

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

Back-to-Office report on mission to Burundi and Tanzania - 12 September to 11 October 1997 - Tony Bailey-Watts

Main diary

Friday, September 12: Depart 0630 Edinburgh for Nairobi *via* Brussels and Entebbe, arriving 'Fairview Hotel' 2400h.

Saturday, September 13: Depart Nairobi 0630 for 'Novotel' Hotel, Bujumbura, Burundi.

Sunday, September 14: Preparing presentations on the Pollution Special Study Work Plan for the Technical Steering Committee meetings scheduled for 16th and 17th September. Also arranged for a 'tour' of mainly point-sources of pollution in Bujumbura (17 September).

Monday, September 15: further work on slides and overheads for the Technical Steering Committee meetings and discussion groups. Visit to the Lake Tanganyika Research (LTR) FAO FINNIDA headquarters (George Hanek and colleagues), and the adjacent Fisheries Department (Director, Roger Kenyaru). Also peered through the barred windows of the former headquarters of the Belgian Centre Regionale de Recherches en Hydrobiologie Applique (CRRHA); a depressing sight characterised by good but thoroughly filthy microscopes! Visit to Gaspard Bikwemu's INECN headquarters; met Gabriel Hakizimana (environmental chemist), Friedrich Weber (Civil Engineer) and Aline Irimbere (Chemist/Analyst).

Tuesday, September 16: Technical Steering Committee meeting. Prepared and circulated a questionnaire inviting the views of delegates (from Burundi and the Democratic Republic of the Congo) on the PSS Work Plan.

Wednesday, September 17: Technical Steering Committee meeting and workshops and discussions. P.m. visits to (i) the wastewater canal from Bujumbura Town, (ii) Kinyankonge, near the waste water treatment plant (serving 60% of the town's people, and 40% of the town area, including the industrial and domestic waste waters), (iii) the treatment station at Buterere, and (iv) the Kanyosha River sedimentation area - not waste water. Factories identified include: SEP (Societe Entrepot Petrol), BRARUDI (beer), BBI (Burundi Battery Industries and the three enterprises producing paints. COTEBU (Complex Textile de Burundi was noted but not visited). Transferred to the m.v. '*Tanganyika Explorer*', departing at 1800 for Kigoma and the forthcoming 'Limnological Field and Laboratory Methods Training Workshop'.

Thursday, September 18: arrived Kigoma Port at 0600 but did not book in to the 'Railway Hotel' until approximately 0930! Discussions with Chris Foxall and Alex Kirika regarding progress with the laboratory and dispersion of field and laboratory equipment.

The complete lack of any help from the host organisation with the preparation of the main conference room (e.g. seating arrangements, checking on electrical supplies for visual aids) was also noted.

Monday, September 22 to Thursday, October 2: the Workshop. *Plenary contribution (i)* Pollution Special Study overview: *raison d'être* 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_a 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.

Friday, October 3: Football match (!) followed by collating thoughts on the successes and failures of the Workshop, and the immediate way forward (see below).

Saturday, October 4: Work on (i) Standing Instructions for phytoplankton sampling, diversity assessment and population density estimation; (ii) the present report, and (iii) the details of the programme of weekly sampling to be carried out by TAFIRI personnel over the period 8 October to the end of 1997.

Sunday, October 5: as October 3, but visit to the Livingstone Memorial and market at Ujiji; Ujiji Memorial custodian extremely pleased with literature sent by Mrs B-W.

Monday, October 6: as October 3 and demonstration to small group of Workshop delegates of microscope techniques with special reference to phytoplankton and other micro-algae; done without electricity!

Tuesday, October 7: meeting with CF and AK re- outstanding tasks and division of labour to deal with these: 'Standing instructions' (different 'chapters' - all 3); points to be highlighted in 'back-to-office' reports (all 3); sampling schedule for period 8 October to end 1997 (TBW and CF); update on CF position as regards Kigoma post; Nicola Wiltshire's Terms of Reference in the light of recent experiences with TAFIRI staff (TBW); resume for Kelly West on staff selected for the PSS activities in Kigoma region, the roles and disciplines of these personnel, and the sampling schedule for period 8 October to end 1997 mentioned above.

Demonstration of Lund Counting Chamber calibration and algal size mensuration.

Pretty disappointed with TAFIRI staff, when it transpired - during a general evening meeting convened by Kelly West - that the majority of the personnel assigned to the preliminary field and laboratory programme set to commence on 8 October had arranged to go to Dar es Salaam on other business that would probably take some three weeks!

Discussed with Catherine O'Reilly the various options open to Nicola Wiltshire re- issues such as (i) when she should come out the region (mid-November likely), (ii) accommodation (sharing with existing students), (iii) where she might be best located (initially Kigoma, but ultimately, Mpulungu and in any event, visiting Kigoma at 6- to 8-weekly intervals), and (iv) the need for her to become - in Tanzania at least - more heavily involved than originally envisaged in the PSS science (as opposed to just supervising and facilitating).

