

RAF/92/G32 - POLLUTION CONTROL AND OTHER MEASURES TO  
PROTECT BIODIVERSITY IN LAKE TANGANYIKA

Progress Report

September to November 1997

NRInternational

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## **1. Project Coordination Unit**

### **1.1. Project Coordinator**

#### **1.1.1. General summary**

It is most encouraging to report that positive progress has been made to initiate project activities in the francophone region of the lake. Following on from earlier visits a Technical Planning Workshop was held in Bujumbura that brought together the principal special study coordinators and a broad representation of technical and managerial personnel from the relevant institutions in Burundi and the Congo. The special study work-plans were reviewed in depth with regard to their application in Burundi and Congo and modified as necessary. This was followed up by a visit of the Project Coordinator to Kinshasa, accompanied by the Director of CRH, Uvira, for discussions with the NC and members of the NWG; a four week visit by the SLO to begin the process of engaging local staff and establishing a project coordination office in Bujumbura, and a visit by consultants from the Sediment special study to make further preparations for the start of activities in the field.

In addition, there has been intensive activity in Kigoma where two major training events have been successfully completed leading to the initiation of further sampling programmes under the Biodiversity, Pollution and Sediment special studies. These were the Dive Training/Habitat & Fauna Mapping Course with participants from all four riparian states and the Laboratory Methods and Training Workshop for participants from Tanzania and Zambia. A similar workshop is planned for participants from Burundi and Congo.

Key events from the other special studies have been the completion of the legal and institutional study tour through a visit to Burundi. The LARST remote sensing system was installed at Kigoma and the first group of operators trained. River gauging stations have been established in Tanzania and reconnaissance work for similar stations has been carried out in Zambia. A PRA study was completed in the Kirondo (Tanzania) region to study land-use, agriculture and fishing practices. In Zambia a tour of three local lakes (Kariba, Mweru and Bangweulu) was arranged for three local chiefs (or representatives) from the lake region, three local council representatives and officers from the two Dept of Fisheries stations. The purpose was to visit and assess application to the Lake Tanganyika situation of the systems of community involvement in resource, especially fisheries, management that have been initiated on the shores of these lakes. The EE national coordinators from Tanzania and Zambia attended a 6 week course "Vision to Visuals" at ICCE UK.

A project Technical Officer, Jerod Clabaugh, has been engaged, currently based in Kigoma. His duties include co-ordinating the purchasing, installation, maintenance and training for all technical equipment at the riparian stations. He will be dealing with

general logistics and security issues on the lake as well as producing the LTBP newsletter and website.

The Project Performance Evaluation Report (PPER) has been drafted. This is due to be reviewed at a meeting of the National Co-ordinators and advisors, Project Coordinator and SLO, to be held in Lusaka on 19-20 December 1997. The agreed version from this meeting will form the main background document for the Tripartite Review meeting (TPR) to be held in Lusaka on January 19, 1998. The TPR will be followed immediately by a meeting of the Project Steering Committee.

The December meeting will also review plans for developing the Lake Tanganyika strategic action plan and preparations for the legal and institutional workshop due to be held in February 1998.

The Project Coordinator visited UK during this period for a series of meetings with UK management and special study coordinators.

#### 1.1.2. Goals for next quarter

The principal task for the Project Coordinator will be preparations for the National Coordinators meeting in December, the Tripartite Review and meeting of the Steering Committee in January 1998.

### **1.2. Scientific Liaison Officer/Kigoma Station**

#### 1.2.1. Activities

During the July 1997 reconnaissance mission to Bujumbura by Kelly West and Philippe Petit, the Burundian National Working Group and Dr. Nshombo, Director General of the Center for Hydrobiological Research-Uvira proposed a set of technical meetings to introduce the project to the francophone countries. The SLO assisted the Burundian National Coordinator and the Project Coordinator in organising the meetings, which were attended by LTBP Special Studies leaders and representatives of Burundian and Congolese collaborating institutions. At the conclusion of the intensive special studies meetings, the LTBP work-plans were modified to incorporate the comments of the francophone participants and were approved by the delegations.

A Laboratory Methods and Training Workshop was held in Kigoma from 22 September to 3 October. BIOS, PSS, SSS leaders and an international team of trainers assembled to present the current state of conservation and biodiversity management and to conduct field and laboratory sessions to teach and standardise techniques required to implement the special studies work-plans. More than 35 participants from Tanzanian Fisheries Research Institute, Tanzanian National Parks Association, Tanzanian Bureau of Standards, Zambian Fisheries, Zambian Office of Water Affairs, and Zambian National Parks participated.

The bilingual dive-training course concluded with 15 divers from the four riparian countries receiving BSAC "Sport Diver" Certification. The divers then participated in

a six week course on Underwater Research Methods using SCUBA where they learned how to conduct: manta board surveys, quadrant censuses, point censuses, gill-net censuses, habitat profiles, and grab sampling. The course concluded with aquatic field surveys of Gombe Stream and Nsumbu National Parks by various teams of divers. The fishing practices team collected complementary data on artisanal fishing practices at the Gombe site.

Rupert Loftie from NRI travelled to Kigoma to install the LARST (Local Application of Remote Sensing Techniques) equipment and to train 5 Tanzanian counterparts from the National Meteorology School in the capture and use of satellite data. The equipment was installed without problems and the trainees were progressively introduced to the use of personal computers, data capture and data analyses. Currently the team is collecting NOAA data on lake surface temperature, and catchment vegetation. In conjunction with special studies programs, they will increase capacity to collect data on sediment discharge, rainfall, and fires.

SLO travelled to Burundi to investigate possibility of establishing LTBP offices in Bujumbura. After discussing possibilities with the National Coordinator and collaborating institutions, The Minister of the Environment, on behalf of the project, submitted a request to the Minister of Agriculture for several buildings in the Fisheries Compound (former Center for Regional Research in Applied Hydrobiologie buildings) for use as LTBP project offices.

SLO engaged an administrative assistant for the Bujumbura Station and two consultants for work on behalf of the biodiversity module, Dr. Gaspard Ntakimazi and Mr. Felix Nicayenzi.

Biodiversity team in Burundi met several times with the SLO to discuss and begin implementation of a research program to survey aquatic biodiversity in Ruzizi Park.

SLO travelled to Uvira on a reconnaissance mission to evaluate the facilities of the Centre de Recherche Hydrobiologique (CRH). After consulting with a surveyor, the SLO compiled a list of required renovations to the Center and solicited proforma invoices from three companies for the work. The bids, ranging from \$89,000-\$220,000, have been submitted to the PCU to determine whether it is more cost effective to renovate the existing building or to build a new structure.

The Tanzanian sedimentation team established rainfall and river gauging stations on two rivers that will be the sites of long term sediment-load studies, including a master's thesis by Mr. Rubabwa.

