



Bahía de Jobos



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Management Plan Adopted for JOBANERR

The Jobos Bay National Estuarine Research Reserve (JOBANERR) was appointed as such in September 1981, through an agreement between the Puerto Rico Department of Natural and Environmental Resources (DNER) and the National Oceanic and Atmospheric Administration (NOAA). This designation established Jobos Bay as the eleventh place of interest of the National Estuarine Research Reserves System (NERR) and also NOAA's. Through this designation, Puerto Rico reaffirmed its commitment in developing an estuarine research and education program, preserving the area's resources and ensuring their availability as a natural laboratory that provides information for the making of decisions having to do with coastal affairs. Forming part of NOAA means having the necessary funding for the proposed objectives.

To join NEER, it is necessary to meet certain requirements, among which is the Management Plan. In December 2000 a Management Plan for the Jobos Bay Estuarine Research Reserve was adopted. This plan was approved for the period 2001-2005. It is an extensive document that proposes and describes the goals, objectives, and strategies that must be executed to coordinate research education and interpretation, public access, construction, acquisition and conservation of lands, restoration and utilization of the same. This document informs on the direction and itinerary of the programs. Its usefulness is immense in that it allows administrators to evaluate their own

effectiveness in complying with the objectives and make the necessary modifications to achieve them..

The fundamental goal that the Reserve must comply with, is to operate and protect the coastal mangrove systems and their habitats, in such a way that it is fit for research, education and interpretation, at the same time promoting better decisions pertaining coastal zone management. The plan is commonly directed and administered by the state or territory and the federal government. The federal government is represented by NOAA, responsible of managing and safeguarding the nation's coastal resources. The states or territories have the mission of organizing the personnel and the day to day management of the Reserves. The operation and management of JOBANERR are under the responsibility of the DNER. This agency makes sure that the places encompassed in the Reserves, are used according to the policies and pertinent agreements. There also exist memorandums of understanding that dispose the active role of the post secondary institutions of the country, whose function is to technically assist and support the research and education activities. With other governmental and non-governmental entities of the country, ties have been established so that there may be future work relationships that allow to develop the areas better. To include all sectors of the community, the management plan disposes the voluntary participation of citizens in a local Council of Citizen Advisors. The management of the Reserve thus turns into a matter of interest and responsibility of the government and the citizens in which both are collaborators.

Important Objectives in the Process of Implementation of a Management Plan

Research Objectives	Protection Objectives	Education Objectives
<ul style="list-style-type: none"> To promote and carry out studies to identify the flora and fauna of the Reserve in order to better understand the interrelation between organisms and the environment. 	<ul style="list-style-type: none"> Acquire natural areas worth protecting. 	<ul style="list-style-type: none"> Provide educational services to schools and the community in general.
<ul style="list-style-type: none"> Promote a better understanding of the condition of water quality and the physical processes that operate within the watersheds. 	<ul style="list-style-type: none"> Manage and monitor the impact caused by the public use of the Reserve. 	<ul style="list-style-type: none"> Provide a data base that the concerned authorities may use in making decisions.
<ul style="list-style-type: none"> Promote research and complete the data base. 	<ul style="list-style-type: none"> Monitor the impact on the Reserve of the activities developed in the area. Provide surveillance and the means to execute the laws in place. Allow the participation of citizens in the making of decisions and the activities of the Reserve. 	<ul style="list-style-type: none"> Provide training opportunities and participate in research activities. Make available the appropriate installations for education and volunteer workers.

The Management Plan offers information to the public on the activities allowed at the Jobos Reserve. It is important that the community visits and uses the natural resources of the Reserve. For this, there is a dual use visitor's center that informs

about the resources and their use, and where other activities may be held. Nevertheless, it is important to mind the regulations for each area to contribute in the effort of protecting the Reserve.

Things you MAY do at the Reserve	Things you MAY NOT do at the reserve
Passive recreation activities, path-way interpretation, snorkeling, bird watching in designated areas.	No removal of organisms, sediments, deposits, and/or digging, or cutting or burning of the plants at the Reserve.
Hunting and fishing in the designated areas and complying with the regulations of such areas and the hunting and fishing laws in Puerto Rico.	No pets allowed
Harvesting oysters from the mangroves in the traditional form.	NO motor vehicles should be used.
Vessel owners may use the docks or landing spots within the Reserve in the designated areas.	NO water skis
Carry out research with special permission	NO leaving trash generated from human activities taking place at the Reserve.
Vessels less than 22 ft. are allowed in the areas of the Mar Negro and near the Cays.	NO cooking or campfires.
Vessels larger than 22ft. may use the navigation channel inside the Bay.	NO anchoring of vessels in the roots of the mangroves. NO camping

