

SOCIAL IMPACT AND RECREATIONAL USE OF INLAND WATER RESERVOIRS
IN PUERTO RICO

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ABSTRACT

Recreational Use of Inland Water Reservoirs in Puerto Rico

This report describes the characteristics and leisure behavior of visitors engaged in recreational activities at Puerto Rico lakes: Guajataca, La Plata, Dos Bocas and Luchetti. Description of lake facilities and local residents opinions about the lake area are also included.

Lakes, in this case, are dams built as water reservoirs for either domestic water supply or energy generation. Recreation, however, is assumed as a legitimate secondary activity that should be promoted.

Data for the study was obtained mainly through a survey of lake visitors and supplemented by field observations. Data was collected between June 1986 and March 1987.

The information gathered establishes a profile of demographic and socio-economic characteristics of lake users, provides knowledge of recreational activity along the lakes and gives direction to agencies responsible for the planning and management of lakes in Puerto Rico.

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INTRODUCTION

This report describes the characteristics and attitudes of visitors engaged in recreational activities at Puerto Rican lakes. Local residents' opinions about recreation at the lakes are also presented.

One of the recommendations made by the Select Committee on Natural Resources states that "recreation should be recognized as an appropriate use of domestic water supply resources. Such use will have to be strictly controlled in order to protect water supplies from possible contamination." (15) In Puerto Rico, the public's need for outdoor recreation has increased concomitant to population growth. A report on Puerto Rican water resources indicates that there is a considerable number of Island inland water reservoirs (lakes and rivers). Some of these reservoirs might be used as an excellent alternative to Puerto Rico's shoreline. (7)

To avoid water contamination and enhance the diversity of the Island residents' recreational opportunities, the planning and management of lakes and rivers in Puerto Rico needs to be based upon information provided by research. Evaluation of the current recreational use of inland water reservoirs, their facilities and the social characteristics of the public participating in the area is vital to the development of new recreational opportunities. Any resulting touristic activity and outdoor recreation could contribute significantly to local economies as well as to the quality of life in Puerto Rico.

Specifically, this report:

- reviews the literature on recreation in Puerto Rico; and specifically lake recreation

- identifies and describes the lakes recreational facilities.

- establishes a profile of the demographic and socioeconomic characteristics of inland water reservoirs users.

- determines the predominant lake recreational facilities available.

- ascertains recreationists and local residents perceptions of the positive and negative characteristics of the lakes as recreational areas.

The authors expect this report to be helpful to policy makers and recreation managers. The information presented should enable policy makers to determine if water recreation services are adequately provided, while managers could improve or add services to fulfill unmet needs of recreationist without drastic alteration of the natural environment.

LITERATURE SURVEY

This section of the report summarizes findings and comments of previous studies dealing with recreation in Puerto Rico. It also includes publications that treat methodological and theoretical frames of leisure and recreation research.

Puerto Rico's Comprehensive Plan for Outdoor Recreation, reports on a 1968 survey conducted in 59 municipalities based on the sampling process designed by the Department of Labor for its continuing survey of employment in the Island.(8) The study found that of the respondents 40 per cent had at least one favorite outdoor recreational activity. The favorite activity of the largest number, 7.2 per cent, however, was attending rather than participating in outdoor activities. Playing outdoor games was preferred only by 6.9 per cent while driving an automobile by 5.9 per cent.

The survey also indicates that 63.8 per cent of the respondents did not participate in any outing during 1967. Outings defined as trips away from home which occupy the major part of the day for the purpose of recreation. For example visits to a lake fall in this category.

An outing is usually a group activity and the study revealed that the average party size was 6.4 persons. The study also found that participation in playing outdoor games was related to educational background in that the higher the level of education the higher the level of participation. Walking for pleasure was also frequent in those possessing an above average education. Finally the report mentions that despite the increase in recreational facilities in recent years, there exists a substantial latent demand for facilities which are not available.

A 1970 survey of existing water-related recreational facilities in Southwest Puerto Rico covered thirteen beaches from Guajataca beach to Salinas Ensenada. The study also included lake Guajataca which is considered a semi-developed recreational center. Characteristics and accessibility plus opinions of recent users are presented for each recreation locality. The data was collected through personal interviews and field observations. Regarding Guajataca lake, the report states that "most of the visitors (about 150 weekly) go there on Sundays and holidays. On week days, the place is virtually deserted." Existing facilities were found inadequate(9).

A 1974 government of Puerto Rico document(7) reveals an increase in recreation. In 1940, the proportion spent in recreation was 3.4 per cent while in 1970, it was 8.5 per cent. The document projected that the proportion of income devoted to recreation would be 9.3 per cent by 1985. There is no known recent study on recreation in Puerto Rico which could corroborate this estimate.

The same 1974 document states that Puerto Rico has only 104,000 acres of land for public recreation, that is, less than 40 acres per 1,000 population. The publication adds that the Island has developed only ten per cent of the more than 100 kilometers of potentially good beaches. Ten thousand acres of inland water reservoirs have not been developed as recreational areas. The report considers this situation a waste of potential. Regarding the 300,000 acres of forest areas, the report estimates that only one third is public property for recreational purposes. Three factors are mentioned as negatively affecting the development of recreation in Puerto Rico:

- the lack of facilities in relation to the population size
- the poor distribution of facilities which tend to meet needs of a specific segment of the people (69 per cent of the available recreational facilities are sports facilities)
- lack of public information on how to use free time which makes people opt for low effort and low perception activities.

In 1984, the Environmental Quality Board (EQB) published a report entitled Trophic Classification and Priority Ranking for the Restoration of Lakes in Puerto Rico. (6) The report establishes the trophic classification and priority list for lake restoration and also summarizes lake characteristics and pollution. The study uses eight criteria for evaluating the lakes through existing information and field inspections. These eight criteria are: population benefited, lake accessibility, actual and potential recreational uses, trophic conditions, lake size, lake location, fish species and lake problems. The criterion recreational facilities provided the basis for selecting the lakes currently under study in this project. Table 1 shows how the EQB report ranks the lakes of Puerto Rico according to recreational facilities.

Table 1. Ranking of the lakes of Puerto Rico according to recreational potential

Rank	Number of lakes	Name of Lakes
High: 11 or more	5	La Plata, Dos Bocas, Cidra, Guajataca, Carite
Medium: 7 to 10	7	Loiza, Guayabal, Guineo, Toa Vaca, Caonillas, Luchetti, Matrullas.
Low: Less than 7	8	Las Curias, Patillas, Toro, Loco, Pellejas, Guayo, Las Curias, Garzas.

*15 is the maximum score.

As the concept of environment has been broadened to include social conditions it is worth noting that reports on inland water reservoirs in Puerto Rico often make marginal recommendations on the importance of socioeconomic impact of the construction of dams in the Island (Torres-Dias, p.23)(12).

