

**INTERNATIONAL TROPICAL  
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**Committee on ECONOMIC INFORMATION AND MARKET INTELLIGENCE**

**EX-POST EVALUATION REPORT  
ITTO PROJECT PD 194/03 Rev.2 (M)**

**Expanding and Improving Global Mangrove Database and  
Information System (GLOMIS) and its Networking (Japan)**

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Information System (GLOMIS) and its Networking (Japan)**

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## Executive Summary

### 1) Introduction

The purpose of ex-post evaluations is to learn lessons and to draw conclusions for future Projects. Ex-post evaluation of PD 194/03 Rev.2 (M) *“Expanding and Improving Global Mangrove Database and Information System (GLOMIS) and its Networking”* is particularly relevant, as the project has been the third and last phase of three succeeding ITTO projects with a total duration of six years.

The ex-post evaluation of PD 194/03 Rev 2 should reveal the relevance, impact and sustainability of the project. More in particular the evaluation should determine to what extent the project has contributed to strengthening the information exchange for networking on mangrove ecosystems between and among GLOMIS Headquarters and its Regional Centres and promoting the sustainable management of mangrove ecosystems globally for forest products, fisheries production and coastal water quality and stability.

In August 2008, ITTO has invited Mr. Erik Lammerts van Bueren, Netherlands to undertake the Ex-post evaluation. He directs a small bureau, ISAFOR, which advises policy makers and institutions on forest policy and management issues. The evaluation comprised a desk study of relevant documents pertaining to the project, and a visit, 13-17 October 2008, to the office of the Execution Agency and ITTO.

#### **Main problems to be addressed**

During Phases I & II of GLOMIS, the Regional Centres were not adequately resourced to carry out their respective mandates i.e. collect and screen data and information related to mangroves; enter the information, using a standardized format, in to the GLOMIS database; organize training programmes; encourage stakeholders to communicate and identify and liaise with mangrove management experts. Information exchange between the RC's had also not been well achieved. The database was mere a reference database without abstracts or full publications. Also, the lack of digital visual data such and maps, color photos and figures made the online database and the CD Rom less attractive.

#### **Project PD 194/03 Rev 2**

##### Development objective

To ensure that the mangrove ecosystems globally are managed and utilised judiciously for forest products like timber and fuel wood as well as the sustainable production of fisheries and the maintenance of coastal water quality and stability.

##### Specific objective

To strengthen information exchange for networking on mangrove ecosystems within and among Regional Centres and GLOMIS Headquarters (HQ). The specific objective was to be realized through five outputs.

##### Starting date and duration

The project started 1 June 2004. The anticipated duration of two years was budget neutrally extended with half a year until the end of December 2006, allowing for the completion of GLOMIS CD ROM III.

##### ITTO contribution

\$ 484 865

##### EA contribution

\$ 163 952

##### Executing Agency

The International Society for Mangrove Ecosystems (ISME) is an international non-profit and non-governmental scientific society, established in August 1990. ISME is a membership organization with over 900 members all over the world. ISME Head Quarter is located at the University of the Ryukyus in Okinawa, Japan. The Headquarters were supported by four Regional Centres in Brazil, Fiji, Ghana, and Malaysia.

### 2) Findings

#### Project outcome and impact

Overall, PD 194/03 Rev 2 (M) has been implemented with a high rate of efficiency and has resulted in an improved comprehensive and up to date Mangrove data base and information system. GLOMIS was still operating at the time of the ex-post evaluation, two years after the completion of the project.

The quality of the data base has been stepped up considerably by the third phase of the project, notably with respect to:

- the number and variety of data;
- the search possibilities;
- possibility to retrieve abstracts;
- attractiveness;

However the Project did not accomplish an additional feature to aggregate data on productivity and management or a specific window to store this type of information.

At the time of the ex-post evaluation the database provided impressive lists of people, institutes, projects and references. Evidence of the usefulness of the data base is, among others, provided by the ever increasing number (39,246 as of 10 November 2008) of hits on the website. However an analysis of users is not yet possible.

ISME is conducting training courses on a regular basis for scientists, policy makers and mangrove managers. To a modest extent, ITTO has financially contributed to these activities, through the implementation of GLOMIS phase III.

The Project Document describes the intended situation after project completion by five aspects. But little can be said about the impact of the improved database and the training and extension activities. Hard evidence and sound indicators are lacking, particularly with respect to the uptake of information by end users such as planning agencies and mangrove ecosystem managers and users.

What can be stated is that the quality of the data base has been stepped up considerably and that the Regional Centres and the communications between them and with the Head Quarter have been strengthened.

Since the inception of GLOMIS the information technology has evolved tremendously. Innovated and empowered search engines, such as Google, have made a wealth of information available to its users. Search on key words, including *mangrove*, results in thousands of results. Future development of GLOMIS should be considered in the light of this evolution in particular with respect to the reference data base.

#### Project design

The positive results of GLOMIS phase III have been achieved in spite of a flawed project design and a shaky logical framework. The development objective seems too general and too far away from the performance level of the project to serve as a basis for measuring the impact of the project. The specific objective is somewhat ambiguous. It is not clear whether *Networking* is merely confined to HQ and the RC's, or also includes stakeholders.

It is crucial that activities are sufficient and necessary to produce the outputs and the outputs are sufficient and necessary to achieve the specific objective. In this sense the vertical logic is sloppy. Some outputs have been formulated ambiguously and open ended other outputs comprise project management activities rather than deliverables of the project. Activities do not always support the outputs. Most of the means of verification, presented in the logical framework, resembled rather indicators than sources of information. Being short of the sources of information, where the value of indicators can be verified, little can be concluded as to the impact and outcome of the project.

Apparently the EA knew exactly what it wanted to achieve but failed to harness it in a sound project design and logical framework. This may have resulted in false expectations with the donors of the project, notably concerning the involvement of and uptake by end users. For projects like this it is difficult to measure the real uptake by endusers. It takes a well designed user survey to gain insight in the real impact.

#### Sustainability

Although GLOMIS is still operating its sustainability is at stake. Major problems are relative high costs, single funding source, lack of funds and consequently manpower. Also the limited content and the lack of a library function, as well as competing database are being considered as constraints. Necessary measures to secure continuation of GLOMIS at a adequate level include reduction of costs and integrating budgets in other ISME projects.

