Recreational Carrying Capacity Assessment for Black River

Submitted to the

Tourism Product Development Company Ltd.

By

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COASTAL & ENVIRONMENTAL ENGINEERING

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1. Introduction

1.1. Project Background

With the growing number of visitors to Jamaica over the past decade, there has come an increase in the number of hotels, and the number and variety of water sports offered around the island. Additionally, the growth of the hotel and leisure watersport industry throughout the country has had a significant impact on the coastal and marine ecology of several of our resort areas. This has also had impacts on safety, with reports being made of frequent marine accidents. In fact, for the period January 2001 to December 2004, 56 watersports-related incidents were reported. These issues have the potential to negatively affect tourism and watersports in Jamaica.

The Maritime Authority of Jamaica (MAJ) in conjunction with the Ministry of Industry and Tourism along with other concerned agencies is interested in streamlining the management of leisure water-sporting activities, and to integrate this into an overall framework for inter-sectoral management of tourism products, coastal environmental health and marine safety. As such they have commissioned a study, to be coordinated and managed by the Tourism Product Development Company (TPDCo), *to determine the capacity and safety in marine recreational areas in Jamaica*.

In November 2004 TPDCo contracted ***Smith Warner International*** to carry out the desired capacity and safety studies in six designated areas around the island, as follows:

1. St. Ann to St. Mary (including Ocho Rios, Tower Isle to Mammee Bay Point, Runaway Bay and Discovery Bay);
2. Negril (Bloody Bay to Norman Manley Sea Park);
3. Port Antonio (East and West Harbours);
4. Montego Bay (Bogue Lagoon to Rose Hall Beach);
5. Kingston (Lime Cay to Port Royal); and
6. St. Elizabeth (Black River up to Broad River).

1.2. Project Objectives

There are five (5) primary objectives for the overall capacity and safety study. These are to:

I. Establish optimum capacity(ies) for water sports operations in Marine and Riverine Recreational Areas islandwide;

II. Provide guidelines for the delimitations of zones for water sports activities in the determined focus locations, especially in Marine Parks;

III. Document the environmental impacts of the water sports on the focus areas;

IV. Provide guidelines for the overall development of water-sports activities in Jamaica in relation to safety, security and marine/riverine pollution prevention; and

V. Recommend better environmental management systems for the marine protected areas.

Additionally, the TPDCo is interested in determining the potential impact of zoning and leisure-craft regulations on the tourism product (visits by tourists to the island) and as such requires that a marketing study be done to ascertain such information and to guide the development of marketing and promotions pertaining to regulated water sports activities.

The ultimate intention is that the findings of this study will be used to guide the pending legislation related to watersports activities around the island.

1.3. Document Objectives

This document conveys the findings and recommendations for one of the six locations studied, *Black River*. The information presented in this report has been obtained through desk review, and field investigations[1], and is offered to assist decision-makers in formulating policies and regulations to ensure safety and environmental health in Black River. The recommendations outlined are intended to be used as tools in the evaluation of options for minimizing user conflicts, incidents and environmental concerns in Black River. Further information on the overall development of water-sports activities in Jamaica in relation to safety, security and marine/riverine pollution prevention will be presented in the Final Report for the overall Capacity & Safety study.

This report addresses the following:

- The nature and extent of watersporting activities on Black River.
- The recreational carrying capacity of Black River (up to Broad River).
- The characteristics of the Black River watersports market.
- Recommendations and a summary of the findings.

It should be noted that this location report is somewhat different from the other five prepared under this project, in that the Black River assessment is for activities on a river as opposed to a coastal/marine environment. Furthermore, the water-based activities on the Black River are considered tour operations rather than watersports.

While the methodology employed for the overall study has been adapted as best as possible for this Black River assessment, the different parameters and characteristics of the Black River scenario limit the applicability of the methodology, and as such the findings and recommendations presented should be considered within this restricted context.

[1] Site visit made July 14, 2005.

2. Site Description – Black River

2.1. General Description

Located on the southwestern end of the island, Black River is a historical Jamaican town, developed around the river which gives the town its name. The Black River is the longest river in Jamaica starting in the Cockpit Country (as Hector's River) and ending at Black River where it empties into the Caribbean Sea.

The main activities in the town of Black River are fishing and other agriculture, and recently the town has experienced growth in tourism with the offering of tours such as the 'safari' tours on the river.

For the purpose of this study, the area considered is the Black River itself, from the mouth up to the intersection with the Broad River.

