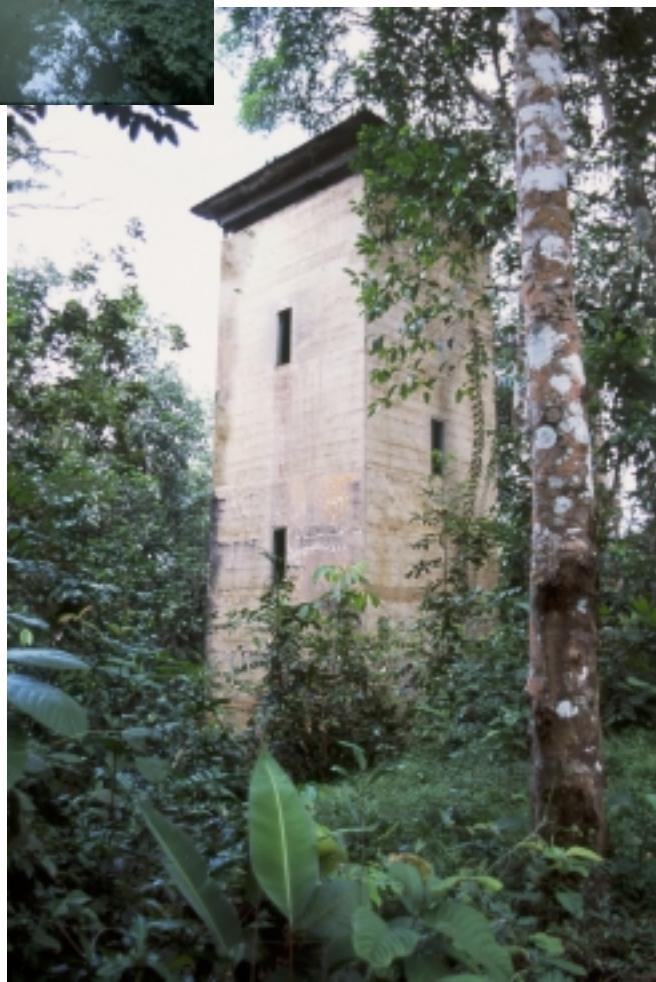


Photograph 4. Many of the side roads off the San Lorenzo Road provide important access into the forest.



Photograph 5. The bridge over the Rio Arenal offers one of the few views into the surrounding forest along the San Lorenzo Road.

Photograph 6. The concrete gun towers near the San Lorenzo Road zone could be developed as a tourist attraction and viewing platform.





Photograph 7. The clearing at the end of the road to Rio Arenal is an excellent location for a picnic area.



Photograph 8. Many of the small streams flowing along the Caribbean Coast Zone end in small waterfalls or cascades.



Photograph 9. The raised reef platform along the Caribbean Coast provides an attractive route for hiking.



Photograph 10. The beach at the mouth of the Tortuguilla River.



Photograph 11. The broad beaches west of the mouth of the Chagres River are much different from the Caribbean coastline to the east.



Photograph 12. The road to Devil's Beach is currently gated and locked.



Photograph 13. Devil's Beach is one of the most important access points to the Caribbean near Colon.



Photograph 14. The World Heritage Site of Fort (Castle) San Lorenzo is classified as a *Rura*/recreation area. A wooden bridge is recommended at this location to provide access across the first moat.



Photograph 15. Recreational use of the parking lot at Fort San Lorenzo may cause conflicts between users.



Photograph 16. This view from the Fort shows much of the Fort San Lorenzo Zone and the site of the historic town of Chagres.



Photograph 17. The caretaker's house has recently been painted white. A more natural color and screening it with vegetation would help rehabilitate the visual quality of the site.



Photograph 18. Francisco Valenzuela discussing the view up the Chagres River from Fort San Lorenzo. This vista is shown on Map 3.



Photograph 19. The Primary Entry Corridor is another example of *Roaded Natural* classification.



Photograph 20. Sherman is one example of *Urban* classification. This distinctive architecture and landscaping forms a special cultural landscape that should be preserved.



Photograph 21. The IPAT sign at Sherman directing visitors to Fort San Lorenzo could be smaller, less visually intrusive, and contain something to reflect the historic character of the site.



Photograph 22. Shimmey Beach at Sherman.



Photograph 23. View of the Caribbean coast near the village of Piña.



Photograph 24. The Gatun Locks Urban zone.



Photograph 25. The Drop Zone is an area that has been heavily modified during the U.S. military period.



Photograph 26. This opening created by a landslide provides one of the few views of Lake Gatun on the road to Escobal.



Photograph 27. There are several small homes and farms hidden in the forest on both sides of the Primary Entry Corridor.



Photograph 28. One of many abandoned farms near the Principal Entry Corridor.



Photograph 29. The French Canal is lined by mangroves.



Photograph 30. The reef pools near the entrance to Sherman could provide important public swimming opportunities.



Photograph 31. This small opening in the mangroves near the entrance to Sherman could be expanded to provide an important vista into Limon Bay.



Photograph 32. The Core Forest zone as seen from the STRI research crane. The mouth of the Chagres river is visible in the distance.



Photograph 33.  
The road to the STRI  
research crane is  
gated to prevent  
prohibit public vehicle  
access.



Photograph 34. The STRI research crane  
is not open to the public.



Photograph 35. One of many small rivers in the Core Forest Zone.



Photograph 36. The road between Escobal and Achiote is a famous bird watching area.



Photograph 37. Roadside trash along the Achioite-Escobal Travel Corridor.



Photograph 38. One of the many small farm houses along the road north of the village of Escobal.



Photograph 39. The shoreline of Lake Gatun near the village of Escobal.



Photograph 40. This view south from Gatun Hill provides the only vista of the southern portion of the San Lorenzo Protected Area and the vicinity of Escobal.



Photograph 41. View north from Gatun Hill showing Limon Bay and the city of Colon.



Photograph 42. Panorama view downstream from the Gatun Dam bridge.







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