Drs. Steve Evison and Claude Mung'ong'o led a PRA to study landuse, agriculture, livestock and fishing practices in the Kirando region.

### 1.2.2. Calendar

1 September                      Jerod Clabaugh began as the project's Technical Officer

- 5 September PRA led by Steve Evison and Claude Mung'ong'o returned from Kirando and wrapped up their reporting period with local counterparts.
- 12 September Dive Trainees from Burundi, DR Congo, Tanzania, and Zambia successfully finished BSAC Sport-Diver Certification Program and began Underwater Research Methods Program.
- 14-18 September PCU and Special Studies leaders participated in technical meetings in Bujumbura, with SLO representing the BIOS.
- 22 September - 5 October "Research Methods" Training Workshop held in Kigoma for Tanzanian and Zambian colleagues. Eddie Allison, Tony Bailey-Watts, Roger Bills, Rob Duck, Chris Foxhall, Ken Irvine, Koen Martens, Hudson Nkotagu, Graeme Patterson participated as trainers.
- 10-31 October Vicki Cowan from MRAG visited Kigoma Station to oversee Biodiversity and Fishing Practices Activities.
- 14-20 October SLO in Dar es Salaam for briefings with the PC
- 26 October Hudson Nkotagu from Univ. Dar es Salaam and Mrs. Mbwambo from Tanzanian Bureau of Standards arrived to direct SSS activities at Gombe Stream National Park with counterparts from Kigoma Water Dept.
- 27 October - 15 November Rupert Loftie held LARST training course in recovery of satellite data for five Tanzanian trainees from the National Meteorological School.
- 3-29 November SLO travelled to Bujumbura to engage local staff and consultants and investigate possibilities of establishing an office in Bujumbura.
- 7 November Rubabwa travelled to the University of Dar es Salaam for registration for his Master's thesis in Geology under the supervision of Dr. Nkotagu.
- 12-15 November SLO travelled to Uvira for reconnaissance mission.

### 1.2.3. Goals for Next Quarter

Address water pollution problem by TANESCO's Kigoma Office

Discuss establishing LTBP offices in Bujumbura at the National Coordinators and Steering Committee Meetings and act on recommendations

Plans for Uvira Station: evaluate rehabilitating existing building vs. constructing a new building.

Prepare for Sedimentation Cruise in Tanzania and Burundi

Get administrative help for and finish equipping Kigoma Office

Solicit and edit contributions for LTBP Newsletter

Plan for Francophone Workshop

### **1.3. Mpulungu station**

#### **1.3.1. General**

The major achievements during this quarter were:

The acquisition of most of our essential equipment

Completion of the rehabilitation of the laboratory

The initiation of the EE program with a Lakes tour to visit 3 other fishery areas in Zambia where co-management and community involvement schemes are operating

The visit of the EE co-ordinator on a short training course.

A National Working Group meeting was held in Lusaka in September

Reports were received on the visits of Paul Vare and Henry Sichingabula from last quarter.

#### **1.3.2. Visits**

*Jerod Clabaugh*

Arrived on Liemba on October 3rd for a 4 hour visit in which a number of administrative issues relating to stores, equipment and facilities were discussed

*Paul Tierney*

Came for a two week visit on 31/10/97 to continue the training of the Zambian divers who had to be brought back from Kigoma prematurely because of the reorganisation of the Ministry of Agriculture. During this visit he made a partial survey of the Nsumbu area, but was unable to do much in the vicinity of the National Park because of the heavy concentration of crocodiles and hippos.

#### **1.3.3. Activities**

*Laboratory rehabilitation*

Rehabilitation is substantially complete: this involved rewiring, replumbing and replacement of lab furniture. A few minor additions (painting, wall cupboards, lab taps and extractor fans if they arrive) are still needed but the lab is operational.

### *Boat rehabilitation*

Now that the specifications for use of the utility boats has been expanded, the Vikings no longer seem to be suitable. The focus has shifted to 26ft Yamaha hull which can be produced locally after Xmas. All extras needed to rehabilitate Silver Shoal have been received, and rehabilitation is awaiting the arrival of somebody to oversee the work. This may not be an onerous duty if the local engineers can be infused with the vision of what the boat is to look like, in fairly great detail.

### *E.E Program*

A tour of three local lakes (Kariba, Mweru and Bangweulu) was arranged for the leaders of the major power institutions; the three local chiefs (or representatives), three local council representatives as well as officers from the two Dept of Fisheries stations.

On each of these lakes a system of community involvement along the lake shore has been initiated by trying to organise the lakeside dwellers and devolving a measure of self responsibility to the people. The three lakes each have an individual approach, but are similar to the proposed EE program in that they consist of forming local village committees which are part of a hierarchy culminating in a single lake committee in which traditional rulers, councils, government and prominent locals meet with the fishermen to address fishermen problems.

A number of problems arose during the trip (breakdown of the vehicle and consequent delays in the schedule) which unfortunately led Chief Chitimbwa to abandon the trip before it reached the first lake. Others persevered however and came back impressed by the way in which different authorities were co-operating. They did, however, find a number of faults with each of the projects and it is hoped that their experiences will allow us to finalise a design for Lake Tanganyika which will be entirely appropriate to the local situation.

One interesting fact which emerged is that there is an environmental land use project operating in Senanga, where the Departments of Fisheries, Forestry, Wildlife and Agriculture are co-operating with local authorities and traditional rulers and of course the residents to manage their land in a sustainable way. This project is said to be very successful.

### *National Working Group*

The third meeting this year of this body took place in Lusaka

### *Chisanse Beach*

The fishing concession on this beach was closed two weeks early, in mid November, unilaterally, by the wild life warden, Northern Command.

