

### 3.2.1 Insufficient management activities of the RBRC office

#### 1) Information necessary for environmental management is not obtained

##### Existing research results are not integrated

Although high-level research and studies are carried out at various institutions, they are often not related each other. Geographical information is not overlaid on the site. This causes difficulty in systematic understanding of information obtained, and prevents proper decision of countermeasures.

##### Insufficient research

Scope of existing research does not cover all the subjects necessary for formulating sustainable environment management plan. Insufficient research subjects include: update of ecological inventories such as reproductive area, feeding area and rest area of animals, examination of sustainable yield of fishery resources, hydrology of “petenes” (isolated freshwater-origin forest or vegetation developed around springs occurring in mangrove swamp forest) around Ria (partly started by CINVESTAV) and social anthropology.

##### Insufficient monitoring

Environmental monitoring of the RBRC office is insufficient due to lack of manpower, technology and equipment. Monitoring system shall be strengthened in collaboration with relevant institutes and NGOs. Required monitoring subjects include: change of land use and geographical information, migratory population of important animals such as flamingo and turtle (partly started with NyC and PPY), water quality, tourism activity and fishery activity.

#### 2) Planning and executing capacity is insufficient

##### Insufficient ability to plan and implement management policies

Because of the short history of the RBRC office (established in 1998), relevant laws and regulations have not been reviewed well, and its management system has not been sophisticated. Collaborative activities with local governments, universities and NGOs have been introduced gradually, however, they are still insufficient. The RBRC office is required to improve those situations practically considering the social characteristics of Celestun community involving significant percentage of immigrants.

##### Insufficient ability to regulate illegal activities

There are many illegal activities pertaining to RBRC such as intrusion of hunter, animal poaching (particularly for deer and jaguar), cutting of mangrove and illegal fishing in and outside the Ría. Bird hunters enter RBRC not only from Celestun side but also from the neighboring El Palmar State Reserve where hunting is allowed by UMA. Although exploitation of wood for domestic use is allowed, there is no system to control over-exploitation.

Legal authorities of inspection and prosecution for those illegal activities are PROFEPA for overall activity and SAGARPA for fishery-related activity. Establishment of effective surveillance and regulation system of illegal activities shall be achieved in cooperation to those organizations.

Insufficient ability to create effective measures for sustainable use of natural resources

As indicated in the management program of RBRC, promotion of sustainable use of natural resources is one of the important measures to realize participatory conservation of the reserve. Existing activities such as traditional salt making, boat tour and fishery shall be re-examined from the view of sustainability. Local residents are expecting examination about new resource utilization measures such as Artemia culture, establishment of new UMAs (at present only one UMA on flamingo resources is registered), effective resource utilization in buffer zone, etc.

The number of tourists in 2000 is estimated to be about 40,000, which is double of that of 1998. A study of PPY indicates 60% of them are foreigners. Although RBRC would have sufficient capacity of tourists, it is required to examine the maximum capacity from the view of sustainability, and at the same time required to develop alternative eco-tourism in order to attract the interest of tourists as well as to improve their ecological knowledge.

Present ability of the RBRC office is insufficient to create the aforementioned effective measures for sustainable use of natural resources.

3) Adequate advice and technical assistance is not given against negative environmental impacts

Insufficient advice and technical assistance for environmental restoration work

Following restoration activities are now needed in RBRC.

- Reforestation of damaged mangrove (135 ha in Celestun village, and 3447 ha in Calkini Municipality) due to fragmentation of hydraulic environment by construction of main roads namely Federal Road No. 281 for Celestun and the State road between Tankche-Isla Arena in Campeche State.
- Rehabilitation of nature springs to conserve "peten".
- Reconstruction of the dykes which support the bridges over the Ria (both in Celestun and Isla Arena Villages), because the dykes prevent water flow of the Ria and elaborate sedimentation problems. These dykes are parts of the aforementioned two main roads.

