

**Pollution Control and Other Measures to Protect Biodiversity in  
Lake Tanganyika (RAF/92/G32).**

**Special Study Group Progress Reports  
for the period**

**March - August 1996:**

## **1. Socio-economics (SE) and Environmental Education (EE)**

### **1.1. Overall summary of progress**

Considerable progress has been made this quarter towards the establishment of nationally owned and implemented socio-economic special study and environmental Education processes. Following the completion of the SE / EE chapter of the Inception report, based on workshop recommendations, NRI international technical advisors have undertaken field visits with national counterpart institutions. Draft reports have been submitted and terms of reference for national consultancies drawn up, including workplanning for in-depth investigations at local level. In most cases suitable national consultants or counterparts have been identified in consultation with the lead national institutions. Workplanning, identification and recruitment of national teams for participatory field investigations and EE work is ongoing.

### **1.2. Brief chronology of activities and visits**

March 1996

- Inception workshop: participation of SE and EE lead technical advisors (Quan, NRI and Whitehead ICCE); combined group discussions with national delegates.

April 1996

- Immediate production and circulation of SE / EE workshop report, with draft workplan and schematic methodology for SE special studies and pilot EE activity as agreed by workshop delegates, for incorporation in Inception Report (Ch 6). Report includes country summaries based on workshop national statements, to supplement and summarise the assessments made in the baseline review.
- Revision of job description for project regional socio-economic coordinator
- Advice and assistance on overall structure and content of inception report

May 1996

- Development of logical framework for project Phase 2 (Special studies and Strategic Planning), as agreed at Inception Workshop and incorporated into Inception Report
- Development of TOR for mid-year country visits by SE / EE technical advisors to all four countries to develop and initiate nationally owned special study workplans; discussions with MRAG and ICCE.
- Meetings and discussions with Terre sans Frontieres on possible support to project missions and operations in Burundi
- PCU recruitment efforts for regional socio-economic coordinator, via project National Coordinators

June 1996

- Finalisation of TOR, work planning and logistics for mid-year country missions; liaison with NRI, MRAG and ICCE consultants, PCU Dar and Chief Scientific Officer, Kigoma.
- Forward work planning and TOR for intensive support to PCU in late 1996 on socio-economics, to cover recruitment of national staff and coordination of national inputs to special studies / EE: NRI internal recruitment of East Africa based Swahili speaking Social Development staff member to support project work in the field (Dr Martin Walsh).
- Correspondence with CADIC about their role in EE and possible project support to NGO environmental management activities in Zaire portion of lake basin.
- Consideration of GEF monitoring and evaluation guidelines for international waters projects and implications for project strategic planning process

#### July 1996

- SE / EE Field missions to Burundi (Quan NRI), Tanzania (Quan and Walsh, NRI; Whitehead ICCE) and Zambia ( Whitehead ICCE, Aeron Thomas MRAG) for work with national counterparts to develop and plan special study work programmes.
- Since Zaire turned out not to be accessible from Burundi (contrary to UNDP Bujumbura advice that it was) we arranged a visit by a Zairean delegation (CRH Uvira, CADIC) for discussions in Kigoma.
- In addition to discussions with National Coordinators and others in Bujumbura, Lusaka and Dar-es-Salaam, and with regional /district government and NGOs, initial fieldwork was undertaken in lake shore districts, with full participation of national / local counterparts from relevant government departments national lakeshore districts.
- Informal exchange and networking was initiated through participation of the Zairean team in local fieldwork and discussions in Kigoma
- Terms of reference and workplans drafted for national investigations, in consultation with national partners as follows:
  - Burundi: Socio-economics initial investigation, and preparation of national EE work programme,
  - Tanzania: In depth SE / EE investigations at pilot lakeshore sites (PRAs ) for Kigoma region,
  - Zaire Initial socio-economic / resource management /institutional investigation, and follow up programme for NRI technical support visits and NGO workshop,
  - Zambia Lake shore village inventory and subsequent in-depth studies at pilot sites (PRAs)
- Identification of national counterparts / consultants and teams for local investigations
- Drafting of mission reports by international SE / EE technical specialists
- Military coup in Burundi (25 July 1996)

#### August 1996

- Final stages of above field missions and report drafting
- Mission reports received from Aeron Thomas, Quan, Whitehead and Walsh
- Continuing follow up, including:
  - ongoing discussion of draft TOR / workplan with CRH Uvira, Zaire
  - preparation for first phase of national field investigations, Zambia
  - secondary data collection and local team building by local consultant, Kigoma

- identification of lead national counterparts consultants and possible project staff for Tanzania and Zambia
- Discussions with SE / EE international advisors for final revisions to their reports and with ICCE on development of framework for coordination and management of project EE activities
- Discussions with PCU on contractual and remuneration arrangements for national consultants, counterparts and project staff members