Study Reveals Important Findings About Environmental Pollution and the Education to Residents

During the month of July 2000 there was ample coverage in the most important papers in the Island of the study on air pollution carried out in coordination with the Public Health Graduate School of the Medical Sciences Campus and the Jobos Bay National Estuarine Research Reserve (JOBANERR). Five hundred and twenty five (525) questionnaires in nine (9) geographical zones covering the JOBANERR territory were applied. A hundred percent of those involved in the study are residents of the communities surrounding the Reserve, and are ideal observers because of their nearness to the Reserve.

This Research is very important for it compiles experiences and know-how in matters related to health, culture, education and knowledge from the communities of residents and users of JOBANERR. This research will enable the development of projects that succeed in satisfying the needs of the residents as well as promote support and participation of the public on behalf of JOBANERR. Not only is data collected from the residents, but the residents get to know the Reserve and the work being carried out. The objectives of the study were: to evaluate the environmental and social conditions of the residents, get to know the environmental situation, and determine what they know about the Reserve. Research is the first step to establish effective and affective contact with the communities. Through this procedure we may get the people to participate in the processes of formulation of the Reserve's work plan. We chose to interview them because we acknowledge that they have valuable information that will enable us to plan our action schemes.

From this research we have learned that the majority of the population is composed of adult women, housewives; indicator that suggests to us that the programs developed should be directed primarily at this sector. The majority of those inquired showed great bonding to the zone in

cultural, historical and social terms, an important factor to achieve participation and involvement of the communities in the environmental pursuit and management of the Reserve. The knowledge of the history of the communities and their processes are central to strengthen new projects, as the people treasure their history and is conscious of its worth, they feel the need to collaborate in making the resource known and preserving it. Sixty seven percent (67%) and of those inquired have lived more than 10 years in the area, nevertheless 50% of the population does not know the estuary and 85% wishes to learn more. This may indicate that there is interest in knowing and participating in the programs run by JOBANERR, which suggests the need to integrate the community.

Dr. José Seguinot an environmental health professor at the University of Puerto Rico and coordinator of the study, indicates that they gathered data about prevailing sicknesses in the area. Of these, 24% are related to respiratory tract, and 16% have to do with other sicknesses. This finding confirms that environmental health has an impact on the health of residents and there is need to improve their life conditions. Due to these findings the Major of Salinas, Abraham López Miranda pledged to "form a working team with governmental agencies to get to know the problems in depth, come to concrete conclusions, and search for quick and effective solutions". In this effort he means to involve the industrial complex at Salinas and the Electric Power Authority. In this sense, one of the most important suggestions of the study is to address the need of researching the health condition of the residents and promote plans to restore the environment and reduce pollution. Research is action and promotion of changes that favor information exchange and the taking of decisions by the community, government agencies, non-governmental organizations and the institutions that manage and preserve the resources. This research has awakened interest and commitment on the part of the governmental organizations, as well as helping them to focus more intently on the programs at the Reserve.

The Jobos Bay National Estuarine Research Reserve, JOBANERR, joins efforts to combat nonpoint source pollution

The former Department of Natural and Environmental Resources Laboratory, in coordination with JOBANERR, carried out research on septic tanks of domestic, industrial and agricultural use, in the Watershed of the Jobos Bay with the purpose of identifying nonpoint source pollution in the area. Jobos Bay Reserve has been monitoring the septic tanks since 1999 through water quality studies. It also supports, participates and cooperates with studies carried out by several postsecondary institutions in the country. Among them, The School of Public Health of the University

of Puerto Rico with the intention of identifying possible pollutants.

These studies are important to be able to determine biological, inorganic, organic and pesticide/ herbicide- originated pollutants, so as to identify the sources of pollution in order to reduce or eliminate them. Research is vital to the development of preventive and remedial measures with respect to the use and management of the habitats and to reduce the effects to public health and the quality of life of the communities. On June the 8th of the present year, the collaborative efforts directed towards identifying nonpoint source pollution, were presented to government representatives and other concerned entities.

Research Directed towards Determining Nonpoint Source Pollutants and their Sources of Origin.