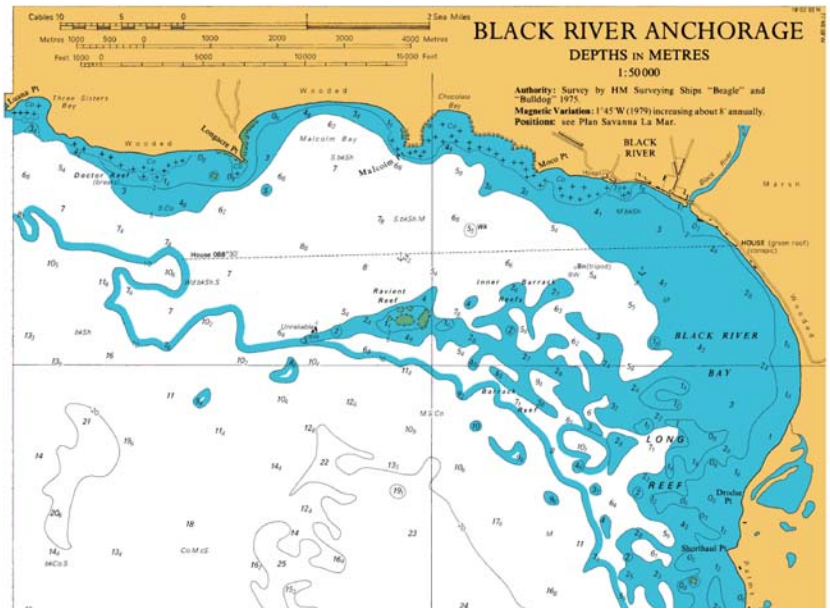


Figure 2.1 Map Black River Bay

2.2. The Black River Lower Morass

The study area falls within the Black River Lower Morass (BRLM), a declared wetland of importance under the United Nations RAMSAR Treaty, and a designated game reserve and protected area under Jamaican law. The BRLM is the largest freshwater herbaceous wetland ecosystem in Jamaica, supporting a rich indigenous flora including over 90 species of flowering plants. The area is also one of the most important habitats for wetland birds (including migratory species), and provides nursery habitat for shrimp and fish of commercial value. Other vertebrates found in the wetland include the rare and protected American crocodile (*Crocodylus acutus*) and the freshwater turtles *Pseudemys terrapen* (endemic) and *Chrysemys terrapen*.

The area was declared a RAMSAR site in 1997; however, there is no designated management entity for the site.

2.3. Water Sports Activities

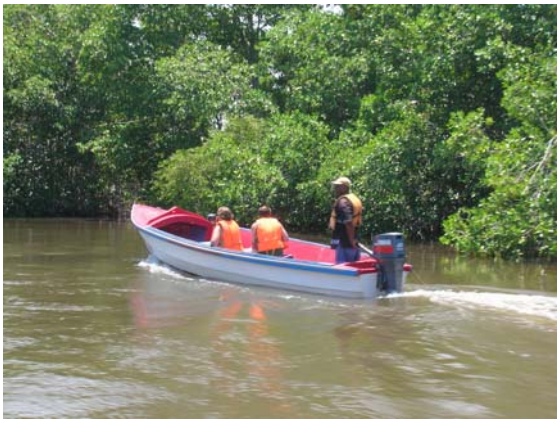
The Tourist Board (Water Sports) Regulations under the Tourist Board Act, does not give a specific definition of water sports, however it does list a number of the activities covered under the Regulations, which include:

- Board sailing
- Parasailing
- SCUBA diving
- Sunfish sailing
- Water skiing.

Water sports are considered to be sports which take place on or in water. The activities which take place on the Black River can not, for the most part, be described as water ***sports***. As such the following discussions do not focus on water sports specifically, but on the water-based activities.

2.3.1. Nature of Water-based Activities

There are limited types of water-based activities which take place in the study area. By far, the most prominent activity is the conducting of 'safari' boat tours from the mouth of the river up to various points on the river. In addition to the tours, fishing and berthing of vessels occur in the study area. Some spear-fishing and recreational swimming also take place, and there are reports that locals occasionally use jet skis on the river for recreational purposes.

2.3.2. Tour Operators

There are no licensed water sports operators in the area. However, there are three operators registered with the JTB to conduct tours under the River Rafting Act. The three licensed tour operators are:

- Black River/South Coast Safari - Mr. Charles Swaby
- Jacana Aqua Tours (Irie Safari) - Mr. Lloyd Linton
- St. Elizabeth Safari - Dr. Donovan Bennett

There are also canoes (fishing) which offer tours up the river, starting in the Treasure Beach area.

Discussions with staff of the tour operators indicated that each operator conducts an average of five (5) tours a day, with an average of 25 persons per tour. There is also an average of two canoes a day from the Treasure Beach Area.

2.3.3. Tour Vessels

The MAJ register of tourism vessels indicates that there are a total of 16 registered vessels in the Black River area. Eight (8) of these vessels are motorized, and the remaining eight (8) are non-motorised (kayaks). During the field visits a total of 14 tour vessels were observed: some moored, some in service, and some on trailers on land. These vessels are mostly pontoon boats, although a few of them are small shallow-hulled boats, and they range in size from approximately 5m to 10m in length.

In 1997, when ESL conducted the Carrying Capacity assessment of the Black River, the same three operators reportedly had a total of seven (7) boats.

A recent report prepared by Environmental Management Consultants on a *System for Classification of Jamaican Rivers for Recreational Use* indicated that the number of boats operated by all the tours companies on the Black River totals 19.