#### Organizational matters

Project organization was sound. The EA has signed a Memorandum of Understanding with each of the Regional Centres specifying the task and the budget of the RC. The responsibilities were clear and no redundancy in management and procedures has become manifest with the ex-post evaluation.

#### Financial matters

The Project document presents consolidated costs and breakdown of costs over the activities. The unit costs seem fair. The ITTO funds have been fully spent with only minor deviations from the budget components in the Project document. Progress reports were adequate, presenting budget expenditures per component, progress in realized outputs and executed activities, but no specification of expenses per activity, nor does the final Audit report. So it is hard to draw conclusions on the actual implementation of activities in relation to budgeted amounts, other than observing the outputs.

#### **Lessons learned, conclusions and recommendations.**

See main text sections 2.2 and 3.

## **Main Text**

### **1. Introduction**

#### **1.1 Background**

Ex-post Evaluation is the systematic and objective collection of information, on the spot assessment and analysis of the validity, design, appropriateness, performance and the impact of the Project after its completion, with the intent to establish the extent to which it achieved its objective, its degree of effectiveness and efficiency, as well as its sustainability. The purpose of ex-post evaluations is to learn lessons and to draw conclusions for future Projects.

At its Forty-first Session held in Yokohama, Japan from 5 to 10 November 2007, the ITTO Council endorsed the recommendation of the Committee on Economic Information and Market Intelligence to launch an ex-post evaluation of the completed project: PD 194/03 Rev.2 (M) "Expanding and Improving Global Mangrove Database and Information System (GLOMIS)" (Japan). GLOMIS was initiated in 1997 to consolidate mangrove data into a single database accessible to worldwide users. ITTO has provided on-going support to GLOMIS through a series of 3 projects. Phase III of the project, PD 194/03 Rev.2 (M) started June 2004. The Project has been implemented by the International Society for Mangrove Ecosystems (ISME), Okinawa, Japan.

#### **1.2. Evaluation scope, focus and procedure**

##### Scope and focus

The objective of PD 194/03 Rev.2 (M) is to strengthen information exchange for networking on mangrove ecosystems within and among the GLOMIS Regional Centres and GLOMIS Headquarters.

Ex-post evaluation of PD 194/03 Rev.2 (M) is particularly relevant for two reasons. First, the project has been the third and last phase of three succeeding ITTO projects with a total duration of six years. Secondly, ITTO has shown much interest and continued support for the conservation, rehabilitation and sustainable utilization of mangroves. The ITTO Mangrove Workplan 2002-2006 reflects its commitment to mangroves.

The Terms of Reference for the Ex-post evaluation focused the assessment, among others, on:

- the extent to which the general objective, the specific objective and the outputs of the project have been achieved.
- the impact and relevance of the project and determine to what extent the project has contributed to strengthening the information exchange for networking on mangrove ecosystems between and among GLOMIS Headquarters and its Regional Centres and promoting the sustainable management of mangrove ecosystems globally for forest products, fisheries production and coastal water quality and stability.
- the effectiveness of information dissemination of project outputs and assess the overall post project situation in relation to its impact on the global mangrove ecosystems, forest products from mangrove ecosystems, fisheries production, coastal water quality and stability, as well as the continued operations of GLOMIS Headquarters and Regional Centres and ISME.

The full Terms of Reference are presented in Annex I.

##### Procedure

In August 2008, ITTO has invited Mr. Erik Lammerts van Bueren, Netherlands to undertake the Ex-post evaluation. He directs a small bureau, ISAFOR, which advises policy makers and institutions on forest policy and management issues. Mr. Erik Lammerts van Bueren is well acquainted with ITTO and its project work and has worked on the revision of the ITTO Project Cycle Manuals and Guidelines.

After agreement between ITTO and the consultant, ITTO has informed the Executing Agency on the forthcoming evaluation mission. In close cooperation between ITTO, the consultant and the Executing Agency had worked out an efficient itinerary to execute the evaluation mission. The Assistant Director for Economic Information and Market Intelligence (EIMI), Mr. Amha bin Buang, has sent relevant project documents for examination by the consultant prior to his visit, 13-16 October 2008, to the office of the Executing Agency, ISME, in Okinawa Japan.

At the ISME office the consultant discussed various project matters with the Executive Secretary of ISME Prof Dr. Shigeyuki Baba, the Assistant Project Coordinators Dr. Mami Kainuma (Phase II and III until June 2005) and Ms Nozomi Oshiro (Phase III from July 2005) and the leader of the Regional Centre for South and South East Asia Dr. Chan Hung Tuck, Forest Research Institute Malaysia (FRIM). The presence of the leader of RC for South and South East Asia enabled a direct input from the side of RC's.

The team had prepared the visit of the evaluation mission well. The Executive Secretary of ISME presented the project. This was followed by various discussions with the complete team during the duration of the visit. Each of the team members was also available and willing to provide further input and support during the full duration of the mission. They provided additional documents which completed the information necessary for a thorough ex-post evaluation. The consultant gratefully used the workplace at the office which was offered to him.

Direct after his visit to the EA office in Okinawa the consultant has debriefed the ED, the Assistant Director EIMI and the ITTO project coordinator at the ITTO head office in Yokohama.

A draft evaluation report was sent by e-mail on November 4, 2008 to the EA for comments. After taking account of the comments of the EA the consultant submitted the report to the Assistant Director for Economic Information and Market Intelligence of ITTO.

## **1.3 Project facts**

### **1.3.1 Origin**

The suggestion to develop a global mangrove data base and information system was first made at the ITTO workshop held at Madras in January 1991. Workshop participants recognized that there was a substantial body of information and experience that could and should be used more widely. Unfortunately this information was scattered across many scientific journals and technical reports which are often unknown or unavailable to policy makers and coastal zone managers. At its inception, according to Project Proposal Phase I, it was understood that GLOMIS *“main objective will be to interpret and present the available information (quantitative, qualitative and inferential) in a way that allows planners to make informed decisions on site suitability for particular uses and the development of sustainable management practices for those uses, based on all the available information. Thus, its focus will be primarily to respond to the needs of coastal zone managers and decision makers”*.

However, during the discussions with the consultant for the ex-post evaluation, the project team argued that justification for the establishment of GLOMIS also was supported by the fact that a sound database would prevent scientists and researchers from duplicating efforts and missing existing information that otherwise would only be scattered available or not accessible.

ITTO recognizes that mangrove conservation and sustainable management depends to a large extent on the promotion of global information sharing and dissemination on mangroves. This recognition is entailed in the vision of ISME in building a database of all available information on the character, function, distribution, productivity and utilization of mangrove ecosystems.