Type of Research	Research Institution	Object of the Research	Time Frame
Research Nitrate pollution evaluation	US Geological Survey	Define nitrogen sources and estimate potential sources of major concentration of nitrates in the Salinas aquifer.	2001-2003
Development and implementation of the Model for the evaluation of Secondary and Cumulative Impacts in the Jobos Bay Watershed.	Water Resources Research Institute, RUM	To provide objective measures of the probable impacts of the activities that are being developed in areas near the Reserve.	2000-2001
Development and implementation of a plan to reduce nonpoint source pollution related to agricultural practices in the coastal waters of the Jobos Bay estuary.	University College of the East Huelva University, Spain, USDA-ARS-SOIL plant Nutrient Research Unit, Fort Collins, Colorado	Provide Assistance and complement efforts of the DNER to oversee the adequate use and protection of a vulnerable ecosystem,	2001-2003
Evaluation and Development of a plan to restore the mangrove area to the west and north of the Jobos Bay Reserve.	UPR Department of Environmental Sciences	Development of a plan for the environmental and vegetative restoration of the Black Sea mangrove.	2001-2002

Nonpoint source pollution

Nonpoint source pollution comes from diverse or diffuse sources that produce damaging or altering effects within a region or vast terrain. This means that a precise source can't be identified as the polluting source although it is clearly the product of human activity.

One of the most common polluting elements is nitrate. Due to this Jobos Bay initiated a program to study groundwater finding nitrate particulates in agricultural use wells. In this watershed we found high levels of nitrates, higher than 10mg/L. the EPA established limit as adequate for human consumption. While we still have not identified the sources of pollution, there are several research projects in coordination with the Reserve to be able to pinpoint them.

Nitrate is a toxic salt, very soluble in water, that is present in agricultural fertilizers and animal wastes. These salts are formed as a consequence of the meteorization of the cortex of the earth. One of the main characteristics of nitrate is its solubility, which makes it dangerous to human health for it remains in the soil until it reaches very high concentrations deposited in the watershed when it rains. This characteristic produces negative effects in the environment and upon human health. Scientists point out nitrate as one of the culprits in acid rain production and in the deterioration of the ozone layer. Some of the health hazards are: difficulty breathing, eye irritation, asthma bouts, miscarriages, infertility, development of nasopharyngeal cancer, cancer of the esophagus, cancer of the gastric tract, heart attacks and in some cases asphyxia. Nevertheless, according to the literature review, the most dramatic effects have been produced in breast-fed babies, less than six months old, who may suffer symptoms of the scianotic baby syndrome or developmental defects. Although at present this chemical substance has been found only in agricultural use wells, studies should not only be made for the agriculture industry, but there is also a need to determine other non point pollution sources in the watershed to be able to establish programs to reduce it. The Public

Health Department and the Aqueduct and Sewer Authority, being conscious of their responsibility and obligated to serve drinking water for Puerto Rico, are carrying out periodical sampling in drinking water wells showing that there have not found levels of nitrate in them.

For the Salinas population it is very important to take care of their aquifers since they depend on groundwater to supply their drinking water of which they need 3 million gallons daily. These waters are susceptible to pollution by nitrates due to their proximity to the surface and to the activities of the zone. In Salinas nitrate may come from several diverse sources such as: the agriculture and aviculture industries, the landfills, the inadequate disposal of solid waste, ill construction of septic tanks, and unplanned urban development. The broad scope of pollution sources reveals the necessity of a greater conscience in the use of the resources on the part of the citizenry, industry and the government. Let us consider that resources are scant and susceptible to being affected by decisions with respect to the use and management of the lands near watersheds. Nobody has anything to gain in degrading the resources. Nonpoint source pollution may destroy the beauty and the health of the clean waters, threatening beach close outs, fishkills and the death of ocean fauna, the drinking of polluted water and other problems of human and environmental health.

Federal and State Government Efforts to Reduce Pollution

Each year the federal government invests millions of dollars to help prevent and clean coasts damaged through nonpoint source pollution. In the United States nonpoint source pollution is a major water contaminant. In an effort to find solutions to the problem, the Congress of the United States expanded the Coastal Zone Management Act, approved in 1990 to include section 6217 titled "Protecting the Coastal Waters". NOAA and the Environmental Protection Agency (EPA), are the Agencies in charge of administering and coordinating the program requiring the states and/or

territories of the United States to approve and develop Coastal Zone Management Plans. With these goals in mind, both agencies produced a management plan that proposes a Strategic Plan of Five (5) and Fifteen (15) Years directed towards the implantation of measures with the object of diminishing non point source pollution in the Coastal Zone. The first year after the approval of this plan, Puerto Rico had to develop and demonstrate evaluation techniques that would evidence the capacity to implement the strategies. The plan proposed by NOAA and EPA, includes technical assistance, a process to continually identify critical coastal areas, development of additional management measures, and the continuous revision of the measures already applied to the critical coastal areas, a plan for the evaluation of the pollution extension with a long- range reduction of discharges and the improvement of the water quality. Puerto Rico must monitor the progress to make the necessary amends in order that the Plan is completely implemented within 15 years.