2.3.4. Tour Patterns & Activities

The general trend is for tours to leave from the docking facilities at the mouth of the river, and to head upstream. Most tours take the Broad River, and a few others continue up the Black River. The smaller vessels and fishing canoes are able to take small tours further up the river. Each tour travels approximately 3km and lasts for just over an hour.

The tours tend to take the same general routes, stopping at similar points of interest. Furthermore, several of the tours from the competing operators depart within close timeframes, so that they are on the river at the same time.

One of the main attractions touted for the tours is the sighting of crocodiles. In fact, the general locations of select crocodiles are known and frequented by the tours, with the animals having names, and regularly being fed chicken by the tour guides. The tours are therefore conducted in extremely close proximity of wildlife, and in fact, during the field visit for this study, birds were nesting in the mangroves close to the mouth of the river, and each of the tours stopped immediately beside the nests.

Along the trip features of the wetlands are pointed out by the tour guides, and at certain points along the trip, visitors are offered the opportunity to swim in the river. During the stop for swimming, the vessels are 'docked' by using the mangroves to hold the vessel in place.

2.4. Safety Records & Practices

There are no records of reported tour-related incidents on the river, although informal discussions with locals revealed that there are occasional 'bounces' between tour vessels on the river.

The vessels tend to travel at slower speeds on the trips up the river, and faster speeds when returning to dock. There is some level of adherence to the rules of navigation, and concerns of 'right of way', however, some of the smaller vessels (canoes) did not indicate awareness of such practices.

The river has several bends which the boats often traverse at speed, which can result in close passes of vessels traveling in the opposite directions.

Most of the vessels used on the tours had life vests available for the patrons.

2.5. Environmental Conditions

As mentioned previously, the study area, and the area within which the safari tours are offered is a part of a protected area. The Black River Lower Morass is a recognized

wetland of importance based on its ecological and hydrological characteristics and functions.






Nonetheless, over the past few decades in particular, there has reportedly been a reduction in the number of species (in particular water birds) observed in and around the wetland. In fact, during this field visit only 2 species of birds were observed. This decline in the bird species on the river has been attributed by ESL to the '*speeding boats on the river, resulting in erosion of the river banks and disturbance of the lily pads on which several species feed*'. There were actually very few lily pads noted during the tour of the river.

The river has been impacted by several sources of pollution, primarily land based such as run-off from agriculture. There has also been an apparent shift in the water quality of the river, evidenced by the prevalence of the floating water hyacinth, which is typically used as an indicator of elevated nutrient conditions. Large clusters of this plant were seen floating down the river, having been cut by the users of the river – the species is a known nuisance species, often growing prolifically and blocking navigation channels. The waters under areas covered by this plant species can suffer significant loss of oxygen, which in turn can affect the functioning of the ecosystem.

Furthermore the ecology of the wetlands has been affected by the removal of vegetation for various purposes. Other environmental concerns along the river are the several small channels reportedly cut by fishermen, which serve to open up the waters of the wetland into the river, further enabling the alteration of the water quality and ecology of the river.

3. Carrying Capacity Analysis

3.1. The Concept of Carrying Capacity

The term carrying capacity is derived from ecological science, where it represents the number of organisms that the physical and ecological resources of a given area can support in a particular period of time. A similar meaning has been given to the term which has been adopted by various other disciplines, among them tourism management and recreational management.

3.1.1. Tourism (Visitor) Carrying Capacity

In the tourism industry, carrying capacity refers to the number of people who can use a given area in a particular period of time without an unacceptable alteration to the physical environment. For coastal and marine destinations the determination of tourism/visitor carrying capacity has typically been associated with marine protected areas (MPAs), and has addressed the number of visitors that can be accommodated at a particular site each year without an unacceptable impact on the physical and ecological resources. Similarly, for riverine areas carrying capacity has focused on protected areas and the physical and ecological implications.

Strictly speaking, the visitor carrying capacity is a determination of the maximum number of people that can be accommodated in a given area at a given time. It asks the question *'How many visitors is too many*?'. For example, how many divers can be accommodated at a coral reef location each year without causing an unacceptable change to the reef system? Conducting such carrying capacity assessments often proves challenging given the difficulties of measuring 'unacceptable impact'. This requires knowing what amount of change to the reef is acceptable, which itself necessitates substantial data, and the findings can be quite controversial.

Giving consideration to this limitation of measuring 'unacceptable impact', a basic formula for calculating tourism (visitor) carrying capacity was developed by the WTO and UNEP in 1992. The equation is:

Visitor Carrying Capacity = Area used by visitors ÷average individual standard

The average individual standard, measured in unit area per person, is the space a visitor requires for an acceptable experience at the location. This is therefore a subjective value, and is dependant on a number of factors including: the type of area, the activities undertaken and the management initiatives at the location. However, while acceptable experiences are subjective, measuring them is less difficult and controversial than measuring unacceptable impact.