### *Local Collaboration*



Both the Chongolo Club (local branch of the National Conservation Club, particularly active in schools) and Ulungu Wane ( local traditionalist society have asked me on behalf of LTBP to join their societies

#### 1.3.4. Programme for next Quarter

1. Attend National Working Group Meetings and particularly ensure that the work-plans and PSAP is thoroughly discussed
2. Go to Nsumbu to review the Chisanse Beach issue locally, and Kasama to discuss with wildlife warden
3. Make the laboratory functional
4. Provide a sampling and analysis work program for trained staff (by Special study directors)
5. Make a delayed start on the SE program
6. Continue with EE program, specifically:
  - Hold a 'Headmans' meeting to alert the middle leadership, and finalise details of the local committees
  - Arrange the Tanganyika Drama Group tour
  - Form local, strata and lake development and conservation committees
7. Rehabilitate Silver Shoal, make sure welding machine is fit
8. Build new landing jetty for Silver Shoal.
9. Order utility boats
10. Finalise the memo of understanding from DoF
11. Obtain blanket authority for travel of local staff on project activities
12. Finalise the acquisition of office equipment
13. Procure a comprehensive spares supply for Silver Shoal and outboard engine

## **2. Progress reports of special study groups**

### **2.1. Progress Report: September - November 1997 for "Biodiversity" Special Study and "Conservation Activities"**

#### **2.1.1. Overall Summary of Progress**

The overlap of international experts, researchers and technicians from each of the four countries in Kigoma during training and workshops ensured both quantity and quality of progress in this quarter. Activities in this quarter have been largely field based. Regional teams were trained for BIODIVERSITY survey work, a joint SS workshop introduced many of the technical issues relating to field work to Zambian and Tanzanian counterparts, technical details of the field programme were developed and sampling protocols established. It became clear during this quarter that having a mobile regional team for BIODIVERSITY field work solves many constraints to furthering field based activities. The key constraints are the efficient expansion of regional capacity to undertake field work for BIODIVERSITY and the security situation in Burundi and DR Congo which severely limits the safe execution of underwater sampling along their coast line. The skills and experience of the newly trained teams are an important regional resource.

Increasing the mobility of these researchers will: ensure greater coverage of the lake's coastline within the project's lifetime; ensure that newly acquired skills are maintained and developed in the region; increase the likelihood of rapidly establishing a field programme in the Francophone countries when security allows; increase the experience of ecological based sampling of biodiversity in the lake; facilitate the transfer of regional skills which in the long term will minimise the reliance on international support; and, develop relationships between researchers from each of the riparian countries that share the resources of Lake Tanganyika.

#### **2.1.2. Chronology of Activities**

September-October: Dr Allison, Dr Tierney and W Darwall continued activities begun in the last quarter. Namely, training BIODIVERSITY field team in underwater sampling techniques, data management and all aspects of mounting BIODIVERSITY survey expeditions. The training included teams from all riparian countries and was undertaken in Kigoma. At the conclusion of the training period, Dr Tierney travelled to Mpulungu with the Zambian dive kit. Together with the Zambian dive team, he made a preliminary assessment of Nsumbu and other potential field sites in this area of the lake. Special field protocols will have to be developed to ensure field team's safety when working in areas with hippo's and crocodiles.

September: BIODIVERSITY consultants (Dr Martens, R Bills, Dr Tierney and W Darwall) contributed to the Joint Special Study Technical workshop (Anglophone) in Kigoma. In addition to specific technical inputs, Dr Allison, the BIODIVERSITY field coordinator, took significant responsibility in the coordination of the workshop. This was a critical time for development of the BIODIVERSITY field programme: regional BIODIVERSITY field teams from

all four riparian countries (Anglophones attending the workshop and Francophones participating in the dive/sampling training) plus international experts were gathered together.

The exchange of experience and ideas combined with field testing served to establish the core BIOSS field programme. Two surveys were conducted in Gombe National Park, to draw together all elements of the training and sampling development. The second survey was managed by the regional teams, illustrating their capacity to mount expeditions with minimal international support.

October: V Cowan to Kigoma, assisted with BIOSS field team training, particularly with data management and computing skills (using spreadsheets for data entry and calculation of biodiversity indices). Standardised the BIOSS data collection forms and ensured that they complied with overall data management strategy proposed by MRAG and agreed by NRI. The Biodiversity literature collated in Kigoma was made available to field teams. Requested sections were copied and, where appropriate, books were sent back to Congo/Burundi with the teams. Consulted BIOSS international experts on variety of issues related to the field programme and project in general.

Meetings with Dr Kelly West (SLO) on progress of field programme and furthering of the strategic planning aspects of LTBP.

October: BIOSS field teams returned to their respective countries as BSAC qualified divers. The Francophone team, who worked with the Tanzanian team (two trained divers) on the Gombe national park surveys took complete copies of the survey data with them.

November: Consultants involved in summer missions preparing variety of technical and BTOR reports. The deadline for these has been extended to early Dec

November: BIOSS teams (Burundi) with Dr West developed plans to initiate a field programme in Ruzizi National Park. These plans will be executed on the arrival of dive kit to Francophone countries (imminent).

### 2.1.3. Staffing Schedule

Special Study Director

Dr Ian Payne, MRAG Ltd

Field Team Leaders

Dr Eddie Allison, MRAG Ltd

Special Advisor

Dr Rosemary Lowe-McConnell (Independent) Dr George Coulter (Independent)

UK

Vicki Cowan (MRAG) Project support  
John Pearce, Simon Holden (MRAG) IT specialists

Consultants contributing in this quarter.

Dr Paul Tierney

Will Darwall

Roger Bills

Dr Koen Martens

#### 2.1.4. Main Outputs and Achievements

Fourteen of the sixteen divers who began the dive training course have been trained to BSAC sports diver standard and are capable of diving safely and independently to depths of 30 m. Medical and legal reasons prevented the remaining two from completing the course.

The divers have been trained in techniques for mapping underwater habitats, censusing and monitoring fish populations and carrying out a variety of underwater sampling and surveying techniques. The standard achieved varies and is dependant on education, experience and ability in the field of aquatic biology. However, as a regional team there is capacity to carry out independent survey work, including expedition planning and management, with ever decreasing support from international experts.

Field surveys of Gombe National Park, including underwater habitat maps (both at coarse scale of entire park coast and more detailed scale at sampling sites), fish census data, mollusc samples, length frequency data from gill net samples. Some analysis of the data has been carried out by the teams i.e., maps have been prepared and biodiversity indices calculated.

Further analysis and findings will appear in the technical reports prepared by international consultants. Copies of the data reside in Tanzania, DR Congo and Burundi so all participants have access to the information and may work on the data as required.

Habitat maps have been produced for the area South of Kigoma, which will form a regular monitoring site for the BIOSS. Note that, given the smaller number of divers trained from Tanzania, the field work here will require support.

The Gombe data set provides the template for the BIOSS survey database to be developed. The strategy developed for the BIOSS database followed discussions between MRAG and NRI (GIS component of LTBP). Therefore, the BIOSS survey database, as the first SS database to be prepared, should provide guidance for other SS database development. This is essential if integrated analysis of the data collected in each SS is to be achieved within the project.

The 14 divers trained in the BIOSS form a regional resource to the project.

We hope that where appropriate, other special studies will work with these individuals in the field. The BLOSS intends to employ this regional team to push forward lake wide sampling. The situation in Burundi and Congo prevents the establishment of an extensive field programme in either of these countries at the moment. However, Francophone teams have proved themselves very competent in the field. This combined with their previous research experience offers a unique opportunity to build regional capacity from within the region. Through increasing the mobility of these researchers, BLOSS aims to facilitate this exchange of experience between regional researchers.