To evaluate the effective implantation, the procedures are periodically reviewed and the results achieved quantified through the plans established.

In accordance with this law, the state government has also developed a public policy directed towards the reduction of contaminant particles. In February 8, 1999, the acting governor, Pedro Roselló González, approved an executive order directed towards establishing the policy on the control of nonpoint source pollution in Puerto Rico's coastal zone. The ex-governor pointed out the commitment of the Government of Puerto Rico to utilize all available means and measures to promote the general well being, to create and maintain the conditions through which man and nature may exist in productive harmony, complying with the social and economic needs of the present and future generations. Through this Plan a committee was designated to Control Nonpoint Source Pollution, it was integrated by 16 government agencies among which are: the Environmental Quality Board, the Department of Natural and Environmental Resources, the

Administration of Regulations and Permits, the Department of Agriculture, the Planning Board, the Agricultural Experimental Station, the Agricultural Extension Service of the University of Puerto Rico, Soil Conservation Districts, the Health Department, the Milk Product Regulating Office, Department of Transportation and Public Works, the Highway Authority, the Ports Authority, the Electrical Power Authority, the Aqueduct and Sewer Authority and the Department of Economic and Commerce Development.

The principal function of these agencies is to evaluate the progress, and determine the obstacles in the implantation phase of the Plan. This report shall be ready for the year 2002. This executive order compels all governmental agencies to implement the Plan for non point source pollution in the coastal zone of Puerto Rico. It also disposes that a permit is necessary for any moving of contaminated soil or discharges, preliminary development, activities that may cause erosion, sedimentation, extraction of material from the earth's cortex, permits for the granting of franchises for water and the control of solid waste. The report also emphasize the need to educate and give technical assistance to the agriculture industry and other types of industries that may affect the coastal zone.

The government of Puerto Rico, the Department of Natural and Environmental Resources (DNER), the Jobos Bay Estuarine Research Reserve (JOBANERR) and the National Oceanic and Atmospheric Administration (NOAA) are obligated to implant the public policies that determine the adequate use of these critical habitats. As we have said, JOBANERR has been cooperating with other governmental and non governmental entities for the past two years to determine, in the first place the existence of nonpoint source pollution and secondly, the origin of the same. This second goal will take approximately five years in reaching.

Preventive Measures to Reduce Pollution
As we can see, there is public policy that obliges the agencies of the municipal, state and federal governments in their engagement of rehabilitating

and diminishing nonpoint source pollution in critical coastal habitats. Nevertheless the responsibility and the obligation must be supported by the community and in fact be made extensive to the citizenry as we depend on them to reach the goals of zero nonpoint source pollution. Everybody may cooperate in this process. The wells for agricultural use shall not be used for human consumption. Farmers could use compost instead of fowl wastes. Some farmers in the area already use irrigation practices through channels and retention pools. These practices should be imitated by other farmers in the area, due to the fact that irrigation by dropping prevents the water from being absorbed, and this provokes the diminution of the level of groundwater which in turn induces the rise in the concentration of nitrates per liter of water. Urban development should be planned. It is necessary to work more intensely to adequately dispose of our solid wastes, and above all, it is important to make adequate and prudent use of our coastal resources so that future generations may enjoy them, being a joint responsibility of municipal, state and federal authorities, and society in general, to preserve this natural resource and its quality. Each one shall be conscious of the role he/she plays in the search for solutions; public policies directed towards the eradication of nonpoint source pollution, the proposed research to identify its source and the ways its impact can be mitigated, need community collaboration. These efforts are the reflection of the future resource protection.

Three trails inaugurated

On April 9th and August the 4th, 2001 the ex-secretary of the Department of Natural and Environmental Resources (DNER) inaugurated three interpretative trails in the Jobos Bay Estuarine Research Reserve (JOBANERR). The inauguration activity included a walk through each trail. These trails, aside of opening a space for tourism, also provide the public a contact with nature, where they may learn about the essential elements of these habitats. There are three different projects that invite the public to carry out various activities: walk, swim or paddle.