This approach to determining visitor carrying capacity is more in keeping with the concept of **Limits of Acceptable Change** (LAC). The determination of LAC does not itself provide a 'carrying capacity' in its strict sense, but it provides a set of conditions, (biological, physical and social) that are deemed to be appropriate by resource managers. The determined limits are intended to reflect values, preferences, science, policy and public input, and can be maintained through a variety of policies. The LAC

can therefore still answer the question, '*how many visitors is too many*?', and often leads to a management approach that involves resource use zoning.

3.1.2. Recreational Carrying Capacity

With respect to recreational management, such as is applied in terrestrial parks and on rivers and lakes, the term carrying capacity is used to indicate the number of vessels/ entities that can be operated within a defined location without compromising safe recreational use, aesthetic enjoyment, and/or environmental quality (Progressive AE, 2001). Some typical recreational carrying capacity studies assess the number of kayak entities that can occupy a waterway, or the number of water vessels that can operate on a lake at a given time without negatively affecting safety, aesthetics and/or environmental quality on the waterway or the lake. Essentially, such recreational carrying capacity assessments aim to answer the same general question *'how many is too many'*?

The general equation for determining recreational carrying capacity is as follows:

Recreational Carrying Capacity = Area suitable for recreation ÷ Desired density.

Desired density, measured as the number of vessels per unit area, is the space required for each vessel in order to promote safe use, aesthetic appeal and environmental quality. Similar to the average individual standard used in tourism carrying capacity determinations, the desired density is a subjective value, and is dependant on a number of factors including time, location, activities offered and management approaches. The concept of recreational carrying capacity, like visitor carrying capacity, is as much perception as it is science (Mahoney and Stynes, 1995).

3.2.Determining Recreational (Boating) Carrying Capacity

In the context of aquatic recreational areas and for the purpose of this study, carrying capacity can be defined as the number of vessels that can be operated in a given location without compromising safe, recreational use, aesthetic enjoyment and/or environmental quality. Calculating recreational carrying capacity can be done according to the abovementioned formula. For example, in a location with an area of 100acres suitable for recreation, and a desired boat density of 10acres/boat, the recreational carrying capacity is as follows:

Recreational Carrying Capacity = 100acres ÷ 10 acres/boat = 10 boats

Such a location could accommodate 10 boats at a time safely without compromising aesthetics or environmental quality.

In order to determine the area suitable for recreation and the desired densities, the following parameters need to be ascertained:

1. The **physical characteristics** of the location, including the available water surface area, the maximum depths, the mean depths, and the shoreline accessibility. This can be done from charts, maps, aerial or satellite photography.

2. The **use characteristics** of the area such as the number and types of vessels. This can be obtained from licensing records and field surveys.
3. The **usable water area.** This is a determination of the areas that can safely accommodate water-based activities. Areas that are too shallow, too rocky, have strong currents, are shipping channels etc., may be deemed not-usable, and should be subtracted from the total available water surface.
4. The **desired vessel density**. This is the most subjective component of the capacity study. In previously conducted studies, the desired densities have been determined through:
   - analysis of spatial requirements of different boat types;
   - requirements for safe vessel operation; and
   - social research (through surveys) that ascertained the user groups, their perceptions of crowding, and acceptable levels of change to the environment.
5. The **use rate**, to note the differences between typical and peak use times.
6. The potential **environmental impacts,** with an awareness of the ecology of the area, and the threats to the sensitive organisms and areas.

Essentially, no conclusive studies have been done that answer the general question: *How many vessels is too many?* There is therefore, no single standard that can be applied in all situations for the desired boating density. This can be attributed to the fact that, ultimately, recreational capacity decisions are about people's access to recreational opportunities and the quality of their experiences (Chilman). Each location is different, and users will have different perspectives on *what is too many vessels*.

Nonetheless, the few studies that have been done with the objective of determining optimum boating densities, have come up with ranges of acceptable boating densities, based on user groups, activities, safety, and user perceptions. These are summarized in Table 3.1.

Table 3.1 Summary of Optimum Boating Densities

Source	*Recommended Density*	*Uses Prescribed*
Jackson et al, 1989	20 acres/boat (81,000 m^2/boat)	Waterskiing & Motor Cruising
	8 acres/boat (32,000m^2/boat)	Kayaking & Sailing
	10 acres/boat (40,500 m^2/boat)	All uses combined
Duke Power, 1999	4 acres/boat (17,000 m^2/boat)	Fishing, Sailing & Jet Skiing
	1 acre/boat (5,000 m^2/boat)	Canoe/Kayak
	9 acres/boat (36,000 m^2/boat)	Motor Boating
	12 acres/boat (49,000 m^2/boat)	Water Skiing.

3.3. Carrying Capacity Analysis for Black River

3.3.1. Previous Carrying Capacity Analysis

In 1997 TPDCo commissioned a Study of the Carrying Capacity of the Black River Morass for Watersports Activities. The study was carried out by Environmental Solutions Limited (ESL) and aimed to define the carrying capacity of the wetlands and to develop a management plan for the watersports activities in the area.

