REPORT OF THE STAP SELECTIVE REVIEW
OF THE PROJECT “SUSTAINABLE DEVELOPMENT
AND MANAGEMENT OF BIOLOGICALLY DIVERSE
COASTAL RESOURCES” OF BELIZE

[Prepared by the Scientific and Technical Advisory Panel (STAP)]
Report of the
STAP Selective Review of the Project
“Sustainable Development and Management
of Biologically Diverse Coastal Resources”
of Belize

Belize
March, 1998

Prepared by
The Scientific and Technical Advisory Panel (STAP)
Of the Global Environment Facility (GEF)

STAP Secretariat
United Nations Environment Programme
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**Acronyms:**

BAS: Belize Audubon Society  
CCC: Coral Cay Conservation  
CARICOMP: Caribbean Coastal Marine Productivity Program  
CZM: Coastal Zone management  
CZMA: Coastal Zone management Authority  
CZMSC: Coastal Zone Management Steering Committee  
DA: Data Analyst  
GEF: Global Environmental Facility  
GOB: Government of Belize  
ICRS: Institute of Coastal Resources Studies  
ICZM: Integrated Coastal Zone Management  
IUCN: The World Conservation Union  
MAF: Ministry of Agriculture & Fisheries  
MED: Ministry of Economic Development  
MNR: Ministry of Natural Resources  
MPA: Marine Protected Areas  
MRC: Marine Cabalash Centre  
MTE: Ministry of Tourism & Environment  
NPA: National Project Advisor  
NPPPs: Technical Cooperation Personnel of the Project  
PSs: Permanent Secretaries  
SCZ: State of the Coastal Zone  
STAP: Scientific, Technical and Technological Advisory Panel  
TPR: Tripartite Project Review  
UCB: University College of Belize  
UNESCO: United Nations Educational, Scientific and Cultural Organization  
WCS: Wildlife Conservation Society
I. Background and Project Setting

1. Belize is a small Central American country, with an area (including the cayes) of approximately 22,960 km$^2$.

2. The economy is based on agriculture, fisheries and increasingly on tourism, given the well-preserved nature of both its terrestrial and marine ecosystems. The reef barrier of Belize forms part of the second largest in the world and the largest in the Western Hemisphere and has been nominated a World Heritage Site by UNESCO.

3. GEF financing is available to meet the agreed incremental costs of measures to achieve agreed global benefits, and is thus additional to existing conventional development assistance and local financing. In the case of the Coastal Zone Management Project (CZMP), which covers the World Heritage Site of the Belize Barrier Reef, this means the incremental costs of achieving global biodiversity benefits that would be lost if the project were to focus on domestic benefits from tourism and fisheries only. The project has identified an urgent need to establish marine resources and biodiversity baselines and to monitor development in key indicators from this baseline in order to secure sustainable management of key marine species and habitats.

4. The extra costs of securing such measures are incremental in the GEF sense, and this includes capacity building of local experts and local institutions, the establishment of a domestic ownership to continue the globally important project activities, and the role model that the project may play for other GEF initiatives.

5. The STAP team composed of Dr. Jorge Soberón, Dr. Stein Hansen and Dr. Helen Yap went to Belize, had meetings with a number of local stakeholders and visited the main offices and field installations of the project (see VII and VIII below).

6. The STAP team recognized three important phases in this project:

   - A pre-GEF period, of about five years, where a number of local stakeholders (the Fisheries Department, the local chapters of the WCS and the Audubon Society) and international partners (IUCN, the WCS) developed the notion of a CZM project and its basic features.

   - The GEF phase, starting in 1993 and about to finish this year, in which the CZMP became a reality, with an undeniable effect in the raising of awareness, training of people, creation of links and partnerships and the beginning of the integration of the CZMP into existing Belizean institutions.

   - The post-GEF phase, where the main task will be the mainstreaming and sustainability of the objectives and aims of the CZMP.

7. In this Selective Review we will discuss the achievements and shortcomings of the project along its different phases. Also considered are the balances between the participation of local and foreign experts and capacity building in the country, from the perspective of the role of science and technology in the design and conceptualization of the program.
II. Origin and Design of the Project

II.1 History of the Design

8. Some detailed information on the CZMP and its development can be found in references (1) and (2). What follows is derived from the STAP interviews and readings.