In 1982, The Corps of Engineers produced the report "Recreation Master Plan, Ponce Channel Improvements, Portugues and Bucana Rivers Project, Puerto Rico". (13) This plan establishes development criteria for public use of recreational resources in the area of Lower Ponce Channel. The report assumes that by 1990 the parasite *schistosoma mansoni* will be controlled to permit fresh water contact without the risk of infection. The report, however, cites two official reports claiming the rivers Bucana and Portugues to be free of the parasite. In general, fresh water contact reports in P.R. are discouraged due to the assumed presence of

schistosomiasis or bilharziasis. Another assumption is that the future economic expansion of the area will increase per capita income and leisure time. The recreational data that frames this report is in large part extracted from the 1967 recreational survey already mentioned and entitled " Puerto Rico's Comprehensive Plan for Outdoor Recreation " published in 1968.

In 1986, the Department of Natural Resources (5) produced a report entitled "Plan para el Manejo de los Recursos Pesqueros en los Embalses de Puerto Rico (Plan for the Management of fishing resources in the Inland Water Reservoirs of Puerto Rico). This report basically deals with recreational fishing in the lakes. The report points two factors that negatively affect fishing, they are: large size and high power of the boats that endanger safety of recreationists. The other factor is the illegal use of commercial fishing gears.

In an article that discusses the uses of recreational surveys, Ferris (1) states that this type of study encompasses a wide range of variables. Demographic, trip characteristics, and time and cost variables are more frequently used than attitude, motivation, and decision making factors. The article also classifies the methods employed to gather data into three categories:

1. data gathered from persons passing a transportation point
2. data gathered from persons found within an area engaging in an activity of interest to the investigator, and
3. data gathered from persons at their homes or other usual place of habitation. According to the author, economists, investors, legislators,

policy makers and others make wide use of recreation surveys in their recommendations.

In a more recent article, Riddick, De Schriver and Weissinger (10) examine the methodological adequacy of research articles published in the Journal of Leisure Research from 1978 to 1982 that apply quantitative techniques. The article concludes that the quality of reported research improved during a five year span in about one-half of the criteria used for review. Most of this research employed survey research techniques. The authors emphasize the need for a theoretical foundation in studies as well as validity and reliability.

Iso-Ahola (3) examines how people perceive and experience outdoor recreation and concludes that the perceived quality of an outdoor recreational environment correlates positively with its perceived naturalness. Naturalness involves such physical features as landforms, water, agricultural features and natural vegetation. These characteristics are conceived as opposed to urban development and the presence of large number of people. The author cautions that this relationship may vary according to the prevailing culture and the observer's level of education since the expectations recreationists bring to the situation influence the environmental perceptions of a given recreation environment.

John Neulinger in his book The Psychology of Leisure (4) considers information on leisure facts and attitudes more meaningful when related to social psychological variables that help understand the dynamics of leisure. Neulinger includes the standard background variables that appear in most questionnaires such as: sex, age, education, income, occupation and the like. He, however, leaves it up to the researcher to include his own relevant

variables. This author also advocates subjective measures of leisure since leisure is a criterion of the quality of life.

This literature survey reveals the following:

- a) there seems to exist no recent study of recreation in Puerto Rico
- b) there is a shortage of recreational areas in the Island
- c) lakes, despite their high potential, have not been developed as recreational areas
- d) there are three factors that adversely affect recreation in the lakes: the presence of bilharziasis, large size and high power boats and the illegal use of commercial fishing gears
- e) recreation studies encompass a wide range of variables
- f) surveys are the most frequently data collection technique used in recreation
- g) there is a need for sophistication in the theoretical frames of recreational studies

METHODOLOGY

Two approaches for data collection are followed since this study is interested in recreational style forms and distribution of variable values among lake recreationists. The first approach is field observation which gives qualitative data and provides opportunity for reasoned explanation of results. This technique is also used to locate the specific places for conducting interviews, design the sampling strategy, identify actual types of recreational activities and behavior exhibited by lake users. To add validity, two independent observers are used and interviewers are instructed to make observations while in the field to check the observers notes.

The second approach for data collection is the use of personal interviews. The interviewers are trained social science majors. The training covers both the specifics of the questionnaire and interview procedures. The questionnaires are pretested. The training of interviewers and the pretesting of the questionnaires should help identify validity and reliability pitfalls.

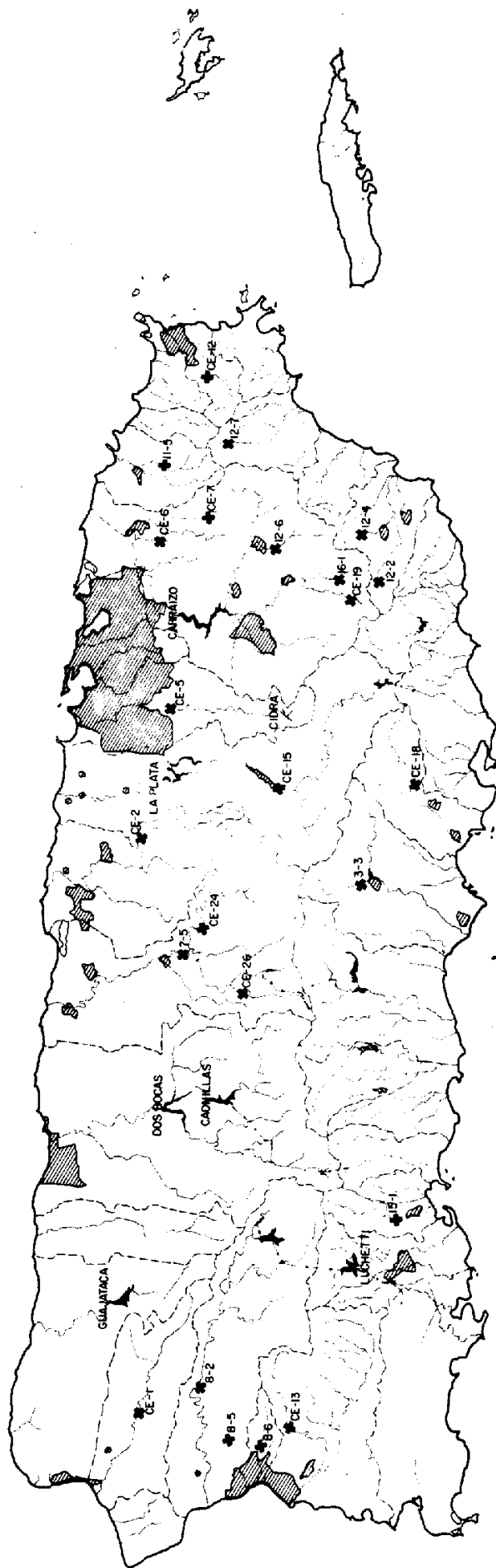
Sampling

The relevant population for the survey part of this study is formed by the people engaging in recreational activities in the lakes of Puerto Rico during the months of September to December 1986. Some empirical criteria were followed to establish the size of the sample. Among them the researchers previous experience with samples involving different data collection sites (2) and the most common sample sizes used in regional studies for subject matter (11).