The ESL study presented:

- The vulnerable factors of the river (ecological, socio-economic and management);
- An analysis of the environmental impacts of the watersports (river tour) operations;
- Mitigation measures for the determined environmental impacts;
- An analysis of the carrying capacity of the river;
- The policy, legal and administrative framework for use and management of the river; and finally
- The management plan for the watersports activities in the area.

The study concluded that *'the ecological impacts [of river tours] do not threaten a loss of integrity or destruction of the wetlands, as they have the acquired assimilative capacity to absorb them The impacts are therefore not immediately critical to the determination of Carrying Capacity of the wetland for watersports.'* Ecological factors were not considered to be of first order importance in the determining of carrying capacity of the wetlands. However, socio-cultural factors were seen to be significant, and the exclusion of the local communities from benefiting from the tours was deemed at the time to be a threat to the sustainability of the tours. Based on those findings the study report indicated that '*the carrying capacity of the river will be limited to its present level of operations (15 tours/200 visitors per day), unless the socio-cultural impacts are mitigated. By instituting improved tour management the Carrying Capacity may be increased to 30 tours/600 visitors per day.*'

The study report does not give a definition for carrying capacity, nor does it indicate the specific method applied to determining the capacity of the river to accommodate up to 30 tours/600 visitors a day with improved tour management.

3.3.2. Assumptions for this study

Research has shown that with increasing density of boats, the potential for negative impacts increases. However, despite a growing interest in recreational carrying capacity and recreational boating management, only a few scientific studies have been done to determine ***optimum (desired) boating densities***. These studies have primarily been conducted for lake environments, and few studies on recreational carrying capacity or optimum boating densities are known to have been conducted for riverine environments

Given the lack of a precedent recreational carrying capacity study, some assumptions have been made in conducting this recreational carrying capacity assessment. These are as follows:

1. The spatial constraints of an enclosed lake environment can be simulated in the river environment, by setting an upper (inland) and lower (seaward) boundary for the location.
2. The width of the river is constant for the area considered.
3. The ranges of desired boating densities determined in lake based studies can be applied to river locations, given that the activities are of a similar nature (e.g. boating.). These are presented in Table 3.1

3.3.3. Area suitable for Recreation/Boating

There are no maps available that show sufficient detail to delineate the area of use on the river for use in this assessment. However, based on observations and the descriptions of the river in other documents, it has been determined that the area of use, from the mouth of the river up to the Broad River is approximately 3Km, and the average width of the river along this stretch is approximately 50m. This suggests a water surface area of approximately 150,000 m^2.

The non-usable area of water has been estimated by assigning a 10m buffer on either side of the river (as a consideration of the ecological sensitivity of the wetland flora and fauna), and this amounts to approximately 60,000 m^2. This leaves an estimated 90,000m^2 as water usable for recreational/boating purposes, as indicated in Table 3.2 following.

Table 3.2 Area Suitable for Recreation

	Total Water Area (m^2)	*Non-usable area (m^2)*	*Usable Area (m^2)*
Lower Black River	150,000	60,000	90,000

3.3.4. Desired Density & Recreational Boating Capacity

Based on some of the previous studies done (Table 3.1) to determine optimum densities for lake conditions, a desired density of 9acres (36,000m^2) of water surface per boat has been selected as a conservative density the type of boating activity which takes place on the river.

Applying the equation for recreational carrying capacity (Section 3.2), the boating (vessel) capacity for the lower reach of the Black River has been calculated, and is presented in Table 3.3 following.

Table 3.3 Combined Use Vessel Carrying Capacity for Port Antonio– Study Area

	Usable Water Area	*Optimum Boating Density*	*Carrying Capacity (CC)*
Lower Reach of the Black River	90,000	36,000m^2/vessel	2.5

Based on this calculation, the study area can accommodate between 2 and 3 vessels **at a time**, without compromising safe use, aesthetic enjoyment and/or environmental quality. This is well below the number of vessels that were observed in operation at a given time on the river.

Based on the capacity determined above, if each tour conducted by an individual vessel was to last for an hour and a half, and tours are conducted between the hours of 9:00am and 4:30pm each day, a total of 15 tours can be accommodated each day (approximately 5 tours per operator each day).

3.3.5. Constraints

As mentioned previously, recreational carrying capacity is as much perception as it is science. The determination of the carrying capacity for tour boats on the lower Black River was done based on the assumptions presented in Section 3.3.1, and with several constraints. These include:

- **The short duration of the study period**. The single field observation (two days) facilitated through this study does not allow for a true assessment of vessel use patterns or density over time. No comparison can be made between the average use periods and the peak use periods.
- **The lack of site-specific user information**. Without the conduct of a 'perception' survey, there is no way to truly develop a site-specific optimum boating density for Black River. The social survey designed into this study is a marketing survey and addresses more the 'watersports' market profile, and not so much the perceptions. Furthermore, this social survey is too small a sample size to develop a true picture of the user perceptions of safety and aesthetics on the water in Black River.
- **The unavailability of scale**-appropriate mapping. The assessments of the usable water area and non-usable water area have been estimated using topographic maps, and a mixture of observations and previously reported dimensions. A more appropriate method of determining the areas would be to use geo-references aerial photography, which would better indicate the non-suitable areas for water-based recreational activities.