9. The CZM Project arose from the need, perceived both by the Fisheries Department and a locally active NGO, the Wildlife Conservation Society (WCS), of creating and managing a network of marine protected areas (MPA’s).

10. By the late 1980s, an increased awareness arose in the country about the very large potential of the Belize coral reef (almost in pristine condition) for tourism revenues and for fisheries health. It involved the concern about the increased risk derived from the expansion of agricultural activities (citrus, bananas) that are intensive in agrochemicals and that could damage the reef.

11. In 1987 the reserve of Hol Chan was created, with full participation of the current National Project Advisor of the CZMP, Ms. Janet Gibson. The experience of creating the MPA of Hol Chan led to a workshop, organized in 1989 by the WCS in collaboration with the IUCN and with the participation of world experts from Australia and the USA, as well as of local interests like the Audubon Society, the WCS, and the University College of Belize. In this workshop, the need for creating a comprehensive network of MPA’s giving full consideration to influencing factors like agricultural run-off, fisheries and tourism was established.

12. Between 1989 and 1992, the WCS through its Belizean chapter began a literature search and the creation of a set of maps and acetate overlays that were to become the basis for the GEF proposal. In 1992, the New York office of the WCS learned about GEF and asked the Belize chapter to submit a proposal to GEF. The project was accepted and it is now in its final year.

II.2 Shortcomings of the Design

13. From reading the documents and from the interviews with Ms. Gibson and several government officers, the STAP team learned that, at the beginning of the project, a clear perception of the integrated nature of the terrestrial and the marine subcomponents of the ecosystem existed. It was also clear to the Fisheries Department that a set of MPA might have a role in maintaining the health of some fisheries. These two ideas clearly influenced the proposal of a major activity in the first version of the project [1] as “Monitoring and Research.”

14. The major weakness was in the relatively late mobilization of certain project components due to delays in the hiring of the appropriate individuals, the slowness in acquisition of essential equipment and other factors related to the flow of funds. A serious problem of understaffing also was identified which left critical tasks unfulfilled or caused major gaps in the scientific information being gathered.

15. The design of the project has solid scientific underpinnings. However, a factor that could distract from the effective delivery of outputs is the way in which the objectives have been formulated. The objectives are separated [3] and given equal weight eventhough they contain
scientific elements that are obviously interrelated and which would fit together better in a hierarchy of priority. The disadvantage of the current scheme is that subsequent efforts might be fragmented with poor interaction and integration. Therefore, a hierarchical approach to the scientific design of this project and similar ones might be more appropriate.

16. In a hierarchical approach, the first order of business would be to adopt a *landscape or ecosystem perspective* in scoping the project. Although this is indeed stated in some of the documents [1,3], the expression of objectives and goals do not reflect the hierarchy.

17. The next stage of activities would be composed of a comprehensive *mapping* effort, and the establishment of a monitoring system (more on this below).

18. The next level of priority would be the *establishment of the system of protected areas* both marine and terrestrial (in Belize this began at the beginning of the 1980s, but in a non-systematic way). The designation and location for the protected areas should ideally be based on some knowledge of the habitat and species they contain, the underlying dynamics and the interconnections among them and with other habitats via physical and biological processes (wind, currents, movements of adults, transport of larvae).

19. This leads to the final level, which is to establish the *research programs* on the fundamental species, processes and interactions of the whole system. The hierarchical scheme proposed is illustrated below.

(See next page)

![Diagram](attachment:diagram.png)

20. The scientific understanding that would serve as a basis for the design of a marine and terrestrial system of protected areas would derive from the habitat mapping effort as well as from the results of more specific research on critical ecosystem composition, structure and functioning.
21. Political, budgetary and other constraints might force the commencement of the above phases in a non-sequential manner. What should be borne in mind is the fact that their outputs must feed into each other in an integrated, hierarchical and dynamic way.

II.3 The Monitoring Scheme

22. In a project like the CZMP, the proper design of a monitoring scheme is vital. In accordance with the diagram in the previous section, the monitoring scheme should be based on an adequate understanding of the dynamics of the natural system. Such understanding would guide the identification of relevant variables, the choice of location for permanent monitoring stations and the time and density of sampling.