Taxonomic groups that could be used in monitoring programmes have been assessed and suggested by BLOSS consultants (Roger Bills and Will Darwall for fishes, Koen Martens for Invertebrates). The use of various indicator groups for assessing the threat of sedimentation is the focus of a research initiative under the direction of Ken Irvine, carried out on behalf of the Sediments SS. Toxicity testing and other forms of experimental work to gauge pollution sensitivity have been judged too crude to be useful - many of the effects of pollutants are likely to be sub-lethal. The design of experimental tests for pollution indicators remains to be carried out. No specific plans were formulated to assess the impacts of fishing on diversity, but the use of fish community size-structure could provide a useful preliminary indicator of levels of impacts, as, for a given habitat type, unexploited fish communities within the lake are likely to have a similar size-structure, whereas they may differ in species composition due to the localised distribution of many species. The more controversial use of indicator or 'predictor' sets of total diversity was extensively debated during meetings in Kigoma. The relationships among diversity of different groups can only be tested using an extensive database covering all taxonomic groups. This data does not exist, but there are data across a number of locations for a restricted group of taxa (cichlid fishes, molluscs, ostracods).

The SLO convened a meeting of National Park staff who were attending the technical workshop and dive training: representatives from parks in Burundi, Tanzania and Zambia attended. This was an important first step in the sharing of information and experience relating to National Parks bordering to Lake Tanganyika. It is hoped that the BLOSS strategy to work from National parks and include more parks staff in field work will further this progress. There is considerable overlap with the EE component of the project, FPSS and the legal study: these relationships will be developed as the focus on parks increases in the next year.

Discussions on the opportunities for formal training within the BLOSS took place due to the presence of international experts, drawn from many institutions in Europe and Africa, and BLOSS field teams from all four riparian countries. Individual consultants were approached by potential students and it is expected that the relationships developed during this time will lead to academic training with project support.

### 2.1.5. Main Objectives for the Next Quarter

Preparation of the technical reports detailing sampling protocols and findings of training and surveying periods.

Survey database for BLOSS field programme to be developed at MRAG during this quarter. The data forms developed for the field programme determine its structure. This database will be compatible with the historic database already developed at MRAG to store species location data gleaned from the literature and past surveys in the Lake. During October, the field teams indicated the need and desirability for training in data entry and management. Once the survey database is designed, MRAG will liaise with Dr West (SLO) on providing training in the region.

The historical database will be further developed to allow data entry to proceed in the region. It is the intention to give responsibility to Mr Mboko (CRH, currently completing PhD in Japan), Dr G Ntakimazi (University of Burundi) and Mr D Ruhoza (University of Burundi) to gather literature from European, Japanese (Mboko) and African institutions to increase the breadth of the data already collated. Contracts and Terms of Reference for this work to be developed asap.

BLOSS international consultants to participate in the technical workshop, planned for Bujumbura in February. Consultants include Dr Eddie Allison, Dr Koen Martens, Dr Luc de Vos and Dr Gashagaza. Terms of Reference to be prepared.

Plans for mobilising the field teams to complete surveys of Mahele and Nsumbu National Parks will be developed. At this stage these surveys are timed for April/May, 1998. We aim to hold another round of dive and sample training specifically for Parks staff before the surveys (March 1998). This will feed directly into the project's requirement to train national park staff. These trainees will then benefit from working in the field with more experienced regional researchers in the mapping and surveying of their respective parks.

### 2.1.6. Recommendations

Contracts with remaining institutions to be finalised as soon as possible.

The BLOSS survey database outline will be circulated to all SS group leaders. We recommend that the development of data management in each special study be compatible to ensure the integrated approach to collection, storage and analysis essential for LTBP success.

PCU to confirm that administrative arrangements to allow the BLOSS field team mobility throughout the lake are progressing.

## **2.2. Progress Report: September - November 1997 for "Fishing Practices" Special Study**

### **2.2.1. Overall Summary of Progress**

This quarter saw the end of intensive field work with the support of the international consultant, Dr Petit. The Tanzanian field teams have had broad experience of planning and conducting appraisals with the SESS. The technical overlap in the field with BIOSS was initiated with a joint survey of Gombe National Park.

Unfortunately, it became clear that the type of appraisals conducted by FPSS would be very difficult in either Burundi and DR Congo: the teams have to travel beyond the main centres, fish with local fishers, live in remote places and the social conflicts within many communities in these countries are key constraints to this type of village-based work. Recent news from the region indicates that fishing activities have been suspended in Burundian and DR Congo waters close to Bujumbura and Uvira effectively halting the FPSS in these countries.

### **2.2.2. Chronology of Activities**

September-November: Dr Petit continues mission begun in last quarter, largely based in Kigoma with some travel to Francophone countries for FPSS and wider LTBP investigations. FPSS field team writing reports with Dr Petit on recent appraisals.

October: FPSS team joined the BIOSS field team for field work in Gombe National Park. FPSS conducted meetings with fishers at Mwamgongo village (on northern border of the park) and on the beaches. Fishers who held TANAPA permits to fish from camps on the beaches adjacent to the park were targeted in these interviews. The catches from beach seines operating from beaches bordering the park were sampled.

October: V Cowan to Kigoma, accompanied the FPSS field team to Gombe National Park (joint with BIOSS field team). Discussions with Mrs Beatrice Marwa (DoF) on the potential for her to take increasing responsibility with respect to the FPSS field activities in Tanzania. Informal workshop with FPSS field team to begin to synthesise Tanzanian FPSS data collected to date.

### **2.2.3. Staffing Schedule**

Special Study Director  
Dr Ian Payne, MRAG Ltd

Field Team Leaders  
Dr E Allison, MRAG Ltd  
Dr P Petit, MRAG Ltd

Tanzanian Team  
Mr Omari Kashushu (TAFIRI, Kigoma)  
Mrs Beatrice Marwa (DoF)

Mr Keita Swedi Tambwe (DoF)  
Mr Hamza Maboche (Community Development)  
Zambian Team  
Mr Joseph Chimanga (DoF, Mpulungu)  
Mr Whiteford Chumba (DoF, Mpulungu)  
Mr Charles Lukwesa (DoF, Mpulungu)  
Mr Isaac Zulu (DoF, Mpulungu)

UK  
Mr Mark Aeron-Thomas, MRAG Ltd  
Ms Vicki Cowan, MRAG Ltd

Special Advisor  
Dr Rosemary Lowe-McConnell (Independent) Dr George Coulter (Independent)

#### 2.2.4. Main Outputs and Achievements

Joint field work with BIOSS field teams carried out in Gombe National Park. Results will provide a indication of the impact of beach seining on beaches bordering the park. Issues surrounding the relationship between fishers and the park were raised and will require SESS/EE input. The results of the surveys will provide critical material for the development of EE materials for Gombe.