Given these limitations to the carrying capacity assessment, the findings (vessel numbers) presented in Section 3.3.4 should be used as guides, and not definitive or finite figures.

A more comprehensive carrying capacity assessment could provide a location-specific study that would provide the necessary information on perception and actual use areas and patterns, and would therefore provide a more exact assessment of tour vessel capacity on Black River. The number of each type of vessel that could be accommodated based on demand and optimum density could then be determined, and used to further guide the licensing of tour activities. Such a study would require the following:

- Developing a profile of recreation users/visitors through on-site and mail surveys. This will enable the measurement of visitor expectations, perceptions of existing conditions, and satisfaction and opinions of river management.

- Measuring use patterns, with the aid of aerial and ground counts, over an extended period of time, to account for peak and low use periods.

4. Marketing Analysis

4.1. Background & Methodology

A marketing analysis was conducted in the study area in order to determine the following:

- The current level of participation in water sports in Black River.
- Whether or not what was being offered in the water sports industry was what was in demand by visitors to the island.
- Whether or not the water sports operators were providing enough services to fill the needs of current and potential participants.
- Whether or not the quality of the water sports services offered made Jamaica a true competitor in the water sports industry.
- Whether or not there was space for improvement of water sports services and protection of marine and riverine areas through regulation.
- What marketing strategies would be useful in encouraging interest in Jamaica as a water sport destination?

In conducting the market survey, a questionnaire was drawn up, with emphasis placed on obtaining the views of participants in water sport activities in Black River. Independent, non-focused interviews were conducted with water sport operators (tour operators) and stakeholders in the focus areas to get a feel for the context within which the data was being gathered.

A questionnaire consisting of 11 questions was developed, some of which were split into 2 or more sections, using the objectives of the study as a guideline. With consideration of the expected unwillingness of tourists to spend vacation times completing a lengthy survey more closed-ended than open-ended questions were included. The questionnaires contained 4 biographical questions, and 7 others geared towards gleaning information on the above bullet points.

The questionnaire was pilot tested among foreign nationals residing in Jamaica and who frequently participate in water sports, to test its level of 'user-friendliness'/ appropriateness, inclusive of:

- logical sequencing of questions;
- ease of comprehension of questions and instructions; and
- possible resistance to unforeseen implications of questions.

These completed surveys and the individuals' personal assessments were discussed to see whether the intended meaning of the questions was clear, and if their responses were typical of what could be considered useful for this exercise. A copy of the survey instrument is presented in Appendix II.

A two (2) person team implemented the surveys in Black River over a three day period. Respondents were approached randomly in the vicinity of water sports facilities (tour

facilities), and were screened only to see if they had already participated in water sports (a tour) while in Jamaica. The researchers were not required to survey tourists only. Questionnaires were administered at the three locations on the Black River which offer the a Black River Tour. Many of the 50 persons who accepted the questionnaires did not return them, some of these were taken to be completed at the restaurant where the boat made its final stop and although they gave the assurance to the operator that they would be returned to the restaurant personnel, they were not. Others were completed hastily before or after the boat tour. Only 21 questionnaires were returned.

4.1.1. Constraints

- Tourists generally are not willing to spend the time to complete surveys when it interferes with their activities.
- As a result of the above many of the questionnaires were hurriedly completed and the data shows that many of the questions were not answered, resulting in a high percentage of data with "no response".
- Some answers could not be processed as respondents clearly did not read the questions e.g. question 8 which ask for a list of "activities pursued in Jamaica" persons listed activities pursued in Mexico, the Dominican Republic and Mexico.

4.2. S.W.O.T. Analysis

Black River was once a leading commercial town, and residents' boast of the fact that this was the first place in Jamaica to receive electricity and is the first site of the motorcar. Since then the development has been somewhat slow and the area has remained 'unspoiled', when compared to other resort towns. The area is now referred to as "off the beaten path" for marketing purposes.

European Plan Hotels and properties which combine bed and breakfast are the main players. The majority of visitors to this part of the island have been persons visiting from other resort areas such as Negril and Montego Bay on day trips. The Y.S. Falls, Appleton Rum Tour and Black River Safari Tour are the most popular day trips undertaken in this area. As a result of this feature, traditionally the area has experienced low accommodation levels. The fact that a by-pass road was established many years ago, has also resulted in reduced traffic passing through the town. The town of Black River however, has a distinct architecture and rich heritage and could become a heritage area as well.

The Black River Safari Tour is one of the country's premier attractions (operators suggest that it might be in the top 4 island-wide). The tour is very educational and there is the exciting element of seeing the American crocodile.