Gave the English versions of the overheads mentioned above to Mr Mwape for the Mpulungu library. Also gave Isaac Zulu and Kosam Kaweme, three Lund nanoplankton counting chambers (calibrated earlier during the Workshop), an eyepiece Miller Square and two types of eyepiece measuring graticule, a stage graticule, and worksheets on the use of the chambers ('mini-quadrat' and transect counting strategies).

Wednesday, October 8: submitted (in MS Word for Windows on disc) to the PCU office, (i) the PSS quarterly report (June-August 1997), and (ii) summary information on the personnel selected for the PSS programme, and the roles and duties required of them. Also left with Kelly West (i) the series of overheads and paper copies in French that were used during the recent Technical Steering Committee meeting in Bujumbura, and (ii) paper copies of the English versions.

Short meeting with KW and CF regarding the staff selection and immediate sampling schedule. As to the first, the main decision was that anyone taken on to the GEF project would receive a PRA i.e PERFORMANCE-related pay. Also decided that all staff would have to serve renewable probationary periods. Outlined the first PSS sampling programme - primarily to cover the period up to the end of the year. Convened a meeting with Chitamwebwe and Katonde (+ CF and KW) to discuss the following queries all which impinged on staffing and the sampling activities planned:

(i) staff selected: to what extent will they be available to the GEF project? Generally more or less full-time, and even Chitamwebwe himself is intending to contribute some 25% of his time to this project (macrophyte ecology being his main interest). In passing, it was intimated that the LTR project is unlikely to be resumed until February 1998, and in any event that (monitoring) project is unlikely to occupy more than a fraction of the TAFIRI station's manpower and boat resources. Nevertheless, shortages may arise if Katonda and Bwathondi (who are likely to leave in the near future) are not replaced. In this connection, Chitamwebwe, Dr Bwathondi and Kelly West are aiming to meet in Dar es Salaam shortly to discuss TAFIRI staffing and the possibility of obtaining some new posts.

(ii) How does Chitamwebwe view the current capabilities of the staff ear-marked for the GEF work? He did not hide the fact that a number of the people selected will need training at quite a basic level. Equally, he views some of the personnel as being very capable.

(iii) Could university or college graduates - or, perhaps more appropriate, senior school-leavers with technical training - be drafted onto the project? The response to this was hardly very positive. Nevertheless, the idea was not dismissed out of hand.

(iv) How are Chitamwebwe and his staff likely to view the prospect of Nicola Wiltshire coming to work full-time on the project - between the Kigoma and the Mpulungu project centres? Chitamwebwe and Katonda viewed this as a very welcome development.

Otherwise this day pre-occupied with microscope maintenance, and examination of encrusting algae collected at 25m depth: an interesting mixture of purple, red, green and virtually colourless cyanobacteria, including bunches of sheathed *Rivularia* (?) as well as single filamentous forms. Diatoms - including bunches of *Surirella* (?) with very green or very orange-brown pigmentation to the fore even in adjacent cells. Other diatoms mainly of the

Cymbella form - and motile. 'Pico' forms, and small groups of possibly green coccoids noted. Will have to design a protocol for analysing some index of pollution/eutrophication (e.g. P content per unit dry weight) of such material, as well as e.g. chlorophyll_a content, and a rapid species diversity index. This will not be easy. Because samples of phytoplankton can be readily distributed more or less at random on a slide or (albeit to a lesser extent) the base of an inverted microscope counting chamber, diversity can be quite swiftly assessed by simply 'identifying' the organism nearest each of 50 or 100 randomly positioned points on the slide etc. The assemblage of attached appear to be that are often tightly packed and distributed over and apparently within an irregular carbonate (?) matrix Randomising the organisms in a sample of the attached microflora Thoughts on light attenuation and chromatic adaptation.

Overall assessment of the visit and issues consequent on the Methods Workshop in particular

The PSS Special Study training team paid particular attention is to assuring that it (i) maintains a continuous presence in Kigoma now that the Workshop has finished, and that (ii) a routine programme of work - however simple/rudimentary - is initiated at once. There was every likelihood that these goals could be achieved in that firstly, the PSS trainers are remaining in Kigoma for a week following the official ending of the Workshop, thus permitting additional training and revision for the Tanzanian delegates and, as it happens, the Zambian contingent, since it is not leaving Kigoma until Wednesday 8 October. Before returning to UK, the PSS trainers will also have prepared 'standing instructions' for a preliminary monitoring programme to be carried out by the national trainees; the programme will feature many of the aspects covered during the Workshop. Secondly, Nicola Wiltshire is likely to arrive in Kigoma before the end of November as the permanent PSS (Anglophone) regional representative to support, supervise and facilitate the routine pollution and lower biodiversity monitoring programmes. This optimism also reflects a number of thoroughly encouraging aspects observed during the Workshop. Firstly, the majority of the trainees responded extremely well to our suggestions and instructions in the field and the laboratory. It was most encouraging to witness the lively and frank *rapport* that developed between the delegates and trainers, and between the trainees from the two countries represented. A number of instances of working and discussing issues out of work hours were also noticed. The teams also responded very positively to the final challenge of the Workshop - namely, the collating and analysing of the results that they obtained over the two weeks, and the graphing, interpreting and verbal reporting of these to the full Workshop on the last day. as indicated above, however, a lack of organisation, communication and in some cases, general attention to the work in hand on behalf of the TAFIRI station, has tended to reduce our faith in its ability to host an effective project base.

