



Management Program for Conservation of Critical Coastal Ecosystems in Mexico: Santa Maria Bay. Executive Summary, March 2001

Villalba, Armando

2001

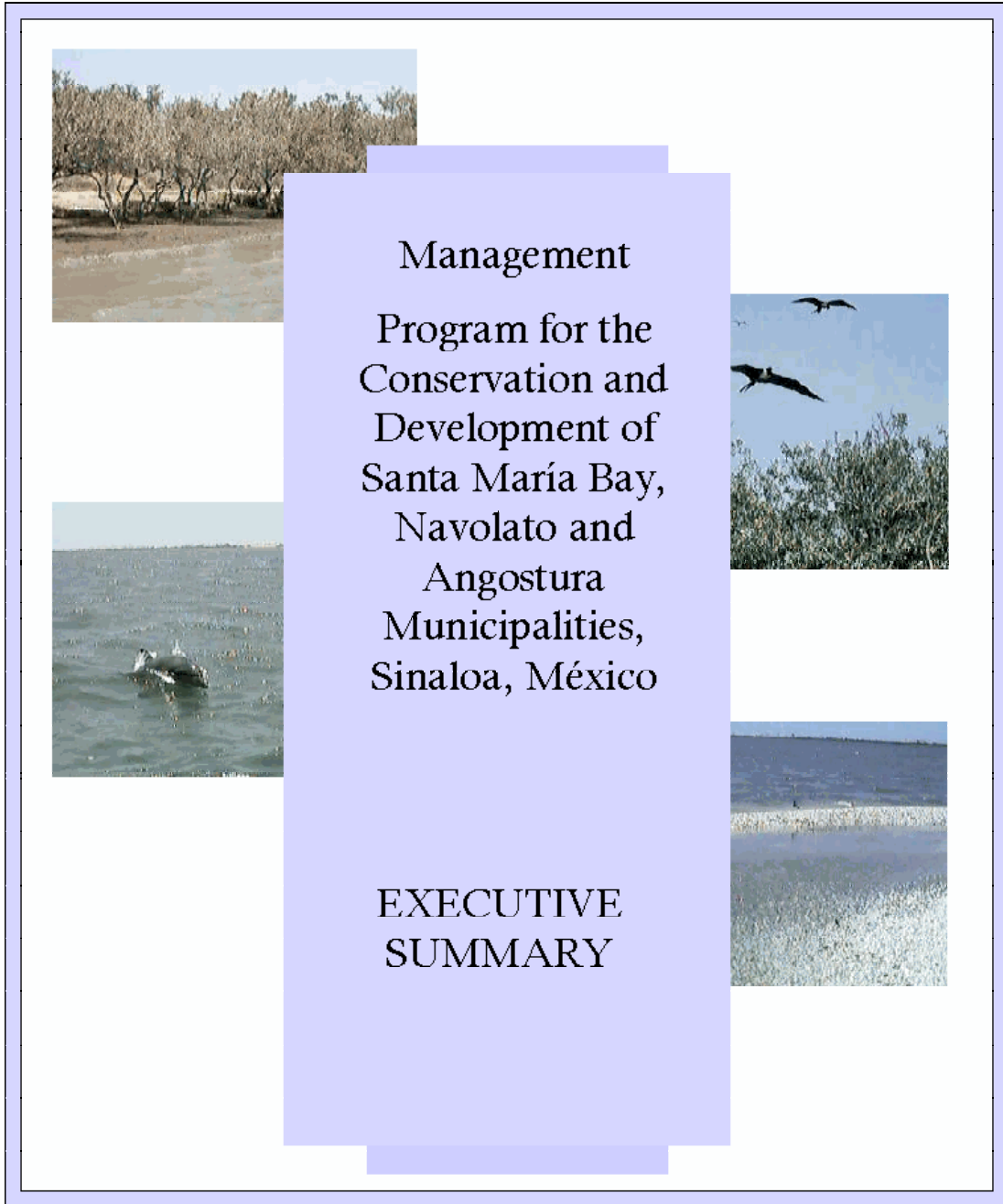
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This five year project aims to conserve critical coastal resources in Mexico by building capacity of NGOs, Universities, communities and other key public and private stakeholders to promote an integrated approach to participatory coastal management and enhanced decision-making. This publication was made possible through support provided by the U.S. Agency for International Development's Office of Environment and Natural Resources Bureau for Economic Growth, Agriculture and Trade under the terms of Cooperative Agreement No. PCE-A-00-95-0030-05.