### **1.3. Current staffing schedule (simple table of names/institutions involved)**

#### 1.3.1. International

Julian Quan, NRI Socio-economics and Environmental Education Coordinator  
 Martin Walsh, NRI (Social Anthropologist) Field advisor on Social Science and EE  
 Malcolm Whitehead and Paul Vare, ICCE Technical Advisors, Environment Education  
 Mark Aeron Thomas, MRAG Development Economist

#### 1.3.2. National

Proposed national project posts:

Shadrick Nsongela, ECZ: National EE coordinator, Zambia

Laisha Said, NEMC: National EE coordinator / project Information Officer, Tanzania

#### 1.3.3. Consultants:

Mambona wa Bazolana, CRH Uvira: National socio-economic consultant, Zaire  
 Beatrice Marwa: Kigoma Region Fisheries Department local EE, fisheries and Women-in-Development consultant, Tanzania

Proposed consultants, Burundi:

Arthemon Gihimbare, University of Burundi, Agronomy Faculty: Socio-economist

Gaspard Bikwemu, Director, INECN: Environmental Education Coordinator

Work is underway to identify and select possible candidates from national academic institutions for the role of lead socio-economic consultant for Tanzania.

### **1.4. Main objectives and achievements (list outputs)**

- SE / EE workshop report, with draft workplan and schematic methodology for SE special studies and pilot EE activity as agreed by workshop delegates, for incorporation in Inception Report
- Revised job description for project regional socio-economic coordinator

- logical framework for project Phase 2 (Special studies and Strategic Planning), as agreed at Inception Workshop
- TOR for mid-year country visits by SE / EE technical advisors to all four countries to develop and initiate nationally owned special study workplans
- TOR for intensive support to PCU in late 1996 on socio-economics, to cover recruitment of national staff and coordination of national inputs to special studies / EE
- Terms of reference and workplans for national investigations, in consultation with national partners as follows:
  - Burundi: Socio-economics initial investigation, and preparation of national EE work programme,
  - Tanzania: In depth SE / EE investigations at pilot lakeshore sites (PRAs ) for Kigoma region,
  - Zaire Initial socio-economic / resource management /institutional investigation, and follow up programme for NRI technical support visits and NGO workshop,
  - Zambia Lake shore village inventory and subsequent in-depth studies at pilot sites (PRAs)
- SE / EE Mission reports received from Aeron Thomas, Quan, Whitehead and Walsh

### **1.5. Main objectives next quarter**

- Integration of mid year SE / EE mission reports, recommendations and national commentaries into combined national action plans for continuing special study investigations and EE pilot work.
- Full time, short term NRI social science presence in field October - December 1996 (Martin Walsh)
- Clarification of way forward (if any) for implementing national SE / EE consultancies for Burundi, and supervisory / support arrangements
- Finalisation of TOR and recruitment of national Environment Education coordinators for Tanzania and Zambia (roles partially overlap with that of project Information Officer)
- Clarification of needs and contractual arrangements for project national staff / NGO collaboration, Zaire
- Completion of initial socio-economic investigation for Zaire, and assessment of implications for strategic planning; field support visit to Zaire
- Lake shore village inventory and PRA work planning, Zambia
- PRA work planning and practical training, Kigoma, Tanzania

- Advertising and recruitment for post of in-region socio-economic coordinator, or alternatively identification of national lead consultants for project socio-economic studies
- Participation by project staff in development of Preliminary Strategic Plan
- Action on reviewing combined training needs for project staff and collaborating institutions, and development of project training plan

### **1.6. Recommendations and conclusions.**

The critical outputs for next quarter are the agreed national action plans for the field investigations and the EE work, and the identification / contracting of national project staff and consultants to begin implementation. Concerted efforts by the PCU in establishing adequate remuneration rates and suitable contractual and institutional arrangements for these purposes is essential, and a thorough review of the budgetary requirements and available resources will be needed.

Practical support to the PCU will be provided by fielding Dr Walsh for an approximately three month period. If adequate national institutional arrangements and human resources are not forthcoming in-region by January 1996, within budgets, resources will need to be secured to strengthen the socio-economics / environmental education budget to finance ongoing technical support to PCU by a suitable international expert.

Given (I) the centrality of SE and EE components to this project, and (II) the very heavy demands of the project on UK-based management and coordination time, it is now evident that the absence of a position for a full-time project socio-economist in the first eighteen months of the project was a serious shortcoming in project design, and in the agreed implementation plan and allocation of financial resources between posts and disciplines.

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## **2. Biodiversity and Fishing Practices Special Studies and Conservation Activities**

### **2.1. Overall Summary of Progress**

An intensive period of preparation for the Inception Report followed the Inception Workshop. While this was being finalised, the international contact base was being broadened through meetings with experienced institutions and contributors to the LTR project. Design and construction of the project database and Information Management System (IMS) was started by MRAG and NRI and the specific biodiversity database has been implemented and the baseline data from all previous observations by species and locality for fish are being entered. Field team leaders have conducted the first circum-lake visits to finalise work programmes with collaborating national and regional institutions and to begin site identification for both scientific and socio-economic work. Potential sites for conservation areas and National Parks have been given particular attention with some preliminary mapping and indicative zoning being initiated.

