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April 10-30, 1988

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The document is an interim evaluation of an AID supported project devoted to research and institution building in the area of Schistosomiasis control in the Republic of Cameroon (Health Constraints to Rural Production 698.0408.1). The evaluation is a formative one that addresses the technical, social, institutional and regional objectives of the Project which was initiated by Tulane University in 1983.

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**AN EXTERNAL INTERIM  
EVALUATION OF THE HEALTH  
CONSTRAINTS TO RURAL PRODUCTION PROJECT  
APRIL 10-30, 1988**

by

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**AR-086**

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We are also most grateful to the Tulane Technical Assistance Team for their prompt attention to our numerous inquiries and requests and also for their generous hospitality. To all who helped in little but important ways we extend our sincere thanks.

## GLOSSARY

A.I.D.	U.S. Agency for International Development
ATP	Annual Transmission Potential
COP	Chief of Party of Technical Assistance Team
CRESS	Center for Social Sciences Research
CUSS	University Center for Health Sciences (Centre Universitaire des Sciences de la Santé)
DGRST	Republic of Cameroon's General Delegation for Scientific and Technical Research
DRST	Direction de la Recherche Scientifique et Technique
EOPS	End of Project Status
FCFA	Francs, Franco-African Community
GTZ	German Agency for Technical Cooperation
GRC	Government of the Republic of Cameroon
IMP	Institute for Medical Research and Medicinal Plants
MESRES	Ministry of Higher Education and Scientific Research
MOH	Ministry of Health
OCCGE	Organization for Coordination and Cooperation in the Campaign against Endemic Diseases (Organisation de coordination et de cooperation pour la lutte contre les Grand des Endemies)
OCEAC	Coordinating Organization for the Fight Against Endemic Diseases in Central Africa (Organisation de coordination pour la lutte contre les endemies en Afrique Centrale)
PC	Peace Corps (volunteers)
PID	Project Identification Document
PP	Project Paper
RCRS	Regional Center for Research on Schistosomiasis
RT	Review Team
TA	Technical Assistance
TU	Tulane University, New Orleans, LA, U.S.A.
TAC	Technical Advisory Council
TAT	Technical Assistance Team
TDR	UNDP/WORLD/BANK/WHO Special Program for Research and Training in Tropical Diseases
UNDP	United Nations Development Program
WHO	World Health Organization

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## INTRODUCTION

## A. PURPOSE OF THE EVALUATION

1. This evaluation is an interim evaluation performed 41 months after the arrival of the Technical Assistance Team and start-up of the project. The project has approximately two more years before completion in December 1990.
2. The purpose of this formative project evaluation is to examine the efficiency and effectiveness of the project efforts. It differs from an impact evaluation, which examines the effects of a project on the ultimate beneficiaries, or a sustainability evaluation which examines a project after completion to see if the benefits of project activities can be sustained for an extended period once A.I.D. funding ends. However, this evaluation did examine the technical, institutional and financial factors which will make sustainability of project activities more feasible.

## B. OBJECTIVES OF THE PROJECT

1. Goals. The program goal is to control schistosomiasis, a disease which may reduce productivity through incapacitation of the economically most active age groups of the affected population. The project goal is to develop an effective, economical and environmentally sound strategy for the control of the three forms of endemic human schistosomiasis found in sub-Saharan Africa. The ultimate Government of Cameroon (GRC) goal is the eradication of schistosomiasis. This ultimate goal must be modified to ensure control of schistosomiasis morbidity, as eradication of the infection is not likely in the foreseeable future.
2. Purpose. The project purpose is to develop a schistosomiasis research facility in Yaounde, Cameroon, capable of (a) mapping the distribution, prevalence, and intensity of schistosomiasis infection and disease; (b) developing effective schistosomiasis control activities that are economical, environmentally sound and socially acceptable; (c) training Africans in laboratory and field research methodology; and (d) serving as a major sub-Saharan Regional Center for Research on Schistosomiasis (RCRS). Although not the primary purpose of this project, the research experience gained and the training provided will

enhance the institutional capacity of Cameroon to conduct medical research.

3. Project Outputs

- a. A schistosomiasis research center capable of conducting a broad range of studies including laboratory studies on the clinical, parasitological, malacological and ecological aspects of schistosomiasis, experimental animal studies, epidemiological studies of the parasites and the snail hosts and anthropological and behavioral studies on the dynamics of schistosomiasis. The center will contain the required laboratory space and equipment, data processing and storage space, training facilities, and office space;
- b. Increased knowledge about schistosomiasis, such as the clinical features in humans infected with the various species of schistosome parasites, the prevalence, intensity and distribution of the disease, the environmental and behavioral parameters pertaining to schistosomiasis transmission, schistosomiasis control techniques, the pathological effects, the bionomics, taxonomy, distribution and population dynamics of the six known species of snail hosts found in Cameroon, snail control using molluscicides as well as biological and other natural methods. Seven communities were selected for intensive longitudinal studies;
- c. A cadre of trained Africans capable of staffing the research center and continuing multi-disciplinary research on schistosomiasis in the sub-Saharan African region. Twenty-two Africans will receive post-graduate participant training: ten Cameroonians (four at the Doctoral level and six at the Master's) and twelve from other sub-Saharan African countries at the Master's level. Fields of training include epidemiology, malacology, parasitology, water chemistry, biostatistics, environmental health, economics, and behavioral science. Fifteen people from other sub-Saharan countries will receive on-the-job training at the Yaounde center. Twenty laboratory and field technicians will receive third-country, in-country, or on-the-job training; and;

- d. An interagency and regional network of governments and other institutions cooperating in schistosomiasis research, training and dissemination and application of new knowledge to be achieved through participant and on-the-job training, regional conferences, a newsletter, collaborative research relationships, and a Technical Advisory Council (TAC) to the project.

#### C. ANALYTICAL METHODS USED TO EVALUATE THE PROJECT

The evaluation team visited Cameroon, April 10-30, 1988. They examined documents provided by A.I.D./Washington, and USAID/Cameroon, by the contractor (Tulane University) and by the GRC Ministry of Higher Education and Scientific Research (MESRES) and Ministry of Health (MOH). The team also conducted intensive interviews with all the parties involved in the project, visited on many occasions the Schistosomiasis Research Laboratory, now housed in a temporary rented location, and inspected the new laboratory under construction.

The questions asked during the interviews focused on:

1. The conditions indicating that progress toward the project purpose has been made (i.e., progress toward the achievement of End of Project Objectives (EOPs).
2. The relevance, effectiveness and sustainability of existing outputs, the magnitude and degree of achievement at this stage of the project, and the feasibility of their final achievement by the end of the project.
3. The adequacy and timing of major inputs.
4. The environmental, organizational and political factors impeding or limiting progress toward achievement of the project's outputs.

The data in project documents and information from the many interviews were analyzed in terms of the team's scope of work (SOW) and reported as an interim evaluation.

#### D. FINDINGS

The technical studies have been performed very well by the Tulane TAT and the Cameroonian scientists. The mapping of schistosomiasis prevalence and intensity, and the parallel malacological studies have been major achievements and are about 80% complete. The researchers should now consider how their findings can be applied to national schistosomiasis control

programs. The socioeconomic research component was not carried out; it should be started as soon as possible in order to contribute to the design of effective control strategies. Lack of implementation of the socioeconomic research component of the project will adversely affect the development of control activities that are economical and socially acceptable to the Cameroonians.

The training component of the project has been very successful, about 70% complete, though heavily weighted in favor of Cameroon. Twelve Cameroonian trainees are working toward Ph.D. degrees, while eight non-Cameroonians are being trained at the Master's level. The Institute for Medical Research and Medicinal Plants (IMPM) should now give serious consideration to effective assimilation of the returning students into schistosomiasis or allied research programs.

Few of the regional objectives of the project have been met. The team also found deficiencies in the institution building objectives of the project, which are only about 10-15% complete. One major problem was that the Project Paper (PP) did not give thorough consideration to institution building and its sustainability. Another problem was that none of the three parties (United States Agency for International Development (USAID), Tulane Technical Advisory Team (TAT) and IMPM) involved in project implementation, focused on the institutional objectives. Other major outputs of the project and their levels of completion are (i) construction of a schistosomiasis research center, 25% completed; (ii) increased knowledge about schistosomiasis, 85% completed; and (iii) formation of interagency and regional network, 10% completed.

#### E. CONCLUSIONS

Many of the components of this project have been very successful, but some deficiencies still remain. Remedial action would include planning a pilot control study, developing work plans, ensuring further training of key personnel, and staging workshops, as recommended below. In the case of socioeconomic research, funds and personnel will need to be identified. The project is now in a position to go beyond its present status by reaching out on a national and regional basis to disseminate results and develop strategies to control schistosomiasis. The project has many aspects of which the GRC can be proud. Sustaining the effort in the years ahead is a major challenge.

#### F. RECOMMENDATIONS BY PRIORITY

The Evaluation Team recommends that:

1. By June 1988, USAID/Cameroon should extend Tulane University's technical assistance (TA) contract for

eighteen months, from July 1989 to December 1990, in order to complete long-term training and short-term technical assistance and ensure home office support.

2. TAT, with the assistance of GRC/IMPM and USAID/Cameroon, and in collaboration with government officials in neighboring countries, should identify and matriculate, by May 1988, four non-Cameroonian trainees to the master's degree program at Tulane University.
3. By June 30, 1988, GRC/MESRES should readvertise and award a contract for the construction of the schistosomiasis laboratory.
4. The Schistosomiasis Research Project should prepare a preliminary protocol by the end of October, 1988 for a pilot control scheme (applied field research) in a defined, representative area (population not less than 30,000) in northern Cameroon as the first step in the possible implementation of cost-effective schistosomiasis morbidity control strategies. Tulane University, with the concurrence of USAID/Cameroon should provide a consultant, for one-person month in October 1988, with definitive experience in the development of schistosomiasis pilot control planning and implementation in Africa. The consultant will assist in the preparation of the protocol and recommend further development of this activity. Depending on progress made, further activities relevant to this scheme can be anticipated in 1989 and thereafter.
5. IMPM should prepare a "National Schistosomiasis Control Manual", (perhaps following the model published in Malawi) which should become a reference document for all health personnel, especially those engaged in schistosomiasis control activities.
6. IMPM should develop a plan for the utilization of the newly acquired skills of the returning trainees from Tulane University. Special attention should be given to the establishment of IMPM GRC positions for the four Cameroonian student trainees now at Tulane.
7. Tulane University, at the request of the Director of the IMPM, should provide as soon as possible, and preferably not later than July 1, 1988, a consultant in Health Management for one month. The consultant will lead IMPM and TAT in a detailed planning exercise that should result in an operational plan for the transfer of research operations from TAT to IMPM. Participants

should include top personnel from TAT, IMPM, the Chief of the Kumba Station and the USAID Project Officer.

8. Tulane University should provide a consulting medical anthropologist with experience in tropical disease research for one month, beginning July 25, 1988, to assist IMPM in developing a work plan for socioeconomic studies. The anthropologist should work with IMEM, TAT, and MOH in prioritizing the studies to be undertaken. It is further recommended that IMPM should not undertake research on the extent of incapacitation of infected humans and its economic implications on workforce productivity. Such studies done in the past were costly, difficult to carry out and inconclusive due to multiple infections and other variables affecting incapacitation and workforce productivity.
9. The contract of Dr. Raoult Ratard, epidemiologist and present TAT Chief of Party, should be extended for at least one year, so that he may provide technical assistance and work with doctoral students returning from Tulane in their future roles as trainers as well as researchers.
10. The contract of Dr. George Greer, the Tulane University malacologist, should be extended to accommodate four months of consulting in 1989.
11. USAID/Cameroon, IMPM and TAT should arrange for a short-term project management course for the IMPM Schistosomiasis Project Scientific Coordinator. This course should be an applied project management course, where participants use skills during the course to work on issues from their own institutions.
12. USAID/Cameroon, IMPM and TAT should arrange for a short-term project administration course, preferably in-country, for the IMPM Schistosomiasis Project Administrator.
13. IMPM should convene at least two, two-day intensive workshops to update knowledge and increase management capabilities of IMPM in areas of particular interest to research organizations. These include: (i) incentive systems for researchers; (ii) raising funds for research; (iii) developing functional relationships with other organizations, both public and private, to apply the results of research; and (iv) creating and participating in regional and international research networks. Tulane University should provide a management consultant trained in case analysis techniques to facilitate the workshop. Participants

should include the IMPM Director, research programs' managers, Directors of other MESRES research institutes, the Tulane Chief of Party (COP), and top officials from Ministries of Health and Planning.

14. Tulane University should provide a consultant in training and management for one month, from January 15, 1989, to assist IMPM and TAT/COP in producing operational manuals covering: (i) procedures to prepare a research protocol, (ii) management systems for operating a laboratory, (iii) survey procedures, and (iv) procedures to produce a newsletter.
15. Training programs for mid-level personnel and field workers should be given a high priority during the remainder of the project and in the future. This is particularly important for the implementation of schistosomiasis pilot control activities in the Cameroon.
16. IMPM and TAT should prepare a manual for training-of-trainers by February 1989. One person-month for an experienced training consultant can be provided from project funds.
17. IMPM and TAT should develop training materials for health workers that reflect local requirements.
18. IMPM and TAT should consider adopting the "training-of-trainers" approach in local and regional training activities. This program should accelerate the creation of an African training capability to continue technical training during the life of the project and in the future.
19. IMPM should locate funds to begin the socioeconomic research component and find a senior professional to assume full-time leadership at the schistosomiasis laboratory. IMPM should formalize a research relationship with the Center for Social Science Research (CRESS) to assist in the development of research protocols and in the training of research assistants. Research results should, as far as possible, be expressed in quantitative terms.
20. IMPM should give early consideration to the needs and requirements of hosting a regional conference/workshop on schistosomiasis research and control in late 1989, when most long-term students should have returned to Africa, and when Tulane technical assistance to the project should have virtually ceased. The workshop could include a special session for non-Cameroonian

returning students to debrief them on their studies and research topics. The agenda and contents of the workshop should be finalized before April 1989 by the IMPM Coordinator and TAT. Funding from bilateral, or other external sources, should be required and should be sought towards the end of 1988 or early 1989.

21. IMPM should give consideration to the possibility of making a film on schistosomiasis research and control in Cameroon. This film could be widely used as a teaching tool and would give credit to the increasing research capabilities of the Institution and its collaborating potential with other national institutions (Ministries of Health, Agriculture, Education, etc.), as well as bilateral and international agencies. External funding is likely to be required.
22. IMPM should consider trying to obtain funds for socio-economic research from WHO/SER/TDR. This should necessitate the completion of a detailed research proposal acceptable to SER/TDR. The Director of TDR/WHO might, if requested, consider sending a consultant to assist IMPM staff in the elaboration of a comprehensive research protocol, always bearing in mind that such assistance will not necessarily ensure the acceptance of the research proposal by the WHO/TDR Committee concerned.

#### G. LESSONS LEARNED

1. When project design deals with the analysis of the strengths and weaknesses of the beneficiary institution, it is advisable that top personnel of the latter participate in the design and, if possible, in the analysis itself, in order to ensure that they fully understand and agree with the institutional objectives of the project.
2. For projects with both technical and institutional objectives, it would be advisable to ensure that any contractor having strong technical capabilities, but weak institutional ones, subcontract a firm specializing in management, institutional analysis and design and organizational development.
3. Long-term academic training of host country nationals represents a major investment in financial and human resources and project time. As this project clearly demonstrated, the Master of Public Health (MPH) degree is not a valued and well-recognized degree for physicians in Francophone African countries. The

project was, therefore, required to invest additional funds and time for long-term training by changing the degree requirements from MPH to doctoral degrees. As a consequence, the trainees will not be able to spend the necessary time needed for joint on-the-job training with TAT. The cultural differences in educational systems between the U.S. and other countries should be examined during the project design stage of A.I.D. projects. A.I.D. should now become aware of differences in training expectations and the status of various degrees in the Francophone countries.

4. The project was weak on institutional development and program management; thus, sustainability is problematical. The project designers had hoped to involve several host country institutions in providing technical advice to the project. However, no specific plans, funds, or human resources to ensure coordination of integrated institutional inputs and outputs were in the project design. The lesson to be learned is that, in order to rapidly transfer the results of research into operational control activities, integrated institutional arrangements must be formalized in project design and not be dependent on ad hoc top-level decision making, or the lack of it.
5. Collaboration with international organizations regarding components of an A.I.D. project should be legally formalized and agreed upon before a project is submitted to potential contractors. If other donors do not honor their agreements, A.I.D. should locate another donor or consider funding it themselves. The component should not simply be dropped. This lesson is clearly demonstrated in the lack of the socioeconomic component of the schistosomiasis research project.
6. Outputs that would measure sustainability should be carefully considered in project design. Otherwise, even though it may be an important issue for both A.I.D. and the host government, arrangements to ensure its development may be lacking during project implementation. Sustainability is the sole responsibility of the national authorities once A.I.D. inputs are phased out.
7. Project design teams should rigorously study and review the institutions in the host country to ascertain whether they are: (i) capable of effectively benefitting from a particular project; (ii) have the funds, personnel, buildings and other resources for providing their expected inputs; and, (iii) are seriously committed to project sustainability.

8. Collaborative efforts need to be well coordinated, particularly with respect to time schedules. This has been a problem in the past in activities with the Peace Corps.
9. Virtually all tropical disease problems have important human behavioral variables, which have implications for cost-effective control procedures. Recognition of these variables is often neglected. Their inclusion, protocol development and institutional arrangements for their implementation, must be ensured at the earliest design phase of project planning. The findings of behavioral studies should, whenever possible, be quantitatively expressed.

## II. THE PROJECT COMPONENTS

### A. TECHNICAL COMPONENTS

#### 1. Background

The project paper calls for technical studies necessary for an improved understanding of the epidemiology and control of the three species of Schistosoma endemic in Cameroon. The three technical studies being carried out by the project are: a) studies on the prevalence, intensity and distribution of schistosomal infection, called the National Primary Schools' Survey; b) longitudinal studies in selected communities on the dynamics of transmission; and c) snail host studies to determine which species are the most important vectors of the disease and to determine seasonality of transmission.

Schistosomiasis is essentially a "person-made" affliction; the snail intermediate hosts play only a passive role in transmission. The infection is most prevalent in children between the ages of 8 and 16 years. Current control strategies now aim at significantly reducing morbidity rather than the interruption of transmission. Knowledge of human demographic patterns in the endemic areas, where schistosomiasis research and control activities are being carried out, is mandatory.

In December 1983, the population of the Republic of Cameroon was just over 9 million, with an annual growth rate of more than 2.5%. The population is young, with over 40% under the age of 14 years, and as many as 27% between the ages of 5 and 14 years. The population distribution is uneven with approximately 80% living in the north and east of the country. As will be seen later, the findings of the Schistosomiasis Research Project have shown that the North and Extreme North are the provinces in the country with the highest prevalence of schistosomal infection.