This led to the implementation of ITTO/ISME Global Mangrove Database and Information System (GLOMIS) Project PD 14/97 Rev.1 (F), Dec. 1997-March 2001 (Phase I) and April 2001-March 2003 (Phase II). The main objective of the first phase of the project was to establish the database software and identify four institutes, in the most relevant mangrove regions, to serve as GLOMIS Regional Centres (RC's). The four Regional Centres were established in Brazil, Fiji, Ghana, and India. (The RC in India has been transferred to Malaysia for the implementation of phase III). The second phase focused on collecting and compiling various mangrove-related information scattered around the world such as published and unpublished documents and references, people and institutions, implemented and on-going projects into standardized format. The Regional Centres collected the data and transferred them to GLOMIS Headquarters in Okinawa, Japan. GLOMIS HQ aggregated and disseminated the information worldwide to disseminate to policy makers, coastal zone managers, researchers and local communities for sustainable management, conservation and restoration of mangrove ecosystems.

By the end of phase II the GLOMIS project had successfully accomplished to establish the reliable database on the Web (<http://www.glomis.com>).

### **1.3.2 Main problems to be addressed**

During Phases I & II of GLOMIS, the Regional Centres were not adequately resourced to carry out their respective mandates. This resulted, with some of the RC's, in poor staff remunerations and frequent staff changes and inability to cope with the quantum of work assigned to them. Information exchange between the RC's had also not been well achieved. Yet another problem was the scarcity of traceable information. Also, the database was rather a catalogue of mangrove information where numbers of requests were sent to Regional Centres and GLOMIS HQ for posting abstracts of the references. Finally the lack of

digital visual data such as maps, color photos and figures made the online database and the CD Rom less attractive.

### **1.3.3 Project PD 194/03 Rev.2 (Phase III)**

The Phase III proposal therefore aimed at making the Regional Centres more operational through adequate financing to fully achieve the GLOMIS objectives as outlined in the Phase III proposal. The project also intended to strengthen the existing channels of communication between the Centres and the GLOMIS HQ, to enhance effective networking, to add available abstracts to references and to include visual data and to enhance software to make the database even more user-friendly.

#### Development objective

To ensure that the mangrove ecosystems globally are managed and utilised judiciously for forest products like timber and fuelwood as well as the sustainable production of fisheries and the maintenance of coastal water quality and stability.

#### Specific objective

To strengthen information exchange for networking on mangrove ecosystems within and among Regional Centres and GLOMIS Headquarters (HQ).

#### Outputs

The anticipated outputs, as formulated in the Project Document were:

- capacity at each Regional Centre (RC) developed (output 1.2).
- Inter and intra-regional networks established and strengthened by each RC (output 1.3).
- new features in GLOMIS such as data on productivity of mangrove species and management of mangroves using digital, visual data and GIS. (output 1.4).

In addition two other outputs had been formulated:

- continuation of functional GLOMIS including database, newsletter, and Electronic journal with the latest information on mangroves (output 1.1.).
- efficient administrative network established (which in fact refers to the establishment and implementation of an efficient project organisation and administration (output 1.5)

#### Starting date and duration

The project started 1 June 2004. The anticipated duration of two years was budget neutral extended with half a year until the end of December 2006, allowing for the completion of GLOMIS CD ROM III.

#### Project Steering Committee (PSC) meetings and Midterm evaluations

The PSC met three times: June 3, 2004; April 26 2005; June 22, 2006.

Mid-Term evaluation by ITTO and ISME June 10, 2005. No external Mid-Term evaluation.

Reviewing Workshop with end users August 24, 2005, Kuala Lumpur Malaysia.

Evaluation Workshop confined to GLOMIS officers, June 23, 2006.

#### ITTO contribution

\$ 484 865

#### EA contribution

\$ 163 952

#### Executing Agency

ISME is an international non-profit and non-governmental scientific society, established in August 1990. ISME is a membership organization with over 900 members all over the world. ISME Headquarters is located at the University of the Ryukyus in Okinawa, Japan. The extremely dedicated ISME Secretariat is headed by the Executive Secretary, Prof. Dr. Shigeyuki BABA. The Secretariat comprises of four full-time staff members. ISME took over various initiatives and followed the lead given by earlier UNDP/UNESCO Regional Mangrove projects. Among other items, the Statutes of ISME indicate that "the Society shall collect, evaluate and disseminate information on mangrove ecosystems" and "promote international cooperation." On an annual basis the project portfolio of ISME is \$ 6 to 700,000. One of these projects is the Mangrove Atlas project (PD 276/04 Rev.2 (F))

During the GLOMIS project the Headquarters were supported by four Regional Centres in Brazil, Fiji, Ghana, and Malaysia with a mandate to collect and screen data and information related to mangroves; enter the information, using a standardized format, into the GLOMIS database; organize training programmes; encourage stakeholders to communicate and identify and liaise with mangrove management experts.

## 2. Evaluation

### 2.1. Findings

#### 2.1.1. Achievements of the Project

##### Overall achievement

Overall, PD 194/03 Rev 2 (M) has been implemented with a high rate of efficiency and has resulted in an improved comprehensive and up to date Mangrove data base and information system. GLOMIS was still operating, including the Electronic journal, at the time of the ex-post evaluation, two years after the completion of the project. During the implementation of the project 4 GLOMIS News letters were issued, but none has appeared since then.

The quality of the data base has been stepped up considerably by the third phase of the project, notably with respect to:

- the number and variety of data;
- the search possibilities, thanks to the developed data matching system which enables avoiding duplications in the data base and data entry system which, together with the extended keyword list, contributes to more smooth and targeted search possibilities;
- possibility to retrieve abstracts, thanks to the developed software which links reference titles to abstracts with journal publishers.
- attractiveness, which is being enhanced by the use of digital visual data, which in turn was partly enabled by the rapid development in digital storing and transmitting capacity.

The substantial increase in the number of data from 7300 to 8,500 for Phase III reflects the successfully strengthened capacity of the Regional Centres. At the time of the ex-post evaluation the database provided impressive lists of people, institutes, projects and references. GLOMIS is particularly unique in identifying and bringing together so called grey literature and providing a facility, through its Electronic Journal, which stimulates students and young scientists to publish.