There are twenty eight lakes in Puerto Rico. Since the subjects of the study are the actual recreationists, it was originally decided to work in the five lakes with the highest actual and potential recreational facilities (see Table 1). These lakes are: La Plata, Dos Bocas, Cidra, Guajataca, and Carite. After visiting each of these lakes, Carite and Cidra were dropped due to the fact that the first lacked public access to its shores and the second, after three visits, showed no recreationists at the shores to be interviewed. Lake Luchetti which had originally followed Carite in the ranking of recreational potential was then included and the decision made to work with only four lakes. These four lakes are widely scattered throughout Puerto Rico what adds generalizability to the findings and at the same time allows for interlake comparison. (See map. Fig.1) The interlake comparison is important since no account was found of a previous study on recreationists in the lakes. It should be mentioned that lakes with low ranking recreational potential could not be included in the study because some of them were not actually used for recreational purposes.

Despite the above geographical distribution of lakes, for this study a list of registered recreationists was not available to provide a suitable sampling frame. To overcome this limitation two sampling strategies were followed to obtain the subjects for the set sample size of fifty people per lake. First, lake shore sites for boat launching, fishing, camping, picnicking and the like were identified and second, interviews were taken of subjects engaging in recreational activities. Besides the lack of sampling frame another limitation of the sampling is that lakes are more frequently visited during the Summer vacations and the interviewing occurred after the Summer. To avoid any large discrepancy due to the season factor interviews

were taken in week-ends. The final working sample was 200 interviews; fifty for each lake: Dos Bocas, La Plata, Guajataca and Luchetti.



ISLAND-WIDE WATER SUPPLY STUDY
PLATE III-1
LOCATION OF EXISTING AND POTENTIAL NEW RESERVOIRS
 A COOPERATIVE EFFORT BETWEEN
 THE GOVERNMENT OF THE COMMONWEALTH OF PUERTO RICO
 CORPS OF ENGINEERS JACKSONVILLE DISTRICT SAN JUAN AREA OFFICE

RESULTS

DIRECT OBSERVATIONS

Field observations were made at lakes La Plata, Dos Bocas, Carite, Cidra, Guajataca and Luchetti (See map for location, Fig.1) during the months of June and July, 1986. As previously mentioned, the purpose of the observations was to: determine whether existing facilities promote or limit recreational behavior, identify types of recreational activities, establish interviewing sites, informally interview land or business owners and residents in the lakes' vicinity as well as personell of agencies or members of groups associated with the lakes.

Facilities

In the recreational experience the physical environment is sometimes a mean toward an end and other times it is an end in itself. Since lake recreation refers to activities that occur in the lakes themselves or its immediate natural environment, scenic enjoyment of a lake and its natural surroundings qualifies as recreational end in itself. On the other hand, in recreational fishing the physical environment is a mean toward an end. It has been established that " the perceived quality of an outdoor recreation environment is positively related to its perceived naturalnesss" (Iso-Ahola,pag.277). Man made facilities can be seen as the rational influence of man upon the environment with the purpose of making it more comfortable. The following comments are based on the expectations the observers had before visiting the lakes' vecinity and the actual field observations.

The first aspect observed was the lake's accessibility to the visitor. All of the roads leading to the lakes lacked directional signs, even though four of the six lakes are crossed by state roads. Except for Lake Luchetti which is surrounded by a secondary road, the other lakes were frequently reached by a road up to a certain point while the rest lake shore was surrounded by private property, other public accesses did not exist. At Guajataca, Cidra and Carite some owners of land adjacent to the lake charged a fee for allowing people to reach the lake in their cars. The controlled accesses to the lakes were mostly established businesses or new ones. At Lake La Plata two access roads were closed and used for dumping. Interviewed area residents claimed the roads were closed because they were used to dismantle stolen cars.

All lake shores are underdeveloped and lack public facilities such as parking lots, restrooms, trashcans, picnic areas, walking trails and telephone service. Lake Guajataca is the only lake which has semideveloped facilities provided by private businessmen. These businessmen specifically complained about the lack of telephone service. Although all the lake areas lack public facilities, two formal groups enjoy direct private access to the lakes. These two groups are the Fishing Clubs and the Boy Scouts of America. At Guajataca, Cidra and Dos Bocas, the fishing clubs control areas with direct access to the lakes. It should be mentioned in advance that fishing tournaments are one of the most common recreational activities in the lakes. According to a former president of the Association of fishermen of Lakes and Rivers of Puerto Rico, there are six lake fishermen clubs in the Island with about 600 members. The authors consider that these club

members are the people getting most of the recreational benefit of the lakes since they are well organized and have their own facilities. The Boy Scouts of America also have private camping facilities at Guajataca. These facilities are used by boy scouts during the Summer, but during the rest of the year the facilities are rented to religious, civic and private groups from all over the Island. The Boy Scout Camp has facilities for some two hundred boys and a staff of seventy persons.

The absence of road signs and the lack of access roads and suitable facilities is obvious in the visited lakes. Despite this, people visit the lakes and engage in recreational activities. This situation seems to indicate that there is a shortage of outdoor recreational environments and that providing developed facilities would increase the constituency of lake recreationists.

Littering was common in the places where people improvised camping and picnicking; when camping and picnicking occurred in areas with private access, however, less littering was observed.

On the roads that get to Lakes Dos Bocas, Guajataca and Luchetti some housing developments were observed which are examples of the demographic pressure on the land near the lakes. Lake Carite has on the shore a fairly large sophisticated housing development to be used as a vacation or second homes area.

Recreational Activities

Picnicking and fishing were the most common types of recreational activities observed at the lakes. Overnight camping is a frequent activity at the private facilities of Guajataca and Dos Bocas Lakes. Boating for pleasure and for recreational fishing occurs despite the fact that boat launching

sites are inefficient and unsafe. At Lake Carite, although the road accessing the lake was in poor conditions, the cemented launching ramp was in fairly good conditions. Dos Bocas also had a good working cemented ramp.

Swimming was observed at Lake Luchetti. Informants, however, said that it occurs occasionally in most of the lakes, even though Carite is supposedly the only lake that has not been contaminated with bilharzia.

Swings made of used tires were observed at Lakes Dos Bocas and Guajataca. Picnic tables were also observed in some private locations at Dos Bocas and Guajataca, but in Luchetti they were in what seemed to be public area.

Informal Interviews:

The interviewees voiced several complaints about the lake area. A frequent complaint concerned the lack of vigilance in the lake what made possible for some people to carry illegal fishing and boating in the lake. Other aspect frequently mentioned was the need for an educational campaign to teach people the importance of resource protection to prevent the degradation and depletion of water bodies and natural land areas. According to an informant there are sewage services discharging into the lakes but no action is taken to stop the practice. Some people prefer to avoid developing the lakes areas for recreational purposes to maintain the naturalness of the areas and the existing wildlife habitats. To develop the areas means more visitors to endanger these characteristics.