Process of synthesising Tanzanian findings begun.

#### 2.2.5. Main Objectives for the Next Quarter

Tanzanian team to carry out joint appraisal with SESS team in villages bordering Mahele. The teams for the Mahele appraisals will be entirely Tanzanian, no international consultants will be present.

Dr Petit and FPSS teams to finalise appraisal reports. Then a synthesis of FPSS findings in Tanzania will be prepared (post Mahele appraisal) and discussed by all participants in the FPSS appraisals and staff (regional and international) from other SS's, particularly SESS.

Finalise work programmes for Tanzanian and Zambian teams to carry out regular catch monitoring close to Kigoma and Mpulungu.

FPSS field work in Zambia requires one or two more appraisals with international support, plans for these will be made in the next quarter.  
SESS plans will be consulted.



### **2.3. Progress Report: September - November 1997 for Legal Component**

#### 2.3.1. Summary of Activities

The legal and institutional study's tour of the four countries was completed in this quarter as Mr S Hodgson met with colleagues in Burundi.

Activities in the remainder of this quarter have focused on furthering plans for the regional legal workshop planned for Lusaka in February 1998.

The participants names, details of the papers drafted, a proposed agenda were forwarded to the PCU and agreed. Administrative arrangements are now being taken forward by Dr A Menz, project co-ordinator.

#### 2.3.2. Chronology of Activities

September: Details for regional workshop forwarded to PCU for action.

October: Mr Hodgson held a series of meetings in Bujumbura with key staff from a range of institutions.

November: finalisation of workshop discussions papers to be presented by legal consultants

#### 2.3.3. Current Staffing Schedule

Special Study Director  
Dr Ian Payne, MRAG Ltd

Legal Specialists  
Mr Cormac Cullinan, MRAG Ltd (Anglophone) Mr Stephen Hodgson, MRAG Ltd (Francophone)

#### 2.3.4. Main Outputs and Achievements

Completing the tour of all four riparian countries. These meetings were vital in commencing the consultation process leading to the preparation of the Agreement. The visit also contributed important new information of strategic importance for the Project, for example that it is possible that oil exploration will commence in the Northern part of the Lake within the life of the project. This highlights the need for suitable legal mechanisms for environmental protection for the Lake to be put in place as soon as possible. Discussions were held with the Ministries responsible for foreign affairs in each of the countries regarding the proposed Agreement and the procedure to be followed in negotiating it.

The key findings of the Burundian mission are as follows: The Burundian National Environment Strategy has been completed in draft and it is anticipated that it will shortly be approved by the Government.

Similarly a draft framework law on the environment, which includes provisions on environmental impact assessment has been prepared and will shortly be submitted to the Government. Once the framework environment law enters into force, it is planned to revise other key laws relevant to the environment, such as the forest code, the land code and the mining code, in the light of the provisions of the environment law.

While work on the preparation of the National Environment Strategy began in 1991, its completion has been delayed by the ongoing political difficulties. This in turn has also delayed the enactment of a number of items of draft legislation relevant to the Lake, which were identified in the Legal and Institutional Baseline Review, such as new fisheries legislation and a new navigation code. The situation has also led to delays in implementing other laws such as the water law.

It transpires that there are no serious omissions in the Legal and Institutional Baseline Review notwithstanding comments made at the inception workshop, except that the pesticides law, which was described as being in a draft form, was actually passed in 1993.

As with the three other countries, discussions with government lawyers and officials of the Ministry of Foreign Affairs revealed a high degree of agreement that there will need to be some kind of formal agreement or treaty between the four countries to create a mechanism for the management of the Lake. There was also clear support for the proposed Institutional and Legal Workshop which was seen as an important first step in the process of concluding an agreement.

Although it was not possible to meet with officials from the Ministry of Energy and Mines, discussions with other officials suggest that at present there is little oil prospecting activity in the Burundian sector of the Lake. On the other hand, there is concern within the Ministry of Transport, Posts and Telecommunications over the potential from pollution from vessels on the Lake (particular those transporting oil). There is a perceived risk of pollution both from everyday operational discharges (eg from the washing of tanks) and from accidents.

Coordination generally seems to be a problem among ministries directly or indirectly concerned with environmental issues. Previous attempts to establish national environment and water resource committees have been unsuccessful and there is at present no appropriate mechanism for inter-ministerial coordination.

Legal Baseline translated and being checked before dissemination.

### 2.3.5. Main Objectives Next Quarter

Dissemination of workshop papers, and terms of reference for country presentations at the workshop.

Hold the legal workshop in February 1998

### 2.3.6. Recommendations

PCU to confirm administrative arrangements for Lusaka venue and issue invitations as soon as possible to named participants.

### 2.3.7. List of People Met in Burundi

#### Ministère de l'Amenagement du Territoire de l'Environnement

1. Mr Mathias Kinezero, Chef du Cabinet; 2. Mr Jean-Berchmans Manirakiza, Directeur Générale de l'Institut Nationale pour l'Environnement et la Conservation de la Nature and National Project Coordinator;
3. Mrs Libérate Ntamagenderom Directeur adjoint des Forêts; 4. Mrs Kidudi, Conseiller à la Direction Générale de l'Amenagement du Territoire;
5. Mr Damien Nindorera, Directeur du Département de l'Environnement et Conseiller Juridique;
6. Mr Gabriel Hakizinmanam, Ingénieur en génie de l'Environnement et Expert Nationale au Projet d'Evacuation des Eaux Usés de Bujumbura et lutte contre la Pollution;
7. Mr Friederich Weber, Consultant, Projet d'Evacuation des Eaux Usés de Bujumbura et lutte contre la Pollution;

#### Ministère des Relations Exterieurs et de la Cooperation

8. Mr Renovat Ndayirukiye, Directeur Générale de l'Administration et des Affaires Juridiques;
9. Mr Benoit Bihamiriza, Directeur du Département des Affaires Juridiques;

#### Ministère de l'Agriculture

10. Mr Roger Kanyaru, Directeur du Département des Eaux, Pêches et Pisciculture;
- #### Ministère des Transports, Postes et Telecommunications
11. Mr Pascal Ndizeye, Directeur des Transports Lacustres;

#### Universities

12. Dr Gaspard Ntakimazi, Professeur de Biologie, Université de Bujumbura; 13. Dr Gérard Niyungeko, Chargé de cours à la Faculté de Droit, Université de Bujumbura;
14. Dr Gaspard Bikwemu, Professeur d'Ecologie, Institut Superieur d'Agriculture;é