### **2.2. Chronology of Activities**

March: Finalisation of outputs from Inception Workshop.

April to early May: Drafting of finalisation of special study contributions to Inception Report including "Conservation Activities".

June: Contribution to editing Inception Report.

June: Meeting with FAO LTR Desk Officer, Dr J Kapetsky.

Broadening of international contacts base - e.g. University of Leiden and Royal Museum, Tervuren.

June: Replacement of leading team member Kees Goudeswaard, who had to take up Dutch Government funded project on Lake Mweru, with Philippe Petit (ENSAT).

June: Meeting with Lake Circulation Modelling Group.

July: Initiation of project database and Information Management System (IMS) between MRAG and NRI systems specialists.

July: Construction of biodiversity database format and systematic search and entry of all fish species/locality records in international literature on a geographical locality basis.

August: Field visit to lakeside locations in Zaire, Tanzania and Zambiano follow up on institutions and priority sites identified during Inception Workshop. Team members: Dr E Allison (MRAG), Dr P Petit (ENSAT, Toulouse). Mr M Aaron-Thomas (MRAG), whilst on a socio-economic survey, also contributed to site selection for social aspects of Fishing Practices Special Studies.

### **2.3. Staffing Schedule**

Special Study Director  
Dr Ian Payne, MRAG

Field Team Leaders  
Dr E Allison, MRAG  
Dr P Petit, Ecole National Supérieure, Toulouse

Special Advisor  
Dr Rosemary Lowe-McConnell (Independent)

Research Assistants (UK) Biodiversity Database  
Ms Vicki Cowan (MRAG)  
Mr Nicholas Kotschoubey (Independent)

Database Specialist  
Mr John Pearce (MRAG)

### **2.4. Main Outputs and Achievements**

- Contributions to "Biodiversity" "Fishing Practices" and "Conservation Activities" in Inception Report
- Establishment of links with key collaborative institutions following Inception Workshop.
- Initiation of project database construction.
- Implementation of first field visits by team leaders to establish work programmes and begin site selection. Priority sites include those which may be designated as National Parks.

### **2.5. Main Objectives for the next quarter**

- Completion of baseline fish species biodiversity locational database pending addition of new material.



- Analysis of database to assist in identification of optimum conservation strategy which depends upon how fragmented distribution of species tends to be.
- Debrief of field team leaders to produce detailed work plan for special studies, according to guidelines provided by Inception Workshop following consultation with national collaborators.
- Contribute work plan and strategy to the Preliminary Strategic Plan.
- Mobilise and commence main field work programmes under field team leaders, following contractual agreements with the collaborating institutions.

### **2.6. Recommendations**

- Contractual arrangements to be concluded with collaborating institutions as soon as possible.
- Project database and IMS to be finalised and constructed in conjunction with Lake Systems Modelling components, as soon as possible.
- Conservation strategy to be finalised soonest.

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### **3. Legal Component**

#### **3.1. Summary of Activities**

From the Inception Workshop it was clear that the Legal Component must be brought forward in order to define and initiate the most appropriate agreement or treaty and legal instruments to underpin the formation of a Lake Basin Management Committee in time to take ownership of the Final Strategic Plan. The need to convene a Legal Workshop to bring together Government lawyers from the participating countries was included in the contribution to the Inception Report. The profile of potential contributors has been defined and circulated through the National Coordinators, along with the Terms of Reference for the Workshop. Nominees from the National Coordinators are being received.

#### **3.2. Chronology of Activities**

April: Contribution to Inception Report.

June: Definition of profile of national participants in Legal Workshop and finalisation of the Terms of Reference.

July: Circularisation of ToRs and profiles via National Coordinators with requests for two nominees for each country.

August: First responses from National Coordinators.

#### **3.3. Current Staffing Schedule**

Special Study Director      Dr Ian Payne, MRAG

Legal Specialist (Anglophone)      Mr Cormac Cullinan, MRAG

Legal Specialist (Francophone)      Mr Stephen Hodgson (Independent)

Legal Specialist (Conservation/Community)      Mrs Dorothy Muzurewa  
(Independent)

#### **3.4. Main Outputs and Achievements**

- Definition of legal requirements through Inception Report.
- First steps towards organisation of Legal Workshop to initiate pathway to political agreement and working legal framework for harmonisation of legislation.

**3.5. Main Objectives Next Quarter**

Finalise composition of Legal Workshop comprising at least two nominees from legislative departments of each Government and coordinated by specialists in international environmental law.

Conduct Workshop over a five day period in one of the partner countries.

**3.6. Recommendations**

Workshop to be held as early as possible to allow time for legal aspects of treaty to be finalised in order to give authority to the Lake Basin Management Committee.