In summary, the field observations showed that the lake areas are underdeveloped for recreational purposes since they lack basic facilities and services. Members of fishing clubs seem to be the people who benefit

the most since they are organized and have facilities on the shores of the lakes. Fishing and picnicking are the two most common observed activities despite the absence of basic facilities and services in some locations.

The interviews left the authors with the impression that the potential social and economic benefits of recreation in the lakes are not fully understood by all citizens and government officials. Fortunately, however some people suggested the positive relation between constructive recreation programs, family participation, and low delinquency rates. Finally, the authors consider that there is a need to produce and transfer useful recreation information to citizens and decision makers.

SURVEY OBSERVATIONS

Respondents Characteristics

This section presents the results of the sample studied according to sex, place of interview, education, occupation, family size and income.

The 200 subjects sample was composed of 87.5% males and 12.5% females. Sixty eight percent of the interviews were conducted in a public area and the rest in a private area.

Table 2 presents the frequency distribution of levels of education. It shows that four out of every ten subjects (38.5%) has 9 - 12 years of schooling and a similar percent (41.5%) had at least some university education.

Table 2. How many years of schooling do you have? (n=200)

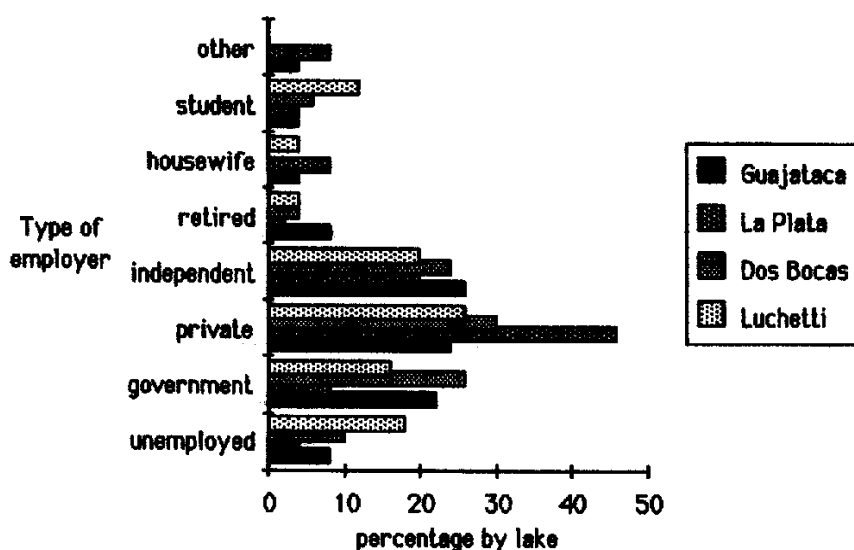
	Percentage
No schooling	0.5
1 - 6 years	9.0
7 - 8 years	5.0
9 - 12 years	38.5
vocational 2 - 4	5.5
College 1 - 4	39.0
More than college	2.5
	<hr/>
	100.0

Regarding the occupation of lake recreationists it was found, as presented in Table 3 that one in every three respondents (31.5%) worked for a private organization and that 18.0% were government employees. Of the remaining sample, 22.5% were independent workers and 10% were unemployed.

Table 3. Type of respondent's employer (n=200)

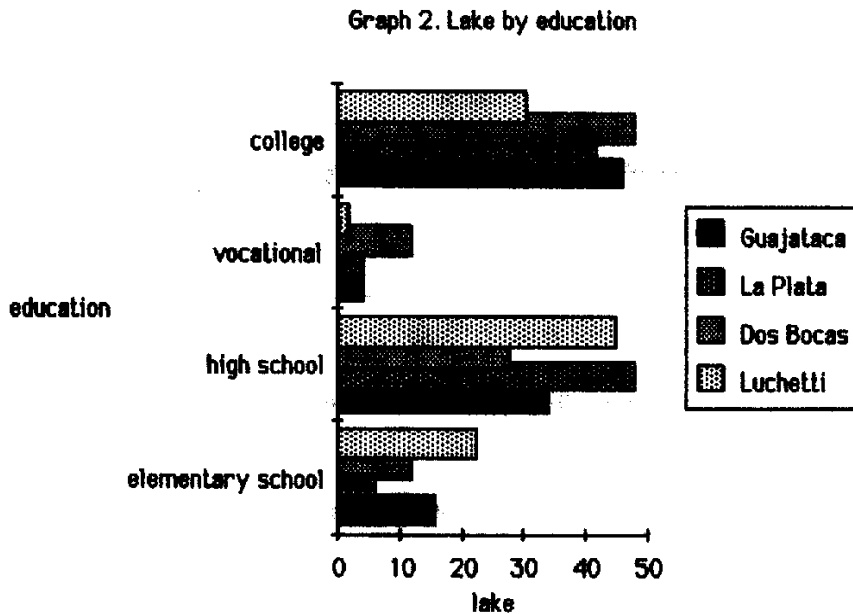
	Percentage
Government	18.0
Private	31.5
Independent	22.5
Retired	4.5
Housewife	4.0
Student	6.5
Unemployed	10.0
Other	3.0

Graph 1. Type of employer by lake



When the type of respondent employer is crosstabulated by lake (Graph 1) it appears that the percentage of unemployed varied from 4.0% at La Plata to 18.0% at Luchetti. The category government employee varied from 8.0% at La Plata to 26.0% at Dos Bocas; on the other hand, employment with a private company varied from 24.0% at Guajataca to 46.0% at La Plata.

The categories of independent worker and retired presented little variation among lakes.



When each lake is crosstabulated by educational level (Graph 2), subjects with a grammar school education represent 22.4% in Lake Luchetti while in La Plata they are but 6.0%. On the other hand, subjects with a college level or higher education represent only 30.6% at Luchetti and 48.0% at Dos Bocas which is followed by Guajataca (46.0%) and La Plata (42.0%).

In addition to the questions on sex, education and occupation subjects were queried about the size of their family unit. Table 4 presents the three clasifications of family size.

Table 4. How many people live with you under the same roof? (n=200)

	Percentage
1 - 3	30.5
4 - 6	58.0
7 or more	11.5
	100.0

The 4 - 6 category is the most common family size of the lake recreationists since six out of every ten subjects (58.0%) are in this category.