Probably more than 60% of the people live in communities of less than 5000 inhabitants. Approximately 80% of the population are engaged in agriculture, which accounts for about 30% of the gross national product. However, there is marked migration to the larger urban centers and the combined population of Douala and Yaoundé is now approximately two million persons. Migration is associated with the

planting and harvesting seasons of the major crops and tends to be north to south, with the main agro-industrial infrastructures located in the south.

Schistosomal transmission is also frequently associated with seasonal rainfall and temperature patterns, which are quite diverse, reflecting the unusually wide range of ecological zones in Cameroon. The southern regions have two rainy seasons, with high precipitation from March to July and during September and October. The rainfall decreases progressively towards the north-east where in the Extreme North arid conditions exist with a single, short rainy season of less than three months. Here, snail-host populations are maximum during the wet season when water-contact activities, which promote transmission are also most marked. In Cameroon existing temperatures do not limit the distribution of the snail hosts, but average warmer temperatures do accelerate both snail growth and schistosome larval development.

The introduction of water resource development projects, such as irrigation schemes and barrages, may herald new or increased transmission of schistosome species. While plentiful supplies of freshwater may promote socioeconomic benefits, unfortunately, they may also have adverse health consequences which should be carefully monitored and, if possible, controlled. The Cameroon Government is aware of the need for good water management practices as endorsed in recent Five-year Development Plans. Somewhat paradoxically, however, as the project's findings have unequivocally shown, schistosomiasis is at present most dramatically encountered in the drier areas of the country where transmission occurs mostly in temporary ponds and streams, rather than in large permanent bodies of water.

The purpose of the National Primary Schools' Survey is to determine the distribution, prevalence and intensity of the three human schistomes (Schistosoma haematobium causing urinary schistosomiasis, S. mansoni and S. intercalatum both provoking intestinal schistosomiasis) in the entire country. No systematic studies on these three parameters had been undertaken prior to the survey which was completed in November, 1987. The findings of the earlier, local studies, are summarized in the (CEGET)/WHO Atlas of the Global Distribution of Schistosomiasis (1987) and also comprehensively in project documents. The project's two-year systematic, primary schools' survey is thus an outstanding achievement, and the findings will

contribute significantly to the development of rational control planning at the national level, especially when considered in conjunction with a parallel national survey of potential snail hosts and associated studies on transmission sites and susceptibility to schistosomes.

Less than 10 of the 70 articles, both published and unpublished, on schistosomiasis in Cameroon, deal with specific studies on control (e.g., chemotherapy, snail host control) and none on sociological aspects relevant to either transmission or control. Most deal with descriptive epidemiology and few have a truly quantitative basis. Unfortunately, for diverse reasons, the Project's contributions to specific control studies, including sociological research, are also limited.

A document which could serve as a preliminary basis for future control action entitled, "A Proposed National Plan of Action for Schistosomiasis Control in the Republic of Cameroon" (WHO, 1986) has been prepared. The Ministry of Health recognizes schistosomiasis to be an important public health problem. According to the Review Team, the German Agency for Technical Information (GTZ), is presently planning to undertake schistosomiasis control as part of an assistance program on primary health care activities in three provinces (North-West, South-West and Littoral) in the country.

In summation, while much field and laboratory research, especially on epidemiologic aspects, had been carried out in the last three decades, it has generally lacked overall national perspective. This deficiency has been in large measure corrected by the comprehensive studies of the USAID-sponsored Schistosomiasis Research Project (known administratively under the title of Health Constraints to Rural Production Project), especially in the areas of collecting and analyzing systematic data on the prevalence and intensity of the three human schistosome species endemic in Cameroon, and on snail host taxonomy, ecology and susceptibility status. Few studies have been carried out on control procedures and none of any importance on socioeconomic aspects. The MOH is planning, in collaboration with GTZ, to undertake operational control activities; the findings of the project can make a significant contribution for the determination of areas for control priority, the provision of baseline data, as well as the initiation of pilot control studies, if collaboration between the MESRES and MOH is assured.

## 2. The Role of the Technical Studies

The plan of action for the project specifically calls for the development of a research center at Yaounde which would be capable of undertaking studies on carefully selected technical components, necessary for an improved understanding of the epidemiology and control of the schistosomiasis in Cameroon. A brief description of the role and importance of these technical studies is given below.

### a. Studies on the prevalence, intensity and distribution of schistosomal infection. The National Primary Schools' Survey

Current national strategies for the control of schistosomal disease are based on cumulative epidemiological and clinical evidence that heavy parasite loads are related to clinical disease. Thus the number of persons infected in a certain community, tabulated by such parameters as age, sex and occupation, and the number of eggs expelled in their urine and/or feces, are important indices of the local status of schistosomal infection and disease. When data on prevalence and intensity, collected and analyzed by standardized procedures in an index group of children, become available for the entire country, a major requirement for the planning and implementation of rational and cost-effective control strategies then becomes available. As already mentioned, most earlier studies on the distribution and epidemiology of Schistosoma in Cameroon were locally based and a systematic, nationwide study of prevalence and intensity had not been undertaken. The national survey, using objective sampling procedures and standardized diagnostic methods, mainly in children in the highest grade of primary schools, carried out by the Project in the 182 administrative subdivisions of Cameroon, has provided findings not only of scientific interest, but of major practical importance. Moreover, based on the results of the children's survey, a reasonable estimate of the prevalence and status of schistosomiasis in the entire local population can be obtained.

### b. Longitudinal studies in selected communities

While the nationwide survey of primary school children provides a valid picture of the distribution and status of schistosomiasis, it

does not give a deeper understanding of the dynamics of transmission in a particular community which are influenced by a multiplicity of physical (e.g., geographic and climatic features) and human (e.g., demographic status of the human and snail hosts, socio-cultural characteristics) factors. In order to obtain a sound knowledge of spatio-temporal transmission patterns, carefully planned longitudinal studies in ecologically representative communities are required. Such longitudinal studies can be expected to generate additional baseline information for the planning, implementation and evaluation of efficient control measures. The control components, apart from chemotherapy and health education inputs, are likely to vary widely according to the broad range of ecological conditions so characteristic of Cameroon. With this rationale in mind, the project has carried out since January 1987 a series of longitudinal studies in seven selected communities. The protocol for the study includes such issues as census, mapping, household information, prevalence, intensity and incidence of infection, clinical morbidity studies, water-contact behavior and snail host population dynamics and infection rate parameters.

c. Snail host studies

A distinctive feature of each schistosome species is its affinity for particular species of snail which act as intermediate hosts of the larval stages of the parasite. In fact, specificity may be so marked that a certain strain of schistosome is capable of developing in only a certain species of snail. Some species of snails are more efficient hosts than others. For example, Biomphalaria pfeifferi is significantly more susceptible to Schistosoma mansoni than is B. camerunensis. Certain genetic variants of the truncatus/tropicus group of bulinids are highly compatible with S. haematobium, while others are totally resistant to infection. In the more arid northern areas of Cameroon, both Bulinus senegalensis and Bulinus globosus occur; both are capable of transmitting S. haematobium, but the role of each species in the local endemic communities deserves thorough investigation, especially if mollusciding is to be included in a schistosomiasis control strategy.

Seasonal transmission of schistosomiasis is the rule rather than the exception. Longitudinal studies of the snail hosts, including the determination of infected specimens, can therefore make a major contribution to our knowledge of the seasonality of transmission and thus to the timing of periodic control measures such as the delivery of chemotherapy and mollusciciding.

The finer details of snail taxonomy can best be studied if good museum collections are available. As the project's museum collection includes most of the snail hosts recorded in Central-West Africa, it is a valuable resource for biologists interested in sub-regional malacological problems, whether the aims of the investigation are academic or applied. For further clarification, it should be mentioned that modern snail host taxonomic studies now include biochemical as well as morphological methods; the allozyme studies on the forskalii group of snails which can transmit S. intercalatum, S. haematobium and their hybrids, presently being conducted at the project's laboratory, are of international interest and outstanding in quality.

### 3. Implementation. Progress and Issues

#### a. National Primary Schools' Survey

During the National Primary Schools' Survey, each examined child was given a four-page leaflet on schistosomiasis and the teachers received a more detailed information booklet about the disease. As could be expected, the participation rate was extremely high. All ethical requirements were fully met. The schools' survey results have provided an excellent general picture of the schistosomiasis problem in Cameroon and provide indispensable baseline information for future studies. Detailed knowledge about prevalence in specific areas would require more intensive sampling.

This two year systematic nationwide survey was completed, according to schedule, in November 1987, and involved the collection and examination of 41,690 excreta samples from children attending 512 schools. The number of samples surpass the original estimates derived from statistical procedures.

The baseline data provided by the survey, represent an outstanding achievement, with many practical implications especially for the planning and implementation of future national control activities. When the results of these surveys are studied in conjunction with the findings of the ongoing and proposed morbidity studies, the true public health importance of urinary and intestinal schistosomiasis in Cameroon (and by inference in neighboring countries in Central-West Africa) will be more profoundly understood. In the meantime, the results of the survey should be fully disseminated and exploited. They are of considerable scientific interest and should be published. The success of this activity may thus encourage donor support to undertake comparable studies in other African countries where the need exists (Central African Republic, Gabon, Equatorial Guinea, Chad, and others).

In view of their important practical implications, the findings of the survey need to be conveyed formally and informally to the MOH and other institutions in Cameroon (Education, Agriculture, Fisheries, CUSS, etc.), in order to encourage further and closer collaborative efforts leading to prevention and control initiatives, including the development, implementation and evaluation of cost-effective control strategies, in a representative pilot control area in north Cameroon. The MOH may subsequently wish to ensure that Provincial/District Medical Officers, especially those in the endemic areas most heavily affected, are aware of the results of the nationwide survey. Similarly, bilateral and international institutions (OCEAC; WHO Regional Office, Brazzaville; UNICEF) should be kept informed.

b. Longitudinal Studies

The sites of the longitudinal studies were selected as being ecologically representative and having one or more of the three endemic schistosome species. At one of the communities, Kinding Njabi, a *S. haematobium*/*S. intercalatum* hybrid is endemic. The selection criteria for these studies included other parameters such as accessibility and population stability. A comprehensive protocol for these studies was prepared. Maps of the communities were prepared, complete censuses of the residents were or are

being undertaken, and some data on living standards have been collected. The stool and urine samples of residents were collected at six month intervals to determine prevalence, incidence and intensity rates. Information on environmental issues (potential or actual transmission sites, domestic water supply and sanitation) has been collected and is being analyzed. In some communities, longitudinal studies on snail host population dynamics and schistosome infection rates have been undertaken to obtain information on the seasonality of transmission. Perhaps most important of all, morbidity studies are being conducted at four of the seven communities. Unfortunately, sociological studies, such as water contact and contamination patterns, have not been undertaken for reasons that are described elsewhere in this report.

The longitudinal studies have now reached the half-way stage and, in general, are making satisfactory progress, supplementing the results of the nationwide prevalence and intensity studies in children by collecting longitudinal data on populations in defined communities representative of the diverse transmission patterns in both urban and rural settings. The main findings currently available are well described in project documents, and analyses of the data are continuing to be made. The attempt to eliminate the hybrid species at Kinding Njabi by praziquantel treatment in September 1986 has not yet been successful. However, more than a year later the mean intensity rate (egg-output) has remained low. The case control studies involving *S. mansoni* patients at Obili and Makenene have so far not revealed serious morbidity, even though prevalence and mean intensity rates of infection were both very high, but firm conclusions cannot be made until prolonged and more detailed studies are carried out. The longitudinal studies on snail host population bionomics and schistosome infection rates at four of the communities still do not indicate any marked seasonal transmission at sites with permanent water. Data on migration, water supplies, sanitation and potential or actual transmission sites are being gathered. Incidence data are being collected, but their usefulness and interpretation are debatable. Dr. Joseph Foubi recently began his doctoral thesis studies on the assessment of urinary schistosomiasis morbidity

using ultrasound. While evidence of disease can be expected, only long-term follow-up studies can reveal whether morbidity progresses or recedes.

The results of the longitudinal studies are being well analyzed and reported. While some useful conclusions can be expected at the termination of the two-year study, some of the results, especially with reference to the status of morbidity findings, are likely to remain equivocal. This technical component lacked trained personnel residing at the communities under study. Had the 10 Peace Corps volunteers and their national counterparts been recruited and assigned to contribute to the longitudinal studies, both more detailed and probably more valid findings would have been forthcoming.

c. Snail Host Studies

The third technical component of the project involves the snail host studies, including a nationwide survey, snail host/ parasite relationship observations, as well as both morphological and biochemical (allozyme) taxonomic investigations. Protocols for these studies were prepared. The National Snail Host Survey was undertaken in parallel with the National Primary Schools' Survey and completed, as scheduled, between the first quarter of 1985 and that of 1988. Over 650 sites were sampled in 140 subdivisions of Cameroon. Geographical and ecological information for each snail collection are stored on database files and entered in the records of the malacological museum, which the project created as part of the facilities of the Schistosomiasis Research Center. Other facilities include a fully operational electrophoresis unit and a basic water chemistry section.

A distribution map of the snail hosts of the three human schistosome species is being prepared. The project malacology museum has regional significance, containing over 800 identified and catalogued specimens; it is unrivaled in Central-West Africa and is fully computerized. Studies on aestivation, sentinel snails and cercarial shedding patterns were envisaged, but could not be carried out due to the time demands of other activities. In addition to morphological taxonomic studies, allozyme and chromosome investigations are being carried out to gain

further insight into the taxonomy of closely related species, especially the local members of the forskalii group, which differentially can transmit either S. haematobium or S. intercalatum or their hybrids. Some of the findings of these studies are now being submitted for publication.

The most important practical discovery was the widespread occurrence of Bulinus senegalensis in the North and Extreme-North of Cameroon, where this species, together with B. globosus, is an important snail host of urinary schistosomiasis. Both species readily survive in temporary bodies of water. Transmission is of short duration and takes place during the single rainy season. Snail control by mollusciciding, along with chemotherapy, may have some promise in such situations. B. senegalensis had previously been reported from only one locality in Cameroon. Its common occurrence in the north of Cameroon would indicate that its range probably extends into Chad.

The snail host/parasite relationship studies have demonstrated that Biomphalaria camerunensis is a relatively poor host for S. mansoni. Even young snails are strongly resistant to infection. There is now little doubt that B. pfeifferi is virtually the exclusive snail host of S. mansoni in Cameroon.

The snail host studies have made a useful contribution to the project, both scientifically and practically. A small core of Cameroonian scientists, well trained in malacology and parasitology, now exists; they deserve every support and encouragement to extend their studies on snails as intermediate hosts of important trematode diseases and to participate in the development and implementation of pilot control studies.

d. Conclusions

The main findings and conclusions are elaborated in the review of the technical studies of the project, Annex G. The key elements are summarized below.

The completion in two years of the nationwide, statistical surveys on the prevalence and intensity of the three human schistosome species,

and the parallel surveys of the snail hosts, is a major achievement. The results provide sound baseline data for the development and testing of rational schistosomiasis control strategies in areas deserving highest priority of disease control.

The longitudinal studies have made good progress, but careful consideration to terminate the components which cannot be further exploited should now be made. The morbidity studies should continue and even be expanded.

The snail host studies have contributed much to a more precise understanding of the epidemiology of the disease, especially in northern Cameroon. There is now a need to undertake snail control studies (e.g., molluscicide evaluation) and to participate in the proposed baseline studies in pilot control areas, particularly in northern Cameroon.

## B. Socio-Economic Component

### 1. Background

The research protocol, which had many technical components, also contained a component on sociocultural factors in disease transmission and economic impact of the disease on the affected populations. The component was to be started by an expatriate senior anthropologist to be provided by WHO-TDR for 24 person-months and five person-months of other social science consultants and carried on by two Cameroonians to be trained at the MPH level in health economics and behavioral sciences. Funds, amounting to \$360,900 for the socioeconomic research and the scientists, were also said to be pledged by WHO. The senior anthropologist and funds for socioeconomic research were to be obtained by the GOC submitting a formal request to WHO in Geneva.

An Implementation Review carried out in February and March 1986, by Drs. A. Buck and J. Shepperd noted that no action had been taken to obtain the services of the WHO anthropologist and no comprehensive plan of action had been developed for the socio-economic research component. They recommended that a working group represented by IMPM, TAT and CRESS be established to make a formal research application to the Steering Committee of the Scientific Working Group on Socioeconomic Research in Geneva with receipt of the

application on March 7, 1986. Dr. Buck personally provided TDR research proposal forms to IMPM for making the request.

At the time of this evaluation, the status of the socio-economic research component was nearly the same. A partial plan of action for the research has been developed, but the research has not been carried out. The component still lacks leadership and expertise. IMPM has made no formal request for a senior anthropologist or research funds from WHO. A working relationship between CRESS and TAT was established soon after the Buck and Shepperd review. A medical anthropologist from CRESS joined the project on an advisory basis in April 1986 to assist in the development of social science research protocols. In June 1986, a Peace Corps volunteer with no training in social sciences joined the project to assist the CRESS anthropologist in development of proposals. After two years of this working relationship, three research protocols of limited scope have been developed, but no significant data gathering has taken place. This approach to getting the social science research underway turned out to be a very weak solution to the problem.

## 2. Role of Human Behavioral Studies

The role of human behavioral studies in schistosomiasis research is to assist in developing effective schistosomiasis control activities that are economical, environmentally sound and socially acceptable.

Both the transmission of schistosomiasis and its control are to a great extent determined by human behavioral patterns which are culture-specific. Humans must come into contact with water contaminated with cercariae; these cercariae must penetrate the skin, develop into worms within their human host and shed eggs which are transmitted via the urine or feces back into bodies of water, in which species of snails that host the disease live.

The main areas of socioeconomic research in schistosomiasis are the following:

- a. Schistosome Habitats' Studies. Human economic activities may create bodies of water favorable to host snails. These economic activities can range from large nationally-planned development schemes, such as irrigation projects, to local village-level activities, such as fish ponds and

small ponds that collect rain water for brick-making. Economic activities that create bodies of water favorable to schistosomiasis, and their importance relative to natural formations, require identification.

- b. Water Contact Studies. Certain human economic activities also require contact with contaminated water, such as wet-rice farming and brick-making. Level of economic development is also a strong determinant of the need for further contact with contaminated water, such as the need to use open bodies of water for washing laundry and dishes, for bathing, swimming and playing. People in areas having piped water supply and privately dug wells, presumably, would have less need for contact with contaminated water than people in areas relying partly or solely on streams, rivers, ponds and mayos. In areas where both contaminated and uncontaminated sources are available, anthropological studies need to determine why certain water sources are preferred over others. Water contact activities and their economic and social necessity in various societies require documentation. One cannot expect to eliminate human contact with contaminated water unless acceptable alternatives are provided.
- c. Water Contamination Studies. Economic development, in conjunction with local beliefs, to a large extent, determine human practices that contaminate bodies of water with schistosome eggs. S. mansoni and S. intercalatum are perpetuated by humans defecating near, or in open bodies of water, or performing anal cleansing in such water. Provision of latrines and hygiene education on the importance of their use may, to some extent, break the life cycle of these forms of schistosomiasis. S. haematobium is perpetuated by humans urinating in water bodies supporting potential snail hosts. Migration patterns of infected individuals from endemic areas to non-endemic areas and their role in spreading the disease can fall under this heading. Fundamental to the understanding of the dynamics of transmission is the documentation (KAP studies) of migration patterns and cultural beliefs and practices that lead to contamination of open bodies of water. In addition, documentation can help determine to what extent a hygiene education program could be expected to reduce or eliminate contamination, and assist in

the design of a hygiene education program that is appropriate to the culture.