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## **4. Sediment Discharge and Its Consequences'**

### **4.1. Overall summary of progress**

The period began with preparations for the Project Inception Meeting which occurred in Dar es Salaam on 25-28 March 1996. The Inception Meeting gave a clear indication of work objectives of the special study and gave an initial list of regional institutions which would be relevant to the study and willing to co-operate with the study. The outcome of this meeting was compiled and Chapter 7 of the Inception report deals specifically with this special study. The 'Sediment Discharge and Its Consequences' baseline Review was modified somewhat in the light of comments made at the Inception Workshop and at the end of the reporting period the three technical baseline reviews (Sediment Discharge and Its Consequences', 'Biodiversity' and 'Pollution') have been edited and compiled. They are now being translated into French for publication as a literature review.

During the month of August the special study co-ordinator (Dr G. Patterson) and one of the nominated experts (Dr R. Duck) made field visits to the lake region. The mission was to determine which institutions can most suitably undertake the studies in each country, to enlist their support in setting specific objectives, to develop terms of reference and implementation of different elements of the special studies, and also to consider contractual/agreement arrangements. A full report of this mission will be produced at the end of September 1996.

The principal activity of the period is a process of consultation between GP and the Project Co-ordination Unit, experts and in the field, national stakeholders (principally national institutions) and equipment suppliers to try and reach a strategy and balance for the study.

### **4.2. Brief chronology of activities and visits**

GP refers to special study co-ordinator, Dr G. Patterson of NRI.

1-2 March. GP to Brussels to meet staff of Africa Museum Tervuren, Royal Belgian Inst. of Natural Sciences, International Bureau of Environmental Sciences and Museum of Leuven

25-28 March. Project Inception meeting Dar es Salaam. GP attended along with I Downey of NRI to lead discussion on the sediments special study.

16-18 May. GP meeting with Andrew Cohen, University of Arizona to discuss special study in general, and his contribution in particular.

28 May. GP meeting with R. Duck (sedimentologist) and V. Podsechtine (nominated by FAO/FINNIDA LTR Project under the interagency agreement) to produce mathematical model of Lake Circulation) to discuss co-operation of lake circulation model with other special studies. I. Payne of MRAG and I. Downey of NRI also present.

4 June. Further meeting of GP with Dr. A. Cohen, University of Arizona following his visit to the Lake Tanganyika region.

30 July meeting of GP, R. Duck of the sediment special study along with A. Bailey-Watts and C. Foxall of the pollution study to co-ordinate county visit activities.

8 August to 4 September. GP and R. Duck to E. Africa to conduct country visits (see Section ?.1). Included visits to Tanzania, Zaire and Zambia. Burundi was excluded due to the security situation there.

#### **4.3. Current staffing schedule**

Many of the International staff who will be responsible for the supervision of various aspects of the special study have been identified. However at this stage no contractual arrangements have been entered in to and it is therefore too early to put names against activities. Precise tasks listed against institutions/persons will be a output of Phase 1 of the project (see Section ?.5) and this should be largely agreed by the end of 1996.

The field visits conducted at the end of the reporting period were intended to add regional institutions and staff to the task list of the Special study.

#### **4.4. Main outputs and achievements**

The Inception process derived a modified (from the original proposal) set of objectives of the sediments special study. These activities (listed below) are felt necessary to achieve the goal of defining the base data requirements on which further monitoring activities will depend. Defined activities based on this set of objectives will allow for the development of the Preliminary Strategic. A balance of relative importance and effort (and funds) for each of these study areas requires to be defined; this process is ongoing.

Principal objectives of the special study (from Inception Report):

- Investigation of deforestation within the lake catchment area and the effect of land use changes on the rate of sediment inflow to the lake.
- Quantification of the sediments currently entering the lake with indication of seasonal variations.
- Tracing the fate of particles entering the lake (vertical and horizontal transport).
- An investigation of the nature of sediment particles and a consideration of the effect of catchment geology, climate and vegetation on the nature of the sediment input.
- Analysing the impact of sediments on the water column, including the effect of sediments on important limnological parameters which may influence the planktonic communities. This will

include impact of sediments directly on these organisms as well as reaching an understanding as to how planktonic communities are affected. .

- Analysing the impact of sediments on the benthic environment including the effect on benthic processes as well as the benthic organisms. This will include taking short cores of sediment to establish timing, background fluctuation and rates of reductions in biodiversity.
- To consider long term effects of current (and possibly increasing) rates of sediment input to the lake and to consider its likely impact.

#### **4.5. Main objectives next quarter (September 1996 to November 1996)**

The schedule for the special study is defined in the Inception report (still to be approved by the project steering committee). This is as follows:

Phase 1          Initiation phase. This period will be used to establish links between the project and the national agencies who will co-operate in the Special Study. It will also involve and examination of existing data which will reside in the archives of the national institutions. Duration 5 months (early to late 1996).