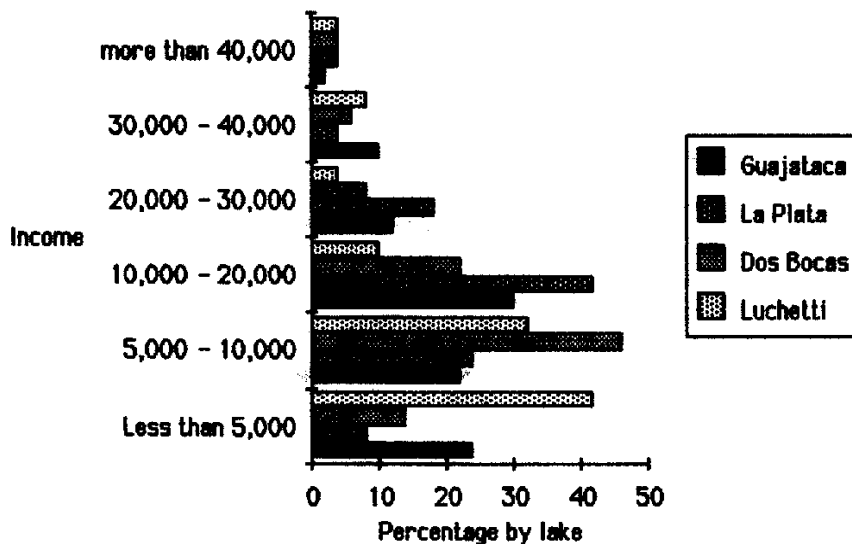
The authors of this report are aware of the limitations of data on income obtained through a questionnaire. Nevertheless they attempted to measure family income to have a base for future comparisons or validation. In order to measure family income of the subjects, each respondent was presented with a card showing different levels of income and each level was identified with a letter. The subject was then asked to say which letter best represented his family income. Table 5. summarizes the income level categories and the percentage for each category.

Table 5. Which category best represent your yearly family income including any government assistance? (n=200)

	Percentage
Less than 5,000	22.0
5,000 - 10,000	31.0
10,000 - 20,000	26.0
20,000 - 30,000	10.5
30,000 - 40,000	5.0
More than 40,000	5.5

Fifty three percent of the subjects claim an annual family income of less than 10,000. Twenty six percent have an income ranging from \$10,000 - 20,000. The rest of the respondents (21.0%) have an income of \$20,000 or more.

Graph 3. Income by lake.



Each lake was crosstabulated by visitor income (Graph 3) and it was found that the lake with the largest percentage of income under \$5,000 was Luchetti (42.0) while La Plata (8.0%) had the smallest percentage in this category. The position of these two lakes is reversed in the category 20,000 - 30,000 where La Plata (18.0%) had the largest percentage and Luchetti (4.0%) the smallest. The other lakes vary between the extremes for each of these two categories.

In summary, the average lake recreationist is male (87.5%), has more than nine years of schooling (80%), is more likely to work for a private organization (31.5%) than for the government (18.0%), belongs to a family of 4 - 6 members (58.0%) and has a yearly income of less than \$10,000 (53%).

Visit to the lake

The purpose of this section is to first, describe lake visits in terms of frequency, first visit and visits to other lakes. Second, to present the time needed as well as mode of transportation used to reach the lake. This section concludes that lake recreation is a group activity which integrates different age and sex groups.

Out of two hundred subjects asked "Is this your first visit to the lake?," thirty nine people (19.5%) answered yes. The thirty nine new visitors to the lakes were distributed according to lake as follows: Dos Bocas (38.5%), Guajataca (25.6%), Luchetti (20.5%) and La Plata (15.4%). It should be mentioned that part of the interviews at Dos Bocas were taken while a fishing tournament was in progress. These fishing tournaments tend to attract a new public to the lakes. Those persons who answered that this was not their first visit to the lake, (80.5%) were then asked when they had visited the lake for the first time. One hundred and fifty six subjects answered this question. Their answers appear in Table 6 .

Table 6. When did you visit the lake for the first time?

(n=156)

	Percentage
Less than one year ago	9.6
1 - 2 years ago	5.8
3 - 4 years ago	9.6
5 - 6 years ago	8.
more than 7 years ago	66.7
	<hr/>
	100.0

Table 6 reveals that two out of every three subjects visited the lake more than seven years ago while only one out of every ten subjects (9.6%) visited the lake for the first time in the last year. This result suggest that the lakes are visited mainly by either the same people or people from adjacent areas.

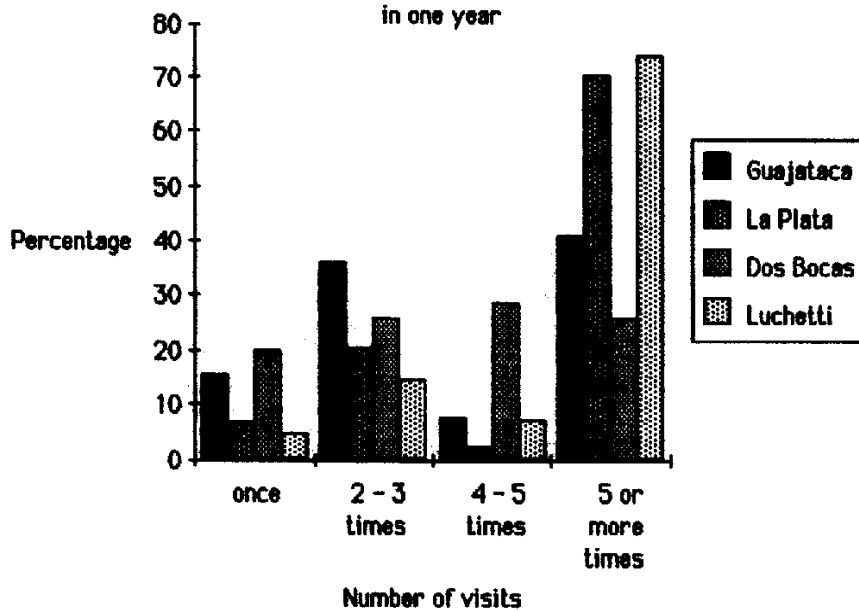
Table 7 presents the number of visits subjects made to the lake during the last twelve months.

Table 7. In the last twelve months how many times have you visited the lake? (n=160)

	Percentage
once	11.2
2 - 3 times	23.8
4 - 5 times	10.6
5 or more times	54.4
	<hr/>
	100.0

About half of the subjects (54.4%) visited the lake more than five times during the year and one out of every four subjects (23.8%) visited the lake two to three times during the same period of time. The results of this table add validity to the conclusion that the same people tend to frequent the lakes.

Graph 4. Percentage distribution of numbers of visits respondents made to the lake in one year



When comparing the number of visits respondents made in the last twelve months to their respective lakes it appears, as shown in Graph 4, that the percentage of subjects that made only one visit varied from 4.8% at Luchetti to 15.4% at Guajataca. The percentage of subjects on the other hand that visited the lakes five or more times varied from 25.6% at Dos Bocas to 73.8 at Luchetti; Guajataca had 41.0% and La Plata 70.4%. Luchetti and La Plata reveal similar patterns of number of visits; low percentage of one visit and high percentage of five or more visits. Here we discovered that the visiting of the lakes by the same people is more common in lakes Luchetti and Dos Bocas than in other lakes.

The questionnaire also posited the question "In the last twelve months have you visited another lake?" of the 200 subjects, 98 (49.0%) answered that they had visited other lake. The lakes more frequently mentioned by the people who visited another lake were:

Lake	Frequency
Guajataca	26
Toa Vaca	25
Carite	22
Dos Bocas	21
Luchetti	15
La Plata	11
Caonillas	11
Carraizo	6

Four out of the eight most frequently mentioned lakes are included in the sample studied. This fact adds validity to this study's sample selection.