**Management
Program for the
Conservation and
Development of
Santa María Bay,
Navolato and
Angostura
Municipalities,
Sinaloa, México**

**EXECUTIVE
SUMMARY**

March 2001

El November 1998, Conservation International Mexico A. C., the Universidad Autonoma de Sinaloa and the municipal governments of Angostura and Navolato, decided to evaluate the impacts that the developing shrimp farms were having on the mangrove forest and in the commercial fisheries of Santa Maria Bay.

After a working tour around the zone and a public reunion with fishermen and shrimp farmers of Angostura, it was decided to elaborate a proposal called:

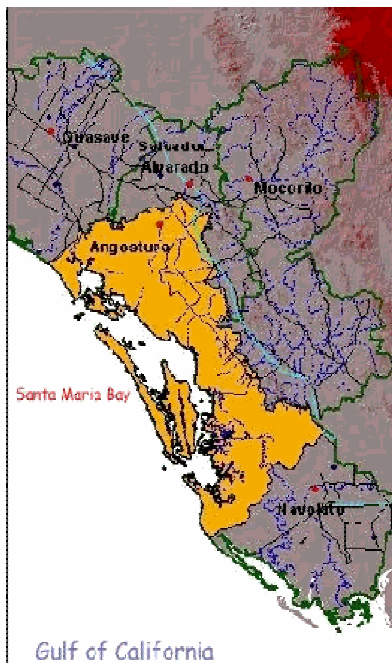
"Join Venture to Develop and Apply a Management Plan for the Conservation of the Coastal Wetlands in Santa Maria Bay, Navolato and Angostura Municipalities, Sinaloa, Mexico."



This proposal was approved for funding by the North American Wetlands Conservation Council (NAWCC) and the work started in February 1999.

Study zone: Santa Maria Bay

The application area of the Management Program for the Conservation and Development of Santa Maria Bay lies within the political boundaries of Navolato and Angostura municipalities. The Northern and Southern limits of the area are defined by the watersheds of Mocorito and Culiacan river, respectively.



In this study area, the main activity is agriculture, which covers most of the valley's surface, except for two mountain ranges called Sierra de Allende and Sierra El Tecomate, with heights of 350 to 400 meters, where native vegetation is still found. Santa Maria Bay is located in the lower part of the valley, with a water surface of almost 50,000 hectares. Fishing is practiced here and is the main source of income for five communities located along the Bay's shores. These are: Dautillos, Yameto, La Reforma, Costa Azul and Playa Colorado.

At the Bay's shores, in the tidal flats, behind the mangrove forest, there are almost 7000 hectares of shrimp farms. South from La Reforma the tidal flats of Malacatayá exist, where plenty of hunting activities take place, promoted by a hunting club called Patolandia. Farther south a group of farmers from Montelargo are mining salt from seawater evaporation in the tidal flats. Among the Bay's islands there are some which are more important because of their size: Talchichilte, Altamura and Saliaca Islands.



After the working tour of the area and the first public meeting with fishermen and shrimp farmers of Angostura, the participants recognized that the Bay is:

- An important source of resources to the local communities, the state and the country
- An important habitat for flora and faunal species.

Although its ecological richness, an increasing decline was identified regarding:

- Water quality and fresh water runoff
- Health of wild shrimp
- Mangrove forests
- Fish landings



Strengths and weaknesses in Santa Maria Bay.

Issues in the Bay.

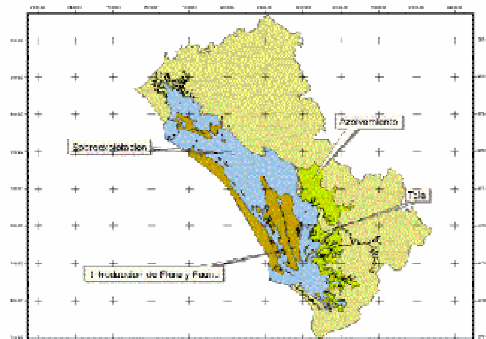
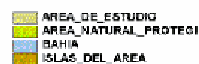
The statistics on the last decades showed a decline in:

- The productivity of some economic activities.
- The commercial landings of some fish species.
- The presence of the gray whale.

It was also evident the loss of:

- Identity of the fisherman with the water.
- Local traditions.