Evidence of the usefulness of the data base is, among others, provided by the ever increasing number of hits on the website. Average was about 15 hits per day during Phase III. After the completion of Phase III, the number of hits was increased to 20 hits per day. Unfortunately the source of the hits can not yet be identified. Thus a user analysis is lacking.

GLOMIS showed to be more than just a unique database. ISME is conducting training courses on a regular basis for, scientists, policy makers and mangrove managers. Part of the training program is a course Formulation of a Mangrove Action Plan, directed at mangrove ecosystem managers. To a modest extent, ITTO has financially contributed to these activities, through the implementation of GLOMIS phase III. Besides these training activities, GLOMIS direct outreach to end users was limited to one workshop in Kuala Lumpur, Malaysia, August 2005.

The Project Document describes the intended situation after project completion by five aspects. But little can be said about the impact of the improved database and the training and extension activities which were sponsored by phase III. Hard evidence and sound indicators are lacking, particularly with respect to the uptake of information by end users such as planning agencies and mangrove ecosystem managers and users.

Since the inception of GLOMIS the information technology has evolved tremendously. Innovated and empowered search engines such as Google have made a wealth of information available to its users. Search on key words including mangrove results in thousands of results. Future development of GLOMIS should be considered in the light of this evolution in particular with respect to the reference data base.

The positive results of GLOMIS phase III have been achieved in spite of a flawed project design and a shaky logical framework. Apparently the EA knew exactly what it wanted to achieve but failed to harness it in a sound project design and logical framework. This may have resulted in false expectations with the donors of the project, notably concerning the involvement of and uptake by end users.

##### Realized versus planned Objectives and Outputs

The EA states in its completion report that the specific objective and all outputs have been accomplished. However the specific objective and outputs 1.2 and 1.3 have been formulated so ambiguously and open ended that in fact they do not provide a solid basis for such a statement. Output 1.4 is *new features of GLOMIS such as database on productivity of mangrove species and management of mangrove*. Though the reference database and the Electronic Journal may include items on these topics, there is no

additional feature to aggregate data on productivity and management or a specific window to store this type of information. Output 1.1 is the mere continuation of GLOMIS and output 1.5 is the management of project phase III.

What can be stated firmly is that the quality of the data base has been stepped up considerably and that the Regional Centres and the communications between them and with the Head Quarter have been strengthened.

#### Impact and effectiveness

The project has been implemented without unexpected effects and impacts neither harmful nor beneficial. IT technology continued to develop fast during phase III, but this was not unforeseen.

The Project Document describes the intended situation upon project completion. Taking that description as a reference, the following observations can be made.

- GLOMIS has been enhanced and made more valuable to potential users especially under- and post-graduate students. This has been achieved by adding more current references to the GLOMIS references slot, the linkage of references to abstracts of journals and visual data in a new slot.
- The expected role, after project completion, of each GLOMIS Regional Centre as a reference point or a library facility stocked with available published and unpublished data on the distribution and productivity of mangrove species and major mangrove forest types worldwide has proven too ambitious. At the time of the ex-post evaluation the Centres were understaffed and the library function was very limited. However, some RCs continued submission of data entries and publications after the completion of GLOMIS.
- Information exchange and networking has been increased during project implementation.

Progress Reports refer to activities of the Regional Centres during project implementation such as: presenting papers at conferences; distributions of CD Rom's to scientific institutes and government organizations; giving lectures (Brazil) to small fisherman and aquaculture producers; requesting experts to contribute to the Electronic Journal; reviewing existing data on Brazilian mangroves for the FAO inventory.

Further more various training courses have been executed during and after project implementation. JICA has been organizing and ISME has been implementing mangrove training courses annually since 1995. With the commencement of GLOMIS in December 1997, these training courses have included GLOMIS into the syllabus as one of the lectures. Most training courses took place in Okinawa and Iriomote Islands.. Subjects were *mangrove ecosystems and sustainable management, identification of mangrove species, mangrove plantation techniques, various case studies etc.* The training courses have been directed at various target groups such as mangrove managers, environmental conservationists and even school children. Participants came from a variety of countries.

- In the absence of strong outcome indicators, the above mentioned activities, in combination with the increasing number of hits on the website, indicate to a certain extent the accomplishment of the objective that:
  - targeted stakeholders in mangrove growing areas have increased their abilities to perform core functions, to provide necessary information to solve problems, and define objectives in relation to mangrove ecosystems conservation, sustainable management and rehabilitation.
  - targeted stakeholders in mangrove growing areas have increased their ability to understand and deal with their mangrove-related development needs in a broad context and in a sustainable manner.

#### Sustainability

The Project document features a chapter *Future Operations and Maintenance of GLOMIS* (Part III 3).

It states "*For the long term the database should be self maintained and also each Regional Centre should be independent and self supported as a focal point for information on mangroves*". Several suggestions are being made to reduce costs and generate revenues.

A GLOMIS Futures Workshop was held in June 23, 2006 in Okinawa to implement activity 1.4.6 *Hold evaluation meeting to evaluate the achievement of GLOMIS project and discuss the future of GLOMIS*. At this meeting a SWOT analysis has been executed. Threats were identified e.g.:

- lack of funds and consequently manpower,
- competing databases on biodiversity.

Weaknesses were e.g.:

- relative expensive,
- single source finance,
- limited content and no library function.

To address the problem of lacking funds and relative high costs, the workshop generated various suggestions.

- 1) Reduction of the number of Regional Centres from four to two. This option is endorsed by the GLOMIS and ISME board. Regions such as Oceania and Africa, where mangrove scientists are few and where communication is difficult should be given priority.
- 2) Relocation of the Head Quarters and server from Japan to a less expensive country. This options has been rejected as much of the success of GLOMIS and its interface with ITTO rests in the efficiency of the Japan office.
- 3) Reduce the project operations. (Here seem to be possibilities. The cost of the server can be reduced and full time staff at HQ could be limited to one person).
- 4) Cost recovery through charging for the use of GLOMIS. This was not considered to be a realistic option. Majority of individual stakeholders in developing countries are not able or willing to pay for these services.
- 5) Build the cost of running GLOMIS into every project that ISME runs. This seems a feasible option.

In addition, the Executive Secretary of ISME has approached various private companies for financial support, so far without success.