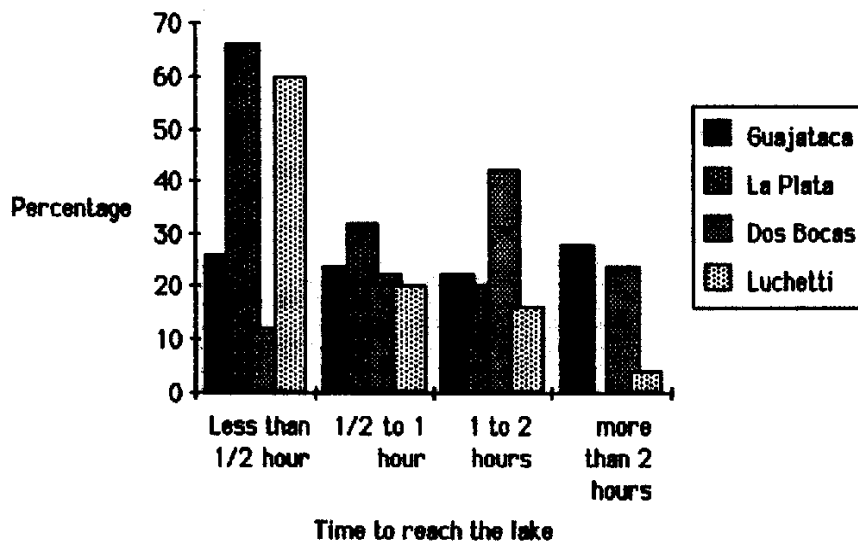
Out of the 98 subjects who answered that they had visited other lakes, 45 (46%) mentioned they had visited but one lake while 33 respondents (34%) answered they visited two to three other lakes in the last twelve months. The remaining 20 subjects (20%) visited four or more lakes. The 98 subjects that had visited other lakes in the last twelve months are distributed by lake as follows: La Plata 21 (42.0%), Guajataca 23 (46.0%), Luchetti 26 (52.0%) and Dos Bocas 28 (56%). Table 8 confirms that in general the lakes are visited mostly by people living close by.

Table 8 How long does it take you to come to this lake from your home?

	Percentage
Less than 1/2 hour	41.0
1/2 - 1 hour	24.5
1 - 2 hours	20.5
more than 2 hours	14.0
	<hr/> 100.0

Four out of every ten respondents (41.0%) lived less than half an hour from the lake. Only 14.0% of the respondents drove more than two hours to reach the lakes.

Graph 5. Time it took subjects to reach the lake



Graph 5 shows that one out of every four subjects at Guajataca (28.0%) and Dos Bocas (24.0%) drove more than two hours to reach the lakes. Driving time to lakes La Plata and Luchetti, for most subjects (66.0%), on the other hand, was less than half an hour from their home. These results are explained in part by the fact that at Dos Bocas some interviewing was done while a fishing tournament was in progress and at Guajataca part of the interviews were taken at the Boy Scouts of America facilities which host organized groups from around the Island.

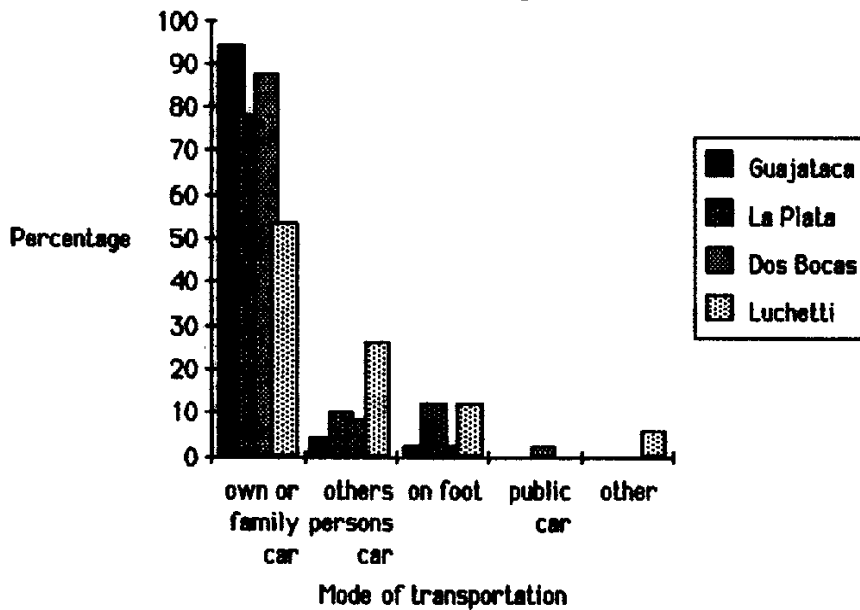
Besides asking how long it took subjects to reach the lakes from their home, the study also asked about the kind of transportation used to reach the lake, the question used for this purpose and the answers appear in Table 9.

Table 9. How did you arrive to this place?

	Percentage
Own family car	77.5
Other persons car	12.0
On foot	6.5
Public car	.5
Other	3.5
	<hr/> 100.0

Table 9 shows that a high percentage of subjects, 77.5%, use their own or their family car to go to the lake. It can be observed that 6.5% of the subjects lived close to the lake since they walked to the lake. The low use of public transportation (0.5%) simply reveals the lack of this type of service. In case of concerted plans to increase the number of visitors to the lakes the improvement of public transportation facilities could be a relatively high impact yet low investment service.

Graph 6. Mode of transportation subjects use to reach the lake.



Making comparisons of mode of transportation, among lakes (Graph 6), it appears that the percentage of recreationists arriving to the lake in their own or family car is higher at Guajataca (94.0%) than at the other lakes. Dos Bocas has a percentage (87.5%) of car owners close to that of Guajataca while, on the other hand, Luchetti has the lowest percentage (54.0%) of recreationists arriving on their own or family car. About one out of every ten recreationists arrives at La Plata and Luchetti on foot (12%).

The study also investigated the extent that the visiting of the lakes is a group activity. Subjects, therefore, were asked "How many people come with you?". Table 10 shows the number of people accompanying each subject. Only one out of every five respondents (19.5%) came alone to the lakes. Groups of two to five people represented 56.0% of the lake visiting while 24.5 % of the subjects interviewed came to the lake with six or more people. It is clear then that in most cases visiting lakes is a group activity.

Table 10. How many people accompany you? (n=200)

	Percentage
none	19.5
1 - 2	30.5
3 - 4	25.5
5 or more	24.5
	<hr/>
	100.0

It was also found through another question that 138 subjects (69%) mentioned that adult males accompanied them to the lake while 93 subjects (46.5%) answered that adult women were part of their group. Regarding children included in the lake visits, 36% of the respondents said that children were part of their group. These data reveals that lake recreation is an activity that integrates different sex and age groups. Adults and males, however, account for the majority.