The RBRC office has started small-scale nursery operation of mangrove using wild seeds, preparation of planting site (about 0.3 ha initially) in Celestun, and experimental

dredging of two damaged nature springs. Those activities shall be encouraged. At the same time, technical advice to mitigate existing environmental impacts caused by public works such as construction of main road and dyke for bridge shall be given by the RBRC office.

Insufficient advice and technical assistance for pollution generated by community

Following diagnostics are made about pollution generated by socio-economic activities of community in Celestun.

- Sewage:  
Only about 50% of households facilitate toilets, which means the people of the other households relieve themselves outdoors. This causes negative impact not only to the wetland ecosystem but also to sanitary conditions of the community. Common disease includes diarrhea, parasitic diseases, infectious diseases such as sexual transferable diseases and dengue fever. In 1997 cholera patients were discovered. PPY is currently supporting the construction of some ecological toilet as a pilot project.
- Garbage:  
According to the survey in 1994, a total of 600kg of garbage is dumped a day by people of Celestun and tourists. This problem is serious particularly for town proper and the southern part of the harbor. About 50% of households use their garbage for illegal reclamation of wetland. Illegal disposal occurs routinely. Tourists throw plastic garbage into the important ecosystem such as peten. There is only one garbage truck working in Celestún Municipality, which is insufficient.
- Illegal housing:  
Local people develop housing area by illegal reclamation and burned-clearance. In fact, vegetation of coastal sand dune areas has been largely burned and cleared in Celestún.

Those pollutions emerge serious negative environmental impact. The study by CNA in April, 2001 indicated high level of nitrate at the Celestún side of the bridge. Water quality of small lagoon and marsh in the village is under serious condition due to filling with solid waste.

In addition, there is a fear about unpredictable damage to natural ecosystem when forest fire or flood occurs, because examinations focusing on the negative effects caused by those pollutions had not been made.

Overall, proper advice and technical assistance against those problems are required as an activity of the RBRC office.

4) Environmental education is insufficient

In RBRC, environmental education has been carried out mainly by initiative of NGOs such as PPY, DUMAC and NyC. For example, PPY has prepared the Environmental Education Program for Conservation of RBRC in 2001-2010 based on the questionnaire survey to residents and local government. The survey indicates that local people and those engaged in local industry have not adequately recognized that conservation of natural environment provides sustainable benefit to them. It is required to carry out systematic environmental education not only for the residents but also for people engaged in tourism industry and increasing number of tourists.

### **3.2.2 Insufficiency of environmental measures in community development**

Quality and quantity of public works aiming at restoration and conservation of environment are largely insufficient presently. Shortly such public works shall be taken into consideration as: construction of adequate sewage treatment facilities, provision of garbage trucks, elimination of illegal housing, reconstruction of dykes supporting bridges, reconstruction of main roads to facilitate sufficient number of culverts, and so forth.

Major parts of those problems are described in the above section from the aspects of responsibility of the RBRC office, namely adequate advice and technical assistance. In order to realize implementation of actual public works, both federal and local governments shall take major responsibility from the view point of environmental friendly community development, although the RBRC office can support and implement some actual works.

### **3.2.3 Inadequate fishing operations**

Fishery and fishery-related activities are main income sources of residents in Celestun. Fish production of Celestun is estimated to be 6000-10,000 tons in 1992-1999, which is the second place next to Progreso municipality and corresponds to about 20% of the Yucatan State. Major target species are octopus and various demersal fishes, shrimps and lobsters. However, there are following problems to be solved for achievement of sustainable fishery.

#### **1) Fishermen do not keep fishing regulations**

More than 50% of Celestun fishermen are immigrants, mainly previous workers for Sisal hemp industry of Yucatan State which was collapsed in the mid 1970s. Since they are not traditional fishermen although new generation is increasing, they do not care about importance of fishery resource management. This is the fundamental social cause behind various illegal fishing activities such as violation about fishing ground, fishing season, fishing gear to be used, prohibited target fish species, etc.

Existing major fishing regulations are as follows.