Strengths
▪ All major operators in this area have been in business for quite some time. ▪ There have been very, very, few accidents in the area thus far.

▪ Minimal or no harassment at all (the case with day trips)
Weaknesses
▪ The perception of danger posed by the presence of the crocodile reduces the options available for recreational activity on the river.
Opportunities
▪ The South Coast expansion programme which is scheduled to take place and the resultant increase in rooms to be added in this area, increased opportunities will be apparent, if the market is to be satisfied.. ▪ As a result of any boom in the activity, employment and the resultant disposable income earned will help to fuel the prosperity of the local people and of the town itself.
Threats
▪ Pollution of the river is cause for concern ▪ The operators who are licensed are competing with other operators of craft who are not required to adhere to the same financial commitments to the licensing body and as such are seen as operating with an unfair advantage.

4.3.Findings of User Survey

Nationality	
The nationality of the participants was quite varied and was as follows:	
Canadian	5%
German	5%
Spanish	9%
Jamaican	14%
American	19%
British	19%
Dutch	29%
Gender	
Male	47%
Female	53%
Age Group	
The pre-dominant age group was **16-25 years** with a total percentage of 35, followed by **26-35 years** (24%). Both the **under 15** and between **36-45 years** indicated a 13% share. Figures of 5% was also attributed to the age groups of **46-55**, **over 56** and persons surveyed who did not indicate their age.	

Motivation/Attitude
In the Black River area, 4% of the participants in the survey indicated that they chose Jamaica because of the availability of water sports. The majority of the visitors, 36% came to Jamaica because of culture (art, music, cuisine) 21% as a result of the scenery/environment, and due to advertising and recommendations (14%). Other categories evident were, to visit family and for vacation 7%. For business and for water sports each scored 4% while 7% of the participants did not indicate any reason for visiting.

Choice of Room Plan

As is the case with the overall occupancy levels for the country, respondents indicated that the majority (38%) of them stayed in all inclusive hotels.

This area indicated other data as follows:

European Plan	24%
Bed & Breakfast	10%
Family	10%
Villas	5%
No response	14%

Repeat Visitors

- 53% of the respondents stated that they were first time visitors
- 33% of them were repeat visitors to the Island
- 14% did not indicate

Travel Time to Participate In Water Sport Activities

Indicative of the fact that the majority of the participants were traveling from other resort areas, it is not surprising that a total of 53% stated that they would travel between 1 and more than 1 hour to take part in a water sport activity.

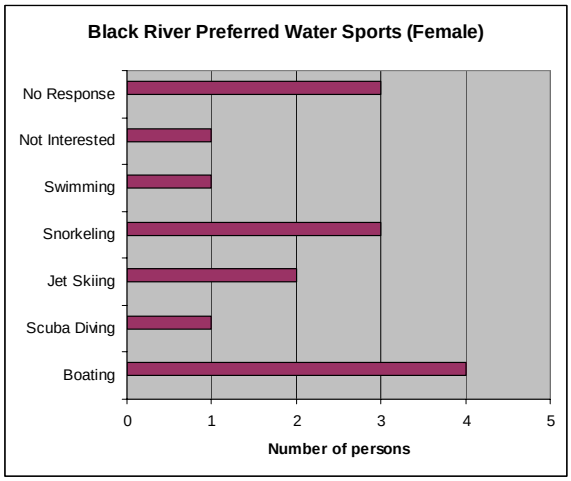
The breakdown of the percentages is as follows:

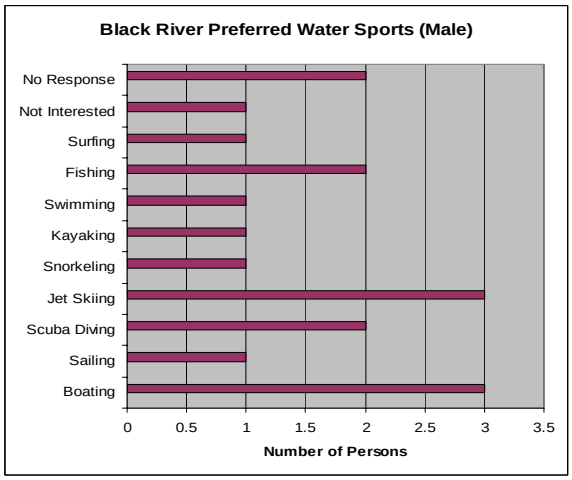
- 14% would travel for a maximum of 15 minutes
- 19% would travel for a maximum of 30 minutes
- 10% would travel for a maximum of 1 hour
- 43% would travel for more than an hour

- 14% did not indicate to time willing to travel

Preferred Water Sports

This question allowed the respondents to indicate more than one choice. It is not surprising that both the males and females indicate a high preference for boating as that was the purpose of their visit to this particular area.





Environmental Awareness

Eighty- six percent (87%) of the persons surveyed stated that they consider themselves to be environmentally conscious. Thirty-three percent (33%) responded that they were not.