Recreational Activity

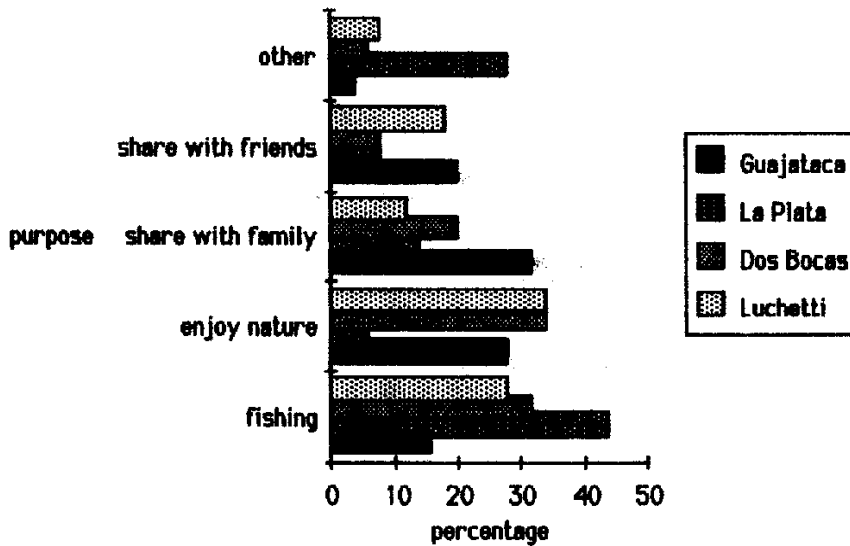
In the following section Table 11 provides a breakdown of lake recreationists by their stated purpose for visiting the lake. Table 12 presents the respondents most frequently performed activity in the lake area.

Table 11 Stated main purpose for visiting the lake.
(n=200)

purpose	percentage
fish	30.0
enjoy nature	25.5
meet and share with family	19.5
meet and share with friends	13.5
other	11.5
	<hr/>
	100.0

Fishing and enjoyment of nature accounted for 50% of the subjects stated main purpose for visiting the lake. Thirty three percent mentioned meet and share with family or meet and share with friends. The rest, 11.5% included among others: swimming and walking.

Graph 7 Recreationists stated purpose for visiting the lake



Graph 7 shows that the stated purpose "to fish" has the largest percentage of respondents at La Plata (44%) and the smallest percentage at Guajataca (16%). The category "share with family" was chosen by the largest percentage of respondents at Guajataca (32%) and by the smallest percentage at Luchetti (12%). Except for La Plata where the category "enjoyment of nature" was chosen by a small percentage (6.0%), this category was chosen at the other three lakes by one out of every three respondents. The fact that at Lake Guajataca the category "share with the family" has the largest percentage (32%) of respondents reflects the existence of privately semi developed facilities that are not available at the other lakes.

In the interview, subjects were asked to give their zip code number. Puerto Rico has 148 zip codes. The percentage of zip codes mentioned at each lake reflects the geographical diversity of recreationists at each lake

area. The zip codes revealed that despite some geographical diversity each lake act as a recreational pole for people coming from nearby municipalities. The zip codes represented three or more times at each lake are the following:

Lake Guajataca

Zip Code	Town	Frequency of mentions
00627	Camuy	8
00755	San Sebastián	4
00619	Bayamón	3

Lake La Plata

Zip Code	Town	Frequency of mentions
00719	Naranjito	16
00619	Bayamón	11
00917-00919	Hato Rey	6
00643	Corozal	3

Lake Dos Bocas

Zip Code	Town	Frequency of mentions
00612	Arecibo	9
00611	Angeles	6
00619	Bayamón	4
00630	Carolina	3

Lake Luchetti

Zip Code	Town	Frequency of mentions
00768	Yauco	30
00653	Guánica	3
00708	Mayagüez	3

Subjects were also provided with a list to indicate those lake activities in which they most frequently participate. The question used for

this purpose was: "of the activities that appear in this card, in which did you participate while at the lake? You may select more than one."

Table 12. Percentage of respondents engaged in each recreational activity.

Recreational activity	Percentage*
Picnicking	37.0
Camping	25.5
Fishing	53.0
Motor boating	18.0
Swimming	10.0
Rowboat	9.0
Walking	7.5
Table games	7.0
Jogging	3.0
Team sport	11.5
Individual sport	3.5
Other	4.0

*Percentages represent the portion of subjects (n=200) that engaged in each activity.

One of every two subjects (53%) chose fishing which was followed by picnicking 37% and camping 25.5%. Motor boating was selected by 18.0% of the respondents.

Recreational Area

It is expected that perception of the lake area by recreationists will vary according to their background and expectations. The questionnaire therefore asked the subjects to identify the characteristics that they value the most in a recreational area. They were also asked to comment upon what they liked and disliked about the lake area.

Table 13 summarizes the answers to the question " According to you, what are the two most important characteristics of a recreational area?"

Table 13. According to you what are the two most important characteristics of a recreational area?

Characteristics	Percentage
Naturalness: trees, water, vegetation	69.0
Facilities: washrooms, parking, telephone	53.0
Easy access	23.5

*Percentages represent the portion of subjects (n=200) that identified each characteristic.

Results presented in Table 13 closely coincide with answers obtained with the open - ended question regarding what subjects liked about the lake area. The percentages of people who mentioned some aspects are the following: the natural environment (51%), beauty of the scenery (27.0%), fishing (15.5%) and quietness of the area (26.0%).

The high percentage who mentioned naturalness underscores the importance of a rational approach to developing lake areas since field observations by the authors found that demographic and economic factors are displacing the naturalness of the environment. For example housing developments were frequently found close to the lakes.

Another question was made regarding things that subjects dislike about the area. Their answers covered such things as: lack of cleanness (28.5%), poor access (13.5%) and use of large boats (9.0%). Other areas of complain were: illegal fishing and lack of facilities and services.

SUMMARY AND CONCLUSIONS

This section of the report describes the sources of data used in the study and presents the conclusions.

The study used three sources of data: first, a literature survey on lake recreation in Puerto Rico; second, field observations and informal interviews by the authors and third, a survey of two hundred recreationists at lakes Guajataca, Dos Bocas, La Plata and Luchetti.

The literature survey on recreation lead us to the following conclusions:

- Studies of lake recreation in Puerto Rico or of recreation in general are dated?

- lakes, inspite of their high potential and the shortage of recreational areas in the Island, have not been developed as recreational areas.

- bilharziasis, large size and high power boats, and the illegal use of commercial fishing gear, adversely affect lake recreation.

- recreation studies in general most frequently use surveys for data collection.

- recreation studies encompass a wide range of variables.

- theoretical frames of recreation studies need sophistication.

Field observations also lead to the following conclusions:

- members of fishing clubs are the groups which benefit the most from lake recreation due to their organization and shore facilities.

- the land use surrounding the lakes needs zoning since there is strong urban and demographic pressure affecting the environment's naturalness.

-lake visitors and government officials need to be aware of the educational and socio-economic benefits of recreation.