23. However, in a project like CZM that, as many others, start almost from scratch in a scientific sense, the design of the monitoring scheme is guided mainly by similarities with other systems as appeared in the literature. What this project must incorporate is a degree of flexibility to accommodate the new information that is generated, so that the monitoring scheme can be adjusted to adequately describe the system. Ideally, this should mean adding variables and sites. It is important to maintain the current efforts so as to be able to take advantage of the observations that are already accumulating.

24. In the present situation, the sampling frequency and design are very inadequate for the scope of the project. This can be attributed almost solely to the shortage of manpower and not to any incompetence on the part of the personnel.

25. Indeed, the number of monitored parameters must be increased to cover the whole suite of relevant physico-chemical variables. This includes the data of the climatological stations under responsibility of the Natural Resources Ministry. Biological processes are notoriously difficult to monitor over long periods of time and therefore will strain the human and budgetary resources of the project. Linking with other initiatives like CARICOMP to manage at least one monitoring point, or to ensure that the data of the Fisheries Ministry is made available to the CZMP, is vital.

26. Finally, since the field stations at both Glover's Reef and Turneffe Islands appear to be physically vulnerable to hurricane impacts, a system of timely retrieval of the data to a central station on the mainland must be devised to secure precious research efforts.

III. Balance Between Local and Foreign Expertise

27. Belize is a country with very limited scientific capabilities. There is only one university or college (University College of Belize), with a clear orientation to accounting and business. The Sciences department has just been created and the Biology career is currently in its second year of existence.

28. The Belizean Government has some Ministries like Tourism and Environment, Agriculture and Fisheries, and Natural Resources, with technical expertise on environmental issues, most to the level of B.Sc. and M. Sc. and a few with a Ph. D.

29. Of the locally active NGOs, a leading role was taken by the WCS, which had in its staff a Belizean with a B.Sc. in zoology, Ms. Janet Gibson, who has taken an instrumental role in
identifying and formulating the project and subsequently recruiting the local participants taking charge of key resource components.

30. Another NGO, the Coral Cayes Conservation (CCC), has staff with scientific training and several years of presence in the Country, but lacks a commitment to the training or the capacity building of Belizeans.

31. The local chapter of the Audubon Society has provided support and participated in the CZMP but lacks significant scientific capacities.

32. In a situation where local scientific capacities are largely lacking, the temptation on the part of aid agencies might be to rely almost entirely on foreign consultants for the design and implementation of a project like this one. The CZMP is unique in the predominant role that a few local experts assumed. However, external expertise was also included mainly via three mechanisms:

- Foreign consultancies for the terms of reference, broad design or partial implementation of certain subcomponents, like water chemistry and geographical information systems (GIS).
- Reliance on foreign institutions for cooperative research and training (for example, St. Mary's College, Maryland, the University of Sheffield, or Ecosur, Mexico).
- Allowing or even encouraging the young Belizean researchers and technicians to attend courses and obtain higher degrees in science.

33. Clearly the project is well on its way to achieve, or has achieved, full capacity in certain technical areas. Obvious examples are the manatee, water quality and GIS subprograms. An indicator that this is the case is the fact that the project is publishing their results in peer-reviewed international journals. On the other hand, there are other areas in which it is doubtful that Belize will acquire in the short-term the human capacities required for a full-fledged research program. An example of this may be the establishment of a full dynamic model of the metapopulation structure of the focal species (red snapper, grouper, spiny lobster, manatee, alligator) and the role of the no-take protected areas as sources of recruits. Another example is the development of predictive, dynamic GIS modeling useful for the assessment of the effects of land deforestation, pollution or of climate change.

34. The CZMP has obtained a remarkable balance between the extremes of total reliance on foreign experts and total autonomy. The control of the project has always been in the hands of Belizeans, and the degree of institutional expertise they have created will allow them to resort to external cooperation and know-how on terms of increased equality. However, it is unlikely that the CZMP will become totally autonomous in the short or medium term. This means that in the next phase of the CZMP, the three ways of strengthening the local capacities and involving foreign expertise that the project has already tried and that lead to this balance should be institutionalized and consolidated according to the new needs of the project.