Phase 2          Pilot Phase. Using rapid assessment to check promising localities, this will involve field visits by consortium and counterpart scientists and specialists to each country, as well as the production of maps/GIS systems. This phase will also involve the establishment of a network of river gauging in, at least, the principal rivers. Coring programmes will be initiated during this phase. The critical part of the Pilot Phase is site selection for more detailed study. Training activities during this phase are important to ensure that a cadre of scientists are available who can carry out the work required during the Detailed Study Phase. Duration 12 months (late 1996 to late 1997).

Phase 3          Detailed Studies. Identification of approximately 12 catchments (see the concept of paired catchments in Section 4.6) for detailed study of the important aspects of Sediment discharge and its impacts identified above in Section. Duration 22 months (mid 1997 to early 1999 -this period involves some overlap with the pilot phase as some studies will be more advanced than others).

Essentially the next quarter is mainly involved with activities under Phase 1 of the special study. It is hope to be in the position to initiate some of the Phase 2 activities by the end of the quarter.

##### **4.5.1. More specific objectives for the next quarter are:**

- To produce the report on the country visits carried out by GP and R Duck during August 1996.
- To produce a full list of proposals to meet the objectives of the special study as defined by the Inception process and with co-operating institutions identified and on board.

- To produce a preliminary estimate of the relative proportion of the budget for the special study broken into the separate activities identified.
- To identify, source and procure the items required for the special study.
- Contribute these special study work plans and strategy to the Preliminary Strategic Plan
- Make major progress towards the publication of the bilingual baseline reviews
- Produce a work plan for the special study leading to a meeting of the special study task force (consisting of international and regional scientists) towards the end of 1996 or early 1997.
- To have a programme of river monitoring agreed with each of the four participating countries (though problem with Burundi - see Section 4.6).

#### **4.6. Comments and recommendations**

The special study is well on schedule and the team to conduct the special study is taking shape. It is desirable to get activities going in the field as soon as possible. However the data provided must be of high quality and this suggests a careful approach. The timetable for the special study (Section 4.5) allows for this.

A problem remains as to the availability of the RV Tanganyika Explorer. The project are attempting to find out about the availability and cost of this vessel. Without this knowledge planning of the special study is difficult, though this will only become acute if uncertainty still exists at the end of the next quarter.

The fact that work cannot go ahead in Burundi, due to the security situation there, will also lead to planning problems. If access to Burundi is allowed within the next quarter then it will be possible to bring Burundian Institutions and sample locations back into the study. If the security situation prevents access to the end of the next quarter, a change in strategy will be required.

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## **5. Pollution in International Waters and its Effects on Biodiversity.**

### **5.1. Overall summary of Progress**

This report summarises the progress made between 1 March and 31 August 1996, with the Special Study on 'Pollution in International Waters and its Effects on Biodiversity in Lake Tanganyika'. Overall summary of progress

This period saw the preparation for, attendance at, and the final reporting on the following: Project Management/Steering Group meetings; discussions between the Co-ordinators of the three main freshwater ecological Special Studies; the project Inception Workshop; and the recently completed institutional resource assessment mission to the lake region.

As a whole these activities have:

- strengthened the links between the UK project managers, Special Study Co-ordinators and African counterparts.
- identified a good deal of 'common ground' regarding the preparation for, and the resourcing and execution of the major Special Studies.
- heightened awareness of the challenges - logistical, practical, social and scientific - that are presented by this huge lake and its catchment.
- within a number of institutions, identified cadres of nationals who should be assigned to the project.
- indicated what is required of the project by way of training and environmental education in the region.
- increased considerably, familiarity with a variety of habitats that exist in the lake ecosystem, and thus, information crucial to choosing study sites and the equipment and approaches that will be necessary for assessing pollution and its effects on biodiversity.
- continued to raise the 'profile' of the project in Africa.

### **5.2. Brief chronology of activities and visits**

Dr Bailey-Watts attended three meetings of the Project Management Group# on 8 March and 31 May at NRI, Chatham, and on 10 July at MRAG, London. He also attended a meeting on 9 July at MRAG with Drs Patterson (NRI) and Payne (MRAG) to discuss the overlapping interests



between the Special Studies on #Pollution#, #Sediment Pollution# and #Biodiversity#. On 30 July Dr Bailey-Watts hosted at IFE Edinburgh, a meeting with Drs Patterson, Foxall (UEA), and Duck (University of Dundee) on the final preparations for their forthcoming resource assessment mission to the lake countries - with reference mainly to the mission Terms of Reference (prepared previously by Drs Patterson and Bailey-Watts, and furnished with a French language version) and sent to the PCU in Dar in July. The project Co-ordinator also attended the Inception Workshop (25-28 March) and completed (in early May) his contributions appertaining to the 'Final Draft' of the Inception Report, which was eventually published in July. The mission itself ran from 8 August to 5 September.