## **2.1.2 Project efficiency and operational aspects**

### Project planning and duration

Phase II was completed January 1, 2004. The completion report of phase II was submitted to ITTO on May 30, 2004. The Project Agreement for Phase III (PD 194/03 Rev. 2) was signed February 9, 2004. The official starting date of Phase III was June 1, 2004. The first installment from ITTO arrived on June 4, 2004. The late arrival was caused by a delayed submission of the YPO by the EA. ISME had to bridge five month between Phase II and Phase III during which it paid the fee for the server. The project duration was 2 years with a budget neutral extension to December 31, 2006 allowing for the completion of GLOMIS CD ROM III.

### Project organization

Project organization was sound. The EA has signed a Memorandum of Understanding with each of the Regional Centres specifying the task and the budget of the RC. The responsibilities were clear and no redundancy in management and procedures has become manifest with the ex-post evaluation.

Staff at the Regional Offices had to be trained during the implementation of the project. It would have been more efficient if the staff would have been trained before the start of the project.

During phases I and II a number of organizational and staff changes had taken place:

- The RC for South and South East Asia was relocated from M.S. Swaminathan Foundation in Chennai, India to the Forest Research Institute Malaysia in Kepong, Malaysia (end of GLOMIS Phase II, December 2003)
- Project coordinator; Dr. M. Vannucci, India, Japan, Brazil (Phase I), Prof. L.D. de Lacerda, Fortaleza, Brazil (Phase I), Prof. Chris Gordon, Accra, Ghana (Phases II and III)

During phase III the following staff changes deemed necessary and took place with permission of ITTO:

- RC for Africa; The staff assistant was changed from Mr. Jessi Ayivor to Ms. Matilda Bissah in December 2004.
- Head Quarters; the assistant coordinator Dr.Mami Kainuma (Phase II and III) became coordinator of the Mangrove Atlas project (PD 276/04 Rev.2 (F)) and was replaced by Ms. Nozomi Oshiro. The webmaster Ms. Sumie Watanabe resigned and was replaced by Mr. Daisuke Nakamura. Both changes took place in March 2005.

### PSC and TAC

The Project Steering Committee (PSC) met three times. Recommendations of the PSC have been followed up. At its first meeting, June 3, 2004, the PSC decided to establish a Technical Advisory Committee (TAC) composed of honorary members from both consumer and producer countries.

The tasks of the TAC were monitoring progress; carrying out peer-reviews of documents for the electronic journal providing inputs to GLOMIS and comments on its development. This provision has had a modest positive effect on the substance and quality of the outputs of the project. For instance the present upgrading, which provide access to abstracts through the linkage to publishers of journals, was suggested by the TAC. The on-line linkage and other improvements such as the visual display and ease of access were tested by seeking the views of several TAC members.

#### Financial matters and reporting

The Project document presents consolidated costs and breakdown of costs over the activities. The unit costs seem fair. Three Yearly Plan of Operations (YPO) were submitted, respectively for the period June – December 2004, year 2005 and January-May 2006. The plans contain a consolidated budget for each period, but they present no breakdown of costs over the anticipated activities for that period.

The first Progress report was submitted in August 2004 and followed by four progress reports in March and August of 2005 and 2006. They were adequately presenting budget expenditures, progress of realized outputs and executed activities, but no specification of costs per activity.

According to the final Audit report, the ITTO funds have been fully spent with only minor deviations from the budget components in the Project document. The final Audit report does not provide insight in the actual division of resources over activities. So it is hard to draw conclusions, other than observing the outputs, on the actual implementation of activities. For instance, the Planning workshop, activity 1.4.1 with a budget of \$ 56,610 was held in conjunction with the sixth General Assembly of ISME in August 2005 in Kuala Lumpur, Malaysia. The latter was paid for by ISME from a separate budget. One would have expected a Planning workshop at the beginning and not half way through the implementation of the project. In addition an Evaluation workshop was held on Iriomote Island in June 2006. While the financial accounts do not provide insight in the actual expenses of activities, the project staff mentioned that expenses for both workshops, paid from the budget of activity 1.4.1, were \$ 22,811 and \$ 29,750 (for participant travel) and \$ 2,133 and \$ 2,120 (for miscellaneous) respectively, totaling \$ 56,814. The balance (\$ 204) was covered by ISME.

#### **2.1.3 Process of Project formulation**

##### Stakeholder involvement during the identification and during the implementation of the Project.

The project has been built on the results of two proceeding projects. Shortcomings and opportunities considered by the Head Quarter of GLOMIS have been the basis for the formulation of project phase III. A structured consultation with actual and potential end-users has not taken place during the formulation of the project. Therefore the project design has not benefitted from a potential input of these stakeholders.

It is difficult to say to what extent this has resulted in a less than optimal sense of ownership over the Project and commitment of stakeholders to participate in the project.

The only structured consultation of (some) stakeholders took place during the GLOMIS Workshop that was organized in conjunction with the sixth ISME General Assembly and Tsunami symposium, 24 August 2005, Kuala Lumpur, Malaysia. This was half way through the implementation of the project.

##### Appropriateness of the Project design

The project design has been very weak compared to the actually realized output and outcome of the project.

The development objective, *to ensure that the mangrove ecosystems globally are managed and utilised judiciously for forest products like timber and fuelwood as well as the sustainable production of fisheries and the maintenance of coastal water quality and stability*, seems too general and too far away from the performance level of the project. Therefore it hardly can serve as a basis for measuring the impact of the project. The specific objective, *to strengthen information exchange for networking on mangrove ecosystems within and among Regional Centres and GLOMIS Headquarters (HQ)* is somewhat ambiguous. It is not clear whether *Networking* is merely confined to HQ and the RC's, or also includes stakeholders. The networking has certainly been strengthened within GLOMIS. Not much evidence supports a strengthened network with stakeholders.

##### *The vertical logic*

The vertical logic refers to the consistency between project elements, i.e. specific objective, outputs, and activities. It is crucial that activities are sufficient and necessary to produce the outputs and the outputs are sufficient and necessary to achieve the specific objective. In this sense the vertical logic is sloppy. Output 1.1 and 1.5 do not qualify as outputs but rather as management activities of the project. Output

1.4, *new features of GLOMIS such as database on productivity of mangrove species and management of mangrove* is not reflected in the specific objective. That may be one of the reasons why output 1.4 has not been adequately accomplished. Two anticipated activities to achieve output 1.4 have only partially been executed. The planning workshop, Activity 1.4.1, has taken place at a fairly late stage, half way through project implementation. Little could be traced from activity 1.4.2, *Collate, document and disseminate available data on productivity of mangrove species globally*. Activity 4.1.6, *Hold evaluation meeting to evaluate the achievement of GLOMIS project and discuss the future of GLOMIS*, seem to be not relevant for accomplishing output 1.4.