35. The STAP team sees as one of the most important and delicate challenges for the future of the project to ensure that its foreign/local balance evolves in a way that is adequate to its
IV. Capacity Building

36. A striking feature of the CZM project has been the consistent search for local experts and undergraduates willing to join, on sometimes uncertain terms, learn from project work and then take a leave of absence to specialize and acquire scientific training and degrees of direct relevance when they return to the project.

37. A combination of factors has contributed to this success:

- A dedicated local team leader with a management and recruitment talent that has succeeded in hand-picking locals to fill posts that in many other cases would have been taken by expatriates.
- What seems to be a national pride and dedication to the growing awareness that the Belize coastal zone is a national heritage fundamental to the future well-being of the country.
- All the project positions filled with locals, often with no more than a B.Sc., impressed the STAP Selective Review team immensely with their scientific orientation and dedication as well as with their mature realistic outlooks for sustaining the project activities. Their interest in pursuing further science studies to be better qualified to come back and continue their work in Belize is strikingly encouraging.
- For the most part, the various governmental agencies and ministries involved have taken to the project, and the recent parliamentary decision to establish the CZM Authority and Institute as Statutory bodies with a core budget is strong evidence of national ownership and commitment to CZM. In the follow up to this act, it is crucial to convince the CZMA Institute board members that various forms of user-related revenue generation will be needed to expand the CZM activities to the level that is necessary for the fulfillment of its objectives and that is sustainable.
- As discussed in the previous section, the need for expatriate experts has been minimal, as a result of the active role of the local team leader. This approach has played a significant role in maintaining interagency tensions at a low level.

38. However, all the above notwithstanding, unless the young scientists can be given some assurances that there will be challenging career opportunities in CZM, they may lose patience and search for opportunities elsewhere, possibly abroad. It is therefore urgent to act now as far as revenue raising is concerned, and to put this activity in a mode that frees up the team leader's time presently devoted to fund-chasing for CZM-related research.

V. Ownership of the Project and Sustainability

39. Despite unavoidable problems and delays in implementation, the project has managed to put in place a crucial base for the intelligent management of Belize's coastal and marine resources. This base consists mainly of a group of talented, dedicated and comparatively youthful individuals together with the basic infrastructure required to manage several subprograms. If such a worthwhile effort is to be sustained, all decision-makers of the country, that is, the Government, the University, the public, the private sector (especially
those directly benefited like the Fisheries Associations and the Tourist Chamber) and the NGOs must provide long-term mechanisms to harness this talent and put it to good use.

40. This selective review has established revenue generation to be crucial for the continued success of the CZMP. Following the termination of GEF funding, conventional core funding from the Government and NGO contributions will not be sufficient to maintain the project in its new form as a CZM Authority and Institute. The creation of the CZM Institute, if able to maintain some degree of scientific and administrative autonomy, constitutes a very solid step towards sustainability of the project.

41. The creation of those statutory bodies provides the opportunity to raise revenue for project continuation by means, for example, of coastal-zone related user charges of various kinds. Such fund raising is strongly recommended by this STAP selective review because:

- It establishes a Government commitment that may increase the willingness of potential foreign donors to contribute to the maintenance of the CZM Institute.
- It provides transparency and autonomy as regards revenue spending.
- It provides a basis for early actions and rational decisions without being burdened by long-established bureaucratic procedures.
- It provides a better chance for retaining and/or attracting national experts and thus enhance human capital accumulation.
- The Belize Barrier Reef and Coastal Zone have unique features that foreign visitors (tourists as well as researchers) are prepared to pay for to enjoy. By charging them, Belize transfers this resource rent to the foreigners.
- Initial fears in the tourism industry that such user changes will drive tourists to other destinations appear poorly founded. One should first establish the ground rules and principles for such user charges and raise them gradually to maintain revenues.
VI. Conclusions and Lessons to be Learned

Early pre-GEF development.
Key role of local, committed scientists with management and human capacities.
Linkages and joint actions with all manner of interested stakeholders.
Support from outside Research Institutes.
Capacity Building.

Stronger Science needed, probably will be locally available only on the longer term.
Monitoring very weak.