- d. Economic Impact Studies. Another possible role for human behavioral studies is measuring the economic impact of the disease upon the affected populations. These studies involve estimating degree of morbidity in the population and loss of productivity due to morbidity. It is possible that, while the disease may be widespread in a country, morbidity is not severe and indeed much of the population does not know it is even infected. Information on the extent of morbidity, mortality, human suffering and loss of productivity, assists Ministries of Health in determining the priority that should be given to schistosomiasis control. However, research on economic impact, such as days lost from school or work, and decreased individual energy and work output, are difficult to design and evaluate because the results are influenced by so many factors other than schistosomiasis. The evaluation team advises against undertaking these studies.
- e. Chemotherapy Studies. Finally, human behavioral studies are required for determining the most cost-effective methods of delivering chemotherapy. Essentially two drugs are currently in use in most endemic zones: praziquantel and metrifonate. Praziquantel is expensive but usually requires only one dose and is effective against all three forms of schistosomiasis in Cameroon. Metrifonate is less expensive but requires three doses spaced two weeks apart, and is only effective against S. haematobium. Patient compliance studies on the two kinds of drugs are required. Because of its side effects and dose spacing, therefore, metrifonate may have poor compliance. It may be more cost-effective to use the more expensive drug, praziquantel.

Another issue in cost-effective chemotherapy is drug distribution methods, whether drugs should be distributed through special schistosomiasis control campaigns, continuously through health centers or through village pharmacies. Which method will bring about the most sustainable control of schistosomiasis morbidity? Since praziquantel is expensive, it should be determined to what extent patients can be expected to pay part of the cost of the drug.

Thus, studies on cost-effective ways to use and distribute chemotherapy, involve human behavioral variables, and require study for the development of good morbidity control strategies.

- f. Health Education Studies. In many schistosomiasis endemic areas people are not aware of the dangers they are exposed to when using water in transmission sites. They do not know the life-cycle of the schistosome and their role in perpetuating the disease. Sometimes people do know the clinical signs of schistosomiasis, but do not know what caused it. Health education can be used as a control tool. In order to develop an effective health education program, people's knowledge and beliefs about the disease must be assessed in endemic areas. Materials and methods must be developed and tested to determine their effectiveness in changing people's behavior with regard to water contact, water contamination, and seeking treatment for the disease.

### 3. Implementation, Progress and Issues

Since mid-1986, the socioeconomic research has made some limited progress. The socioeconomic research team has generated three research protocols, the Contractor has carried out some activities on socioeconomic issues, and two returning Ph.D. students are planning socioeconomic studies for their Ph.D. theses. These are summarized below:

- a. Schistosomes Habitat Studies. The Contractor has gathered some information on human economic activities that create bodies of water favorable to host snails and where transmission is taking place. These data have not yet been properly organized or analyzed.
- b. Water Contact Studies. One of the returning Ph.D. students plans to undertake research on water contact in one town, Kumba, for his Ph.D. thesis.
- c. Water Contamination Studies. This study will be combined with the water contact study in Kumba by the same student.
- d. Economic Impact Studies. A protocol for these studies in the longitudinal study sites has been devised, but the time-line, budget and personnel for the studies have not been planned. The

evaluation team advises against undertaking these studies.

- e. Chemotherapy Studies. One returning Ph.D. student plans to conduct a study on whether MOH health centers alone, or village health volunteers in addition to MOH centers, are more effective in reducing the prevalence of schistosomiasis in an endemic area.
- f. Health Education Studies. The Contractor has developed a four-page information sheet for fifth grade school children and a teacher's handbook on schistosomiasis. These materials have been distributed nationwide and 97 children have been tested one month later to determine the effectiveness of this tool in increasing knowledge about the disease. The results of that small study indicate that children's knowledge did not change significantly (lack of significance may be due to methodological problems). Although this is an important area for study, the Contractor has not had the time to devote to the development and testing of educational materials.

Two other proposals for research have been developed by the CRESS anthropologist and the Peace Corps volunteer; they may be placed under the category of health education. Both appear to be insufficient in obtaining information necessary for designing a health education program, but they could provide some pertinent information.

Of the 12 Cameroonian Ph.D. students currently studying at Tulane, not one is being trained in either medical anthropology or health economics. Two of those being trained in epidemiology have an interest in social issues and have chosen Ph.D. theses topics related to socioeconomic factors. It is unlikely that either of these epidemiologists could immediately assume a leadership role in planning and implementing the social science research needs of the institution upon their return. Although well-trained, they will still lack research experience, and they will not have the opportunity to overlap with Tulane personnel. A work plan of socioeconomic research should be developed by the Tulane COP before his departure.

#### 4. Conclusions

- a. Very little progress has been made on the socioeconomic studies to date. Three research

protocols have been devised and two more are being formulated by Ph.D. students. A health education pamphlet has been made and distributed. These represent only a minor portion of what needs to be done.

- b. No full-time senior anthropologist has yet been assigned to the project. The socioeconomic component of the project requires a senior level professional.
- c. Lack of leadership for the socioeconomic studies has resulted in the lack of a work plan for the socioeconomic component to be transferred to returning Ph.D. students interested in social science issues.
- d. Little progress on the socioeconomic studies has come about as the result of: (1) lack of clarity in the project document; (2) a reliance upon a fourth party, WHO, which was outside the scope of this project; (3) perhaps a general lack of enthusiasm for socioeconomics research among project participants; (4) a lack of leadership in obtaining WHO funds; (5) resistance by IMPM in having WHO choose the anthropologist; (6) perhaps general confusion about the proposed role of WHO in this project; and (7) confusion concerning who was supposed to do what for whom in obtaining funds. After 1986, A.I.D. no longer played a role in trying to obtain any research funds from WHO.

Understanding socioeconomic variables in schistosomiasis transmission is essential for the design of a schistosomiasis control program. The absence of this understanding is as important as the absence of malacological or parasitological studies. This component should be planned and started during the remaining two years of the project while the epidemiologist is still in country.

It might still be possible for IMPM to obtain a long-term senior anthropologist from WHO. In any case, such a move should be viewed as occurring far into the future. It could take the GOC several months to send a request to WHO, and it could take WHO one year to place someone in Cameroon. Valuable overlap time with Dr. Ratard would be lost. It may be possible to recruit someone on a full-time basis from another research institute within Cameroon.

It is essential that the socioeconomic studies be well designed and carried out. Three recommendations are offered as primary corrective measures so that this process may begin. Funds for adequately starting up this component, by contracting a long-term senior professional, appear to be lacking in the A.I.D. project budget. A short-term consultant, provided by A.I.D. should develop a work plan for the component so that returning Ph.D. students in epidemiology have a chance to continue the socioeconomic studies following the departure of the TAT.

### C. Training Component

#### 1. Background

The training component of the project was considered essential in the establishing of the research facility, in providing multi-disciplinary research teams and in building the institutional capacity of IMPM. Therefore, the outcomes of both long-term and short-term in-country training programs supported by the project would be crucial to the sustainability of other project outputs.

The objective of various training programs is to increase the effectiveness and efficiency of existing and new health researchers, technicians, managers and workers throughout Cameroon, and those sent from other African countries in the region, by providing them with the knowledge and skills needed to perform schistosomiasis research and control activities. The training component of the project would be important in assisting the GOC to develop a comparable capacity in schistosomiasis research and control to that obtained in other activities in the overall health sector.

#### 2. Role of Training

The conceptual strategy adopted by the project design team was conceived as providing training at the PhD level for senior level research on responsibilities and master's level education for field researchers. A cadre having the basic technical professional qualifications was considered to be necessary to establish the capability within GRC to plan, conduct and evaluate low-cost schistosomiasis research. The purpose of the training was to strengthen host-country and regional capability in the development of skills for the eventual control of schistosomiasis. Cameroonians specialists, once trained, will eventually replace U.S. technicians.

Training is defined broadly as any activity that transfers knowledge and skills to Cameroonians and non-Cameroonians in the region, to improve the functioning of schistosomiasis research and control. Training, under the project, includes many types: formal and non-formal; academic and on-the-job; and long and short-term. The project designers included opportunities for initial training to improve performance, as well as continuing, or refresher training, and support of graduates to maintain acquired skills.

The original training schedule developed in the project paper indicated that approximately 20 junior-level field workers, laboratory technicians, interviewers and clerical staff would be recruited and trained as part of the project. Because the Cameroonian long-term trainees were envisioned to leave for training early in the project, the training strategy was to include technical short-term training to be started by the U.S. TAT and completed by the Cameroonian specialists on their return from their own programs of study. The sequence of actions to be taken were:

- a. Each U.S. technical contractor would develop a protocol for training for each group of personnel needed in each research study.
- b. Using the protocol for each research study, it was anticipated that intensive didactic training would occur prior to the initiation of any field research or study.
- c. The most important training would be on-the-job training, under supervision of both TAT and Cameroonian supervisors.

### 3. Implementation, Progress and Issues

#### a. Long-Term Training: Cameroonians

One candidate was selected and started training at Tulane University School of Public Health in June 1985. Following a year of recruitment, eleven more candidates began their training at Tulane in June 1986. Of the twelve trainees, eight are physicians, five are employed by MOH, two are medical researchers employed by IMPM, and one is employed by CUSS. The remaining four trainees hold master's degrees and are not presently employed by any governmental agency. The

specialties each is pursuing is summarized in Annex J, Table 1.

The majority of the trainees are reported to be doing extremely well in their study programs at Tulane. According to reports from Tulane, nine or ten of the trainees should complete their studies without difficulties and on schedule. Two or three of the trainees may require additional time or academic assistance. One of the trainees, who started his study program in June 1985, is now conducting research in Cameroon for his doctoral dissertation. He is using sonography to assess the severity of morbidity of S. haematobium in heavily endemic areas in northern Cameroon. He is scheduled to complete his doctoral program by December, 1988. Eight other Cameroonian trainees are scheduled to complete their doctoral studies in late 1989; the last three trainees by the summer of 1990.

b. Long-Term Training: Non-Cameroonians

Non-Cameroonian trainees are selected by officials in their own countries in coordination with the TAT and approval of USAID/ Cameroon. The proposed plan of having placed twelve non-Cameroonians in Master's degree level training is behind schedule. Only eight trainees have been placed at Tulane since the project started. Three of the eight have completed their MPH degrees and returned to their respective countries. The five trainees now in school are scheduled to finish their studies at various times between June 1988 and December 1988. Four additional trainees will be selected and are expected to be placed at Tulane by the summer of 1988.

The countries of sub-Saharan Africa which have benefitted from this training, with one trainee each, include Burkina Faso, Benin, Equatorial Guinea, Chad, Central African Republic and Burundi; Zaire has two trainees (Annex J, Table 2). This training of non-Cameroonians represents excellent progress toward one of the project's outputs, namely, to cooperate in the establishment of a regional schistosomiasis research network of governmental and other institutions.

c. Short-Term Training

The original plan for short-term, in-country training was to train approximately 20 junior-level field workers, interviewers, laboratory technicians and clerical staff that would be recruited as part of the project. In addition, it was planned that personnel from other in-country institutions and other African countries would receive short-term training.

The project provided more than 16 short-term courses covering a variety of subjects, such as epidemiology, malacology, computer and data processing and survey methods. It appears that early in the life of the project, the training courses were organized on an ad hoc basis. Later, in 1986, a short-term training implementation plan was developed for project personnel and related staff. This plan includes the following course schedule:

1986

- Joint malacology and parasitology workshop
- Animal parasitology course for MOH laboratory technicians working in the field

1987

- Training of MOH field technicians in malacology
- Annual parasitology course for MOH laboratory technicians working in the field
- Annual epidemiology course for MOH technicians
- Applied advanced level malacology (to be offered twice)

1988

- Training of MOH field technicians in malacology
- Annual parasitology course for MOH laboratory technicians working in the field
- Annual epidemiology course for MOH technicians

1989

- Training of MOH field technicians in malacology
- Annual parasitology course for MOH laboratory technicians working in the field
- Annual epidemiology course for MOH technicians

1990

- Training of MOH field technicians in malacology
- Annual parasitology course for MOH laboratory technicians working in the field
- Annual epidemiology course for MOH technicians

The TAT, under the direction of IMPM, has successfully followed the agreed training schedule. The short-term training courses have benefited the project staff working at the schistosomiasis laboratory, other IMPM staff and staff from other organizations in Cameroon. In fact, a few individuals from other countries have visited the project laboratory for on-the-job training.

For the period October 1985 to December 1987, the project TAT has trained approximately 60 health researchers and technicians. Of this total number, approximately 25 are from organizations other than IMPM. Organizational institutions in Cameroon and other countries in the subregion of West Africa are aware of this training capacity and increasingly will expect IMPM to provide short-term technical skill training in schistosomiasis research and control. Short-term courses are offered in epidemiology, malacology, microscopic diagnosis, data processing and computers (Annex J, Table 3). The level of expertise in computer literacy as the result of training can be seen in (Annex J, Table 4).

#### 4. Conclusions

Certain deficiencies and constraints were identified in evaluating the training component of the project.

##### a. Delay in Selection and Placement of Long-Term Trainees

The time periods between the signing of the Grant Agreement between A.I.D. and the GRC on August 22, 1983, and the award of the Technical Assistance Contract between A.I.D. and Tulane University on May 5, 1984, and the arrival of the complete TAT in the Cameroon in October 1984, and the final placement of trainees at Tulane University in June-July, 1985 was a total of 22 months. This delay in the selection and placement of key participants who were expected to overlap with US

technical assistance advisors will undoubtedly affect the institutionalization and sustainability of project inputs and outputs. The delay will reduce the successful transfer of on-the-job skills, training functions, and project management responsibilities to the host country staff.

b. Utilization of Trainees' New Skills after Training

The initial success of training 12 Cameroonians at the Ph.D. level could be threatened unless these students are placed in responsible positions in IMPM upon their return from training. At the same time, the returning trainees must have the opportunity to put into practice their new skills and will require the assistance and guidance of an experienced schistosomiasis researcher.

It is not very clear how IMPM plans to use the skills of trainees now studying at Tulane University. If adequate provisions are not made to utilize the newly acquired knowledge and skills gained in academic training in the U.S., some of the physicians may become frustrated and return to practicing medicine full-time. Other participants may return to an organizational setting which is not conducive to utilizing the new skills. Both of these situations would greatly reduce the sustainability of project activities.

Thus, all twelve Cameroonian trainees need to be assigned to established posts as part of MESRES/IMPM staff before they complete their training. Four of the twelve trainees are not employed by any governmental agency; therefore, it is essential that MESRES/IMPM hire them before they complete their training in the U.S. If MESRES/IMPM does not employ these four trainees, they may seek other sources of employment and be lost to the IMPM.

c. Absence of a Detailed Training Plan & Training Materials

The training approach used by TAT in providing short-term, on-the-job training has produced positive results. The TAT trainers have used a modified version of the competency-based method; that is, evaluating the trainees in terms of how well they can perform their jobs after training. This approach has worked reasonably well with the

small numbers of persons receiving training. The approach was sufficient to get project activities started quickly, but it may not be adequate for technically trained scientists to assume responsibility for the training functions. The project and IMPM could greatly improve training by developing a detailed training plan, which includes specific training objectives, course contents, teaching methods to be used, scheduling of courses and course evaluation techniques.

Another constraint observed was the lack of time or the absence of TAT and IMPM capacity to develop and produce local training materials. Good locally prepared training materials can assist trainees in the acquisition of knowledge and skills in a shorter period of time and can serve as references in problem-solving situations in the field.

d. Building Host Country Training Capacity and Sustainability

Short-term training in schistosomiasis research and control activities and the use of these skills in other public health areas will be a high priority for the future. Perhaps one of the most effective means of institutionalization of the project's accomplishments, and improving the chance of sustainability of the project outputs, is the development of experienced African trainers and skilled health workers. It is the evaluation team's view that this objective can be most economically achieved with the human, financial and technical resources available in Cameroon by adopting a "training of trainers" approach. One or two local nationals returning from the U.S. should be identified to collaborate with the TAT trainer during the next round of short-term training courses. Before the TAT completes its assignment in Cameroon, the local national(s) would be responsible for teaching the specific course in consultation with the TAT trainer. At the end of these on-the-job training experiences, a small "training of trainers" workshop could be held to discuss these experiences and resolve common concerns.

The following are the major conclusions from the training component of the project:

- a. Personnel in training at Tulane University represents the major asset for the development and continuation of schistosomiasis research and control in Cameroon.
- b. IMPM should develop a plan for the utilization of newly acquired skills of the returning participants from Tulane before their arrival in Cameroon.
- c. To insure that training activities continue after the schistosomiasis project ends, TAT and IMPM should have nationals assume responsibility for teaching short-term training courses.
- d. The schistosomiasis short-term training program should have tangible impact on Cameroon's health care system. Out of approximately 60 persons receiving in-country, short-term training under the schistosomiasis project, it is estimated that 16 to 27% are from the MOH.
- e. Several short-term, in-country training courses have been conducted for a variety of health workers. However, the training courses were not provided frequently enough nor did they reach a large enough group of field workers. The expansion from one central schistosomiasis research center in Yaounde and one field station in Kumba to other field stations will require an acceleration of, and a higher priority for, in-country training programs.
- f. The Schistosomiasis Research Project will need to intensify its training program for in-country health workers in order to meet the increased demands for field-level skills that will accompany the use of research findings and the initiation of schistosomiasis control activities. Training at district, regional, and field levels should be emphasized, especially for mid-level and lower-level health workers who are responsible for schistosomiasis control activities.
- g. IMPM should develop its own capacity to produce local training materials.

## D. Institutional Component

### 1. Background

Of the four major outputs expected from this project: a) a schistosomiasis research center; b) increased knowledge about schistosomiasis; c) a cadre of trained Africans capable of staffing the research center and continuing the research; and d) an inter-agency and regional network of governments and other institutions cooperating in schistosomiasis research (Regional Research Network), three, a, c and d, have distinct institution building content.

The Implementation Review carried out by Drs. Buck and Sheppard made recommendations to correct deficiencies in institution building. A review of the actions taken on those recommendations revealed that most recommendations had been followed. A list of those recommendations and actions taken are found in Annex K.