Bay's Problematic



The objective of the Management Program is the development of participative community management strategies to preserve the different coastal environments at Santa Maria Bay, so that the richness of flora and fauna on the region is preserved, specially the endangered species, and also to support the development of present and potential productive activities,

Specific objectives:

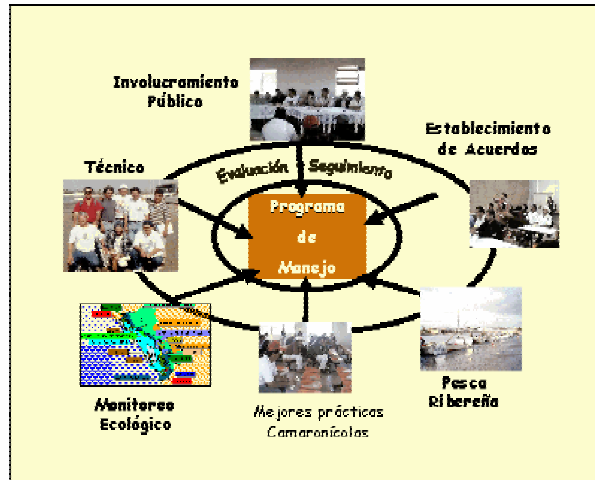
- Develop the local capacity for conservation of critical zones
- Promote low impact productive activities to reduce the pressure on overexploited or critical resources.
- Adopt good management practices, friendlier with the environment, in the ongoing economic activities.
- Promote the sustainable development of the Bay.



Objectives of the Management Program for Santa Maria Bay.



The conservation of the different coastal environments on Santa Maria Bay was stated not only as a goal to keep the rich flora and fauna of the region, a necessary factor for the preservation of endangered species, but also to support the development of present and future productive activities in the Bay. This goal gave place to a public involvement process that in turn became one of the factors that permitted the understanding of the importance of the management and preservation of the Bay's environment and its natural resources.

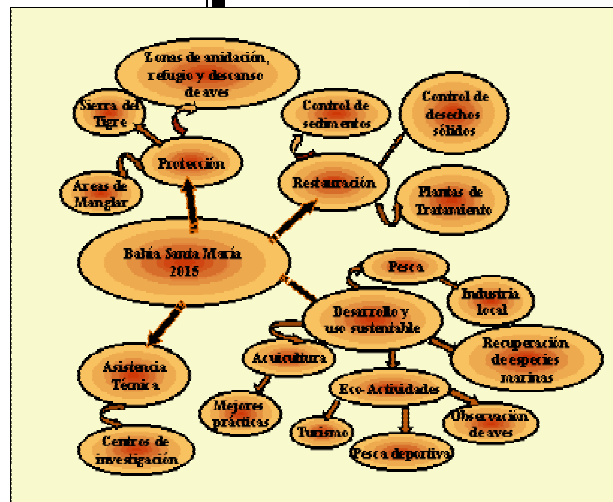


The public involvement workshops had the objectives of supporting the communities and stake holders in defining, in a joint effort, the main issues in Santa Maria Bay, under their actual use scheme, and to identify the potential alternatives for the sustainable management of the area, which resulted in an agreed Management Program. In two years time, 8 workshops were held in different communities around the bay, where the stakeholders:

- Identified the region's main issues.
- Discussed the planning needs from the stakeholders points of view.
- Analyzed other experiences in co-management.
- Identified the overall changes that occurred in the region in the past decades, what has been lost and what is at risk to be lost in the near future.

Public Involvement Process





The elaboration process of the Management Program for Santa Maria Bay has been dynamic, continuous and very participative. This process resulted in the vision of a shared future for the year 2015. A concertation exercise that has involved great effort and work from the communities, productive sectors, authorities and civic associations involved.

Vision for a Shared Future

To reach the planned future vision, certain conditions must be met:

- Improve and maintain the hydrodynamic conditions of the Bay with 3 of 4 meters of depth.
- Maintain the required water quality for supporting the fishing activities and the shrimp farms, defining the stocking capacity of the Bay.
- Improve the community's environmental education and provoke their participation in the Program.
- Assure that the communities around the Bay are the direct beneficiaries of the Program.
- Control the Cat Tail grass vegetation in strategic areas

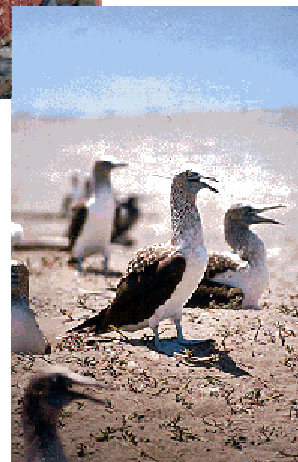


A fundamental element for achieving this desired future, relates to the construction of the Management Program with the possibilities of integrating this document with the different development plans in the region, with the policies regarding the use of the Bay's resources, the present and future land use policies.