Of the 87% referred to above, 64% would be either very or extremely supportive of regulations which may restrict their sporting activity but protect the Jamaican environment.

Length of Stay

The majority of persons who completed the questionnaires were on a visit which lasted for more than 7 nights, i.e. 57%. The other statistics being:

- 4% of the sample were on a visit of **4 nights or less**
- 29% of the sample were staying for period between **5- 7 nights**
- 10% of the sample did not answer this question

4.4.Market Size & Potential for Growth

The total number of stopover visitors for 2004 was 56,289 or 4% of total market share. The corresponding figure for 2003 is 3.9 % of market share or 52,795 stopovers

There is a range of accommodation offered in Black River, as presented following.

	Units				Rooms			
	2000	2001	2002	2003	2000	2001	2002	2003
<50 rooms	10	10	14	13	297	297	362	312
51 – 100	1	1	1	2	65	65	65	115
101 – 200	0	0	0	0	0	0	0	0
>200 rooms	0	0	0	0	0	0	0	0
Total Hotel	**11**	**11**	**15**	**15**	**362**	**362**	**427**	**427**
Guest Houses	33	39	39	43	255	272	260	287
Resort Villas	25	25	26	26	105	105	112	112
Apartments	9	9	9	9	20	20	20	20
TOTAL	**78**	**84**	**89**	**93**	**742**	**759**	**819**	**846**

- Source: JTB Tourism Statistics 2003 Table 25
- The Jamaica Tourist Board in consultation with the Tourism Product Development Co. has removed some accommodation from the current listing because they either have remained closed over an extended period of time or are no longer being used as a tourist accommodation.
- The Guesthouse accommodation category since 2001 includes properties that offer Bed & Breakfast facilities.

This area is poised for considerable growth from Italians, Germans, French, Canadians and Japanese who are exploring this area in greater numbers. The profile of visitors from Continental Europe has resulted in them being popular visitors to this area.

With the slated growth of Community Tourism, attractions such as watersport will serve and an added feature to the tourism product.

5. Summary of Findings & Recommendations

5.1. Nature & Extent of Activities on the Lower Black River

The main water-based activities on the Black River are boat tours, sold as safaris up the river. There are three regulated tour operators on the river which offer the tours with the use of pontoon and shallow-hulled boats, and a few fishing canoes which offer tours along the coast and up the river. The exact number of official tour vessels plying the tour route is not clear, but is estimated to be between 14 and 19.

There are no documented safety incidents related to tour operations on the river, although a few 'bounces' have been reported by the locals.

5.2. Carrying Capacity Assessment

Physical-biological impact at a particular location is a complex phenomenon. Scientists still do not know enough about the relationships between varying levels of use and changes in the biological and physical character of a site, nor what results in the changes in the degree of personal satisfaction. We lack the ability to predict in quantitative terms the consequences of alternative levels, types and patterns of use on the physical-biological environment. Management of nature tour locations and their use by visitors ultimately requires an integrated and long-term approach that considers clear management objectives and a range of alternative actions and opportunities.

Within the realm of such limitations, it has been estimated that the study area can accommodate 3 vessels ***at a time***, without compromising safe use, aesthetic enjoyment and/or environmental quality. Based on this determined number, if each tour conducted by an individual vessel was to last for an hour and a half, and tours are conducted between the hours of 9:00am and 4:30pm each day, a total of 15 tours can be accommodated each day (approximately five tours per licensed operator each day).

It must be understood; that the 'carrying capacity' number arrived at in this assessment is based on several assumptions and is based on the existing characteristics of the Black River and tours on the river, and is subject to change should any of the determining parameters be adjusted, and dependant on any stated long-term management objectives for the river and wetland. As such it is important to note that the 'carrying capacity' value obtained should be used as a guide, and not a definitive or finite figure.

5.3. Recommendations

Based on the observations made during this assessment, the following are some recommendations towards promoting safer and more environmentally friendly tour practices on the Black River. It should be noted, that several of these recommendations are in keeping with recommendations presented by previous studies.

- Limit the number of vessels in use at a time and in close proximity of each other on the river. The 'carrying capacity' figure can be used as a **guide** in this regard.

- Limit the size of the vessels on the river, so as to ensure safe passing distances between vessels, to enable safe turning of the vessels in the river, and to minimize the impact of the vessels on the bank vegetation during 'docking' activities.
- Limit the speed at which the vessels travel on the river, to minimize the potential for collisions of vessels traveling in the opposite directions, and to minimize the impact of the vessel wake on the integrity of the river banks and associated vegetation. Vessels should therefore travel at minimum wake or no wake speeds.
- Further environmental investigation can determine the areas of the river that are conducive to non-motorised activities based on ecological sensitivity, and additional tours can be offered for a slower-paced, non-motorised experience, such as with kayaks. An analysis of the 'capacity' of such areas to accommodate the selected activities should be conducted.
- The encouragement of swimming is not recommended.

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