While progress has been made in technical research on schistosomiasis, the procurement and utilization of laboratory equipment, and in the training of Africans, important deficiencies remain in other institution-building aspects of the project, particularly in the transfer of management from the Tulane TAT to the IMPM researchers and managers. Also, an inter-agency and regional network of governments and other institutions (Regional Research Network) has not yet been developed. Concerns about the absorption of the Cameroonian trainees into the IMPM and other Cameroonian agencies carrying out schistosomiasis work are covered in the training section and will not be repeated here; however, the role of the non-Cameroonian trainees in the Regional Research Network is another issue of importance.

The deficiencies in institution building are largely a result of the lack of clear definition in the Project Paper in terms of how the transfer of management capability from Tulane's TAT to IMPM staff (or other recipient institution) would be accomplished, and how the Regional Research Network would be established, function, and funded. Specifically, three areas lacked proper definition: 1) the Project Paper, while providing a short presentation of IMPM as a research institution, lacks an analysis of IMPM's institutional strengths and weaknesses and a description of the Cameroon's larger institutional environment. Also not described are institutional linkages between research

institutes, such as IMPM, and operational institutions, such as MOH. Thus, no clear direction is given for the strengthening of IMPM itself or its linkages with other national and regional institutions; 2) in the establishment of the Schistosomiasis Research Center, there is no reference to the development and production of operational manuals nor to the use of specialized expertise in management and organizational design. There is no provision for developing the managerial skills of IMPM and MOH program managers. There are no arrangements for the efficient transfer of research technology, methodology, and computerized data processing systems developed during the project from Tulane's TAT to IMPM's newly trained researchers; 3) in the establishment of a Regional Research Network, while the activities of producing a regional newsletter, having regional conferences and training non-Cameroonians are mentioned, the responsibility for coordinating these activities is not assigned to any particular institution, nor is funding provided. Thus A.I.D., the IMPM and the TAT have had to address issues of institution building on an ad hoc basis, lacking a clear plan of action.

Indeed, the interim evaluation team noted that the entire project document was heavily weighted towards the technical aspects of schistosomiasis research and neglected both the social science research that was needed, as well as the "soft issues" surrounding institution building. It appears that the document writers assumed that institutional development would occur automatically as a result of providing the building, the equipment and the trained personnel required for the Schistosomiasis Research Project. Now that the new research facility will be turned over to IMPM in less than two years, there is an urgency to attending to the management side of institutional development to ensure that the transfer of technical and managerial skills is accomplished and that the Regional Research Network at least has a plan and funding.

## 2. The Role of an Implementation Strategy for Institution Building

In order to achieve the institution building objectives of this project, an implementation strategy should be prepared and agreed upon by A.I.D., IMPM and the TAT. Such a strategy would provide specific and measurable objectives (or expected outputs). It would specify the relationship between the conduct of technical (research) activities and the achievement of

institutional objectives. It would specify which activities (technical and nontechnical) need to be conducted to achieve the institutional objectives. It would propose specific management arrangements which would ensure efficient circulation of information and facilitate the existence of a well informed decision-making process.

### 3. Implementation, Progress and Issues

Specific progress on the three institution building objectives (a, c and d above) is as follows:

Objective a: A fully operational schistosomiasis research center. At the end of 1986, equipment for the malacology, the medical parasitology, and the water chemistry laboratories was delivered and it is now operational. Simultaneously, data processing equipment was delivered and is also operational. Local technicians are assigned, trained, and working on their assigned tasks. The laboratory is operating in temporary quarters while awaiting a new facility, currently under construction. It is scheduled for completion at the end of 1988.

Objective c: A cadre of trained Africans capable of staffing the research center and continuing the research. There are two types of personnel required to staff the research center and continue the research. One component is managerial and the other part is research. Some individuals will carry out both functions. Twelve Cameroonian researchers, working on their Ph.D.'s at Tulane University, are expected to return by mid-1989 to assume responsibility for the research center. While these twelve researchers will be well trained in schistosomiasis research and laboratory procedures, it is unlikely that they will have the training or background to manage an entire research facility. Few of them will return in time to overlap with the TAT and thus have little opportunity to learn the required management skills.

Research protocols and plans for future research, and procedures for laboratory management, data processing and quality control have been developed, largely by the Tulane TAT. These protocols, plans and procedures ("systems of operation") have been transferred to local laboratory technicians through practice in the laboratory and the field, but have not been documented in a systematic and didactic fashion for use by the IMPM. There is a need to produce operational manuals that can be used as reference tools by future

researchers and institutional managers and that are consistent with IMPM procedures, policies and practices. Additional personnel, who will have management responsibilities in the schistosomiasis research center, have also not received training in institutional management.

Objective d: Regional Research Network. Little progress has been made toward achieving a Regional Research Network on schistosomiasis. As noted in the Background, the Project Paper was vague on this subject. It did not assign responsibility to any one institution, and did not provide funding. The three parties involved, A.I.D., Tulane University and IMPM, have not designed an implementation strategy for this component.

Six activities were suggested in the Project Paper to bring about a regional research network: i) undertaking participant and on-the-job training, ii) publishing and disseminating a biannual newsletter, iii) staging regional conferences and workshops, iv) developing collaborative research relationships, v) establishing a Technical Advisory Council; and, vi) training non-Cameroonians.

Two of these activities have been accomplished. A biannual newsletter, "The Schistosome African," has been issued regularly since October 1985, by Tulane University, and distributed to institutions throughout the region. This publication could be used to solicit more precise information on schistosomiasis research in sub-Saharan Africa, including the names of scientists, their parent institutions, their activities, a summary of their recent research findings and their major current needs.

With regard to training, Non-Cameroonians are now being trained at the master's degree level, with three having completed their degrees, five still in training at Tulane University, and four more to be selected for training. Participant and on-the-job training has taken place for Cameroonians, however the only regional training has been for the eight non-Cameroonians studying for masters degrees at Tulane.

A regional conference has not yet taken place mainly because the Director of IMPM did not think it was suitable to arrange international meetings or pursue international contacts on research before the schistosomiasis program had achieved meaningful results. Two regional conferences were proposed, but

detailed institutional arrangements for their budgets were never elaborated.

An effective inter-agency/inter-government research network has not yet been established. Subregional collaboration with OCEAC at the earliest planning stage was required to ensure the functioning of an effective inter-agency/inter-government research network. In this connection, it does not augur well that OCEAC has recently excluded schistosomiasis as a public health problem of priority in the sub-region. While early institutional arrangements for formal collaboration with WHO on this project did not materialize, it would have been useful to have initiated communication with the WHO Regional Office for Africa in Brazzaville and to have invited the WHO Regional Officer for Parasitic Diseases to visit the project for early discussion on collaborative activities.

The proposal to convene a Technical Advisory Council to serve the project had some merit, perhaps not only nationally, but also at least sub-regionally. As far as the evaluation team is aware, the Council met only once; the minutes of the meeting were positive and promising, but further regular meetings did not take place.

In conclusion, as the technical and training credibility of the project has gained in status and momentum in the last two years, its capacity to serve as a Regional Center for Research on Schistosomiasis (RCRS) becomes more realistic. The need for such a Center should be fully explored. If promising, all institutional arrangements would have to be detailed and formal Memoranda of Understanding would be required with participating countries, perhaps through the intermediary of WHO and OCEAC. Not least, close attention would have to be given to the sustainability of the project on the departure of TAT. The capabilities of research workers depend not only on training, institutional support and management skills, but also on prolonged experience of the complex and interacting academic and applied disciplines relevant to schistosomiasis research and control. International recognition can only come with excellent quality of work and sustained commitment.

4. Project Management by IMPM, Tulane and A.I.D.

The project began with a somewhat rough start during 1985 and 1986 due to the fact that the Tulane TAT and the IMPM had differing perceptions about their

respective roles and responsibilities in the project. At that time, no formal management system had been developed to define strategies, prepare plans, coordinate activities or establish lines of communication. TAT worked in an institutional vacuum for some time, and IMPM guardedly observed their research activities to see if they held merit. Finally, A.I.D. project officers intervened to defuse tensions and assist the two parties establish a joint technical work plan for the entire project (June 1985 and May 1986). In 1986 a project coordinator was assigned by IMPM to work with the Tulane COP. This assignment has resulted in a relationship between TAT and IMPM management in terms of the day-to-day administration of project activities. There still is no formal management system for the project, but hopefully the project coordinator can continue to serve as a vehicle for communication between the two parties, and this can result in the definition of project institutional objectives and the preparation of an institutional development agenda.

The various management tools provided by the Project Paper, the Technical Advisory Committee (TAC), and the technical subcommittees for longitudinal studies have only been partially used. The TAC was convened once in June 1985, by the IMPM Director. Technical subcommittees were never formally developed; rather, informal meetings between the new IMPM coordinator and the Tulane COP were held. IMPM opposed the creation of new management tools because IMPM has its own advisory and management structures (Comite de Direction et Comite des Programmes). The Director felt that it was inappropriate to create new structures, preferring to maintain flexibility.

Currently, cooperation between IMPM and TAT researchers, technicians, administrators, and support personnel, based on informal arrangements, seems excellent. Similar relationships of excellent informal cooperation and collaboration exist between IMPM/TAT field researchers and MOH field workers. This informal system of convening specialists when needed in an advisory capacity has been used in the preparation of various research and survey operations.

IMPM has been very active in assuming its role as the main implementing agency of the project, principally in cooperating with other Cameroonian organizations involved in schistosomiasis research and control, and also in the identification and nomination of the Cameroonian candidates for long-term training. On the

other hand, early in the implementation phase, IMPM adopted a position of withdrawal regarding the day-to-day management of the project's technical (research) activities. IMPM, with A.I.D. mission concurrence, also cut off its financial contribution to operational expenses of the project, leaving the responsibilities of planning and organizing research operations to the TAT. IMPM used its right of approval to control the execution of project activities. IMPM was slow to assign researchers and technicians as needed for the realization of project technical activities. There are no detailed provisions in the Project Agreement document of how many person-months or person-years of local researchers and technicians are to be assigned to the project. The project paper also does not provide job descriptions for local researcher positions.

Tulane University has been very effective, energetic and resourceful in the design and execution of research activities. (Quarterly and annual reports, as required by the contract, are produced with regularity). The long term training at Tulane will be a success if the present training plan is executed. As reflected by Tulane's Technical Proposal and the initial approach to project implementation, the TAT seems not to have been fully aware of the importance of the institutional development aspects of the project.

The A.I.D. Mission can be credited with a sense of leadership in trying to bridge the gap between IMPM's and Tulane's respective roles in the project, and in developing a management manual to ensure better reporting and consensual decision-making. These efforts have succeeded in improving the situation, essentially by obtaining the assignment of an IMPM project coordinator. Also, A.I.D. project officers have been accessible to IMPM and the TAT and have been very helpful.

A.I.D. shortcomings in managing the project are the following: i) not working toward the development of an implementation strategy common to IMPM and Tulane; ii) lengthy procurement procedures that delayed project progress (list of equipment sent in February 1985 and equipment received in September 1986); iii) decision to purchase American made four-wheel drive vehicles that proved to be inappropriate to the terrain, broke down within three months, and for which parts could not be obtained locally - all finally had to be replaced by more appropriate Japanese models; iv) not finding a solution to the problem of no funding for the long-term social scientist position.

## 5. Project Sustainability

### a) Structure

The purpose of IMPM, which is to design research programs, carry out research and develop experimental applied activities with a view to improving the health conditions of citizens, is compatible with the objectives of the Schistosomiasis Research Project.

IMPM/MESRES has the organizational structure sufficient to continue operations of the Schistosomiasis Research Project. Particularly interesting are the provisions for linkages between research institutions and organizations which can use the research results. The Project Valorization Service of the Direction de la Recherche Scientifique et Technique (DRST) is responsible for making research results known to users and assisting in the implementation of results. In addition, user organizations, such as the MOH, the Ministry of Plan and the Ministry of Agriculture, are members of the Management Board and Program Committee of IMPM.

### b) Equipment, facilities and human resources

IMPM will benefit from the laboratory equipment, laboratory facility, data processing equipment and from operational and procedural systems developed under the project. It will also benefit from the training of 12 Cameroonian researchers in various fields of medical research related to tropical diseases at Tulane University.

### c) Financial resources and recurrent costs

The decentralized system of financial management allows IMPM to have its own budget and its own resources, including revenues generated from its activities.

The 1987/88 budget for operational expenses of research activities is FCFA 50,000,000, down from FCFA 57,562,000 in 1986/87 as a result of the economic crisis in Cameroon. However, IMPM has a reserve fund of FCFA 550,000,000 only for schistosomiasis research operations. This fund should allow IMPM in the middle term to operate the schistosomiasis facilities.

d) **Measures to enhance sustainability**

The sustainability of the Schistosomiasis Research Project under IMPM could be enhanced if the following are accomplished:

- an effective transfer of research operations from the Tulane TAT to IMPM;
- strengthening the management capabilities of IMPM research personnel to a scale comparable to the current operations;
- measures to guarantee the continued presence of the 12 Cameroonian researchers at IMPM and to ensure their continued guidance by senior researchers.

6. **Conclusions**

The project has accomplished a great deal in its technical components (except for research behavioral aspects of schistosomiasis transmission and control) and now needs to focus on the effective transfer of the management of the Project. Other aspects of institution building that will enhance the capability for exchanging research methods and findings with other countries and international agencies in the region should now be stressed.

## ANNEX A

SCOPE OF WORK  
EXTERNAL EVALUATION HEALTH CONSTRAINTS  
TO RURAL PRODUCTION CAMEROON

## Introduction

The Health Constraints to Rural Production (HCRP) project PROAG was signed in August 1983 and has a PACD of December 31, 1990. Principal elements of the project include training, institution strengthening, and applied field research on schistosomiasis control in Cameroon. The project evaluation plan calls for an external evaluation in the 52nd month of the project. USAID/Cameroon has outlined the elements of the external evaluation in Yaounde 11308. This scope of work (SOW) elaborates the elements presented by the Mission and provides information concerning the technical consultants, their tasks, and in-country support provided by USAID/Cameroon.

## The Evaluation Team

The three persons to be contracted are:

1. The Vector Biologist/Epidemiologist
2. The Institutional Analyst and,
3. The Health Economist or Economic Anthropologist

Each of the contract specialists should have substantial experience in the developing world, preferably Africa, be familiar with A.I.D. evaluation procedures, have a Ph.D. or equivalent, and demonstrate French language ability at the S-3, R-3 levels. The three contracted persons will be members of the evaluation team which will be led by the Regional Health Development Officer from REDSO/WCA. The team will be supported during the evaluation by USAID/Cameroon staff, specifically the Health Officer, the Project Design/Evaluation Officer and Mission's Engineer.

- USAID Regional Health Development Officer (RHDO)  
The RHDO will be an experienced Agency Health Officer. S/he will assess the relevant/effectiveness of the training program for Cameroonian and other-country trainees as well as current arrangements and plans regarding trainee placement, roles and functions following the completion of their studies. S/he will assist the Vector Biologist/Epidemiologist in assessing the technical soundness of the project and of its individual components. In addition, s/he will serve as

the team leader and assist in assessing the project's regional objectives and accomplishments, and its information dissemination objectives and accomplishments, and in ensuring that Agency administrative and technical requirements are met in the preparation of evaluation documents. As team leader s/he will be responsible for the completion of the draft document and assign specific tasks to other team members in putting together the final draft document prior to the team's departure from Cameroon.

- Institutional Analyst

The Institutional Analyst must be fully familiar with A.I.D. evaluation procedures and will ensure that Agency administrative, technical, social and economic analysis requirements as outlined in Handbook 3 are met. As Institutional Analyst s/he will assess: (1) the compatibility of the intra- and inter-organizational arrangements (roles, tasks incentives, human capacity, financial/material resources, linkages, etc.) with project technical and institutional objectives (Cameroon and regional); (2) the management performance of USAID, the participation of GRC organizations, and the technical assistance contractor; and (3) the feasibility of sustaining the operations/performance of the schistosomiasis research center. S/he will be responsible for preparing a final draft document in English summarizing the points above and presenting this final draft to the team leader prior to departing. S/he will also assist the team leader in compiling the final evaluation report in draft. S/he will assist the team leader in presenting to the USAID Mission and IMPM a debriefing of the evaluation team's findings and recommendations.

- Vector Biologist/Epidemiologist

The Vector Biologist/Epidemiologist will be a skilled professional with extensive experience in tropical disease research, preferably in schistosomiasis. S/he will be responsible for the technical review of the project including its overall technical soundness, and specifically of the epidemiological, malacological and parasitology studies, and the technical components of the longitudinal studies. S/he will also assist the team leader (a) in addressing technical questions concerning institutional aspects of the project and, in particular, the performance of the technical contractor, USAID and the GRC/IMPM in the implementation of the project; and (B) in assessing project sustainability. S/he will be responsible for preparing a final draft document in English summarizing the points above and presenting this final draft to the

team leader prior to departing. S/he will also assist the team leader in compiling the final evaluation report in draft. S/he will assist the team leader in presenting to the USAID Mission and IMPM a debriefing of the evaluation team's findings and recommendations.

- Health Economist or Economic Anthropologist

The social scientist will be a skilled professional with extensive experience in socio-economic study design and applied field research. S/he will assess the socio-economic soundness of the project, focusing particular attention to the appropriateness of the design, implementation, analysis and application of longitudinal studies dealing with social determinants of schistosomiasis prevalence and incidence in various community settings, and with the socio-economic impact of schistosomiasis morbidity. S/he will assist the team leader in assessing the management of the socio-economic aspects of the project by participating organizations. S/he will be responsible for preparing a final draft document in English summarizing the points above and presenting this final draft to the team leader prior to departing. S/he will also assist the team leader in compiling the final evaluation report in draft. S/he will assist the team leader in presenting to the USAID Mission and IMPM a debriefing of the evaluation team's findings and recommendations.

The evaluation is expected to begin on April 11, 1988 and conclude on April 29, 1988. It is envisioned that the RHDO will spend a full three and one-half weeks in Cameroon to complete the evaluation report. The Institutional Analyst, the Vector Biologist and the Health Economist/Social Anthropologist will spend a total of 25 days each in Cameroon beginning April 11, 1988.

**Tasks**

The tasks outlined by USAID/Cameroon in Yaounde include a review of project objectives, an assessment of inputs and outputs, comment on project sustainability, and evaluation of contractor and GRC performance. The specific tasks the team will address are elaborated below.

- o **Regional Objectives** - The regional objectives of the project will be carefully scrutinized by the team. Progress towards regional training goals should be assessed and input by the contractor and the GRC/IMPM should be evaluated. The evaluation team should provide the Mission with recommendations concerning the appropriateness of continuing the regional objectives of the project, or reducing the scope of the project to

focus primarily on activities in the Cameroon. The team leader and technical advisor will have primary responsibility for formulating the recommendations on regional objectives of the project.