- Octopus fishery, which is the most important in Celestun, is permitted only from August to December.
- Large-scale beach seine called “chinchorro” has been prohibited since 2000 because the fishermen did not follow instructions about mesh sizes, fishing frequency, etc.
- Shrimp fishery in the Ria is totally prohibited.
- Catch of the pink snail (*Strombus gigas*) and white snail (*S. costatus*) is totally prohibited.

2) There is a social conflict among fishermen

There is a social conflict between fishermen in Celestun (Yucatan State) and those in Isla Arena (Campeche State). Major reasons are intensive illegal fishing of Celestun fishermen undertaken in the Campeche State side such as shrimp fishing in the Ria and octopus fishing in coastal waters. In general fishermen of Isla Arena are traditional fishermen meaning they know reproductive characteristics of fishery resources and cannot stand for serious damage of the resources cause by illegal fishing of Celestun fishermen. Fishermen of Isla Arena appeal to PROFEPA and SAGARPA for strict apprehension of illegal fishing activities.

3) Sustainable yield is not calculated

Because of insufficiency of fishery-related statistics and relevant inventory survey, it is now difficult to calculate sustainable yield for coastal fish species. According to the RBRC office, resources of “lisa” (*Mugil cephalus*), “cayo de hacha” (*Atrina* spp), “mero” (*Epinephelus morio*), crab (*Menippe mercenaria*) and octopus (*Octopus maya*) are said to show overexploitation sign in addition to the snails and shrimps in Ria whose capture are already prohibited.

## Chapter4 Project Strategy

### 4.1 Overall strategy

Overall strategy for conservation of wetland ecosystem in Yucatan Peninsula is principally as follows:

- 1) To strengthen conservation measures of RBRL and RBRC, the two core reserves of the target ecosystem
- 2) To conserve coastal wetlands distributed in areas between RBRL and RBRC, and state wetland reserves around those two federal reserves, in order to achieve comprehensive conservation of wetland ecosystem in Yucatan Peninsula.

Based on the overall strategy, several projects have already been carried out as follows:



- Intensive supports from USAID and some international NGOs have been given to RBRL since more than 10 years ago, and fundamental management systems necessary for nature conservation are going to be established. On the other hand, for RBRC, official designation as biosphere reserve was made just recently in November 2000, and its management system is not well established comparing to that of RBRL.
- Regarding conservation of a series of wetlands between RBRL and RBRC, the Mesoamerican Biological Corridor Project has started by assistance of World Bank-GEF fund.

Considering the overall strategy and the progress of foregoing projects, this Project aims at conservation of natural environment and sustainable use of resources specifically for RBRC, which should be most demanded presently.

## 4.2 Project Strategy

### 4.2.1 Selection of the project

When objective analysis was undertaken with the core objective as "Conservation of wetland ecosystem of RBRC is improved", following three alternative approaches were indicated. **Annex 5** shows those approaches on objective tree.

- 1) Approach for strengthening capacity of reserve management office  
To improve project implementing capability of human resources and supportive facilities of the RBRC office
- 2) Approach for environmental friendly community development  
To carry out a series of necessary public works so as to solve directly present social problems (land use, garbage, sewage, etc) and to restore natural environment.
- 3) Approach for sustainable fishery development  
To realize fishery resource management program based on scientific examination and encouragement of community-base fishery activities

Comparative evaluation of those approaches was conducted as shown in the Table below, and the "Approach for strengthening capacity of reserve management office" was selected because of its urgency and appropriateness as a project of Japanese technical cooperation.

	1) Approach for strengthening capacity of reserve management office	2) Approach for environmental friendly community development	3) Approach for sustainable fishery development
Consistency with the scope of request	Agreed well	Agreed	Agreed
Priority from the aspect of conservation of wetland in Yucatan Peninsula	Very high and urgent	High as a specific local issue	High as a specific local issue
Contribution for conservation of overall natural environment in RBRC	High	High	Medium
Needs of local community	Medium	High	High

Possibility of achievement	High	Medium	Medium (long-term)
Project cost	Medium cost	High cost	Medium cost
Expected benefit through technical cooperation	Very high	High	High
Overall appropriateness as technical cooperation project	High	Medium (financial cooperation is more adequate)	Medium
Major organization responsible for project implementation	CONANP	Federal and local governments	SAGARPA

#### 4.2.2 Scope of the project and target area

Scope of the project is to strengthen capacity of the RBRC office through implementation of various conservation activities in line with the upper plan namely “the Management Program of RBRC” prepared by SEMARNAT (SEMARNAP at the time)/CONANP using properly input of both Mexican and Japanese sides.