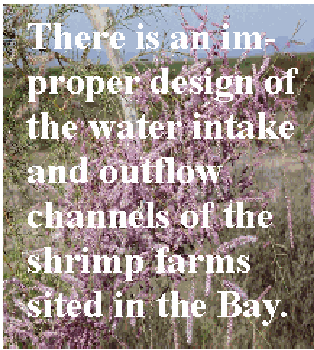
Another important aspect was to obtain necessary information to incorporate "Management Areas" as places with special sensibility.

These elements were established and discussed along the process and within the analysis of five management issues:

1. Hydrodynamic flow, sedimentation and fresh water runoff to the Bay.
2. Pollution and the decline of water quality.
3. Mangrove forests, Malacatayá tidal flat, El Tecamate and Allende sierras.
4. The productivity of fisheries and low impact aquaculture.
5. Santa Maria Bay Islands, included in the Natural Protected Area of the Islands of the Gulf of California.



Management Issues



Management Issues Profile



Hydrodynamic flow, sedimentation and fresh water runoff to the bay

The knowledge of the hydrodynamic flow in the Bay is of vital importance for planning and correcting the productive activities that use the bay's water and the water in the watershed.

The poor knowledge of the circulation patterns of the Bay, has allowed the discharge of residual waters from aquaculture, agriculture, industrial and domestic activities in areas with low circulation and high residence times, provoking the declination of the water quality and a generalized sedimentation process in the Bay. This has caused quite a few shallow areas around the Bay, obstruction of navigational channels, loss of fishing grounds, loss of breeding zones for commercial marine species and has resulted in an overall loss of fish production.

The general management strategy is based on technical studies for developing an hydrodynamic model of the Bay, so that it can be used as a tool to plan and correct the infrastructure that supports the productive activities.

Therefore the objective is:

- Reduce the sedimentation rate of the Bay.
- Maintain the bay's present water exchange rate with the open sea,
- Restore areas of ecological importance, strategic fishing and mariculture sites.
- Rehabilitate dredging channels.
- Define the most adequate zones for the discharge of domestic, agricultural, urban and industrial waters.
- Reduce the introduction of larvae of aquatic species to the pumping systems of the shrimp farms.

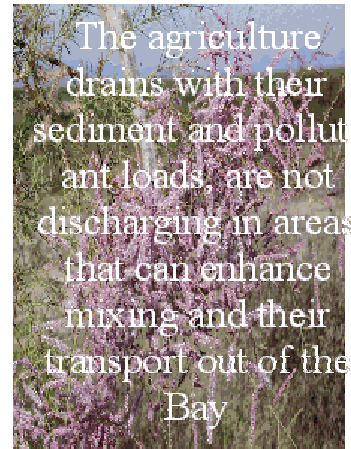
Short term actions (First year)

Conduct studies on the bathymetry, sediments, tides, water currents and winds in the Bay, in order to generate a computer model on the Bay's water circulation.

Promote, in government agencies, civic organizations, foundations, private companies, etc., funding for the technical studies that the Management Program requires.

Medium Term Actions (Years 1 to 3)

- Negotiate with the National Water Commission (CNA), the ecological fresh water budget for the Bay
- Promote with whom it may concern, that the future dredging of channels be made in accordance to the hydrodynamic model to reduce impacts.
- Concentrate and distribute the discharge waters of shrimp farms, agricultural, industrial and domestic activities, in channels discharging in high dispersion areas in the Bay with high mixing rates and low residence times.
- Design the shrimp farms water intake channels according to the appropriate hydrodynamic model, to reduce the larvae trapped by the pumping systems, and reinforce them with the usage of special net filters set up before the pumping areas.
- Promote the construction of sediment traps along the agricultural drains that reach the Bay.



Action Plan

Hydrodynamic flow, sedimentation and fresh water runoff to the bay

The total discharge from the agriculture drains, to the Bay is 250 billion cubic meters per year. 150 billion m³/year are discharged through estero El Tule.