- o Input/output Analysis - The team will review the project implementation plan and the logical framework to assess the timeliness, appropriateness and effectiveness of the inputs and outputs of the project. Critical assessment of the procurement process and conduct of training/institute building activities will be coordinated by the technical advisor. The relationship between the GRC, the contractor and USAID will be explored to identify any logistical/administrative barriers to the efficient utilization of inputs and manifestation of outputs.
- o Project Sustainability - The team will pay particular attention to the issue of sustainability regarding project implementation. Particular attention will be given to GRC fiscal and administrative commitment to future project-related activities, i.e., institution strengthening, training, applied research. The team will provide comment on how the project can enhance the potential for sustainability, and identify specific actions by the contractor, GRC and USAID which will improve sustainability of project efforts in the near and long-term. The team leader will have the primary responsibility for drafting this section of the evaluation with input from the other team members.
- o Review of Technical Studies - The team will evaluate the National Prevalence Survey and the longitudinal epidemiological study. Person-power, training, and technical accomplishments will be enumerated. Problem areas will be identified. Particular emphasis will be placed on assessing the appropriateness of the data generated in relation to operational planning and disease control needs. Quality of data collection and analysis will also be reviewed. The vector biologist/epidemiologist will assume the primary responsibility for this portion of the evaluation.
- o Summary of Lessons Learned - The evaluation team will provide the Mission with a summary of lessons learned during the implementation of the project. The team will present recommendations concerning improved operation of the project and the interaction among the GRC, contractor and USAID. Lessons learned will consider all aspects of the PROAG's objectives and project implementation. The team will identify where the project has succeeded and where improvement is

needed to attain project goals. Comments on management, project goals and objectives, professional relationships within the project and "regionalization" issues will be discussed. The vector biologist/epidemiologist will coordinate this section of the evaluation report with input from the other team members.

- o Adequacy of Project Design - The team should review the project paper (including logical framework), and PROAG to ascertain if the design of the project remains sound. The regional elements of the project should be reviewed and an assessment of project targets should be conducted. Goal attainability and sustainability issues should be reviewed and recommendations to the Mission should be presented concerning the overall direction of the Project in the future. If deemed necessary, the team will present a revised design, targets and implementation plan as appropriate. The team leader will assume responsibility for this portion of the report, but will work closely with other team members.
- o Contractor Effectiveness - The team will assess the effectiveness of the contractor in both its technical and administrative (including management) responsibilities. The team will provide comment on the technical capability of the contractor, in particular interpersonal skills. Adherence to project targets and agreement to the subcontract will be assessed. The team will provide the Mission with specific recommendations concerning improvement of contractor performance if necessary. The contractor will be visited in New Orleans in addition to Yaounde by at least one of the team members. The technical advisor will assume primary responsibility for this portion of the evaluation report.

#### Timeframe for Evaluation

The evaluation team will arrive in Yaounde o/a April 10, 1988. It is estimated that approximately 10 person-weeks will be required. The team leader or technical advisor may be required to remain on site for an extra week in order to finalize the draft document and incorporate Mission comments into the document. It is anticipated that the final document will be prepared in Washington and sent to USAID/Cameroon within 30 days of the team's departure.

## Support for Evaluation

S&T has indicated that the VBC Project will be unable to support the TA for the evaluation team due to a perception of a possible conflict of interest, since Tulane University is one of the primary subcontractors on the VBC/MSCI contract. It has been suggested that the MSCI Tropical Medicine IQC be used to help support the Mission. USAID/Cameroon will therefore be required to prepare a buy-in to the MSCI Tropical Medicine IQC for the external technical assistance. The Mission will also have to make arrangements with an appropriate A.I.D. official to obtain the services of one of their technical officers to serve as team leader.

## Mission Input

The Mission will provide logistical support for the arrangement of meetings with appropriate persons associated with the team and provide in-country transport for meetings and field visits. Per Yaounde 11308 para 4, the Mission will devote some of its professional staff generally to assist the evaluation team, provide briefing material, and monitor progress of the evaluation.

## Format of the Document

The format of the document is at the discretion of the team, however, it is important for the team to provide recommendations which specify what needs to be done, by whom, and how. The recommendation section of the report should provide succinct recommendations, statements of issues within specific recommendations, and specific actions by USAID, the GRC and the technical contractor. Thus, it is suggested that the recommendation section follow the format presented below.

- o Recommendation #1
  - Issue #1
  - Actions for USAID
  - Actions for the GRC
  - Actions for the Technical Contractor
  
- Issue #2
  - Actions for USAID
  - Actions for the GRC
  - Actions for the Technical Contractor
  - etc.

- o Recommendation #1
  - Issue #1
    - Actions for USAID
    - Actions for the GRC
    - Actions for the Technical Contractor
  - Issue #2
    - Actions for USAID
    - Actions for the GRC
    - Actions for the Technical Contractor
    - etc.
- o Recommendation #3
  - etc.

## ANNEX B

## TEAM COMPOSITION AND STUDY METHODS

The Interim Evaluation of the Health Constraints to Rural Production Project (698.0408.1) was carried out between April 10 and 30, 1988 by Dr. Charles Debose (Regional Health Officer/WCA), team leader, Dr. Fergus McCullough, Mr. Jean DeHasse, and Dr. Mayling Simpson-Hebert, all consultants to USAID Cameroon. The team was asked to evaluate the institutional, training, socio/cultural and technical aspects of the project.

Two of the team members, DeHasse and Hebert, were briefed on the project in Washington, D.C. by the Vector Biology & Control Project for USAID and by Dr. J. Shepperd (AID, Washington). Upon arrival in Yaounde the entire team was briefed by USAID/Cameroon. As far as possible the evaluation team followed the scope of work received upon arrival.

The team reviewed documents provided by the Institute for Medical Research and Studies of Medicinal Plants (IMPM), the Tulane Technical Assistance Team (TAT), and USAID Cameroon and conducted intensive interviews with all three parties, both as a team and individually. The team also conducted interviews with persons who had been formerly associated with the project, in order to obtain some historical perspective of events, and met socially on occasions with the Cameroonian and expatriate professionals associated with the project. Unfortunately, the ET had not time to visit the IMPM Field Station, Kumba which is conducting research on schistosomiasis (including chemotherapy and biological control studies using the predator/competitor snail, Marisa cornuarietis). This visit by analogy would have had relevance to the sustainability aspect of the project. The team toured the Schisto laboratory housed in a temporary building and visited the new laboratory under construction.

Each member of the evaluation team was assigned a component area for concentration. Assignment of team members to a specific topic was based on area of expertise for which each member had been selected. Areas requiring evaluation not fitting one of the components were addressed by the entire team. Team members did individual research and met each evening to discuss progress and revise working schedules.

At the end of four days, the team agreed on an outline for individual papers and field work. The second week was devoted to three sets of meetings with IMPM administration, numerous meetings at the Schisto. Lab. and review meetings with USAID. The third week was spent editing individual papers and writing the body of the final report and the executive summary.

Report preparation was shared by the team, and a draft of the main document, as well as a more formal Executive Summary in English, was left with the AID Mission in Yaounde prior to the conclusion of team activities on April 30, 1988. The final report is the responsibility of the entire team in cooperation with AID/Cameroon.

## ANNEX C

## DOCUMENTS REVIEWED

A.I.D. Evaluation Handbook. 43 pp.

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Compte Rendu de la 16ème Session du Conseil de Direction de l'IMPM du 25 juin 1987 - MESRES

Compte Rendu de la 7ème Session du Comité des Programmes de l'IMPM Tenu le 19 decembre 1986 - MESRES

Country Development Strategy Statement (CDSS) update, FY 1989, December, 1986.

Esprusse d'un Plan d'Action de Controle avril 88 - IMPM - MESRES

Extrait des Programmes de Recherches de l'IMPM 1988-89 - MESRES

Health Constraints to Rural Reproduction. USAID Project Paper. 38pp and 13 annexes.

IMPM/USAID/Tulane University Schisto Research Project. Socio-economic Study Proposal. 15pp.

IMPM/TULANE University/USAID Technical Committee, Work Plan FY 87 Through FY 90. Drafted by Bibi Essama.

IMPM/USAID/Tulane University Schisto Research Project. Research Proposal: Darhala clinic utilization.

IMPM/USAID/Tulane University Schisto Research Project. Research Proposal: Children's beliefs association with schisto.

Maternal Child Health/Child Survival, USAID Project Paper, 1987.

MESRES/IMPM/USAID/Tulane University. Cameroon Schistosomiasis Research Project: Summary. 35 pp.

MESRES/IMPM and Tulane University. Health constraints to Rural Production, Summary. 10 pp.

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## ANNEX D

## LIST OF PERSONS CONTACTED

1. Washington, D.C.  
Dr. J. Shepperd, AFR/TR/HPN, Health Officer,  
AID/W
2. USAID/Cameroon  
Mrs. Bibi Essama, Former Project Officer, FSN  
USAID/Cameroon  
Mr. Gary Leinen, USAID/Cameroon  
Health/Population Officer  
Mr. Robert Schmeding, Chief, EHRD Division,  
USAID/Cameroon  
Mr. Robert Shoemaker, PDE USAID/Cameroon  
Mr. George Vishio, Project Officer, FSN  
USAID/Cameroon
3. IMPM Schisto Laboratory  
Tulane Personnel  
Dr. Raoult Ratard, Chief of Party  
Dr. George Greer, Malacologist  
Mr. Tom Talbot, Admin. Assist.  
Mr. Jim Spilsbury, Peace Corps Volunteer  
IMPM Personnel  
Dr. Lizette Koumeni  
Dr. Bessala Ekani
4. IMPM Administration  
Dr. Antoine Abondo, Director IMPM  
Dr. Johnson Jato, Deputy Director
5. CUSS  
Dr. Rose Leke, Faculty of Medicine
6. CRESS  
Dr. Helen Atem, Medical Anthropologist
7. MOH  
Dr. Ghogomu Nongho Amida, Director of Preventive  
medicine

## ANNEX E

**Organizational Structure of the Institut de Recherche Medicale et des Plantes Medicinales (IMPM)**

The data for this presentation of the IMPM are drawn from the texts of the Delegation General for Scientific and Technical Research, mainly the Decree 79/495 of December 4, 1980. Provisions, regarding financial matters and regarding linkages between research and users of research, are emphasized.

The "Institut de Recherches Medicales et des Plantes Medicinales" (IMPM) is one of five research institutes under the Directorate for Scientific and Technical Research (DRST or Direction de la Recherche Scientifique et Technique), formerly Delegation Generale de la Recherche Scientifique et Technique (DGRST), of the Ministry for Higher Education and Scientific Research (MESRES or Ministere de l'Enseignement Superieur et de la Recherche Scientifique). MESRES was formed in 1984 by the merging of the DGRST and the Ministry for Higher Education.

The DRST.

The purpose of the Directorate for Scientific and Technical Research (DRST) is to formulate, orient and implement Government policy in the field of science and technology. The DRST comprises a Department of General Administration, which deals with financial, personnel, and contractual matters, and a Department of Programs which, among other aspects, is responsible for:

- formulation and orientation of scientific policy,
- coordination of research activities throughout the country,
- stimulating scientific activities and ensuring the transfer of technology,
- searching for external sources of financing.

There is a Sub-department of Programs which has particular responsibility for encouraging users of research results to express their requirements and consequently to plan and establish research programs.

The Sub-department for the Support of Research Projects is responsible for following up the execution of finalized projects by competent authorities, and it comprises among others a Project Promotion Service which presents research results to users and assists in their rapid implementation.

The five research institutes are:

1. The Institute of Agricultural Research
2. The Institute for Medical Research and Medicinal Plant Studies (IMPM)
3. The Institute for Geological and Mining Research
4. The Institute of Animal Research
5. The Institute of Human Sciences

These five specialized Institutes are charged with implementing the scientific and technical policy of the Government. They have a decentralized system of financial management and their own budget. Each Institute has several research operational structures such as Centres, Laboratories, Stations and Posts.

#### The IMPM

The main purpose of IMPM is to establish programs and carry out laboratory and field operational research with a view to improving the health conditions of the people of Cameroon.

The Management Board (Conseil de Direction) meets twice a year and is chaired by the Director of DRST and comprises principally the users of research project results (MOH, Plan, Agriculture), officials of IMPM and the Centre Universitaire des Sciences de la Sante (CUSS or University Center for Health Sciences). It approves the budget made enforceable by order of the National Assembly, approves the accounts and accounting documents, guides and adopts research programs.

The Program Committee is responsible for selecting programs and research projects in such a manner as to ensure that they conform with the needs of users and the advancement of science and technology.

The Director of IMPM is appointed by Presidential Decree and is assisted by a Deputy. IMPM has an administrative and financial service, a research service, and three research centers pursuing nine research programs. The three centers are:

1. The Centre for Medical Research with seven programs (Schistosomiasis, Onchocercosis, Malaria, Infectious Disease, Traditional Medicine, Tumors, Acquired and inherited Physiological Diseases).
2. The Nutrition Center,
3. The Center for Medicinal Plant Studies.

Heads of Laboratories, Research Centers and Programs can, in that capacity, be delegated administrative and financial authority to enable them to carry out the functions of their operational structures.

The financial resources of IMPM are derived from:

- subsidies granted by the State, local authorities and public bodies;
- revenues from their own activities;
- loans;
- donations and legacies;
- any other forms of assistance.

Each Institute has a credit line in account opened by the Treasury on behalf of the DRST.

### Personnel

Researchers are either Civil Servants placed at the disposal of DRST or Contract Officers. They are placed in one of the following grades:

- Research Assistant (Assistant de Recherche),
- Research Officer (Chargé de Recherche),
- Senior Research Officer (Maître de Recherche),
- Chief Research Officer (Directeur de Recherche).

Research Assistants sign a two year contract which may be renewable, depending upon the results of their research. After four years, a Research Assistant who has not been promoted is sent back to his original post or his appointment is terminated. Similar provisions are made for Research Officers after 6 years and for Senior Research Officers after 16 years.

## ANNEX F

## LISTE DU PERSONNEL DU PROJET BILHARZIOSE

NOMS ET PRENOMS	FONCTIONS	GRADE ET AFFECTION
Dr. Lysette KOUEMENI	Chercheur/Parasitologie	Contractuel/IMPM
Dr. EKANI BESSALA M. M.	Chercheur/Parasitologie	Fonctionnaire/Minsap
Dr. MIMFOUNDI Remy	Chercheur/Malacologie	Fonctionnaire/YUC
Mr. KOUNGOU MEYONG Cl.	Responsable Adm-Financier	Contractuel/IMPM
Mr. Ernest NGONSEU	Technicien/Malacologie	Contractuel/MESRES
Mr. DJAMEN Merlin	Technicien/Parasitologie	Contractuel/IMPM
Mr. EDZOA Polycarpe	Technicien/Malacologie	Contractuel/IMPM
Mme TOCHE nee KWATY B.	Technicien/Parasitologie	Contractuel/IMPM
Mme MESSINA nee NGUINI	Secrétaire Steno-Dactilo	Contractuel/IMPM
Mr. MA' A NGUELE	Technicien/Parasitologie	Contractuel/IMPM
Mme NDAH Henri	Technicien/Parasitologie	Contractuel/IMPM
Mr. NGUEUCHEU Christophe	Technicien/Parasitologie	Agent/IMPM
Mr. AKAME NDONGO J. R.	Technicien/Parasitologie	Agent/IMPM
Mr. BEMASSA BESSALA	Technicien/Parasitologie	Agent/IMPM

Mlle. SOHIE Bernatte	Technician/Parasitologie	Agent/IMFM
Mlle NGUE Monique	Technician/Parasitologie	Agent/IMFM
Mr. YAKAN BESSONG LEVI	Technician/Parasitologie	Agent/IMFM
Mlle. BOMBA Laurent	Technician/Parasitologie	Fonctionnaire/ Minsap
Mr. ABONDO Joseph Marie	Chauffeur	Agent/IMFM
Mr. BENGONO NSIA	Technician/Parasitologie	Agent/IMFM
Mr. FOUA Christophe	Technician/Malacologie	Agent/IMFM
Mme NEHAMADJI nee KAMENI	Technician/Parasitologie	Agent/IMFM
Mr. ATANGANA Jules R.	Technician/Parasitologie	Agent/Minsap
Mlle. MBAREDOA Juliette	Technician/Parasitologie	Agent/IMFM
Mme BESSONGO nee FRISO	Technician/Malacologie	Agent/Minsap
Mme MBARGA nee BINDI B.	Agent d'entretien	Agent/Minsap

YUC = YAOUNDE UNIVERSITY

MINSAP = MINISTER OF HEALTH

## ANNEX G

## REVIEW OF THE TECHNICAL STUDIES OF THE PROJECT

1. Background Setting and Summary

Schistosomiasis is essentially a "person-made" affliction; the snail intermediate hosts play only a passive role in transmission. The infection is most prevalent in children between the ages of 8 and 16 years of age. Current control strategies now aim at significantly reducing morbidity rather than the interruption of transmission. Knowledge of human demographic patterns in the endemic areas, where schistosomiasis research and control activities are being carried out, is mandatory.

In December 1983, the population of the Republic of Cameroon was just over 9 million inhabitants, with an annual growth rate of more than 2.5%. The population is essentially young with over 40% under the age of 14 years and as many as 27% between the ages of 5 and 14 years. The population distribution is uneven with around 80% living in the north and east of the country. As will be seen later, the findings of the Schistosomiasis Research Project have shown that the North and Extreme-North are the provinces in the country with by far the highest prevalence of schistosomal infection.

At the present time probably more than 60% of the people live in communities of less than 5000 inhabitants. About 80% of the population are engaged in agriculture which accounts for around 30% of the gross national product. However, there is marked migration to the larger urban centres and the population of Douala and Yaoundé is now around two million persons. Migration is associated with the planting and harvesting seasons of the major crops and tends to be north to south, with the main agro-industrial infrastructures located in the south.

Schistosomal transmission is also frequently associated with seasonal rainfall and temperature patterns, which are quite diverse, reflecting the unusually wide range of ecological zones in Cameroon. The southern regions have two rainy seasons, with high precipitation from March to July and during September and October. The rainfall decreases progressively towards the north-east where in the Extreme North arid conditions exist with a single, short rainy season of less than three months. Here, snail host populations are maximum during the wet season when water-contact activities promoting transmission are also most marked. In

Cameroon existing temperatures do not limit the distribution of the snail hosts, but average warmer temperatures do accelerate both snail growth and schistosome larval development.

The introduction of water resource development projects, such as irrigation schemes and barrages, may herald new or increased transmission of schistosome species. While plentiful supplies of freshwater may promote socioeconomic benefits, unfortunately they may also have adverse health consequences which should be carefully monitored and, if possible, controlled. The Cameroon government is aware of the need for good water management practices as endorsed in recent Five-year Development Plans. Somewhat paradoxically, however, as the project's findings have unequivocally shown, schistosomiasis is at present most dramatically encountered in the drier areas of the country where transmission occurs mostly in temporary ponds and streams, rather than in large permanent water bodies.