The area of RBRC extends both Yucatan and Campeche States. However, since a lot of environmental problems are originated in Celestun municipality of Yucatan State and few such problems are envisaged in Campeche State as of now, most of the project activities are carried out in Yucatan State. It is remarked that if conflicts on fishery occur among fishermen of both States, they shall be mitigated basically by intervention of SAGARPA not SEMARNAT or CONANP according to differentiation of their mandate, although the RBRC office shall cooperate with SAGARPA for the solution.

#### 4.2.3 Collaboration with RBRL

It is important to link the management activities of RBRC and RBRL as indicated in overall strategy. Although the major project area is decided to be RBRC, foregoing experiences of RBRL will be able to apply for RBRC so as to realize efficient project implementation. From this viewpoint, the Project requires the staff of the RBRL office who work as counterparts for conservation activity of RBRC. The Project will be able to elaborate maximum impact for future integrated management of wetland ecosystem in all the Yucatan Peninsula through feedback of the experience of RBRC to RBRL and other nature reserves.

## Chapter5 Basic Plan of the Project

### 5.1 Project Purpose

The project purpose is set as “The RBRC office conducts comprehensive environmental management activities properly”. Target group is primarily

counterpart staff of the RBRC office and other relevant persons who work together with counterparts. Residents in/around RBRC will be benefited directly or indirectly through implementation of the Project. The PDM of the Project at the commencement of the Project is shown in Annex 6.

The important assumptions for achievement of the project purpose are decided as “Policy, structure and budget of CONANP are not changed largely”, and “Regulation of user’s fee is implemented”. The regulation of user’s fee for tourists of ANPs with aquatic activities has declared by the Federal Law of Rights but not implemented yet at RBRC.

Achievement of the project purpose will be monitored and evaluated by two indicators such as “Income of the RBRC office increases enough to support a proper office management” and “Approval of RBRC residents for the activities of the RBRC office is increased”. With enhancement of public awareness and positive evaluation of activities and output of the Project, present annual budget of the RBRC office (approximately 1 million pesos, not including salaries) is expected to increase 3 times by the end of the Project. Throughout the Project, more than 90% of activities of the RBRC office shall be recognized and approved by the residents and the basic conservation directions evolved in this Project shall be cited and implemented in community development programs particularly for those of Celestun municipality.

## **5.2 Overall Goal and Super Goal**

### **5.2.1 Overall goal**

The overall goal is defined as “**Conservation of wetland ecosystem of RBRC is improved.**” The RBRC management office, of which capacity will have been improved by this Project, will carry out continuous conservation activities so as to realize the overall goal. The office will be able to examine appropriateness of alternative project ideas by itself or in collaboration with networked resource organizations. However, there is a little threat which cannot be controlled by the Project, namely occurrence of large-scale natural disaster specifically hurricane, increase of fishing efforts and expansion of environmental pollution caused mainly by increase of illegal migrants. Those are indicated as important assumptions.

Indicators of overall goal are given for the three aspects, namely official registration as a site of Ramsar Convention, official registration as a site of Man and Biosphere (MAB) program of UNESCO, and acquisition of external funding for further enhancement of conservation activities. CONANP has ideas to propose RBRC for the Ramsar site as achieved in RBRL, and also to propose for a MAB site together with neighboring two reserves, i.e., Petenes Biosphere Reserve and El Palmar State Reserve, whose total area is approximately 414,516 ha. External funding can be proposed and obtained when comprehensive management system of the RBRC office is achieved.