Management Issue Profile



Pollution and the Decline of water quality.

The management of the water quality of Santa Maria Bay is a necessary condition to achieve in order to be successful in sustaining the fisheries production, develop shrimp and marine aquaculture farms and support the development of new economic alternatives of low impact, such as beach tourism and ecotourism, that will generate employment in the region.

Management objectives.

Maintain or increase the Bay's water quality in order to support the development of the fishing activity, the shrimp farms and to set the bases for the development of new low impact economic activities that will generate employment in the area.

Due to this, most of the management strategies proposed are focused to improve the agriculture and mariculture practices in order to have better use of the water, fertilizers and pesticides.

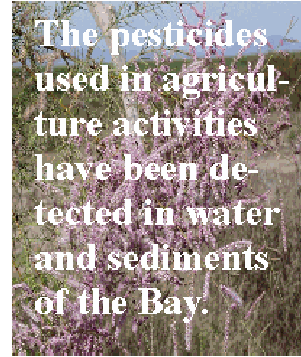
There are already State and Municipal programs orientated to promote good agriculture practices, so there's a need to work towards this goal. In the case of the shrimp farms, the Official Mexican Norm NOM-001-ECOL-1996 is applicable for the

control of waste water, but there's a low capacity of enforcing its correct application. Besides, there are no programs to identify and apply good practices for the use of the resources and to reduce the pollutant materials in waste waters. That's why the strategy and actions are focused on developing the capacity to design and implement a program in this regards.

Finally, there's a need to develop strategies to monitor indicators of the water quality in the Bay, that could serve as the base studies for new developments or new economic activities.

Medium Term Actions (Years 1 to 3)

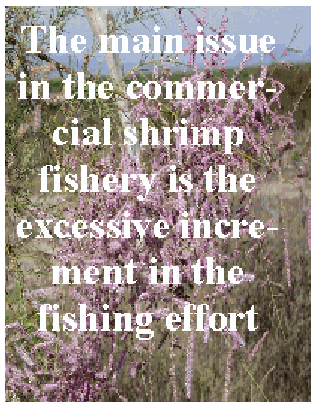
- Develop an hydrodynamic model and a nutrient balance model for the Bay, identifying sources and sinks.
- Collect agrochemical, fuel and lubricants containers in the agriculture zones and the fishing piers.
- Encourage good agriculture management practices (conservation farming, incorporation of the weed to soil, water re-usage, etc.) and good mariculture practices.
- Promote educational programs regarding the acceptance for the use of organic fertilizers in agricultural activities.
- Look for new alternatives in financial sources for the acquisition of equipment for the best use of water and agrochemicals.
- Support a program for irrigation prediction and plague prevention, for optimization of the use of water and pesticides.
- Promote in each community the control and treatment of every source of waste waters, by constructing water works, water treatment plants, oxidation ponds, etc.
- Create collecting stations or repository for stocking the plastic pesticide and fertilizer containers in each municipality.
- Develop strategies for offering economic incentives to support these collecting centers.
- Develop an education program, with fishermen as the target audience, to avoid the squid waste during December-April fishing period.



Action Plan



Pollution and the Decline of water quality.



**Management
Issue
Profile**

It's recognized that the actual fishing and shrimp farming activities are not the correct ones if they pretend to be maintained as a source of development for the Bay and its inhabitants.

The main issues are the excessive increase in the shrimp fishing effort, the fishing conflicts caused by the Official Mexican Norm Pesca-002, the inadequate fishing and aquaculture practices that have affected the breeding zones of various marine species of commercial importance, the lack or inadequate technical studies as well as legislation to administrate other resources beside shrimp, and a non controlled growth of the shrimp farms.



The strategies proposed are focused to increase the knowledge on the species and the consciousness in preserving them to support the fishing and shrimp farming activities; promote public discussions on

**Productivity
and Low Impact
Aquaculture**

the present legislation; adequate the fishing and shrimp farming practices to be friendlier to the environment, and establish criteria and local structures to support the adequate development on these activities.