Prior to the completion of the national primary schools' survey by the project in November 1987, to determine the distribution, prevalence and intensity of the three human schistomes (Schistosoma haematobium causing urinary schistosomiasis, S. mansoni and S. intercalatum both provoking intestinal schistosomiasis) in the entire country, no systematic studies on these three parameters had been undertaken. The findings of the earlier, local studies are summarized in the (CEGET)/WHO Atlas of the Global Distribution of Schistosomiasis (1987) and also comprehensively in project documents. The project's two-year systematic, primary schools' survey is thus an outstanding achievement and the findings will contribute significantly to the development of rational control planning at the national level, especially when considered in conjunction with a parallel national survey of potential snail hosts and associated studies on transmission sites and susceptibility to schistosomes.

In over 70 articles, both published and unpublished, on schistosomiasis in Cameroon, less than 10 deal with specific studies on control (e.g., chemotherapy, snail host control) and none on sociological aspects relevant to either transmission or control. Most deal with descriptive epidemiology and few have a truly quantitative basis. Unfortunately, for diverse reasons, the project's contributions to specific control studies, including sociological research, are also limited at the present time.

A document which could well serve as a preliminary basis for future control action entitled "A Proposed National Plan of Action for Schistosomiasis Control in the Republic of Cameroon" (WHO, 1986) has been prepared. The Ministry of Health at present recognizes schistosomiasis to be an important public health problem in certain areas of the country. According to information given to the Review Team, the Federal Republic of West Germany's aid program (GTZ) is presently planning to undertake schistosomiasis control as part of an assistance program on primary health care activities in three provinces (North-West, South-West and Littoral) in the country.

In summary, while much field and laboratory research, especially on epidemiologic aspects, had been carried out in the last three decades, it has generally lacked overall national perspective. This deficiency has been in large measure corrected by the comprehensive studies of the USAID-sponsored Schistosomiasis Research Project (known administratively under the title of Health Constraints to Rural Production Project), especially in the areas of collecting and analyzing systematic data on the prevalence and intensity of the three human schistosome species endemic in Cameroon, and on snail host taxonomy, ecology and susceptibility status. Few studies have been carried out on control procedures and none of any importance on socio-economic aspects. The Ministry of Health is planning in collaboration with GTZ to undertake operational control activities; the findings of the project can make a significant contribution for the determination of areas for control priority, the provision of baseline data, as well as the initiation of pilot control studies, if collaboration between the MESRES and MOH is assured.

## 2. The Role of the Technical Studies

The plan of action for the project specifically calls for the development of a research center at Yaounde which would be capable of undertaking studies on carefully selected technical components necessary for an improved understanding of the epidemiology and control of the three species of Schistosoma endemic in Cameroon. A brief description of the role and importance of these technical studies is given below.

### a. Studies on the prevalence, intensity and distribution of schistosomal infection. The national primary schools' survey

Current national strategies for the control of schistosomal disease are based on cumulative epidemiological and clinical evidence that heavy

parasite loads are related to clinical disease. Thus the number of persons infected in a certain community, tabulated by such parameters as age, sex and occupation, and the number of eggs expelled in their urine and/or feces, are important indices of the local status of schistosomal infection and disease. When data on prevalence and intensity, collected and analyzed by standardized procedures in an index group of children, become available for the entire country, a major requirement for the planning and implementation of rational and cost-effective control strategies then becomes available. As already mentioned, most earlier studies on the distribution and epidemiology of Schistosoma in Cameroon were locally based and a systematic, nationwide study of prevalence and intensity had not been undertaken. The national survey, using objective sampling procedures and standardized diagnostic methods, mainly in children in the highest grade of primary schools, carried out by the Project in the 182 administrative subdivisions of Cameroon, has provided findings not only of scientific interest, but of major practical importance. Moreover, based on the results of the children's survey, a reasonable estimate of the prevalence and status of schistosomiasis in the entire local population can be obtained. Another major use of prevalence and egg-output data is their importance in the evaluation of the efficacy of control measures.

b. Longitudinal studies in selected communities

While the nationwide survey of primary school children provides a valid picture of the distribution and status of schistosomiasis at the present time, it does not give a deeper understanding of the dynamics of transmission in a particular community which are influenced by a multiplicity of physical (e.g., geographic and climatic features) and human (e.g., demographic status of the human and snail hosts, socio-cultural characteristics) factors. In order to obtain a sound knowledge of spatio-temporal transmission patterns, carefully planned longitudinal studies in ecologically representative communities are required. Such longitudinal studies can be expected to generate additional baseline information for the planning, implementation and evaluation of efficient control measures. The control components, apart from chemotherapy and health education inputs, are likely to vary widely according to the broad range of ecological conditions so characteristic of Cameroon. With this rationale in mind, the project has carried out since January 1987 a series of longitudinal studies in seven

selected communities. The protocol for the study includes such issues as census, mapping, household information, prevalence, intensity and incidence of infection, clinical morbidity studies, water-contact behavior and snail host population dynamics and infection rate parameters.

c. Snail host studies

A distinctive feature of each schistosome species is its affinity for particular species of snail which act as intermediate hosts of the larval stages of the parasite. In fact, specificity may be so marked that a certain strain of schistosome is capable of developing in only a certain species of snail. Some species of potential snail hosts are more efficient "vectors" than others. For example, Biomphalaria pfeifferi is significantly more susceptible to Schistosoma mansoni than is B. camerunensis. Certain genetic variants of the truncatus/tropicus group of bulinids are highly compatible with S. haematobium, while others are totally resistant to infection. In the more arid northern areas of Cameroon both Bulinus senegalensis and Bulinus globosus occur; both are capable of transmitting S. haematobium, but the role of each species in the local endemic communities deserves thorough investigation, especially if mollusciciding is to be included in schistosomiasis control strategy.

Seasonal transmission of schistosomiasis is the rule rather than the exception. Longitudinal studies of the snail hosts, including the determination of infected specimens, can therefore make a major contribution to our knowledge of the seasonality of transmission and thus to the timing of periodic control measures such as the delivery of chemotherapy and mollusciciding.

The finer details of snail taxonomy can best be studied if good museum collections are available. As the project's museum collection presently includes most of the snail hosts recorded in Central-West Africa, it is a valuable resource for biologists interested in sub-regional malacological problems, whether the aims of the investigation are academic or applied. For further clarification, it should be mentioned that modern snail host taxonomic studies now include biochemical as well as morphological methods; the allozyme studies on the forskalii group of snails which can transmit S. intercalatum, S. haematobium and their hybrids, presently being conducted at the project's laboratory, are of international interest and outstanding in quality.

### 3. Methods, Implementation and Progress

#### a. The national primary schools' survey

The methods used in the national prevalence/intensity study (Primary Schools' Survey) are well described and have been carefully considered. In the northern provinces where school attendance is low, urine and stool samples were taken from school non-attenders as well as school children in order to achieve representativeness of the overall child population. A stratified random cluster sampling procedure was used and the survey included all 182 administrative subdivisions in Cameroon. The employment of school children between 9 and 19 years as an indicator population was justified by a number of criteria and the sampling plan required a total of at least 21,060 stools and 17,490 urines to be examined from 580 schools throughout the country. The collection procedure at the schools was both standardized and correctly carried out from the inter-personal relationship viewpoint as witnessed by very high compliance rates. An admirable part of the survey was that each participating child received a 4-page information leaflet on schistosomiasis and its prevention; teachers received a detailed booklet about schistosomiasis. In addition, the project provided treatment (a single dose of praziquantel 40 mg/kg) to children found positive. In this respect, the recommendation of the earlier evaluation team to request the MOH to assume responsibility for the treatment of positive cases was, in the present Team's opinion, quite rightly rejected for diverse reasons fully explained to us by the COP, Dr. Ratard. There is no evidence that the provision of treatment interfered or delayed other project activities as was feared by the 1986 review team.

Before the nationwide schools' survey was started, a comparison was made of centrifugation, sedimentation and filtration techniques for the diagnosis of urinary schistosomiasis. Because of its satisfactory sensitivity and ease of performance, the sedimentation method was selected as best suited to the requirements of the survey. In addition to these methods a study was undertaken on the potential use of reagent strips for the screening of urinary schistosomiasis, if microscopic examination would not be available. It was concluded that the use of strips would provide satisfactory results, but precise quantitative data on intensity would be lacking; costs, it seems, were not considered.

The well known Kato-Katz method was selected, rather than the Ritchie techniques, to examine stool samples. Both urine and stool samples were preserved by adding a few milligrams of sodium azide which remained active for up to 12 weeks. All examinations of samples were performed by trained technicians at the laboratory, Yaounde. With quality control in mind, 10% of the samples were examined independently by another technician. While these methods are satisfactory for the schools' survey, other methods may need to be tested for use in a national schistosomiasis control programme where there will be need to examine and treat positive cases "on the spot."

As a separate parasitological study, the distribution of eggs in stool specimens was observed and found to be uniform throughout the specimens. Therefore, the examination of even very small portions of stool, as in the Kato-Katz method, did not invalidate results.

Implementation and Progress: The survey was completed in 2 years, i.e., from October 1985 to November 1987. The number of stool and urine samples, collected and examined, exceeded the sampling plan estimate, namely 22,166 stools (original estimate 21,600) and 19,524 urines (original estimate 17,490) and the total number of children examined was 23,796 indicating a very high rate of participation. The survey was undertaken in all 182 administrative subdivisions. These data represent a very satisfactory achievement, of which the participating parties and individuals should be justly proud, especially as this immense amount of work was completed in a relatively short period of time. There are few other countries in Africa which have such an impressive body of baseline data on the prevalence, intensity and distribution of human schistosomes. The findings are of major importance for the planning and implementation of future national control activities.

b. The Longitudinal Community Studies

The earlier review in February-March 1986 by Drs. Buck and Shepperd stated that "the most important goal of the project is new knowledge about schistosomiasis to be obtained from well designed longitudinal epidemiologic and clinical studies." They also reported that neither a draft study protocol nor a master plan for the proposed multidisciplinary, longitudinal studies were available for review. Consequently, a recommendation was made to the Technical Assistance Team (TAT) to fully utilize the experiences from other recent epidemiologic studies in Africa that have included

transmission dynamics and morbidity in longitudinal investigations. The TAT and national counterparts accepted this suggestion and prepared a 16 page preliminary plan for longitudinal community studies dated 15 May, 1986. This document includes a time schedule, criteria for the selection of communities, forms, a literature review, the materials and methods for studies on the disease impact of schistosomiasis and human/water contact investigations derived from W.H.O. Report TDR/SER-HWC/79.3.

The protocols for the studies relating to disease impact of schistosomiasis are of particular interest and the methods to be employed, especially for the case control study, are given in detail.

The criteria for selecting the communities were: (a) population of 500 to 1000, (b) reasonable accessibility, (c) population stability, (d) cooperation from community, and (e) ecological representation of a region of active schistosomiasis transmission.

Originally, the following communities were selected for the longitudinal studies: Melen area (Obili), Makenene, Edea, Barombi Kotto, Loum, Bertoua, Koussery and Semry III, Koza, Banyo, and a locality in the Northern Province. However, except for Obili and Makenene, studies at Edea, Barombi Kottro, Loum, Bertoua, Koussery, Koza and Banyo were not started and the latter were replaced by Mfou, Kinding Njabi, Kolafata/Guereme, Yagoua and Toukou/Zoulla. It would have been interesting to have retained Edea for longitudinal studies, in view of the high prevalence/intensity of *S. intercalatum* there, and also to have replaced Loum with Kumba where schistosomiasis endemicity seems to be of recent origin. *S. mansoni* is endemic at Obili, Mfou, Makenene, Kolafata/Guereme and Yagoua. *S. haematobium* occurs at Kolafata/Guereme, Toukou/Woulla and Yagoua; *S. intercalatum* is recorded at Yagoua and at Kinding Njabi, where it may be a hybrid of *S. haematobium* and *S. intercalatum*.

Implementation and Progress: The longitudinal studies were started early in 1987 and are expected to continue for two years. Maps of all sites have been prepared, demographic data are almost complete, prevalence/intensity studies are undertaken and the results analyzed every six months, in some of the sites (Kolafata/Guereme, Toukou, Mfou and Kinding Njabi) longitudinal snail bionomics/infection rate studies are underway, and morbidity studies are being carried out at Obili, Makenene, Toukou/Zoulla and Yagoua. Data on

migration, domestic water supplies, latrines and their use, and potential/actual transmission sites are being gathered; reporting on these data has still to be made. Some water contact information has been recorded, but lacks veracity. Incidence data are collected, but the results are problematical as the study of incidence demands a degree of rigor which the staff of the project can not provide due to other demands of priority. An attempt has been made to eliminate the hybrid S. haematobium/S. intercalatum strain at Kinding Njabi by treating all positive cases with praziquantel (40 mg/kg) in September 1986. Drastic reduction of prevalence/mean intensity was observed at two follow-up surveys. Thus, the prevalence dropped from 21% prior to treatment in June 1986 to 2.6% post treatment in June 1987. However, in November 1987, the prevalence had increased to 4.7% with the greatest increase in the age groups at highest risk. During the last two surveys 12 new cases have been recorded, but an encouraging aspect is the fact that mean intensity rates have remained low. These results provide evidence of the difficulty of eliminating schistosomiasis even in well defined endemic communities. The frequency of population-based chemotherapy schedules will depend on the objectives of the study (see WHO/SCHISTO/83.70 Rev. 1). Further findings at this community will be of interest and will have relevance for control strategy.

Dr. Foubi has recently started his doctoral thesis' studies on the morbidity of S. haematobium at Yagoua using ultra-sound imaging. A detailed protocol has been prepared and his work will be carefully supervised. Dr. Foubi's studies will involve a wide range, if not all, age groups. The veracity of his findings, on whether urinary schistosomiasis causes serious sustained morbidity in a community, will increase in significance as the time frame is prolonged.

At Makenene, where S. mansoni is "hyperendemic", the results of a preliminary case control study revealed no major morbidity, but further investigations are desirable. These initial findings do, however, point to the high priority status of carefully planned morbidity studies on both intestinal and urinary schistosomiasis, involving infected/uninfected individuals preferably of both sexes and representative of the age groups normally used in schistosomiasis investigations. As far as possible, stable rural communities are preferable to urban groups in order to ensure better compliance and avoid excessive fall-out

over a period of at least 3 years, and preferably much longer, due to migration which is characteristic throughout most of Africa.

The findings of the longitudinal studies are being well analyzed and reported. Unfortunately, major overall conclusions are unlikely to materialise in a period of two years and, with the exception of morbidity studies, there are good reasons to terminate them at the present time. In the previous evaluation, February-March 1986, the recommendation was made to postpone the decision to include Peace Corps (PC) participation in the project until a comprehensive workplan could be prepared. The Director, IMPM, had given his approval for Peace Corps participation. The decision to postpone PC participation effectively eliminated their presence in the project. The presence of the single PC volunteer in the project is serendipitous; he is making a valuable contribution to project activities. The inclusion of PC volunteers, together with their Cameroonian counterparts, would certainly have been a significant contribution to the efficiency and outputs of the longitudinal studies, to some of the short-term training exercises, to releasing senior technicians from some routine supervisory activities and, perhaps most important of all, to enable the project to make more contributions to pilot control studies, especially in areas of highest prevalence/mean intensity which may be difficult to materialize in the next 18 months.

c. Snail Host Studies

Parallel to the protocol for the longitudinal studies, a similar one was prepared for studies on the snail hosts. The materials and methods required for snail host bionomics under natural conditions and in the laboratory, snail host/parasite relationship investigations and cercarciometry, were described and the literature was scanned to validate the proposed approaches. Consideration was given to undertaking studies on aestivation, sentinel snails and diurnal cercarial shedding patterns, all of which might have augmented knowledge of seasonal/daily transmission patterns of schistosomes. These studies were not pursued due to the pressure of other work schedules and of lower priority rating.

A major malacological component of the project was the national survey of freshwater snails, paralleling that of the primary schools' survey. The snail survey was completed in the third quarter of 1987. Over 650 sites in 140 administrative subdivisions were sampled.

Geographical and ecological information, relevant to each collection, was stored in database files linked by a key field to the catalogue number given to each specimen as it is entered into the museum records. During the countrywide survey all important snail hosts of the three human schistosome species were found. Potential snail hosts of other important trematode parasites were also collected.

The project's Malacological Museum could well act as a model for the collection and storage of biological specimens in National Natural History Museums in Central-West Africa. It has regional significance and deserves to be utilized to the full; this will certainly be true if expatriate malacologists should visit Cameroon. The Museum presently contains over 800 identified and catalogued specimens. Record keeping has been greatly enhanced by the use of database computer files, permitting immediate retrieval of each specimen entered in the museum catalogue.

Apart from classical malacological taxonomic studies, allozyme and chromosome investigations are presently being undertaken. Several publications in international journals on the results of these studies are anticipated. The project's malacologists and other staff members contributed significantly to the joint meeting of the American Society of Tropical Medicine and Hygiene and the American Society of Parasitology at Denver, Colorado, in December 1986.

In order to develop expertise in enzyme electrophoresis the malacologists benefitted from the consultancy visit of Dr. P. Kat of the National Museum of Kenya, Nairobi, an acknowledged specialist in this field.

Snail host/schistosome parasite studies have been carried out both in the laboratory and in the field, the latter especially in connection with some of the longitudinal community sites such as Yagoua, where large numbers of infected *B. globosus* were found infected in July, about two months after the site filled with water. In September the highest schistosome prevalence in snails (4%) was recorded. The transmission season in the northern arid region of Cameroon is probably very short in many endemic foci; this should facilitate more cost-effective control strategies, including possibly chemical snail destruction procedures using commercial or plant molluscicides. The malacological arm of the project has not yet undertaken research on the control of the snail hosts, and this is a deficiency that should be

rectified in the months ahead. With reference to the biological control of snail hosts in certain transmission sites, it is noted that Marisa cornuarietis is being kept in laboratory aquaria at the IMPM field station, Kumba. This is an exotic, introduced species which should be kept under careful containment conditions and tested for any adverse biological impact (as well as its efficacy for snail host control) before being released into national freshwater bodies in Cameroon. The project staff is well placed to contribute to these studies and to collect all documentation on Marisa. The appropriate Cameroonian authorities must, of course, assume responsibility for the introduction of Marisa into the country, any subsequent research on it and, not least, if the results are considered unequivocally satisfactory, its release into appropriate natural habitats.

Some observations of special interest on snail host bionomics have been recorded and, if possible, should be pursued. First, for example, at Obili Biomphalaria pfeifferi used to be common in the Melen Ponds, but during the last 2 - 3 years this species can no longer be found there, even though other species of snail hosts still survive in large numbers. Very long-term (10-20 years) observations on freshwater snail populations, and their association with other ecological/limnological parameters in a wide variety of habitats are needed, especially in tropical countries and they are likely to provide far more valid findings than longitudinal studies of only a few years. Cameroonian biologists, working under the aegis of IMPM, could in future make a very useful contribution to such truly long-term studies. Secondly, at Mfou and Makenene, very small numbers of snails seem to be supporting moderate or high prevalence rates of S. mansoni. These data are difficult to explain and they put in question the role of chemical snail control in such situations. They may also contribute to the concept of "snail host/schistosome years" for which there is some evidence that a "steady-state" transmission pattern for schistosomiasis seldom exists. In certain ecological conditions transmission may fluctuate widely not only seasonally, but it may be explosive during certain years, with several intervening years when the transfer of infection is nil or low-key. If this pattern of transmission exists, its prediction becomes important in the development of control strategy. Findings were recently recorded at Kolofata and Guereme, where S. haematobium prevalence is high, but the potential snail hosts were relatively

rare in collections undertaken at three-weekly intervals over a period of a year. Collections will be continued for another year at these and two other sites in the Extreme North Province where the prevalence and intensity of schistosomiasis is particularly high.