#### International Organisations

15. Mr Adama Toe, Représentant Résident Adjoint, UNDP; 16. Mr Jean Kabahizi, Chargé du Programme, UNDP; 17. Mr Louis Nduwimana, Chargé du Programme, UNDP; 18. Dr George Hanek, Coordinator FAO Project GCP/RAF/271/FIN Research for the Management of the Fisheries on Lake Tanganyika;

#### Non-government Organisations

19. Mr Antoine Kinydmuyi, Président de l'Organisation pour la Défense de l'Environnement au Burundi.

## **2.4. Progress Report: September - November for Special Study on "Sediment Discharge and Its Consequences"**

### 2.4.1. Overall Summary of Progress

The main objectives for this quarter were given in the previous quarterly report as follows:

- Irvine in field until 1/10/97. Principal objective to initiate work on the Impacts of Sediments on biota and formulate a coherent workplan with local institutions (plus some initial collection).
- GP to region on 2/9/97 until 10/10/97. Principally to present and discuss overall workplan of Sedimentation Special Study at regional technical workshops. But also to initiate work by Universities of Dar es Salaam and Lusaka as well as conducting work with K. Irvine, R. Duck and C. O'Reilly on impacts of Sediments on biota.
- Training workshop will go ahead from 20/9/97-3/10/97.
- GP will take a role in the setting up of laboratories in Dept. of Fisheries, Mpulungu and TAFIRI, Kigoma, now that equipment has arrived.
- Goeyens and Coveliers will visit the region during this quarter.
- The sediment study workplan (supplied with the Preliminary Strategic Plan) will be presented at the technical co-ordination meeting in Bujumbura in September by G. Patterson and then again to the sister meeting to be held in October in Tanzania. They will be modified as deemed appropriate after discussion with local technical experts. Draft work plans have, however, been derived after a series of meetings and correspondence between the Special Study Co-ordinator (G. Patterson) and scientists within and without the region.
- A major effort will be made to prepare for a 3-4 week cruise in January 1998 for paleolimnological work.
- GEF will make a small (3 day) contribution to a cruise organised by the Royal African Museum, Brussels this will allow us to test some equipment to be used during the Paleolimnological cruise. This will hold in November 1997.

Overall progress on these activities throughout the quarter was satisfactory. More detail is provided below.

#### 2.4.2. Chronology of Activities

This section lists one-off activities and does not take count of ongoing activities such as workplan development and field monitoring activities.

H. Sichingabula (University of Zambia) visited Mpulungu region from 1-12 September with a team that included the following regional staff: Mungandwi Nazitwitwi (Student, University of Zambia), J.C. Chama (Regional Hydrological Officer, Water Affairs Dept., Kasama), V. Lungu (Water Engineer, Water Affairs, Lusaka) and Happy Sikazwe (Acting Officer in Charge, Hydrologic Unit, Water Affairs, Lusaka). Sichingabula produced a quarterly report covering the period August to October 1997. This is available.

K. Irvine visited region (Zambia and Tanzania) from 25 August-1 October 1997. Back-to-office report produced and available.

G. Patterson visited region (Burundi, Tanzania and Zambia) from 2 September 1997 - 8 October 1997. Back-to-office report produced and available.

R. Duck visited region from 12 September to 4 October, 1997. Back-to-office report produced and available.

Training workshop was held from 22 September to 2 October 1997. R. Duck's back-to-office report describes the input to the sedimentation aspects of this workshop.

G. Patterson visited FAO headquarters in Rome on 14-15 October to negotiate lease of Tanganyika Explorer with FAO staff and George Hanek (LTR project co-ordinator). Cruise scheduled for January 1998. Cruise Plan and copy of Memorandum of Understanding available.

L. Goeyens and P. Coveliers visited Burundi 16-26 November 1997. Back-to-office report produced and available.

H. Nkotagu from University of Dar es Salaam visited Kigoma during September 1997 and made a further visit from October 27 to November 2 1997 from which he produced a study initiation report (Topic: The isotope hydrology of Lake Tanganyika selected catchment areas).

Mrs Mbwambo of the Tanzanian Bureau of Standards produced an initial report on the analysis of samples for the isotope study above.

#### 2.4.3. Staffing Schedule

The principal investigators remain as stated in the previous quarterly reports.

Additional:

Ms Emma Msaky of the Tanzanian Petroleum Development Corporation (a stratigrapher) has been approached by the project. She will take part in the January

1998 cruise of the Tanganyika Explorer with a view to closer involvement in the Project.

Dr Louis Nahimana of the Dept. of Geology of the University of Burundi has been approached and is discussing co-operation on sediment composition.

It has been agreed that Mathias Sebahene, Directeur General de la Geologie et Mines would be the prime point of contact for the special study in Burundi and that Bombi Kagogozo of CRH would fulfil this role for the Democratic Republic of Congo.

The field visit of Coveliers and Goeyens to Burundi, collected names of a number of potential co-operating partners in the project. Of these Evariste Nzeyimana of the Universite de Burundi and Joseph Ndayegamiye of Regie de Production et de Distribution d'Eau et d'Electricité have been particularly recommended.

David Chuba has nominated by the Head of Zoology and University of Zambia (Dr Mbata) to participate in the study on impacts of sediments on biota to be supervised by Dr Irvine.

Drs Manuel Palacios, Peter Swarzenski and Kiram Lezzar have been nominated by University of Arizona to assist in coring cruise to take place in January 1998. Their names have been submitted to UNOPS for approval.

#### 2.4.4. Main Outputs and Achievements

The training workshop was completed on 3/10/97 with a total of 10 trainees opting for the sedimentation option. These were:

Chobaliko E L Rubabwa (Kigoma Regional Water Department)  
Theodore Mpyalimi (Kigoma Regional Water Department)  
Kezia H Moses Mwanga (Mrs Mbwambo - Tanzania Bureau of Standards, Dar es Salaam)  
Ubald Kisisiwe (TAFIRI, Kigoma)  
Stanislas Muhoza (TAFIRI, Kigoma)  
Mbinduka Chatta (TAFIRI, Kigoma)  
Edmund Kadula (TAFIRI, Kigoma)  
Kennedy K Kaoma (Department of Fisheries, Mpulungu, Zambia)  
Robert Sinyinza (Department of Fisheries, Mpulungu, Zambia)  
Bwalya J Kasonde (Department of Water Affairs, Mpulungu, Zambia)

R. Duck was principally involved in the instruction of the sediments component of this Workshop.

K. Irvine completed his field visit to Mpulungu and Kigoma and a workplan has been formulated to continue work on Impact of sediment on biota.

A fully functioning laboratory now exists in TAFIRI Kigoma. The equipment is also in place in Mpulungu and this laboratory is in the process of being upgraded. Goeyens and Coveliers assessed a number of laboratories in Bujumbura for suitability to conduct work on nutrient cycling. Mr Nshombo (Director of CRH, Uvira) was given a list of laboratory equipment to modify in order to restore the laboratory there to functional capacity.