The Workshop delegates were selected by TBW in collaboration with the Directors of the main organisations represented, during a mission to Tanzania and Zambia in June 1997. At that time, however, the Workshop trainers had little detailed knowledge of the abilities and interests of these personnel. There was also little indication of which personnel (if any) would be (i) keen to work on the GEF project, AND (ii) available for this. However, the Workshop experience has provided valuable information on these issues - particularly bearing in mind that the 10-day exercise merely marks the start of an 18- to 24-month period of training. In that they showed a keen interest and an ability to contribute to the project in practical and theoretical ways, the following personnel (listed in alphabetical order) are suggested as candidates for further training:

In Kigoma:

Elias Lyoba: Laboratory Superintendent in charge of dry and wet laboratories.

Grace Bwathondi: typing, data entry and aspects of the assessment of the microscopic planktonic and attached algae; this proposal bears in mind that Grace, like all personnel appointed to the project will be able to refer to Miss Wiltshire - a former student of TBW (with BSc and MSc degrees) who will be working between Kigoma and Mpulungu permanently from mid-November.

Ibrahim Katonda: 'roving' supervisory role relating to all aspects of the programme; questions over his future availability are acknowledged.

Dinna Lyoba: Dina's experience in chemical analysis is vital for this project - and I suggest that she would find little trouble in carrying out chlorophyll_a determinations in addition.

Stanslaus Muhoza: as a very experienced and reliable worker, Mr Muhoza is being approached with the view to him taking overall responsibility for laboratory organisation, safety and security; his experience in the use of microscopes could also strengthen work on the smaller zooplankton and algal elements.

Meshack Kajelelo: the PSS Co-ordinator has stressed from the outset of the project, that scientists must endeavour to translate their field and laboratory findings in order that these can be used to influence policies over e.g. water quality monitoring and pollution abatement; as an administrator, Mr Kajelelo: could play a leading role in this process; he attended many of the Workshop seminars and laboratory sessions.

In Mpulungu:

Leonard Mwape, Kosam Kaweme, Charles Lukwesa and Isaac Zulu comprise the 'core' of willing and able scientists needed for the maintenance of the Project activities in Mpulungu. They are all interested in, and many have experience of, field and laboratory limnology; in addition, Mr Zulu especially, but also Mr Kaweme, have expressed a desire to work on phytoplankton and other micro-algal assemblages which the PSS is focussing on in relation to assessing the effects of pollution on biodiversity.

Action points

ACTION 1: PCU: process the appointment of the above personnel on as full a time basis as possible - but bearing in mind commitments to e.g. forthcoming LTR programmes and existing studies and general station duties.

ACTION 2: TAFIRI Director: seek the appointment of at least two new scientists (limnologists/chemists) to the TAFIRI station.

ACTION 3: PCU on behalf of the PSS Co-ordinator: explore the possibility of appointing senior school-leavers as assistant field and laboratory personnel in Kigoma and Mpulungu.

ACTION 4: TAFIRI Director: maintain staff stability; a major feature of many of the existing and planned field and laboratory activities within the PSS requires this; the training envisaged for each scientist is long-term.

ACTION 5: PCU in Mpulungu, Kigoma and Dar es Salaam: ensure that all personnel are aware of Nicola Wiltshire's role i.e. under the direct technical instruction of the PSS Co-ordinator, and reporting to the Scientific Liaison Officer, she will train local personnel and facilitate all PSS field and laboratory activities from planning through to reporting and interpretation. A list of her Terms of Reference is being prepared for circulation.

ACTION 6: NRI and IFE: purchase outstanding equipment requests and replace items lost/damaged in the fire in Dar es Salaam.

ACTION 7: NRI and IFE: Investigate why many equipment items ordered by the PSS Co-ordinator are either not the same specification as those received in Kigoma, or are entirely missing (other than those damaged in the fire); relevant lists are with the PSS Co-ordinator.

Dr Tony Bailey-Watts (Pollution Special Study Co-ordinator)

IFE Edinburgh Laboratory

28 October 1997

Friday, Saturday and Sunday, September 19 to 21: Finalising arrangements for field and laboratory activities, 'plenary' presentations and discussion topics for the forthcoming methods workshop - with special reference to pollution and its effects on the diversity of the planktonic and benthic micro-algae. A review of current staff availability suggested that considerable training is required to turn the Tanzanian contingent and to a lesser extent, the Zambian delegation into teams that can monitor pollution and associated biological aspects effectively.