According to two of its activities, output 1.3 *Inter and intra-regional networks established and strengthened by each RC* is about building a network and engaging stakeholders. Particularly two activities, 1.3.2 and 1.3.3, were planned to achieve this result. Activity 1.3.2 *Encourage stakeholders to communicate, transfer and apply existing knowledge and experience to traditional uses and rational management of mangrove ecosystems by organizing regional workshops* was partly implemented through the workshop in Malaysia August 2005. Activity 1.3.3 *Identify and educate mangrove management experts at national and regional level* was marginally implemented. Some training courses at Head Quarters could be considered as a component of this activity.

#### *The horizontal logic, (logical framework)*

The horizontal logic refers to the, indicators, means of verification, and assumptions, which are attributed to each project element. Indicators for the specific objective and output 1.2 were sound. Indicators for the development objective and output 1.3 were difficult to measure, while the indicator for output 1.4 would not really give information on the accomplishment of output 1.4. Most of the means of verification resembled rather indicators than sources of information. Being short of the sources of information where the value of indicators can be verified little can be concluded as to the impact and outcome of the project.

#### *Assumptions and risks*

Assumption is the necessary condition which must be fulfilled to achieve the corresponding project element. Instead of crucial critical assumptions, in quite some cases trivial assumptions have been formulated. For instance output 1.2 *capacity in each Regional Centre developed* is accompanied by the assumption *training materials and human resources available*. This seems not so much an assumption but rather a task for the project itself to fulfill. With this type of assumptions one may not expect identification of too many risks. Indeed, the only risk identified in the Project Document is *commitment of stakeholders to maintain the network after the project period*. So for the actual implementation and accomplishment of the project itself no risks have been identified. However, it is fair to say that some projects, like apparently this one, are less dependent on external conditions than others. This observation is supported by the fact that the project has been implemented without unexpected effects.

#### Project proposal appraisal process

It is clear that the identified shortcomings in the Project formulation process and the Project design could have been recognized during the appraisal process of the Project proposal. The Expert Panel indeed seemed to have been reluctant to submit the proposal to the Committee. After the first appraisal the 25<sup>th</sup> Expert Panel sent the proposal back to the proponent and requested, among others, to revise the specific objective and clarify outputs and activities. The next expert Panel did not make any further remarks on the Project design but requested to revise the logical framework matrix and made yet other observations which should be observed by the proponent as a condition for its formal approval by the Council. The proponent has in a way responded to these requests but the Expert panel had not the opportunity to assess the changes which had been made.

## **2.2 Lessons learned**

### Project design

A justified Project strategy, based on a thorough problem analysis, and a solid Project design, comprising a sound vertical and horizontal logic, are crucial for effective project implementation, monitoring and validation.

*The flawed project design and shaky logical framework have caused inability to properly assess accomplishments and impacts. Frictions between objectives, outputs and activities easily give rise to false expectations with donors, in the case of this project particularly concerning the involvement of and uptake by end users.*

A necessary part of the problem analysis is to anticipate developments which may influence the problem as such and or the project strategy.

*IT technology has developed fast. Powerful search engines such as Google should have had a bearing on the project strategy of GLOMIS. This is particularly the case with respect to the reference part of the database.*

#### Project development

Systematic user analysis and analysis of user needs is a prerequisite to identify Outputs which satisfy (projected) end users and to create a sense of ownership over the project, which in turn stimulates the use of the project products and services.

*Due to lack of a deliberate and systematic consultation with actual and potential end-users during the project formulation process, the project has not benefitted from a potential input of end users such as mangrove policy makers, managers and mangrove users. It was recognized that the content must be more useful for the end user.*

#### Project Appraisal by ITTO

Shortcomings in the Project formulation process and the Project design should be recognized during the appraisal process of the Project proposal and should not be accepted by the Expert Panel.

*A cautious conclusion might be that, at the time of the appraisal (2003), the appraisal process was not robust enough to ensure that proposals with a weak Project formulation process, Project design and logical framework, were either enhanced to a satisfactory level or rejected.*

#### Impact

Impact is the ultimate measurement of success. Impact is measured at the level of the development objective. Albeit broader and at a higher level, the development objective should be closely linked to the specific objective and formulated in away that enables the measurement of impact of the project through appropriate indicators. The description of the intended situation after project completion should reflect these indicators.

*Little can be said about the impact of the improved database and the training and extension activities which were sponsored by phase III. Hard evidence and sound indicators are lacking, particularly with respect to the uptake of information by end users such as planning agencies and mangrove ecosystem managers and users. The impression is that the development objective was too broad and not closely enough linked to the specific objective.*

An indicator for the usefulness of a web based database is the number and origin of the hits. The origin is necessary to get insight in the type of users and, in that respect, the extent to which the objectives of the database are realized.

*Unfortunately GLOMIS can not identify the source of the hits. Thus a user analysis is lacking.*

#### Project organization

A robust organizational structure, clear and documented division of responsibilities and sound procedures are prerequisites for effective and efficient Project management.

*The organization of PD 194/03 Rev.2 and its smooth implementation confirms this statement.*

Project staff must be skilled and available for the implementation of the project in conformity with the Project Document.

*Staff at the Regional Offices had to be trained during the implementation of the project. It would have been more efficient if the staff could have been trained before the start of the project.*

#### Financial matters, requirements by ITTO

Monitoring on both outputs and inputs is necessary to assess the effectiveness and efficiency of project implementation.

*Progress reports provide no specification of expenses per activity, nor does the final Audit report. So it is hard to draw conclusions on the actual implementation of activities, other than observing the outputs.*

### 3. Conclusions and recommendations

#### 3.1. Conclusions

##### Overall conclusion

PD 194/03 Rev 2 (M) has been implemented with a high rate of efficiency. It has resulted in an improved comprehensive and up to date Mangrove data base and information system, which enjoys an ever increasing number of hits on the website. GLOMIS is particularly unique in identifying and bringing together so called grey literature and providing a facility, through its Electronic Journal, which stimulates students and young scientists to publish.

The content of the data base is continuously expanding. A full library function will not be achieved due to constraints connected to copyright. However the linkage with publishers of journals has given access to abstracts.

##### Project design

The positive results of GLOMIS phase III have been achieved in spite of a flawed project design and a shaky logical framework.