Ideal scheme vs. reality

The CZMP appears to be a rather successful project relative to its complex scientific objectives. Its strengths can be summarized in the following points:

1. The CZMP has deep roots in locally defined and implemented programs that included both the Belizean Government and NGOs.
2. The participation of an international NGO with a local chapter facilitated through funding, expertise and contacts, the development of a strong basis for the CZMP and also the initial contacts with GEF.
3. There was a scientifically trained local person (Ms. Gibson), committed over a long period of time to the general aims of protecting the reefs of Belize and also capable of following the literature and adapt creatively from the experiences of advanced countries (Australia).
4. The design of the project, although in need of improvement, considered the main scientific factors.
5. The project leader has been able to attract a number of young and committed Belizean scientists and has also encouraged them to advance in their scientific education.
6. The balance between local and external expertise has been achieved to a remarkable degree. Most relevant local institutions participate at least to some degree and several foreign groups are also involved in joint efforts with the CZMP.
7. The CZMP is on its way to fully achieve Belizian institutionality through the existence of its Technical and Steering Committees and the creation of a statutory Institute affiliated to the University.

On the other hand, a number of problems were detected:

1. The design of such a complex program would probably have benefited from the full time participation of more experienced scientists.
2. The monitoring scheme is insufficient and poorly designed. For some relevant biological processes it is, and it might remain to be, impossible to achieve resorting only to local institutions.
3. The sustainability of the project appears to rely heavily on finding stable sources of revenue, maintaining some degree of independence from the Government and University College, and on consolidating the human resources and technical capacities.

For GEF, the lessons of this project are very valuable. Perhaps the most important one is that the proposal to GEF evolved from a number of local initiatives, that included a number of the major stakeholders and a few very committed and capable persons, and that took several years to
mature and crystallize. The CZMP is not a project imposed externally, despite the fact that many external actors were interested. It grew slowly, incorporating local talent as was available, but encouraging its growth and maturation and the respectful participation of external expertise as required or available.
## VII. Agenda and Participants

**STAP TEAM: DR. JORGE SOBERÓN, DR. STEIN HANSEN, DR. HELEN YAP**

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<tr>
<td><strong>Mon., 16th March</strong></td>
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<tr>
<td>1:30 p.m.</td>
<td><strong>Coastal Zone Management Project</strong>&lt;br&gt;Mrs. Janet Gibson, National Project Advisor.</td>
<td>8 St. Mark St. Belize City (Tel: 02-30719)</td>
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<tr>
<td>3:00 p.m.</td>
<td><strong>Fisheries Dept. Ministry of Agriculture and Fisheries</strong>&lt;br&gt;Mr. Noel Jacobs, Acting Fisheries Administrator</td>
<td>Princess Margaret Drive Belize City (Tel: 02-32623)</td>
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<td>4:00 p.m.</td>
<td><strong>Belize Audubon Society</strong>&lt;br&gt;Mr. Osmany Salas, Executive Director</td>
<td>12 Fort Street, Belize City (Tel: 02-34987)</td>
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<td><strong>Tue., 17th March</strong></td>
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<td>8:00 a.m.</td>
<td>Depart for Belmopan</td>
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<td>09:00 a.m.</td>
<td><strong>Ministry of Economic Development</strong>&lt;br&gt;Mrs. Yvonne Hyde, Permanent Secretary</td>
<td>MED, Belmopan (Tel: 08-22526)</td>
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<td>10:00 a.m.</td>
<td><strong>Ministry of Agriculture and Fisheries</strong>&lt;br&gt;Mr. Cresencio Sosa, Permanent Secretary</td>
<td>MAF, Belmopan (Tel: 08-22330)</td>
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<td>11:00 a.m.</td>
<td><strong>UNDP</strong>&lt;br&gt;Mr. Moises Cal, Program Officer</td>
<td>34/36 Garza Avenue Belmopan (Tel: 08-22661)</td>
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<td>12:00 noon</td>
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<td>1:30 p.m.</td>
<td><strong>Ministry of Tourism &amp; Environment</strong>&lt;br&gt;Dr. Victor González, Permanent Secretary</td>
<td>MTE, Belmopan (Tel: 08-23393)</td>
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<td>2:15 p.m.</td>
<td><strong>Department of Environment, MTE</strong>&lt;br&gt;Mr. Ismael Fabro, Chief Environmental Officer</td>
<td>10/12 Ambergris Ave. Belmopan (Tel: 08-22816)</td>
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<td>3:00 p.m.</td>
<td><strong>Forestry Department MNR</strong>&lt;br&gt;Mr. Richard Belisle, Chief Forest Officer.</td>
<td>MNR Belmopan (Tel: 08-22249)</td>
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<td>3:45 p.m.</td>
<td><strong>Ministry of Natural Resources</strong>&lt;br&gt;Mr. Lindsay Belisle, Permanent Secretary</td>
<td>MNR, Belmopan (Tel: 08-22630)</td>
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<td>Wed., 18th March</td>
<td>FIELD TRIP - Middle Caye, Glovers Reef &amp; Calabash Caye, Turneffe Islands</td>
<td>LV International Airport Via Helicopter</td>
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<td>9:00 a.m.</td>
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<td>Thur., 19th March</td>
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<tr>
<td>8:00 a.m.</td>
<td>Nicole Auil, Manatee Researcher</td>
<td>CZM Project</td>
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<tr>
<td>9:00 a.m.</td>
<td>Marine Research Centre, University College of Belize</td>
<td>University Drive West Landivar, Belize City (Tel: 02-32732)</td>
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<td>Mr. Philip Morgan, Director MRC</td>
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<td>10:00 a.m.</td>
<td>Coral Cay Conservation</td>
<td>CZM Project</td>
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<td>Mr. Jon Ridley, Director</td>
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<td>11:00 a.m.</td>
<td>Eugene Ariola, Chemical Oceanographer, CZM Project</td>
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<td>1:30 p.m.</td>
<td>Mr. Hugo Matus, Data Analyst</td>
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<td>2:15 p.m.</td>
<td>Mrs. Janet Gibson, National Project Advisor. (Wrapping-up session)</td>
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<td>Boat trip to visit the manatee site. Nicole Auil, Manatee Researcher</td>
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<td>CZM Project</td>
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VIII. Terms of Reference for the Visit