Management objectives:

Short term actions (First year)

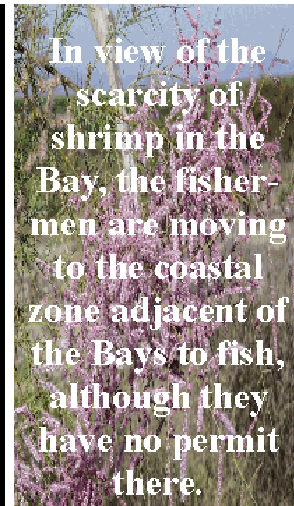
Elaborate a description and characterization of the Bay's fishing resources, identifying the need to generate important missing information. Sign agreements to join efforts in the search for funding sources for research projects to evaluate the state of the Bay's fishing resources and increase the capacity for enforcement of the fishing and shrimp farming legislation. Promote discussion forums around the NOM-Pesca-002 legislation. Evaluate the program's progress in controlling and reducing the fishing effort on the shrimp fishery.

Medium Term Actions (years 1 to 3)

Agree with the involved sectors mechanisms to construct a reliable data base on the fishing landings, which can be used to support future decision making in the Bay. Inform the results of the technical studies regarding the state of the resources and promote discussion forums concerning the possible actions and strategies for resources management and fishing activities. Promote agreements on continuous capacity building to make more efficient the enforcement, supervision and execution of the fishing and shrimp farming legislation. Encourage the development of activities such as ecotourism, sport fishing and beach tourism, so as to reduce the pressure on the fishing resources. Promote the development of pilot mariculture projects for some marine species of commercial importance, such as oysters, clams, scallops, shrimp in cages, etc. Negotiate with the authorities the leadership role of the Commission for the Conservation and Development of Santa Maria Bay (CCD) and define their part in assessing new projects and developments in the Bay so they comply with the results of the hydrodynamic and stocking capacity studies in the Bay.

Long Term Actions

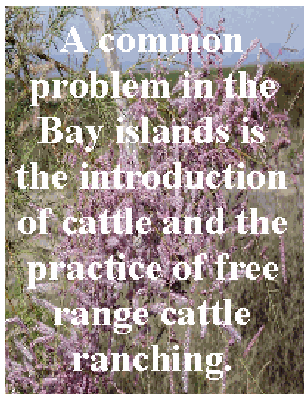
Create a local technical team that can constantly monitor the state of the fisheries and the physical and chemical properties of the Bay.



Action Plan



Fisheries Productivity and Low Impact Aquaculture



Management Issue Profile



Santa María Bay Islands

An adequate management on the Santa Maria Bay islands is necessary to accomplish the Bay's vision up to year 2015, as it is the wish to have Natural Protected Areas in good conservation conditions, to increase research and scientific education, and to promote alternative economic activities such as ecotourism and low impact beach tourism. The general strategy to achieve the previous ideas is the adaptation and application of the legislation developed on the Management Program for the Islands of the Gulf of California, where Santa Maria Bay Islands are included. This adaptation requires field activities and analysis workshops to identify usage, physical features, important natural zones and local necessities. The success of the strategy depends on building capacities for enforcement and

application of the legislation. So there's a need to establish inter-institutional agreements between the three government levels. The education and awareness building of the users to make them sensible to the islands issues are necessary actions for good island management. This implies:

Preserving the natural resources, specially the endemic, rare, threaten and endangered species, those with present or potential economic importance, and contribute to the protection of the communities and ecosystems that allow the continuity of the biological and evolutionary processes of the islands. Maintain and protect the genetic diversity on wild flora and fauna. Protect the breeding, feeding and resting habitats of many sea and shore birds, migrating, resident or the ones important to hunting activities. Encourage low impact economic activities that promote the conservation of the islands, such as ecotourism.

Short Term Actions (First Year)

Building awareness and diffusion about the presence and values of the islands.

- Elaborate a map with the main ecologic, cultural, archeological and paleontology sites of interest in the islands, promote diffusion activities regarding the values and issues of the islands and distribute to a wide audience the administrative legislating for usage of the islands.

Support of enforcement of present legislation

- Offer recognition to active people in preserving and protecting the islands. Enforce the application of the administrative legislation to control illegal hunting; have working agreements with the local fishermen for reducing the impacts of their temporary fishing camps; promote workshops and study tours to verify physical features, usage and natural zones of importance; encourage an island zoning project based on the methodology established by SEMARNAP.

Look for incentives for the preservation of the islands.

- Identify local businessmen and fishermen with interest for learning about ongoing low impact tourism projects in the islands of the Gulf of California, and have experts work with local communities in identifying opportunities and needs.

Medium Term Actions (Year 1 to 3)

Adaptation of the general legislation to the specific features of the islands.