Apparently the EA knew exactly what it wanted to achieve but failed to harness it in a sound project design and logical framework. This may have resulted in false expectations with the donors of the project, notably concerning the involvement of and uptake by end users.

The development objective seems too general and too far away from the performance level of the project to serve as a basis for measuring the impact of the project.

The specific objective and some outputs have been formulated so ambiguously and open ended that in fact they do not provide a solid basis for assessing their accomplishment.

It is not clear whether the term *Networking* in the specific objective is merely confined to HQ and the RC's, or also includes stakeholders. The networking has certainly been strengthened within GLOMIS. Not much evidence supports a strengthened network with stakeholders.

It is crucial that activities are sufficient and necessary to produce the outputs and the outputs are sufficient and necessary to achieve the specific objective. In this sense the vertical logic is sloppy. Some outputs have been formulated ambiguously and open ended other outputs comprise project management activities rather than deliverables of the project. Activities do not always support the outputs. Most of the means of verification, presented in the logical framework, resembled rather indicators than sources of information. Being short of the sources of information, where the value of indicators can be verified, little can be concluded as to the impact and outcome of the project.

##### Impact

Little can be said about the impact of the improved database and the training and extension activities which were sponsored by phase III. Hard evidence and sound indicators are lacking, particularly with respect to the uptake of information by end users such as planning agencies and mangrove ecosystem managers and users.

##### Sustainability

The expected role, after project completion, of each GLOMIS Regional Centre as a reference point or a library facility stocked with available published and unpublished data on the distribution and productivity of mangrove species and major mangrove forest types worldwide has proven to be too ambitious.

Although GLOMIS is still operating its sustainability is at stake. Major problems are relative high costs, single funding source, lack of funds and consequently lack of manpower.

#### 3.2. Recommendations (based on the lessons learned and the conclusions)

##### **Recommendations for the EA**

##### Project formulation and design

The Guidance provided in the ITTO Manual for Project Formulation on stakeholder analysis, problem analysis, logical framework and project design should be closely followed.

Anticipate developments which may influence the problem as such and or the project strategy. Consider in what way powerful search engines such as Google may be used as a basis for references on mangrove.

#### Impact

Adapt the registration of hits on the web based database in order to register numbers, origin, and duplications. Make analysis of the users and improve the database content and presentation to comply with the demand of the target groups.

In turn, the user analysis will provide a sound basis for a well designed user survey which might produce information on the real impact and uptake by endusers. I

#### Sustainability

Consider GLOMIS and an indispensable asset for ISME to accomplish its mission. GLOMIS may be seen as a necessary provision comparable to an office. In order to continue the operations of GLOMIS at a relevant level it is necessary to reduce costs and to provide a continuous funding source.

Cost reduction may be achieved by reducing the number of Regional Centres. Analysis, based on the experience, of the usefulness of the centres for GLOMIS should provide answers as to the minimal number of RC's and their location. Expenses at the HQ should be limited to: maintenance of a server; salary of one fulltime staff and system maintenance and repair. This way HQ costs will probably not exceed \$32,000.

Cost should preferably covered by incorporating the costs as part of the overhead of all ISME activities and projects including but not exclusively ITTO projects such as the Mangrove Atlas project (PD 276/04 Rev.2 (F))

### **Recommendations for ITTO**

#### Project appraisal

Shortcomings in the Project formulation process and the Project design should be recognized during the appraisal process of the Project proposal and should not be accepted by the Expert Panel.

#### Financial statements

Consider the requirement of reporting of expenses per activity in addition to expenses per budget component.

#### Sustainability

Data bases such as GLOMIS may be operated on the expenses of the host and, where and when possible, of the users. Now and than these data basis need a boost to upgrade them. ITTO could express its willingness to financially support a project with the objective to enhance the quality level.

## ANNEX I Terms of Reference

Ex-Post Evaluation of ITTO Project PD 194/03 Rev.2 (M)

*“Expanding and Improving Global Mangrove Database and Information System (GLOMIS) and its Networking (Japan)”*

### *Background*

At its Forty-first Session held in Yokohama, Japan from 5 to 10 November 2007, the ITTO Committee on Economic Information and Market Intelligence *inter alia* recommended to the International Tropical Timber Council the ex-post evaluation of the completed project: PD 194/03 Rev.2 (M) “Expanding and Improving Global Mangrove Database and Information System (GLOMIS)” (Japan). The recommendation was duly endorsed by the Council.

The background information on this project is contained in relevant documents as attached. The development objective of the project was to promote the sustainable management of mangrove ecosystems globally for forest products like timber and fuel wood as well as the sustainable production of fisheries and the maintenance of coastal water quality and stability. Specifically, the project aimed to fulfill the objectives of strengthening information exchange for networking on mangrove ecosystems within and among the GLOMIS Regional Centres and GLOMIS Headquarters. Among the key outputs produced by the project were (i) continuation of functional GLOMIS system including database, newsletter, and electronic journal, (ii) new features in GLOMIS such as data on productivity of mangrove species, (iii) capacity-development of GLOMIS Regional Centres and (iv) established and strengthened networks by each Regional Centre. GLOMIS had previously benefited from ITTO support to a series of 3 projects.

### *Terms of Reference for Ex-Post Evaluation*

- i. Assess the extent to which the general objective, the specific objective and the outputs of the project have been achieved.
- ii. Assess the relevance of the project to ITTA, 1994 and the ITTO Yokohama Action Plan.
- iii. Evaluate the impact and relevance of the project and determine to what extent the project has contributed to strengthening the information exchange for networking on mangrove ecosystems between and among GLOMIS Headquarters and its Regional Centres and promoting the sustainable management of mangrove ecosystems globally for forest products, fisheries production and coastal water quality and stability.
- iv. Determine the effectiveness of information dissemination of project outputs and assess the overall post project situation in relation to its impact on the global mangrove ecosystems, forest products from mangrove ecosystems, fisheries production, coastal water quality and stability, as well as the continued operations of GLOMIS Headquarters and regional centres and ISME.
- v. Define and assess any unexpected event, effect and impact, either harmful or beneficial, and offer explanation for their occurrence.
- vi. Analyze and assess the efficiency of project implementation and management, including technical, financial and managerial aspects.
- vii. Recommend follow-up action, where appropriate, in order to enhance utilization of the results of the project.
- viii. Make an overall assessment of the project's relative success or failure, summarize the key lessons learned; and identify any issues or problems which should be taken into account in the design and implementation of similar projects in future.
- ix. Prepare an evaluation report with an executive summary in accordance with the outline provided in the ITTO Manual for Project Monitoring, Review and Evaluation.