The snail host/schistosome parasite studies have clarified the relatively poor role of Biomphalaria camerunensis in S. mansoni transmission. The possible competitive interactions of this species with B. pfeifferi in certain kinds of habitat might be worthy of study if they both occupy the same niche. Similarly, the comparative transmission roles of Bulinus globosus and B. senegalensis in the northern zone deserve further investigation.

The project's snail studies over the past two years has made very good progress. With the completion of the national snail survey more time is now available to devote to the snail control studies as well as to short-term training, publication of results, and contributions to the development of a national manual on schistosomiasis in Cameroon. Not least, the national snail survey, together with the results of the nation-wide primary schools' survey, can provide a reasonable picture not only of where the status of schistosomiasis can be ranked high, moderate or low, but also of areas and communities where it may later become established.

In summary, the main findings and conclusions of these three technical components of the project are as follows:

The completion in two years of the nationwide, statistically planned surveys on the prevalence/mean intensity of the three human species of Schistosoma in primary schoolchildren and the parallel surveys of the potential snail hosts is a major achievement. The results add significantly to the Cameroon section of the recently published "Atlas of the global distribution of schistosomiasis" and, more importantly, they provide sound baseline data for the development and testing of rational schistosomiasis control strategies, in particular the selection of areas deserving highest priority for control activities.

The finding that Bulinus senegalensis is commonly distributed in temporary waterbodies in the arid northern areas of Cameroon and its important role in urinary schistosomiasis transmission, is an outstanding contribution to knowledge of local disease ecology. This species was previously reported in only one locality in the country, so

knowledge of its range probably extends into neighboring Chad.

The classical and biochemical taxonomic studies on schistosomes and on snail host species, especially those belonging to the forkalii group, have high scientific merit.

The longitudinal studies have made good progress, but careful consideration to terminate the components which can not be explored further should be made. The morbidity studies should continue. Complete information on protected water supplies, latrines and their use, sociological data and migration in the communities being studied, as well as the importance of urban versus rural schistosomiasis in Cameroon, are among issues which need to be fully described in the future. Morbidity studies have started and additional ones, carefully planned and supervised, are desirable.

The computer facilities developed by the project are quite exceptional and have allowed rapid processing and analyzing of data collected in all research activities. They have been applied also to the museum and library facilities. The project, relevant to schistosomiasis, is unique in this respect in Africa. This technology, as a model, could well have application in such countries as Congo, Botswana, Kenya, Morocco, Sudan, Swaziland, Togo, Tunisia, Zimbabwe and others.

An outstanding feature of the project has been the regular production of reports, the half yearly production of "The African Schistosome", which has a very wide mailing list, summaries and reviews of the findings of the technical activities of the project, as well as health educational leaflets and draft manuscripts for publication. Optimum use has been made of the computer/word processor facilities in preparing these documents. The project is now well placed to prepare (i) training manuals on diverse technical subjects, computer/word processor guidelines, (ii) a "National Schistosomiasis Manual for Cameroon" which could be used, among other aspects, for short-term training of health staff associated with schistosomiasis control, and (iii) contribute to a video film on schistosomiasis research in Cameroon. The major technical findings of the project deserve now to be published preferably in a single volume of a reputable international journal and presented also, if funding support can be found, at a regional workshop on schistosomiasis research and control, which may be held under the aegis of IMPM and collaborating agencies in December 1989 when most of the students undergoing long-term training at Tulane will have returned to Africa. Such a

workshop would contribute to the sustainability of schistosomiasis research not only in Cameroon, but also in other African participating countries.

Facilities for immunologic studies have recently been developed in the project's laboratory, but such investigations have minimum practical application at the present time and therefore, in the Team's opinion, have low priority.

The project's inputs into research and testing of control procedures (chemotherapy, mollusciciding, health education and behavioral change, environmental/sanitation improvements, the role of primary health care) have been virtually non-existent due to the need to attend to the ongoing research activities and the shortage of personnel.

The objective of the project to develop effective schistosomiasis control procedures has scarcely been achieved at the present time; it should seriously be addressed in the remaining period of the project and even more, if possible, after the departure of contractor personnel in view of its relevance to the health needs of Cameroon.

The performance of the scientific staff, based at Yaounde, of the technical contractor, has, in the Team's view, been excellent. Their work schedule has been enormous and varied, including teaching, mastery of computer facilities, preparation of diverse reports, health education materials, production of the quarterly newsletter 'The African Schistosome', arduous laboratory and field research, and many other activities. Their inter-personal relationships, at both senior and junior levels, have obviously been very successful in an ambience where both tact and firmness may need at times to be finely honed. Their technical competence is not in doubt, and confidence in their scientific authority, management skills, and devotion to the attainment of the project's purposes has evidently grown steadily in the host country in the last two years. In this connection, it should be remembered that the project got off to a slow start. The report of the Feb./March 1986 implementation review states that the major problems that exists in the project is the lack of collaboration between the interested parties of USAID, the contractor (TAT) and IMPM. The present evaluation team's comments and analysis on these issues are given elsewhere.

The project's interagency collaboration has had some success especially at lower levels. At higher levels it remains to some degree still unsatisfactory. The project has assisted CRESS concerning environmental conditions and residents'

health beliefs at Yaounde. A notable success was the decision of the Provincial Section of Preventive Medicine of the Ministry of Health in Maroua (Extreme-North Province) to follow-up the project's school survey with a more detailed survey in Maroua Subdivision. The project has assisted CUSS with the establishment of its computer system. Curiously, there has been little collaboration with the IMPM Field Station at Kumba which has been undertaking local studies on schistosomiasis among other disciplines. Good working relationships have been developed with Dschang University Center's Forestry Department by assisting in assessment of the environmental impact of the Mamfe River Dam Project. The project's policy is to assist as far as possible when specific requests are made.

Some specific suggestions for the project have already been made such as :

- giving high priority to carefully designed long-term morbidity studies;
- evaluation of the role of primary health care workers in schistosomiasis control activities;
- assessing whether incidence studies deserve to be per  
se continued;
- encouraging national staff to take over the production of the newsletter "African Schistosome";
- giving low priority to immunological studies;
- pursuing all matters relevant to the publication of the findings of the project to date in an integrated manner;
- considering the implications of the non-Cameroonian students visiting Yaounde for debriefing/schisto research site visit on their departure from Tulane.
- pursuing further studies on the complexities of snail host/parasite relationships, snail taxonomy, hybrid schistosomes, etc.

A N N E X HSOCIAL ISSUES, IMPLEMENTATION AND PROGRESS

## 1. Background Setting and Summary

In August 1983 USAID and the Government of Cameroon signed a grant agreement for the Health Constraints to Rural Production Project which would focus on research for the control of schistosomiasis. The research protocol, which had many technical components, also contained a component on socio-cultural factors in disease transmission and economic impact of the disease on the affected populations. The component was to be started by an expatriate senior anthropologist to be provided by WHO-TDR and carried on by two Cameroonians to be trained at the MPH level in health economics and behavioral sciences. Funds for the socio-economic research were also to be provided by WHO. Additional short-term consultants in behavioral sciences and health economics were to be provided by the Contractor and WHO. The senior anthropologist and funds for socio-economic research were to be obtained by the Government of Cameroon submitting a formal request to WHO in Geneva.

The project began effectively in October 1984 with the arrival of technical personnel from Tulane University. An Implementation Review carried out in February and March 1986 by A. A. Buck and J. Sheppard noted that no action had been taken to obtain the services of the WHO anthropologist and no comprehensive plan of action had been developed for the socio-economic research component. They recommended that a working group represented by IMPM, TAT and CRESS be established to make a formal research application to the Steering Committee of the Scientific Working Group on Socio-Economic Research in Geneva with receipt of the application on March 7, 1986. Dr. Buck personally provided WHO forms to IMPM for making the request.

By the time of the current evaluation, the status of the socio-economic research component was nearly the same. A partial plan of action for the research has been developed but the research has not been carried out. The component still lacks leadership and expertise. To date, IMPM has made no formal request for either a senior anthropologist nor research funds from WHO. A working relationship between CRESS and TAT was established soon after the Buck and Sheppard review. A medical anthropologist from CRESS joined the project on an advisory basis in April 1986 to assist in the development of social science research protocols. In June 1986 a Peace Corps volunteer with no training in social sciences joined the project to assist the CRESS

anthropologist in development of proposals. After two years of this working relationship, three research protocols have been developed but no significant data gathering has taken place.

This annex provides recommendations for the socio-cultural component for the remaining two years of the project.

## 2. Role of Human Behavioral Studies

The role of human behavioral studies in schistosomiasis research is to assist in developing effective schistosomiasis control activities that are economical, environmentally sound and socially acceptable.

Both the transmission of schistosomiasis and its control are to a great extent determined by human behavioral patterns which are culture-specific. Just as snails serve as an intermediate host in the life cycle of schistosomes, humans serve as hosts in the other half of that life cycle, which brings about the disease. Humans must come into contact with water contaminated with cercariae; these cercariae must penetrate the skin, develop within the human host and shed eggs which are transmitted via the urine or feces back into bodies of water offering environments favorable to the survival of specific species of snails that host the schistosome.

The main areas of socio-cultural research in schistosomiasis are the following:

- a. Schistosome Habitat's Studies: Human economic activities may create bodies of water, in addition to natural formations, favorable to host snails. These economic activities can range from large nationally-planned development schemes, such as irrigation projects, to local village-level activities, such as fish ponds and small ponds that collect rain water for brick-making. Economic activities that create bodies of water favorable to schistosomiasis and their importance relative to natural formations require identification.
- b. Water Contact Studies: Certain human economic activities also require contact with contaminated water, such as wet-rice farming and brick-making from small temporary ponds. Level of economic development is also a strong determinant of the need for further contact with contaminated water, such as the need to use open bodies of water for washing, laundry and dishes, for bathing, swimming and playing. People in those areas having piped water supply and privately dug

wells presumably would have less need for contact with contaminated water than people relying partly or solely on streams, rivers, ponds and mayos. The three main determinants of water contact are pleasure, expediency and non-availability of water, the latter forcing people to use whatever is available, no matter how contaminated. In areas where both contaminated and uncontaminated sources are available, anthropological studies need to determine why certain water sources are preferred over others. Water contact activities and their economic and social necessity in various societies require documentation. One cannot expect to eliminate human contact with contaminated water unless acceptable alternatives are provided.

- c. **Water Contamination Studies.** Economic development, in conjunction with local beliefs, to a large extent determine human practices that contaminate bodies of water with schistosome eggs. *S. mansoni* and *S. intercalatum* are perpetuated by humans defecating near or in open bodies of water or performing anal cleansing in such water. Provision of latrines and hygiene education on the importance of their use may, to some extent, break the life cycle of these forms of schistosomiasis. *S. haematobium* is perpetuated by humans urinating in water bodies supporting potential snail hosts. This practice is more difficult to control through hygiene education because small children, who like to swim and play in these bodies of water, have little bladder control once immersed in the water. Encouraging them to empty their bladders on dry ground or in latrines before swimming may to some extent curtail contamination of water. Migration patterns of infected individuals from endemic areas to non-endemic areas and their role in spreading the disease can fall under this heading. Fundamental to the understanding of the dynamics of transmission is the documentation (KAP studies) of migration patterns and cultural beliefs and practices that lead to contamination of open bodies of water. In addition, documentation can help determine to what extent a hygiene education program could be expected to reduce or eliminate contamination, and to assist in the design of a hygiene education program that is appropriate to the culture.
- d. **Economic Impact Studies:** Another possible role for human behavioral studies is measuring the economic impact of the disease upon the affected populations. These studies involve estimating degree of morbidity in the population and loss of productivity from this morbidity on a national scale. It is possible that

while the disease may be widespread in a country, morbidity is not great and indeed much of the population does not know it is even infected. Information on the extent of morbidity, mortality, human suffering and loss of productivity assists Ministries of Health in determining the priority that should be given to schistosomiasis control.

- e. Chemotherapy Studies: Finally, human behavioral studies are required for determining the most cost-effective methods of delivering chemotherapy. Chemotherapy, the most effective tool to date for controlling schistosomiasis morbidity, must be evaluated for its cost-effectiveness. Essentially two drugs are currently in use in most endemic zones: praziquantel and metrifonate. Praziquantel is expensive but usually requires only one dose and is effective against all three forms of schistosomiasis in Cameroon. Metrifonate is less expensive but requires three doses spaced two weeks apart, and is effective against S. haematobium only. Patient compliance studies on the two kinds of drugs are required. Because of its side effects and dose spacing, metrifonate may have poor compliance. It may be more cost effective to use the more expensive drug, praziquantel.

Another issue in cost effective chemotherapy is drug distribution methods, whether drugs should be distributed through special schistosomiasis control campaigns, continuously through health centers or through village pharmacies. Which method will bring about the most sustainable control of schistosomiasis morbidity? Since praziquantel is expensive, it should be determined to what extent patients can be expected to pay part of the cost of the drug.

Thus studies on cost-effective ways to use and distribute chemotherapy involve human behavioral variables and require study for the development of good morbidity control strategies.

- f. Health Education Studies: In many schistosomiasis endemic areas people are not aware of the dangers they are exposed to in using stream water. They do not know the life cycle of the schistosome and their role in perpetuating the disease. Sometimes people do know the clinical signs of schistosomiasis but do not know what caused it. Health education can be used as a control tool. In order to develop an effective health education program, people's knowledge and beliefs about the disease must be assessed in endemic areas.

Materials and methods must be developed, which must be pretested for their effectiveness in transferring knowledge, and then tried on the pilot basis to determine their effectiveness in changing people's behavior with regard to water contact, water contamination, and seeking treatment for the disease.

### 3. Behavioral Science Researchers and Financial Support

While the other project components would be initiated by qualified expatriate personnel to be provided by the Contractor, the socio-cultural studies were to be initiated by an anthropologist to be provided by the World Health Organization who would remain in Cameroon for 24 person-months, and by two short-term consultants, one in socio-anthropology (person-months) and one in health economics (3 person-months).

The project document states that "The World Health Organization has pledged to provide a long-term anthropologist and support for complementary training and research not included in the AID portion of the project." It is also stated that "WHO will provide \$360,900 consisting of one senior anthropologist for 24 person-months, 5 person-months of short-term consultants, and research support." It is assumed that all of this research support was to go for socio-economic research, for elsewhere in the report it is stated that:

"It is expected that the socio-economic research unit of WHO/UNDP/World Bank Tropical Disease Research Program will participate in the program by making available a full-time expert as well as consultants to study the socio-economic aspects of schistosomiasis and of its control."

It is not stated in the report how such person was to be obtained nor whose responsibility it would be to initiate action. However, it is customary for WHO to work directly with national governments and not through international donors. Thus, it was considered clear that the Government of Cameroon would have to make a formal request to WHO-TDR for the anthropologist.

### 4. Implementation, Progress and Issues

#### a. Personnel and Funding

In April 1986, following the recommendations of the Buck-Sheppard Report, the Contractor Chief of Party (Raoul Ratard), in cooperation with IMPM (Rose Leke) and the USAID Project Director (Bibi Essama) began a

search for a local anthropologist who could serve as a part-time voluntary consultant to the project to write a proposal for submission to WHO.

The team held meetings with Dr. Ndoumbe Manga, Director of the Center for Research in Social Science (CRESS), and Dr. Helen T-N Atem, a CRESS researcher with a Ph.D. in Medical Anthropology to ask for assistance in writing the proposal to submit to WHO. Dr. Atem agreed to serve as a consultant to the project on a voluntary basis.

In June 1986 Jim Spilsbury, MPH, a Peace Corps Volunteer joined the project to assist Dr. Atem in writing the research proposal for WHO and to serve as a link between CRESS and the Project and IMPM and the project. (Mr. Spilsbury also assists with the production of the Newsletter and serves as an assistant to certain epidemiological field activities.)

Despite these efforts which began two years ago, a research protocol for the socio-cultural aspects of the project has not yet been submitted to WHO. Many reasons have been offered by the various parties involved as to why this has not taken place. The IMPM Director explained that it was his perception that the request for the anthropologist and funding must come from MOH, since WHO usually works only with Ministries of Health and could not come directly from MESRES. Although this project was originally conceived with MOH being the implementing agency, MESRES ended up receiving the project. Since MOH was not part of this project, MOH would not make the request. AID gave the view that the IMPM Director was opposed to accepting an anthropologist chosen by WHO.

Interviews with Dr. Kouemeni (IMPM coordinator), Dr. Atem (CRESS), Dr. Raoul Ratard (COP, Tulane) and Mr. Spilsbury (Peace Corps) revealed each one of them had not been clear about their respective roles. None seemed to have realized that they were to assist IMPM in writing a proposal and a request for an anthropologist to be submitted to WHO for funding. They had the idea that in some way the funds were to come either from the Tulane contract or the IMPM grant.

The component still lacks direction from any of the above parties and USAID, but the IMPM Director expressed an interest in now obtaining an anthropologist by some means to participate in the Schisto Project in the years ahead. Even though the major anthropological studies were supposed to have

been done during the epidemiological surveys and longitudinal studies, the Director said they could still be done because he expects this project to continue for many years.

b. Progress

Since mid-1986 the socio-cultural research has made some limited progress. The socio-cultural research team has generated three research protocols, the Contractor has carried out some activities on socio-cultural issues, and two returning Ph.D. students are planning socio-cultural studies for their Ph.D. theses.

1. Schistosomes habitat studies: The Contractor has gathered information on human economic activities that create bodies of water favorable to host snails and where transmission is taking place. These data have not yet been properly organized and analyzed.
2. Water contact studies: One of the returning Ph.D. students plans research on water contact in one town for his Ph.D. thesis.
3. Water contamination studies: This study will be combined with the water contact study in one town of the returning Ph.D. student.
4. Economic impact studies: A protocol for these studies in the longitudinal study sites has been devised but the time-line, budget and personnel for the studies have not been planned.
5. Chemotherapy studies: One returning Ph.D. student plans to conduct a study on whether MOH health centers alone or village health volunteers in addition to MOH centers are more effective in reducing the prevalence of schistosomiasis in an endemic area.
6. Health education studies: The Contractor has developed a four-page information sheet for fifth grade school children and a teacher's handbook on schistosomiasis. These materials have been distributed nation-wide and 97 children have been tested one month later to determine the effectiveness of this tool in increasing knowledge about the disease. The results of the small study indicate that children's knowledge did not change significantly. Lack of significance may be

due to using unmatched samples. Although this is an important area for study, the contractor has not had time to devote to the development and testing of educational materials.