The sediment study workplan (supplied with the Preliminary Strategic Plan) was presented at the technical co-ordination meeting in Bujumbura in September by G. Patterson. A summary of these work-plans will be included in the PPER for comment at the Project Tripartite Review to be held in January 1998.

A major effort has been made throughout the period to prepare for a 3-4 week cruise in January 1998 for paleolimnological work. This is the principal part of a collection programme organised on the basis of a subcontract with the University of Arizona. There will be local participation of approximately 9 regional scientists from a variety of Institutions.

The November 1997 cruise organised by the Royal African Museum, Brussels was cancelled by the LTR Project who withdrew the RV Tanganyika Explorer due to an alteration in their own cruise schedules. The necessary equipment testing described in the last quarterly report will now be performed in the early part of the January 1998 cruise.

The visit to Burundi of Goeyens and Coveliers has strengthened the linkages with workers in the northern part of the lake. This will proceed towards a major co-operative effort on the analysis on the impacts of sedimentation on nutrient cycling.

Field work activities have continued in the region a number of fronts.

C. O'Reilly has been now been operating in Kigoma for six months and has instigated a number of collection programmes

Dr Sichingabula of University of Zambia and representative of the Zambian Water Affairs department travelled to Mpulungu on 28 August to 16 September to carry out a preliminary survey to assess the possibility of monitoring river-borne sediment pollution in the Zambian part of the Lake Tanganyika catchment. They produced a report on this work and it is available.

River monitoring in Gombe has commenced with the visits of H. Nkotagu and others.

R. Duck of University of Dundee has obtained data records for the Luiche river for analysis. In addition the Project (with the co-operation of the



Tanzanian Water Department) have restored the Luiche gauging station to working order.

Terms of reference to perform a land use study in conjunction with the Socio-economic Special Study have been drafted. It is intended that this study will probably concentrate on the Malagarasi swamp and/or Luiche delta.

#### 2.4.5. Main Objectives for the next quarter

To successfully carry out the coring cruise timetabled for 5-31 January 1998

To complete work-plans with a number of different project sub-components. All to move towards routine monitoring by the end of this quarter. These include:

1. Work which has been initiated in the Tanzanian and Zambian drainages of the Lake catchment. This requires strengthening with the installation of suitable gauging stations - to take place during this quarter.
2. The coring cruise of the *RV Tanganyika Explorer* in January 1998 is intended to provide the material for an exploration of the changing impact of sediment. This work will progress in the period with the material collected and preliminary analysis made.
3. For the detailed analysis of the of selected catchments it is hoped by the end of this quarter that routine data are being collected from sites in northern Gombe, Tanzania.
4. A timetable for the installation of the X Ray diffraction analyser in Burundi should be made - we are dependant on Philips engineers agreeing to do this work.
5. Follow up on the visit of Goeyens and Coveliers to Burundi will (by GP in February) to initiate the nutrient cycle study. To recruit a candidate for visiting Belgium to learn the required techniques and to formalise arrangements with the principal co-operating institute with this work.
6. A drafted programme for side scan sonar surveys will be produced with the intention of commencing fieldwork in mid 1998
7. Work on impacts of sediments on productivity is to continue with the addition of pelagic bacterial rates of production during this quarter.
8. A broad approach is intended to look at impacts of sediments on biota in the region of Mpulungu. This will be a multidisciplinary study involving measurements of sediment composition and sedimentation rates and their impacts on organism distribution and behaviour. Initial aspects of this work and the personnel required should be in place by the end of this quarter.



## **2.5. Progress Report: September - November for the Special Study on 'Pollution in International Waters and its Effects on Biodiversity in Lake Tanganyika'**

### 2.5.1. Overall summary of progress

1. Through the Technical Planning Workshop attended 16-17 September in Bujumbura (Burundi), TB-W gained the general support of the Francophone project personnel including national co-ordinators for the major components and approaches proposed in the PSS Work Plan. TB-W also toured the town with Gabriel Hakizinana (INECN) - the main link for PSS business for Burundi - to view the mainly, point-sources of pollution. Mr K Tshibangu was selected as the PSS Co-ordinator's main link in the Democratic Republic of the Congo. Identified for the Scientific Liaison Officer (Dr Kelly West, the regional personnel that should be appointed to the PSS in the Francophone countries: in Burundi - Rénovat Baragengana (Director, Soil Sciences and Environmental Studies Department, ISABU), Denis Barandemaje (Dir. du Dept. de Gestion des Ressources Hydrauliques), Pascal Mdizeye (Dir. des Transport Lacustres et Internale), Gregoire Njeimana (University of Burundi), Nsabimana Libérat (Directeur de l'eau, Regie de Production et Distribution d'eau et d'Electricite (REGIDESO)), and Gabriel Hakizimana (Ingenieur en Genie de l'Environnement). In the Democratic Republic of the Congo - all CRH: Sona Kimbadi (chemist), Mavula Mbemba ('nutritionist') and Kalala Tshibangu (chemist but also involved in river invertebrates) and Mr M Kamalebo (algologist).

2. With Dr Foxall and Mr Kirika, established a working laboratory in Kigoma (Tanzania), and started the training there of previously selected Tanzanian and Zambian Nationals with a 2-week 'Limnological Field and Laboratory Methods Workshop', and culminating in the initiation of preliminary chemical and biological water quality monitoring programmes. The trainees are, in Kigoma: Grace Bwathondi, Dionatus Chitamwebwe, Edmund Kadula, Meshack Kajelelo, Ibrahim Katonda, Elias Lyoba, Dinna Lyoba, Stanslaus Muhoza and the 'Echo' crew (3 persons), and in Mpulungu: Leonard Mwape, Kosam Kaweme, Charles Lukwesa and Isaac Zulu and 3 laboratory assistants to be selected. Shadreck Ngonsela, Christopher Kashinga are also associated with the Project and based in Lusaka

3. Presented these appointees with sets of standing instructions as regards their initial field and laboratory duties - with the intention of updating these instructions as the various skills are mastered and become routine.