The next five paragraphs present the conclusions of the study's survey section.

The average profile for the 200 recreationists which emerge from the survey is a male (87.5%), has more than nine years of schooling (80.0%), is more likely to work for a private organization (31.5%) than for government (18%), belongs to a family of four to six members (58%) and claims a yearly family income of less than \$10,000 (53%).

Comparing the four lakes according to some of the above characteristics, lake Luchetti has the largest percentage of low education visitors (22.4%) and La Plata the smallest percentage (6.0%). Lake Luchetti also has the largest percentage of unemployed visitors (18.0%) and La Plata the smallest percentage (4.0%). In relation to income Luchetti presents the largest percentage of visiting recreationists in the lowest income level (less than 5,000) with 42.0% while La Plata has an 8.0%. Lakes Guajataca and Dos Bocas have percentages of recreationists employment and income levels which fall between the extremes of Luchetti and La Plata.

Only one out of every five visitors is a newcomer to the lake and most recreationists are frequent visitors to the lake. Only one out of every two subjects has visited other Puerto Rican lake in the last twelve months. The most frequently visited lakes are: Guajataca, Toa Vaca, Carite, Dos Bocas, Luchetti and La Plata. Four out of every ten survey respondents lives less than half an hour from the lake visited and only 14.0% of the respondents have to drive more than two hours to reach the lake. Eight out of ten respondents use their own or family car to visit the lake. Finally, visiting to

the lake is a group activity since the survey revealed that only one in five subjects visits the lake alone.

In terms of recreational activity, fishing and enjoying nature accounted for 50% of the subjects stated main purpose for visiting the lake. Regarding actual participation in recreational activities, one out of every two subjects (53%) chose fishing as the most frequent participatory activity while 37% of the subjects mentioned picknicking.

Seven out of every ten (69%) respondents perceived naturalness as the most important characteristic of a recreational area. This same characteristic is also the one mentioned by 51.0% of the respondents when asked to state what they like about the lake area. On the other hand lack of cleanness (28.5%) and poor access to the lake (13.5%) were mentioned by the subjects as the most unfavorable lake conditions.

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APPENDIX

Universidad de Puerto Rico
Recinto Universitario de Mayagüez
Departamento de Ciencias Sociales

I. La Visita al Lago

1. ¿Es esta su primera visita al lago?

A. Si _____ (Pase a pregunta 4)

B. No _____ (Pase a pregunta 2)

2. ¿Cuándo visitó por primera vez el lago?

1. hace menos de un año

2. hace uno a dos años

3. hace tres a cuatro años

4. hace de cinco a seis

5. hace mas de siete años

3. ¿En los últimos doce meses cuántas veces ha visitado este lago?

1. una vez

2. dos veces

3. tres veces

4. cuatro veces

5. cinco veces

6. más de cinco veces

4. ¿En los últimos doce meses ha visitado algún otro lago?

1. Si ___ ¿Cuál? _____ 2. NO

5. ¿Cuánto tiempo estima usted que le toma llegar en automóvil a este lugar desde su casa?

1. menos de media hora

2. entre 30 y sesenta minutos

3. entre una hora y hora y media

4. de hora y media a dos horas

5. de dos horas y media a tres horas

6. más de tres horas

6. ¿Cuántas personas vinieron con usted?

A. Solo _____ (Pase a pregunta 8)

B. Acompañado _____ (Pase a pregunta 7)

7. ¿Cuántas de esas personas son adultos hombres_____, adultos mujeres_____y niños_____?

8. ¿Cómo llegó usted a este lugar?

- | | |
|--------------------------------------|-----------------|
| 1. carro propio o de la familia | 5. pidiendo pon |
| 2. carro de otra persona no familiar | 6. a pie |
| 3. carro público | 6. Otro_____ |
| 4. guagua de excursión | especifique |

II. Actividad Recreativa

1. De las siguientes actividades, ¿Cuál representa mejor el propósito de su visita al lago? (Escoja una)

- | | |
|-------------------------------|----------------------------------|
| 1. pescar | 7. hacer caminatas |
| 2. disfrutar de la naturaleza | 8. competir en deportes y juegos |
| 3. compartir con la familia | 9. hacer ejercicio |
| 4. compartir con amigos | 10. navegar |
| 5. nadar | 11. Otro_____ |
| 6. descansar | especifique |

2. ¿De las siguientes actividades que hay en esta tarjeta en cuáles participa usted en el lago? (Puede escoger mas de una)

- | | |
|--------------------|------------------------------------|
| 1. natación | 7. juegos de mesa |
| 2. pesca | 8. jogging |
| 3. botes de remo | 9. pasadía, jira |
| 4. botes de motor | 10. actividad deportiva en equipo |
| 5. acampar | 11. actividad deportiva individual |
| 6. hacer caminatas | 12. otra_____ |
| | especifique |

3. Del siguiente listado, ¿cuáles son según usted las **dos** características más importantes en un área recreativa?

1. el ambiente natural de árboles, agua y vegetación
2. que se llegue en forma fácil y cómoda
3. las facilidades existentes: baños, estacionamiento, embarcadero y teléfono
4. servicios de vigilancia y salvavidas
5. distancia desde el lugar donde uno vive
6. costo por utilizar área
7. Otro_____

especifique

4. ¿Qué es lo más que le agrada del lago y sus alrededores?

5. ¿Qué es lo que menos le agrada del lago y sus alrededores?

III. Características Personales

1. Registre el sexo de la persona.

masculino_____ femenino_____

2. ¿Cuántas personas forman la familia suya que vive en la misma casa o apartamento? _____

4. ¿Hasta que grado o año de estudio completó usted?

- | | | | | | | | | |
|-------------------------|---|---|---|---|---|---|---|-------|
| 1. primaria | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 2. secundaria | 1 | 2 | 3 | 4 | | | | |
| 3. vocacional | 1 | 2 | 3 | 4 | | | | |
| 4. universitaria | 1 | 2 | 3 | 4 | | | | |
| 5. más de universitaria | | | | | | | | _____ |

5. Actualmente usted está

- | | |
|---------------------------------|----------------|
| 1. desempleado | 6. ama de casa |
| 2. empleado con el gobierno | 7. estudiante |
| 3. empleado con empresa privada | 8. Otra_____ |
| 4. trabaja independientemente | especifique |
| 5. está retirado | |

5. ¿Cuál es su ocupación o profesión?_____

6. ¿Cuál letra estima usted que representa el ingreso de su familia en un año, incluyendo cualquier asistencia que reciba del gobierno?

1. menos de 5,000
2. 5,000 - 7,000
3. 7,000 - 10,000
4. 10,000 - 15,000
5. 15,000 - 20,000
6. 20,000 - 25,000
7. 25,000 - 30,000
8. 30,000 - 40,000
9. 40,000 - 50,000
10. más de 50,000

IV Entrevistador

1. Nombre del entrevistador_____
2. Lugar de la entrevista:
área pública_____
- área privada _____
3. Fecha de la entrevista: ____-____-____