Due to the magnitude and complexity of the Belize project, the working group decided to undertake a Selective Review focused on the scientific, technical and technological contents of the project, from 16th to 19th March, 1998. The STAP team who will undertake the selective review is composed of: Jorge Soberón; Stein Hansen and Helen Yap.

The objective of the selective review is to assess:

1. The role of scientific and technical issues in the design and development of the project.
2. The relative role of local and external experts
3. The degree of success in the training of local experts and technology transfer
4. The design and implementation of indicators of success

The Team will undertake the review in the following areas:

A. Scientific, Technical and Technological Approach

   a) Relevance of the scientific, technical, and technological formulations to the objectives of the project
   b) Research needs identified
   c) Scientific bases of the indicators
   d) Data bases and mapping: Designs and implementation

B. Participation of foreign experts, advisors and administrators

   e) Role of the Government (Permanent Secretaries, Steering & Technical Committees) and other associate participants (NGO’s, Universities and Research institutions)
   f) Chief technical advisor co-ordination
   g) Involvement of the local communities in the projects' design, the planning process and its participation during the project
   h) Obstacles and constraints on the matter

A. Monitoring and Evaluation

   i) Efficiency of the interaction between foreign and local experts in the technology transfer, field assistance and technical outputs, and capacity building process
   j) Efficiency of the scientific components
   k) Efficiency of indicators (design and implementation)
   l) How the scientific objectives have been reached
   m) Effectiveness of marine and coastal resources' scientific research facilities
   n) National skills implemented
   o) Impact of these results on decision making

If appropriate, the role of traditional knowledge (influence and uses). The team will interview the Steering Committee, the relevant local institutions and the authorities.

IX. Acknowledgments:
Our most sincere thanks are due to many persons who helped us in the organization and during our visit to Belize for the STAP selective review:

To Teresa Bosques from Mexico; to Janet Gibson, National Project Advisor for the project in Belize; to Lita Papparoni, UNDP Regional GEF Coordinator in N.Y.; and to Anne-Marie Verbeken, from STAP Secretariat in Nairobi.

To Nicole Auil, manatee researcher of CZM Project who kindly arranged a boat visit to the manatee site.

To the British High Commission in Belize who kindly arranged for a British Army helicopter to transport us to Middle Caye, Glover's Reef & Calabash Caye, Turneffe Islands.

We are grateful to all those persons who met with us during the visit and shared their opinions and observations about this project.
X. Literature Consulted.