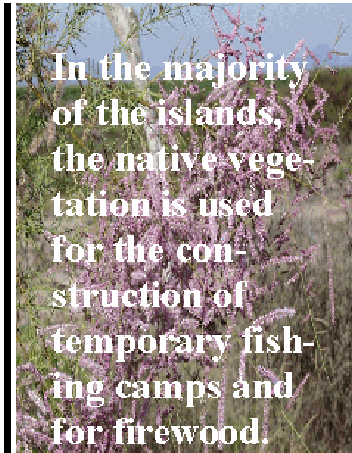
- Elaborate inventories, distribution maps of wild flora and fauna and define preventing actions to avoid the introduction of exotic species.

Enforcement of the legislation.

- Develop a capacity building program directed to the government agencies in charge of the Islands' supervision and the enforcement of the legislation.

To develop economic activities that promote the islands conservation.

Initiate actions to reduce the pressure and threats to the islands, including economic activities such as ecotourism.

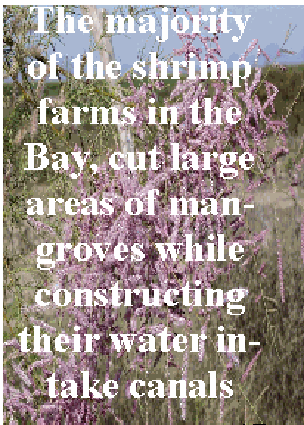


In the majority of the islands, the native vegetation is used for the construction of temporary fishing camps and for firewood.

Action Plan



Santa María Bay Islands



The majority of the shrimp farms in the Bay, cut large areas of mangroves while constructing their water intake canals

**Management
Issue Profile**



**Mangrove forests,
Malacataya tidal flat,
El Tecomate and Allende
Sierras**

The adequate management of these areas is the key for achieving three aspects of the vision for Santa Maria Bay shared future for year 2015: to have Natural Protected Areas well preserved; to have natural laboratories that increase scientific research and environment education, and to be the basis for supporting the development of alternative source of employment on low impact activities.

The mangrove forest areas are important as breeding and feeding areas of many aquatic species which are the basis of the bay fisheries and many of the coastal fisheries. Nevertheless, the extraction of lumber from these forests done by shrimp farms and local neighbors; the introduction of eggs and larvae of aquatic species by the shrimp farm pumps and the pollution caused by wastewater, are endangering the area. The tidal flat of Malacataya is of international importance

because it is part of the route for the migratory birds of North America, but the excessive growth of cat tail grass is endangering this habitat. There are also different activities going on in this area such as hunting, shrimp farming and salt mining, generating land usage conflicts. The mountains are islands with native vegetation, isolated by the agriculture develop-

ment. Different species of ecological, hunting and ornamental importance live there. The main issue is the growth of the agriculture zone that has provoked a reduction of the native vegetation in the sierras. The strategies and actions are orientated to solve this issue by coordinating efforts and resources to increase the surveillance capacity; applying and enforcing the ecological legislation; reaching agreements between the users and the government; developing research and environment educational programs and by promoting low impact economical activities which can reinforce the local consciousness to preserve these areas.

Short Term Actions (First year)

- Publish widely the Ecology Emergency legislation for mangroves.
- Establish agreements to increase the surveillance capacity, enforcement of legislation and its follow up.
- Search for funding support and develop a diffusion strategy regarding the values and importance of preserving specific sites (mangrove forests, mountains and tidal flats).
- Promote working meetings with fishermen and shrimp farmers by municipality to develop corrective measures for the impacts on the mangrove zones.
- Hold workshops for discussing and defining criteria for the development of activities such as hunting, mariculture, mining and for conservation of the tidal flat of Malacataya.
- Support research projects regarding the death of mangroves by drying (due to plagues and hydrologic changes) and the excessive growth of the cat tail grass (affecting the birds habitat).

Medium Term Actions (Years 1 to 3)

- Reach agreements with the State government to revise and support their actions to declare a Natural Protected Area in the Dautillos-Malacataya region, and also in the Allende and El Tecomate sierras.
- Join efforts with government officials and agencies to publish and promote the opportunities to develop low impact economic activities which will strengthen the local awareness for the protection of these sites
- Declare Natural Protected Areas or Units for Environmental Management (UMA) the hills around Dautillos and La Bandera



Action Plan



Mangrove forests, Malacataya tidal flat, El Tecomate and Allende Sierras