- x. Prepare an article for possible publication in the ITTO Tropical Forest Update (TFU), in consultation with the editor, containing an overview of the project and summarizing the lessons learned from the evaluation work. Twenty or more high-resolution photographs of the project should be compiled in a CD along with data on each photograph according to the proforma to be provided by ITTO for this purpose. Guidelines for the preparation of articles for ITTO's TFU are enclosed.

In addition to addressing the above, the evaluation should be conducted in such a way as to answer the questions identified in the ex-post evaluation checklist provided in the ITTO Manual for Project Monitoring Review and Evaluation, a copy of which is enclosed.

### **Proposed Work Schedule**

September-October 2008	Consultation by correspondence and e-mail with the ITTO Secretariat.
12 October 2008	Travel to Okinawa to conduct the ex-post evaluation at the office of the Executing Agency, International Society for Mangrove Ecosystems (ISME), Faculty of Agriculture, University of the Ryukyus.
13-16 October 2008	Meetings with officials of ISME and GLOMIS particularly the Project Coordinator and other available members of the project team for elaboration and finalization of the programme for the assignment, briefing and discussions on project implementation and results and inspection of project sites, tangible outputs and financial accounts and statements. During the course of the assignment, the consultant may hold discussions with any relevant stakeholders involved in, or impacted by, the project.
17 October 2008	Discussions with the Executive Director, the Project Coordinator, the ITTO Project Manager and other ITTO staff members on relevant aspects of the ex-post evaluation.
30 November 2008	Submission of draft report to ITTO and the Executing Agency for comments and suggestions.
2 January 2009	Submission to ITTO, of the final report, including an executive summary, the draft article for the TFU and twenty or more high-resolution photographs of the project compiled in a CD along with data on each photograph according to the <i>proforma</i> to be provided by ITTO for this purpose.
2009	Presentation of the report at the Forty-third Session of the ITTO Committee on Economic Information and Market Intelligence to be held at a venue and dates to be decided by the International Tropical Timber Council.

The assignment will require traveling to ISME, Okinawa, Japan and to the ITTO Secretariat in Yokohama, Japan, from 12 to 17 October 2008. It will also require traveling to present the evaluation report to the Forty-third Session of the Committee on Economic Information and Market Intelligence to be held at a venue and dates to be decided by the International Tropical Timber Council.

## **ANNEX II: Executing Agency's Views**

Annex presents any views of the EA which deviate from the conclusions of the evaluation team.

### **General Comments on the Evaluation Process**

Overall, the evaluation process was professionally done with much cooperation, courtesy and hospitality. Staff members of GLOMIS and the ISME Secretariat have learnt a lot from the evaluation. In particular, ISME will accord high priority in the formulation and design of future projects. Efforts will be made to ensure that the objectives are realistic and that the outputs are verifiable.

ISME views the ex-post evaluation of GLOMIS by ITTO as useful and rewarding where both the implementing and funding agencies benefited greatly from the exercise. The experiences gained and lessons learnt from the implementation and management of GLOMIS are most valuable for future activities of ISME and ITTO.

### **General Comments on the Report**

## **3. Conclusions and Recommendation**

### *Overall conclusion*

ISME concurs with the overall conclusion of the ex-post evaluation that GLOMIS has been implemented with a high rate of efficiency, and is unique in bringing together so-called grey literature and in stimulating students and young scientist to publish through its E-Journal.

The content of the GLOMIS is continuously expanding and improving. The GLOMIS News, Issue No. 10, on the Seventh General Assembly of ISME is on-line as of 10 November 2008.

### *Project design*

The evaluation is right in stating that the project design is flawed and the logical framework is weak. ISME has learnt a lot concerning the importance of identifying practical objectives and verifiable outputs. For future project proposals, ISME will be more cautious in the formulation of the project design and logical framework.

### *Impact*

It is understandable that the impact of GLOMIS is difficult to quantify. With regard to the uptake of information by end-users particularly stakeholders, evidence and indicators are lacking. Plans are underway to upgrade the homepage of GLOMIS by:

- Displaying forthcoming mangrove-related meetings
- Encouraging users to provide information not found in GLOMIS
- Requesting users to provide their comments and suggestions

### *Sustainability*

The evaluation has rightly pointed out that although GLOMIS is still operating, its sustainability is at stake. Major problems are relative high costs, single funding source, lack of funds and consequently lack of manpower.

GLOMIS is an on-line global mangrove database system that needs to continue to function. It would be a great injustice to see the winding up of GLOMIS due to a lack of funding. In this context, ISME would need to seek fresh funds to maintain the website and to enhance its contents to stay relevant for the future. Components that can be enhanced include displaying forthcoming mangrove-related meetings, encouraging users to provide information not found in GLOMIS, and updating the People, Institution and Project components of the database.

Recommendations made in the report on cost reduction are most helpful. They include reducing the number of Regional Centres and future funds for running GLOMIS could be covered by incorporating the costs as part of the overhead of all ISME activities and projects.

Two possible options can be adopted by ISME when applying for funds to continue GLOMIS:

Option 1: Reduce the number of Regional Centres (RCs) from four to two. Regions such as Oceania and Africa, where mangrove scientists are few and where communication is difficult will be given priority

Option 2: Abolish all the RCs with the GLOMIS HQ functioning as the sole centre of operation

The estimated annual budgets (US\$) for these two options are given below:

Activity	Option 1 (with two RCs)	Option 2 (with no RCs)
Maintenance of server	3,000	3,000
Operating cost of two RCs *	26,000	-
Salary of one full-time staff **	24,000	24,000
System maintenance and repair	2,000	2,000
Contingency	5,000	3,000
Total	60,000	32,000

\* The two centres will continue to maintain their portfolio as RCs of GLOMIS. Activities would include, at the regional level, collation of new and additional mangrove information, updating of database, correction of existing entries. They will also serve as focal points for mangrove-related activities and mangrove stakeholders in the region.

\*\* The full-time staff will type-set and publish the GLOMIS E-Journal and News, add new entries into the database, correct errors in existing entries, and increase the number of entries with URL linkages to abstracts of journal websites. Other duties include enhancing of components by displaying forthcoming mangrove-related meetings, encouraging users to provide information not found in GLOMIS, and updating the People, Institution and Project components of the database.