4. Appointed Miss Nicola Witshire consultant on the PSS. Miss Wiltshire's Terms of Reference are presented below.

### 2.5.2. Brief chronology of activities and visits

1. Dr Bailey-Watts (IFE) was in Bujumbura, Burundi **15-17 September** preparing for, and attending and addressing the Technical Planning Workshop. He also visited and discussed PPS issues (such as the siting of field and laboratory facilities) at the Lake Tanganyika Research (LTR) FAO FINNIDA headquarters (Dr George Hanek and colleagues), the adjacent Fisheries Department (Director, Roger Kenyaru), and the INECN headquarters (Gabriel Hakizinana, Friedrich Weber and Aline Irimbere). Unfortunately, Dr Bailey-Watts was unable to see the former headquarters of the Belgian Centre Regionale de Recherches en Hydrobiologie Appliquée (CRRHA). Meanwhile, Dr Foxall (UEA), and Mr Kirika (IFE) started organising the Project's first limnological laboratory - in Tanzania - with equipment safely received and stored there since its delivery in August. Dr Bailey-Watts moved on to Kigoma **18 September** for the final preparations for the field and laboratory activities, 'plenary' presentations and discussion topics (with special reference to pollution and its effects on the diversity of

the planktonic and benthic micro-algae and crustacea) planned for the 'Methods Training Workshop (22 September to 2 October)'. The following issues were covered during this workshop:

*Plenary contributions (i)* Pollution Special Study overview: *raisons d'etre* of the Study, definitions of 'pollution' and 'biodiversity'; reasons for the concern over pollution; outputs envisaged (e.g. a greater understanding of the effects of pollution on certain microscopic biota, and a body of personnel capable of maintaining a programme of pollution-biodiversity monitoring, and *Plenary contribution (ii)* a more comprehensive treatment: the aims to influence pollution control and biodiversity protection policies; relating pollutant status to microbial diversity in open water and on substrata from fine muds to boulders; field monitoring and recording techniques; field and laboratory record and check sheets; water and substrate sampling methods; physical, chemical and biological analyses in the laboratory; 'good laboratory practice'; data analyses and interpretation. *Field and laboratory discussions and practices*: the use of probes e.g. pH, conductivity; nutrient analyses by e.g. phosphorus fractions; chlorophyll<sub>a</sub> determination by spectrophotometry; general microscopy e.g. care of the microscope; the calibration of eye-piece graticules and counting chambers; micro-algal diversity assessment and size determination - plankton and epilithic assemblages; preparation of standing instructions for the above; data logging, presentation (graphing) and interpretation, and a consideration of the broader significance of the results; assessing, and capitalising on individuals' strengths and interests; considerations about how GIS and computerised database systems can serve the practising scientists on the PSS.

Due to ferry problems the Zambian contingent (along with the Tanzania team) stayed in Tanzania and continued training with Drs Bailey-Watts and Foxall and Mr Kirika until **8 October**. Between then and the consultants' departure for Europe on **11 October** discussions on the following were held with the SLO and senior TAFIRI staff. It was concluded that TAFIRI staff availability is encouraging with even the Director intending to contribute some 25% of his time. In the long-term nevertheless, shortages will arise if Katonda and Grace Bwathondi leave in the near future - as mooted - and if they are not replaced. The SLO, Chitamwebwe and Dr Bwathondi are to discuss this in Dar es Salaam shortly to discuss TAFIRI staffing and the possibility of obtaining some new posts. Chitamwebwe views the current capabilities of the staff earmarked for the GEF work as reasonable and especially so as long as training is maintained; in this connection Miss Wiltshire's appointment was viewed as a very welcome development. The possibility of university or college graduates - or even senior school-leavers with technical training - is being considered.

### 2.5.3. Current staffing schedule

Drs Bailey-Watts and Foxall, Mr Kirika and Miss Wiltshire; A summary Miss Wiltshire's Terms of Reference are as follows:

She will:

help with training workshops where these require limnological input.  
train all field and laboratory personnel in the wide range of techniques necessary for assessing the impacts of the above pollutants on biodiversity.

ensure that all sampling and laboratory schedules, and data analysis and reporting are maintained.

#### **Regular activities**

Day-to-day duties: these amount to training and supervising the African personnel in the following:  
Appreciating and understanding the *raisons d'etre* of the Special Study.

Maintenance at whatever intervals are appropriate, thorough checks on all field and laboratory equipment and facilities.

Ensuring that Good Field Practice is maintained - with regard to safety issues in addition to the proper handling of water and sediment samples and sampling apparatus, the safe return, recording, storage and treatment of samples.

Making sure that boats, life-jackets, anchors, ropes and fuel, necessary for sampling expeditions are available and in working order when necessary.

Ensuring that Good Laboratory Practice is maintained; examples include the keeping clean and as dust-free as possible, glassware and electrical and electronic equipment, and the double checking of reagent standards, instrument readings and data logging.

The regular (electronic) distribution of data files.

Maintaining daily diaries of all activities and observations.

Writing reports and papers.

#### 2.5.4. Main objectives for next quarter

1. To see Miss Nicola Wiltshire meeting the requirements of her post as outlined above, and thus appointed beyond the 3-month probationary period stipulated in her current contract with NRI.
2. To establish the Project's second limnological laboratory in the region - in Mpulungu, Zambia and initiate preliminary schedules for monitoring physical, chemical pollution and associated diversity of microscopic biota in open water and littoral substrata sites in Mpulungu Bay - with occasional forays to the even less impacted Nsumbu area.
3. To contribute 2 personnel (1 ex-patriate, and 1 Zambian or Tanzanian) from the PSS team to the forthcoming cruise in Burundian waters.
4. To continue to strengthen the skills of the selected Tanzanian and Zambian teams in all aspects of the PSS Work Plan - from the planning and execution of field programmes, to the analysis, interpretation and reporting of the results.

## **2.6. Progress Report: September - November 1997 for the Remote Sensing and GIS Component**

### 2.6.1. Overall Summary of Progress

During this quarter, the RS/GIS inputs included:

- Completion of ordering and delivery of 'background' data sets for GIS z Training visit to Kigoma covering GIS basics and introducing a prototype all-lake GIS to stimulate discussion amongst SS leaders and local counterparts, concerning ways forward towards delivering sustainable GIS
- Installation and training visit to Kigoma covering installation and training for Local Application of Remote Sensing Techniques (LARST) NOAA satellite receiver system
- Further discussions with SS leaders concerning GIS and database data formats and ingest procedures

### 2.6.2. Brief Chronology of Activities and Visits

September: Completion of spatial 'map' based data products (V Copley).

UK-based discussions concerning data base and GIS requirements and data input formats (C Sear). GIS training visit to Kigoma coinciding with Special Study meeting (J Rutter).

October: Initial discussions (UK-based) on local sustainability of GIS solutions (C Sear)

November: Remote sensing (LARST) installation and training (to local counterparts- met. service personnel) visit to Kigoma (R Loftie).

### 2.6.3. Main Objectives and Achievements

Delivery of first GIS and remote sensing training z Start of discussions concerning appropriate and sustainable use of available technologies

### 2.6.4. Main objectives for next quarter

Specification of GIS requirements and agreement of data ingest formats

Delivery to Kigoma of 'background' map products for use locally

Production of draft 'Action Plan' for local GIS/RS training covering project years three and four