### **5.3. Current staffing schedule**

In addition to the Co-ordinator of this Special Study, the following have contributed to progress over the period under review: Dr Chris Foxall (University of East Anglia) contributed considerably to the recent mission, visiting Zambia as well as Tanzania; Miss Nicola Wiltshire (IFE) helped with the #Pollution and its effects on biodiversity# contribution to the project Inception Report, and she and Miss Dawn Ives (UEA) have assisted Drs Bailey-Watts and Foxall in UK on a number of other LT duties.

### **5.4. Main objectives and achievements**

The earlier phases of the project identified and publicised - by means of the Baseline Review on 'Pollution and its effects on biodiversity in Lake Tanganyika' - the *raison d'être* of this Special Study. The review also aired preliminary thoughts on what basic approaches might be adopted for the work, and most importantly, what would be needed by way of resources (financial, human, equipment etc) to carry out the work. The main objectives and achievements relating to the present reporting period represent a substantial development of these previous phases.

Good progress was made towards achieving these objectives by firstly, presenting at the Inception Workshop in Dar es Salaam (25-29 March) a summary of the findings of the Baseline Review to the workshop as a whole, and chairing and co-ordinating discussions on the preliminary ideas with scientists from the lake countries. This did the following:

- established a common (international) consensus as to what constitute the main issues.
- prioritised the pollution and pollution-related biodiversity issues to be investigated.
- progressed (from the stage achieved in the Baseline Reviews) with the selection of sampling sites encompassing impacted and 'pristine' areas with examples of the main habitats such as muddy through to boulder substrates, as well as open water.
- identified the organisations/institutions and key personnel such as the National Co-ordinators, and regional experts and others interested in pollution and biodiversity issues that could carry out the work.

The contribution to the Inception Report that related specifically to the Pollution/Biodiversity Special Study, was submitted to the PCU in May.

The second major step forward was achieved during the preparation for, and execution of the Lake Tanganyika country visits. Unfortunately, owing to the delicate situation currently prevailing in Burundi, this country was not visited on this occasion; it is hoped, however, that a specific visit can be made before the end of the year.

These aimed to assess in much more detail than hitherto (i) issues likely to influence the nature and extent of the practical programmes, (ii) human and other institutional resource needs, and (iii) identification of the institutions and people to carry out the studies - with training as appropriate. In the event, further progress was also made towards finalising where, i.e. at what sites/locations, samples will be collected to assess the effects of the different forms of pollution on biodiversity.

The following items typify the many successes of the mission:

- establishing from the outset, a collaborative and multidisciplinary approach by all members of the mission, regardless of their main Special Study interests; this is considered essential for 'covering' the lake region adequately in the time available to this mission, and it reflects the joint view that the eventual Special Study teams will also have to collaborate closely in the planning, and the execution of field sampling and laboratory activities if the project is to be successful.
- gaining a much improved awareness of the challenges presented by (i) a lake that is not only extremely large, but also characterised by concentrations of dissolved and particulate matter and population densities of organisms, that lie near, or at the limits of detectability achievable by standard instrumentation, and (ii) #real# difficulties relating to travel by land or water over very long distances.
- identifying (i) a number of centres and personnel that should be involved in the proposed studies, and (ii) mainly small, institutions that need more strengthening by way of equipment, than this project could reasonably afford, but nevertheless have talented and enthusiastic staff meriting involvement in the project on eg. secondment to a larger centre.
- owing in very large part to the efforts of Dr Chris Foxall who managed to visit some 30 institutions/university departments, identifying many potentially useful links between this Special Study and the study on environmental education
- identifying training needs in all aspects of the work of the Pollution-Biodiversity Study from the planning of field expeditions (the establishing the 'why', 'where', 'when' and 'how'); observing and recording environmental conditions; sampling and the immediate treatment of the materials collected; laboratory analyses (including Analytical Quality Control exercises); data logging and analysis; and appropriate interpretation of the results (i.e depending on whether the 'customer' is a fellow scientist, as compared with a conservationist or administrator.

**Table 1** gives the names and affiliations of people met by Dr Foxall and/or Dr Bailey-Watts during this mission. It identifies some 40 institutions and approximately 90 people.

### **5.5. Main objectives for next quarter**

These are as follows:

- the formal identification of the institutions to be involved in the Special Study on Pollution and its effects on biodiversity.
- appointment (with #Conditions of Service, duties, location, enumeration) of scientists and technicians related to the above. appointment of the #supporting staff# (ie. the non-scientific personnel identified in the Baseline Review on #Pollution and its effects on biodiversity').
- preparation of an illustrated leaflet explaining the objectives scope and expected outcome of the Lake Tanganyika Project as a whole.
- as above, but focusing on the pollution and pollution-related biodiversity studies.
- procurement of equipment (e.g. inflatable craft, engines, generators, laboratory furniture, glassware, chemicals and consumables) to facilitate littoral and offshore sampling, immediate treatment of samples, laboratory analysis, data logging and analysis and interpretation; supplies must be sufficient to support at least the first year of practical work even though this is to be viewed largely as a training period.
- finalise plans for a multi-disciplinary limnological field and laboratory methods workshop to be held around the end of March 1997; initial proposals are that this meeting would involve 4 or 5 researchers/technicians from each of the 4 lake countries; the venue proposed at present is the TAFIRI headquarters at Kigoma, moderately easily reached from Zaire and Burundi, and not too difficult to visit from Zambia (eg. Mpulungu); the proximity to Kigoma Port as well as somewhat less #impacted/polluted# sites with rock, pebble, cobble, sand and mud substrates and habitats - in addition to open water, is of obvious value at this and other early phases of the training programme.
- appointment on a part-time basis, of instructors for the above.
- select, and start to establish (by means of Project signs etc) the first 4 centres within the region (i.e. one in each country), where work in the first year at least, will be based.
- distribute around the region many more copies than hitherto, of the Special Studies Baseline Review on Pollution and its effects on biodiversity#.

**Table 1. Organisations/institutions and main people visited by Dr Foxall and /or Dr Bailey-Watts during the Lake Tanganyika resource assessment mission (8 August to 3 September 1996).**

<b>Institutions assessed and/or sites visited</b>
13.8 Kigoma: Regional Water Department (Tanzania): Mr Michael Baragwiha (Regional Water Engineer), Mr C E L Rubabwa (Geologist) and Mr Theodore Mpyalimi (Hydrologist In Charge).
13.8 Kigoma: TAFIRI (Tanzania): Mr Chitamwebwe (Station Director), Mr Katonda (Deputy Director) and Mr U Kisisiwe (Field operative and Boatman).
13.8: LTR (FAO FINNIDA) (Tanzania): Mr P Mannini (Head of Station and fisheries biologist), Mr A Kalangali (Zooplankton researcher), Mr Muhoza (Zooplankton technician), Dr J Craig (Project Statistician), Ms Els Bosma (Zooplankton, nekton and fish), Mr P Verburg (Hydrologist and fisheries biologist).
14.8: Kigoma Secondary School (Tanzania): Mrs Fatima Mashaka (Deputy Head Mistress, Mr Kunga (Head, Department of Biology). 15-16.8: Uvira: Centre de la Recherche Hydrobiologique, and Kalimabenge and Munanira Rivers (Zambia): Mr S Kimbadi (Chemist), Mr M Mbemba (nutritionist), Mr K Tshibangu (Chemist/Invertebrate zoologist), Mr M Risasi (Taxonomist - Cichlidae), Mr M Kamalebo (algologist - mainly epilithon). Phytoplankton net-tow sample collected in approach to Uvira Bay.
15.8: Kipili (Tanzania): small natural bay - with defunct but potentially restorable Fisheries Department buildings.
16.8 and 20.8: Mbala at Mpulungu: Department of Fisheries (Zambia): Mr Mwape, Mr D Kabakwe (Senior Fisheries Development Officer)
16.8 and 20.8: Mpulungu: LTR (FAO FINNIDA) (Zambia): Mr V Landenberg and Ms P Pfaffer.
17.8: Mbala, Mpulungu: Motomoto Museum (Zambia): Mr E Nkole Sosala (Keeper of Pre-History Department).
18-19.8: Sumbu: Lufubu River, Sumbu National Park, and Department of Fisheries (Zambia): Mr Mwape (as above), Mr T Miti (Head Wildlife Service, Sumbu).
20.8 Malagarasi Delta (offshore zone) (Tanzania): seine-net fishermen and boys. Samples collected: submerged and emergent macrophytes, and bottom muds/silts/sands.
21.8 Mahale: Mountains National Park (Tanzania): Mr J Wakibara (Park Ecologist), Mr A H Seki (Senior Park Warden), Mr W Daniel (Park Warden, Law Enforcement) and Mr F I Malisi (Park Warden, Tourism and Community Conservation Service). Phytoplankton net-tow samples collected at five points during return journey to Kigoma.
21.8: Mpulungu: Water Engineer's Department (Zambia): Mr B J Kasonde (District Water Engineer).
22.8: Kasama: Provincial Water Department (Zambia): Mr S C Ngambi (Water Engineer) and Mr C Chizango (Deputy Co-ordinator, Irish Aid Development Programme).
22-23.8: Lusaka : UNDP (Zambia): Dr Chipungu (Sustainable Development Director).
22-23.8: Lusaka (Zambia): Environmental Council of Zambia: Mr J S Phiri (LT Project National Co-ordinator).
24.8: Kigoma (Tanzania): Field visit and sampling of epilithon, epipsammon and epipyton in two local ('Jacobson's') bays.
26.8: Lusaka (Zambia): Fisheries Department: Mr G Mudende (Director at Chilanga).
26.8: Lusaka (Zambia): Department of National Parks and Wildlife, Ministry of Tourism: All staff at seminar in Kafue.
26.8: Lusaka, National Council for Scientific Research (Zambia): Mr C Mwambe (Acting Secretary General) and Dr M Nomai (NCSR, Radio-isotope Unit).
27.8: Kigoma, Tanzania: visit from Selanyika Datomax (Warden, Gombe National Park)