The *Cayo Caribe Trail*, the principal inlet of a group formed by seventeen of them, has two trails: the main one is one kilometer long and another of just half a kilometer. The Cay is located approximately three and a half kilometers from the fishermen's dock in the Aguirre village. The visitor may closely observe the characteristics of mangroves and the vegetation typical of this ecosystem. It has a dock for landing visitors as well as anchoring buoys. This dock was constructed out of recycled-plastic wood. The tour through the cay is about 50 minutes long. The main trail is dedicated to Dr. Clara Mojica, who worked hard in the development of this project.

At the *Jagüeyes Forest Interpretative Trail*, the visitor may go bird watching to see resident and migratory birds that use this ecosystem, and also watch the transition of three types of vegetation that starts at the spiny secondary forest, and brings you to the mangroves. Bird watching is a passive recreation activity that offers the opportunity of knowing, appreciating and enjoying such a valuable natural resource. Birds constitute the most numerous group of the wild fauna in Puerto Rico, the Reserve being no exception. Aproximately 80 diferent species of birds are seen in JOBANERR. Through the walk on the Trail we get information about the birds, their habits, and the habitat surrounding them. Its extension is 1.5 km. Three resting huts are available. The time for the walk should be 40 minutes.

The *Kayak Route*, is an aquatic trail designed for those who practice this sport. It is the first one of this type in Puerto Rico. It has 9 stations with explanations on the surrounding natural resources. It also has resting areas where people may stop to explore, rest and eat. Through this trail the visitor may observe different types of birds, and get to see manatees.

Using this educational "system" the public feels compelled to visit the Reserve as well as obliged to preserve it. At present, we have received groups from the department of Education, from several post secondary institutions, foreign students that are carrying out research at JOBANERR, as well as the

general public. These trails also give the surrounding communities the opportunity to benefit economically developing business enterprises according to the activities that may take place, for example, renting kayaks and row boats.

The **Center at the Reserve** may offer educational conferences to groups, study visits to the Reserve and also passive recreation trips. These services must be requested with ample time to be able to make the necessary coordination. Likewise, the Visitor's Center may be visited all week long during the scheduled hours, and week ends from 9:00am to 12:00m, and from 1:00 pm to 3:00 pm.

The Reserve provides educational opportunities for the community

Unemployment statistics in Puerto Rico have risen up to a 13 percent index (13%). The situation that our country is undergoing since the past two decades, has been a motive of differences between the communities and people that try to protect critical natural resources, and it is sometimes understood that the latter are enemies to progress. In our country, environmental strife has two factors as common denominators, on the one hand, pressure exercised because of health reasons and on the other, the polarization of the trinomial health-environmental protection vs. work. This antagonism seems to have been surpassed at the Reserve, which is giving workshops geared towards training communities to develop businesses according to the objective of conserving the resource, at the same time generating employment.

During the month of August, Professor Juan Ramón González, offered a cycle of three workshops titled *Service to the Client for the Industry of Professional Hospitality*. In these workshops 20 people of the community participated, fishermen, housewives and workmen of the area's tourism industry. After three workdays, the participants acquired knowledge on the concept they have about themselves, their goals, the necessary elements to offer quality service to their clients, and skills to develop teamwork. These

workshops are part of a project whose objective is to develop ecotourism micro-businesses in the area, above all, directed towards offering rental of kayaks, boats and equipment, and to provide food for the visitors of the newly inaugurated trails.

These educational possibilities make it feasible for the community to participate in the labor market, which in turn promotes better quality of life, and turns them into actors of the development process of this national reserve. Through this training process, they also learn about the adequate management of the resources, also serving as teachers of the visitors and residents with respect to the conservation of the environment. This effort shows that it is possible to generate earnings to live, while at the same time protecting our natural resources.

Tying collaborative ties

The personnel that works at JOBANERR recognizes that the users of the resources, companies, and neighboring agencies, are essential to achieve the objectives. As part of a new strategy to close collaborative ties, the Reserve, during the months of August and September, sent hundreds of letters and informative material to private industry, governmental and municipal agencies. This way all are kept informed about the findings of the researchers, the teaching material available, and are stimulated to get involved in development activities to achieve a sustainable balance between the necessities of human beings, and their environment. If you wish to receive this valuable information and be part of the volunteer group that collaborates with JOBANERR, call: 1 (787) 853-4617.

The Spanish version of the Jobos Bay Research Reserve Newsletter was translated in to English by: María E. Font, Sea Grant Information Specialist