27.8: Lusaka, University of Zambia: Professor D D Theo (Dean, School of Natural Sciences), Dr S M Mgwira (Head, Department of Physics), Professor J Cernak (Department of Physics), Professor P C R Jain (Manager, Environmental Resource Centre in the Physics Department), Dr F Kamona (Head, Department of Geology, School of Mines).
28.8: Lusaka, University of Zambia: Dr Jere (Dean, School of Mines) and Dr S Simukanga (Head, Department of Metallurgy and Mineral Processing).
28.8: Lusaka, University of Zambia: Bernadette Crawford (Senior Projects Office, Irish Aid Development Programme).
28.8: Kigoma, TAFIRI/LTR premises (Tanzania): Ms Els Bosma (Zooplankton, nekton and fish).
30.8: Lusaka, National Council for Scientific Research (Zambia): Mr Kaposhe (Head, Livestock and Pest Centre at Chilanga).
30.8: Lusaka, Zambia Environmental Education Programme: Mr J Lupere (Materials Development Officer).
30.8: Lusaka, Geological Survey Department (Zambia): Mr F Njamu (based at Pamodzi).
1.9: Dar es Salaam, British High Commission (Tanzania): Jane Goodall (Director, Gombe National Park and Research Institute).
2.9 Dar es Salaam: University, Geology Department (Tanzania): Dr Mutakyahwa (Acting Director), Dr Kapilima (Stratigrapher and palaeologist) and Dr H H Nkotagu.
2.9 Dar es Salaam: Ministry of Water - Subdivision of Water Resources' (Tanzania): Mr. Msuya (Meraji. O.Y.) Acting Director of Water Resources) and Mr. Mihayo (Hydrologist).
2.9 Dar es Salaam: University, Civil Engineering Department (Tanzania): Dr Mashauri (Hydrologist - mainly flood frequency studies)
3.9 Dar es Salaam: University, Faculty of Science (Tanzania): Professor M H N Nkunya (Associate Dean, Academic).
3.9 Dar es Salaam: University, Department of Chemistry (Tanzania): Professor Mulozoki (Acting Head of Department).
3.9 Dar es Salaam: University, Department of Zoology (Tanzania): Mr Betterweg (Biodiversity database inc. GIS).
3.9 Dar es Salaam: University, Department of Botany (Tanzania): Dr A K Kivaisi (Senior Lecturer in Applied Microbiology).
3.9 Dar es Salaam: Wildlife Conservation Society of Tanzania: Mrs Alice S Bhukali (WCST Co-ordinator).
3.9: Dar es Salaam: Lake Victoria Environmental Management Plan (Tanzania): Mr Mbwana (LVEMP Co-ordinator).

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## **6. Remote sensing and GIS**

### **6.1. Overall Summary Of Progress.**

Preparatory work has continued in line with progress towards clarifying the remote sensing and GIS requirements of each of the Special Studies. The Scientific Office in region has been advised of installation requirements for the NOAA receiver. Once the accommodation is completed, the NOAA installation will take place. Questionnaires to capture the remote sensing and GIS requirements of the Special Studies Teams have been designed and issued. these will assist the design and population of the GIS and Project database.

### **6.2. Brief chronology of activities and visits.**

A visit by the Remote Sensing /GIS expert was made to the region to attend the Inception Workshop. No other visits have been made to the region.

Attendance at Project Management Meeting

Attendance at technical meeting to discuss GEF lake circulation work and remote sensing inputs.

Attendance at project management meeting.

Meeting with MRAG to discuss data base design and draft questionnaire for requirements analysis

### **6.3. Current staffing schedule**

NRI

I.Downey

M.Wooster

M.Rothery

G.Patterson

MRAG

Vicki Cowan

J.Pearce

### **6.4. Main objectives and achievements**

A questionnaire was jointly developed with MRAG to identify key requirements of each of the special study groups and was supplied to participants in the August mission to the region. This will enable the efficient design of the GIS and database for data input and analysis following field visits. Clarification of the installation site requirements for the NOAA system have been established and communicated to the region. A digital elevation model (DEM), with 1 Km sampling resolution, suitable for slope analysis of the catchment has been acquired.

**6.5. Main objectives for next quarter.**

Collection of Remote Sensing and GIS questionnaires.

Analysis of questionnaire results to identify key requirements of the GIS system and project database.

Generation of slope and aspect maps from DEM of Southern Africa to assist site selection.

Commence acquisition and input of suitable data into the GIS and Project database.

**6.6. Recommendations**

Consultative meetings will be required to clarify requirements from the questionnaire survey and achieve consensus/ compromise on inputs, analysis and products required of the GIS and project database.