Two other proposals for research have been developed by the CRESS anthropologist and the Peace Corps volunteer that may be placed under the category of health education. One has been partially implemented. Both appear to be weak in obtaining information necessary for designing a health education program but would provide some pertinent information. These are:

1. Clinic utilization for Bilharzia treatment:

Location: Dargala, a village of 800 inhabitants in the Extreme North.

Infection prevalence: 34% urinary schistosomiasis among school children.

Health services: government health clinic established by Belgians.

Research question: Why some villagers of Dargala seek treatment for schistosomiasis at the clinic while the majority apparently decide to live with the condition.

Hypotheses to be tested: those seeking treatment (a) are more knowledgeable about the disease; (b) are more severely infected; (c) are unsatisfied with traditional curative methods; and (d) have more financial resources to acquire appropriate treatment.

Usefulness of results: to identify indigenous factors in the culture that promote individuals to seek treatment for schistosomiasis.

Progress: not yet implemented

Note: This research proposal was requested from field personnel in the MOH Preventive Medicine Division. The study design is not well developed.

2. Children's beliefs associated with Schistosomiasis.

Location: various longitudinal study sites.

**Purpose:** to identify local beliefs about schistosomiasis in order to design a good health education program on prevention of the disease.

**Progress:** Four schools were chosen to measure the impact of a health education pamphlet on children's knowledge and beliefs about schistosomiasis. Some children were tested in areas where schistosomiasis is endemic and other areas where it is not endemic. Some children tested had seen the questionnaire and others had not. The results of this study are inconclusive because of the small sample size (N=38) and because of a confused study design.

c. **Trained Africans in Social Sciences and Center Capabilities to Conduct Social Science Research.**

Of the twelve African Ph.D. students currently studying at Tulane, none is being trained in either medical anthropology or health economics. Two of those being trained in epidemiology have an interest in social issues and have chosen Ph.D. thesis topics related to socio-cultural issues. One will undertake water contact studies and the other will conduct research on the best methods for praziquantel distribution.

It is unlikely that either of these epidemiologists could immediately assume a leadership role in planning and implementing the social science research needs of the institution upon their return. Although well-trained, they will lack experience and will not overlap with Tulane personnel. What is needed is guidance for the research that they could pick up and follow. This work plan for the socio-economic research needs to be well-developed before departure of the Tulane Chief of Party.

d. **Analysis**

While very limited progress have been made on socio-economic issues, it is quite small in comparison to what needs to be done. It is the opinion of the evaluation team that at least four factors led to the slow progress of studies on the socio-cultural and economic aspects.

First, the project paper is vague about what those studies should consist of and how the findings should be used for control. The document is singularly unconvincing about the importance of these studies for

the project as a whole. The studies are not prioritized as to importance.

Second, relying on an outside agency, WHO, to provide a major input turned out to be a design flaw, especially since MOH did not secure the project. If the socio-cultural studies were truly considered to be important by the design team, then a position for an anthropologist should have been part of the contractor's obligations, and the anthropologist should have arrived at the same time as the other technical personnel. This would also have had the advantage of providing expatriate team solidarity and singularity of purpose. Instead, it was made a four-party research project, with WHO having the weakest link to the project and it was the piece that quickly fell off.

Third, there was apparently a general lack of interest by all parties concerned in pushing ahead on the socio-cultural studies. Perhaps because of the vague and unconvincing wording of the project document about the importance of socio-cultural research, and because of the technical orientation of IMPM, AID personnel and Contractor personnel, no one felt particularly moved to act on the proposal for WHO or to move around line items in the budget to obtain personnel and funds to carry out portions of the research.

Fourth, this aspect of the research and obtaining personnel to carry it out was not pushed by USAID/Cameroon, Health and Project Officers after 1986. The confusion existing among all parties was not perceived and addressed. The need for the research was not appreciated by AID. The lack of action by IMPM was interpreted by AID as meaning a lack of interest, so that this component was essentially dropped from further consideration.

There are also institutional and management issues which arose during the investigation of the socio-cultural research. It seems that the WHO pledge for support had been a verbal pledge, as no letter or other document could be found to substantiate the pledge. Second, when Dr. Helen Atem and the head of CRESS, Dr. Samuel Ndoumbe-Manga agreed that Dr. Atem would work on the project, no Memorandum of Agreement was signed between the Director of IMPM and the Director of CRESS. The lack of such a written agreement has led to an ineffective relationship that has allowed her little release time from CRESS. The result has been very slow progress on socio-economic research protocols and acquisition of research funds.

## 5. Findings and Conclusions

- a. Very little progress has been made on the socio-cultural studies to date. Three research protocols, representing only a minor portion of what needs to be done, have been devised. Two more research protocols by Ph.D. students are being devised. A health education pamphlet has been made and distributed.
- b. No full-time senior anthropologist has yet been assigned to the project. An association with CRESS has been established and a medical anthropologist is now a voluntary consultant to the project.

A Peace Corps volunteer was assigned to take a leadership role in organizing the socio-cultural component, to assist the CRESS anthropologist and to serve as a bridge between the project and CRESS and between the project and IMPM. Because of his lack of expertise and experience in the field, his assignment to this role proved to be a weak solution to the problem.

- c. This lack of leadership has resulted in the lack of a work plan to be transferred to returning Ph.D students interested in social science issues.
- d. This situation has come about as the result of a multitude of problems: lack of clarity in the project document, a reliance upon a fourth party, WHO, which was outside this project, perhaps a general lack of enthusiasm for socio-cultural research among project participants, a lack of leadership in obtaining WHO funds, opposition by IMPM in having WHO choose the anthropologist, perhaps general confusion about the proposed role of WHO in this project, and confusion about who was supposed to do what for whom in obtaining funds. After 1986 AID no longer played a role in trying to obtain research funds from WHO.

### Conclusions:

Understanding socio-economic variables in schistosomiasis transmission and the economic impact of the disease on the population is absolutely essential for the design of a schisto control program. This component should be planned and started during the remaining two years of the project while the contract epidemiologist is still in country.

It might still be possible for IMPM to obtain a long-term senior anthropologist from WHO. In any case such a move should be viewed as occurring far into the future. It could take the Government of Cameroon several months to send a request to WHO, and it could take WHO one year to get someone in place in Cameroon. Valuable overlap time with Dr. Ratard would be lost.

6. Socio-Economic Component Recommendations:

- a. AID should hire for one month, 25 July to 25 August 1988, an expatriate medical anthropologist from Tulane contract funds to assist IMPM develop a work plan (including a time-line, budget and personnel) for socio-economic studies and to put in place a mechanism for sustaining them after his/her departure. The anthropologist should work with the IMPM Project Coordinator, the two Tulane Ph.D. students interested in socio-economic issues (who will be in-country at that time), and the Tulane COP. IMPM and MOH top officials should coordinate with the consultant in at least one joint meeting in prioritizing the research objectives.
- b. IMPM should locate funds to begin the socio-economic research component. Some funds could be obtained from Special Projects in the Project budget. Socio-economic research should begin as soon as funds are available and should follow the work plan developed. This requires that a senior researcher in social sciences be located to take a full-time leadership position at the Schisto lab in the research, at least until the return of the trainees from Tulane. To assist in the development of research protocols and in the training of research assistants, IMPM should formalize a research relationship with CRESS. Research results should, as far as possible, be expressed in quantitative terms.
- c. IMPM should consider trying to obtain funds for socio-economic research from WHO/SER/TDR. This would necessitate producing a research protocol acceptable to WHO. WHO will sometimes send a consultant, upon request, for two to three days to assist in the development of a research protocol.

## ANNEX I

## TRAINING ISSUES, IMPLEMENTATION AND PROGRESS

1. BACKGROUND SETTING AND SUMMARY

Just a few years ago, there was only sketchy information on the dynamics of the transmission of African schistosomiasis. The Health Constraints to Rural Production Project in Cameroon and a similar project in Sudan were designed to discover further knowledge about the distribution, transmission, etiology, prevalence and control of African schistosomiasis. The project in Cameroon proposed to provide technical assistance, long-term participant training, schistosomiasis research, the establishment of an inter-agency and regional information network, and strengthening of the institutional capacity of IMPM as part of the development of a schistosomiasis facility in Yaounde, Cameroon.

The training component of the project was considered essential to the establishment of the research facility, in providing multi-disciplinary research teams and in building the institutional capacity of IMPM. Therefore, the outcomes of both long-term and short-term in-country training programs supported by the project would be crucial to the sustainability of other project outputs.

The objective of various training programs is to increase the effectiveness and efficiency of existing and new health researchers, technicians, managers and workers throughout Cameroon and those sent from other African countries in the region by providing them with the knowledge and skills needed to perform schistosomiasis research and control activities. The training component of the project would be important in assisting the Government of Cameroon to develop a comparable capacity in schistosomiasis research and control to that obtained in other activities in the overall health sector.

2. ROLE OF TRAINING

The conceptual strategy adopted by the project design team was conceived as providing training at the PhD level for senior level researchers and master's level education for field researchers. A nucleus of persons having the basic technical professional qualifications was considered to be necessary to establish the capability within GRC to plan, conduct and evaluate low-cost schistosomiasis research. The purpose of the training was to strengthen host-country and regional capability in the development of skills for the eventual control of schistosomiasis. Especially for the

Cameroonians, specialists, once trained, will eventually replace U.S. technicians.

Training here is defined broadly as any activity that transfers knowledge and skills to Cameroonians and non-Cameroonians in the region to improve the functioning of schistosomiasis research and control. Training under the project includes many types: formal and non-formal; academic and on-the-job; and long and short-term. The project designers included opportunities for initial training to improve performance, as well as continuing or refresher training, and support of graduates to maintain acquired skills.

The original training schedule developed in the project paper indicated that approximately 20 junior-level field workers, laboratory technicians, interviewers and clerical staff would be recruited and trained as part of the project. Because the Cameroonian long-term trainees were envisioned to leave for training early in the project, the training strategy was to include technical short-term training to be started by the U.S. TAT and completed by the Cameroonian specialists on their return from their own programs of study. The sequence of actions to be taken were:

- a. Each U.S. technical contractor would develop a protocol for training for each group of personnel needed in each research study.
- b. Using the protocol for each research study, it was anticipated that intensive didactic training would occur prior to the initiation of any field research or study.
- c. The most important training would be on-the-job training under supervision of both TAT and Cameroonian supervisors.

### 3. SHORT TERM TRAINING PROCESS

The short-term training component of the project was directed at basically three different levels of personnel. First, the TAT was responsible for providing training for the local technical and administrative support staff at the research center in Yaounde. This category of personnel included a senior laboratory supervisor, laboratory technicians, interviewers, and secretaries. The purpose of this type of training is to provide needed staff support for the establishment of the research organizational units and to develop procedures for planning conducting, and evaluating low-cost schistosomiasis studies. The areas covered in this type of training include microscopic

diagnosis of schistosomiasis, basic computer and data processing, filling out health records and progress reports, and techniques of data gathering at the field level.

The second level of training includes middle-level IMPM and MOH technical personnel assigned to the project as well as other personnel recruited by IMPM for short-term training at the research center. This group includes nurses, public health technicians, administrators, accountants and physicians who are not considered researchers as such. The outcomes of these training programs are to improve skills related to health research and studies. These courses include basic epidemiology, schistosomiasis survey techniques, epidemiology of schistosomiasis, malacologic techniques, village census and mapping, and computer and data processing.

The third level of training was for health and schistosomiasis researchers assigned to the project by either IMPM and MOH or visiting scientists from other African countries. The training objectives for this group included, among others, a fuller development of skills required in the formulation and design, conducting and evaluation methodologies used in medical and schistosomiasis research and studies. The content of these courses entailed a deeper level of knowledge transfer and skill development in basic epidemiology, in the epidemiology of schistosomiasis, malacologic techniques, schistosomiasis microscopic diagnosis and computer and data processing. A summary of examples of this type of local short-term training is listed in Table 1.

## ANNEX I

A SUMMARY OF THE SHORT TERM TRAINING DONE SO FAR IS PRESENTED IN TABLE I

TABLE I - LOCAL TRAINING

YEAR	DATES	COURSE TOPIC SCHEDULE TYPE OF COURSE	TOTAL HOURS FACULTY	NAME OF PARTICIPANT	EDUCATION	JOB TITLE	EMPLOYER
1985	OCT 15 - DEC 15	SCHISTO MICROSCOPIC DIGNOSIS DAILY, 2H LAB DEMO, JOB	BESSONGO LOUISE 40 COGSWELL	WADJORE THENE	CEP	MICROSCOPIST	IMPM SCHISTO
				MBARSDOA JULIETTE	CEP	MICROSCOPIST	IMPM SCHISTO
				NGA MADELEINE	CEP	MICROSCOPIST	IMPM SCHISTO
				ATANGANA JULES	BN	MICROSCOPIST	IMPM SCHISTO
1985	OCT 09 - OCT 24	EPIDEMIO SURVEY TECHNIQUES	RATARD	WOUZIA BERNARD	BN	PUB. HLTH. TECH.	PREV. MED.
	OCT 09 - OCT 24-25	WEEKLY 2, 6H FIELD DEMO, JOB		24	FONGANG JEAN	BEPC	PUB. HLTH. TECH.
1985	EACH DIVISION	EPIDEMIO SURVEY TECHNIQUES		12 PARTICIPANTS	BN	PUB. HLTH. TECH.	PREV. MED.
1987	DAY, 6H FIELD DEMO, JOB						

## ANNEX I

TABLE 1 - LOCAL TRAINING CON'T

YEAR	DATES	COURSE TOPIC SCHEDULE TYPE OF COURSE	TOTAL HOURS FACULTY	NAME OF PARTICIPANT	EDUCATION	JOB TITLE	EMPLOYER
1985 1986	OCT 01 - - NOV 05	EPIDEMIOLOGY OF SCHISTO MED. STUDENT THESIS DISCUSS, DEMO, JOB	40 RATARD	SOP LUC	MD	PHYSICIAN	PREV. MED.
1986	JAN 10 - JUL 04	DATA PROCESSING, COMPUTER WEEKLY, 2H LECTURE, DEMO, HOMEWK TALBOT	50	NGOA BEKONO NINGOULOUBEL JEAN NDAMKOU CHRISTIAN AGDORTABI DEBORAH	BEP ELAW MSC MPH	ACCOUNTANT ADMINISTRATOR EPIDEMIOLOGIST EPIDEMIOLOGIST	IMPM SCHISTO IMPM SCHISTO IMPM SCHISTO IMPM SCHISTO
1986	JAN 10 - JUL 04	BASIC EPIDEMIOLOGY WEEKLY, 2H LECTURE, EXERCISE RATARD	40	EKANI MARIE KOUEMENI LISETTE NDAMKOU CHRISTIAN	MD PHD MSC	RESEARCHER RESEARCHER EPIDEMIOLOGIST	IMPM SCHISTO IMPM SCHISTO IMPM SCHISTO
1986	JUN 02 - JUL 28	SCHISTO MICROSCOPIC DIAGNOSIS DAILY, 2H LAB DEMO, JOB	40 STAFF, GREER	FOUDA MESSI IVINA RENE	CEP CEP	MICROSCOPIST MICROSCOPIST	IMPM SCHISTO IMPM SCHISTO
1986	JUL 01 - SEP 30	MALACOLOGIC TECHNIQUES DAILY, 2H LAB DEMO, JOB	60 GREER	NGONSEU BRNEST	MSC	SENIOR TECHNICIAN	IMPM SCHISTO
1987	JAN 02 - MAR 31	SCHISTO MICROSCOPIC DIAGNOSIS DAILY, 2H LAB DEMO, JOB	100 KOUEMENI. EKANI	SUPI BERNADETTE BENGONO NSIA YAKAN BESSONG MBARGA BRUNO NTAH HENRI	BEP BEP BEP BEP BEP	MICROSCOPIST MICROSCOPIST FIELD TECHNICIAN MICROSCOPIST MICROSCOPIST	IMPM SCHISTO IMPM SCHISTO IMPM SCHISTO IMPM SCHISTO IMPM SCHISTO

## ANNEX I

TABLE 1 LOCAL TRAINING

1987	FEB 09	BASIC EPIDEMIOLOGY DAY LECTURE, EXERCISE	1 RATARD	CARE PERSONNEL, 3 ADMINISTRATORS 4 PH. TECHNICIANS	BS BN	3 ADMINISTRATORS 4 PH. TECHNICIANS	CARE CARE
1987	MAR 05 - JUN 30 MAR 05 - JUN 30	SCHISTO MICROSCOPIC DIAGNOSIS DAILY, 2H LAB DEMO, JOB	100 KOUEMENI, EKANI	MA'A NGUELE CHARLES KWATI BEATRICE	BEPC BEPC	MICROSCOPIST MICROSCOPIST	IMPM SCHISTO IMPM SCHISTO
1987	MAR 02 - MAR 05	VILLAGE CENSUS AND MAP DAILY, 4H FIELD DEMO	12 RATARD	YAKAN BESSONG	BEPC	FIELD TECHNICIAN	IMPM SCHISTO

#### 4. SHORT-TERM TRAINING PROGRESS AND LIMITATIONS

The short-term training programs, which lasted from three hours to one and one-half weeks, were provided by the TAT in Cameroon. The training included a lectures, discussion groups and on-the-job training. The majority of the training was directly geared to the trainees work responsibilities. This approach was appropriate for the training needs of schistosomiasis researchers, as public health technicians, and research center support staff. The short-term training provided under the project was relevant, effective and efficient in that it included these characteristics:

- Allowed for flexible training sessions to meet the individual needs of different target groups;
- Provided intensive, practical training sessions so that a lot of information and skills were gained in a short period of time; and
- Ensured on-the-job practice sessions and instant supervision.

The major limitation of this training is that the project did not fully develop training materials to provide the broad range of courses needed either in-country or on a regional scale. The project needs to take steps toward development of short-term training curricula and training materials which IMPM can use once the TAT leaves Cameroon.

On-the-job training and in-service training programs were used to develop the skills required for local technical and administrative support staff, mid-level IMPM and MOH technicians and part-time researchers. The few short-term, in-country training activities were very effective in initial training and upgrading the skills of a limited number of Cameroonian health workers. However, the absence of a detailed coordinated in-country training plan and strategy limited the progress and effectiveness expected at this stage in the training component of the project.

The limitations and less than desirable progress can be categorized at these levels:

First, the fact that detailed training protocols were not designed and developed for use by different TAT and IMPM staff will render it extremely difficult for the Cameroonians specialists to duplicate the training once they return from their own programs of study.

Second, the project trainers have not planned retraining programs to follow-up the initial training of the persons first trained under the project. The knowledge and skills required for each discipline and person assigned to design, conduct and evaluate schistosomiasis research and control activities include, among others, research techniques, computer and data processing skills, survey techniques, laboratory diagnosis, communication techniques and program management. The maintenance of these skills, due to their newness to the trainees and their technical complexity, requires that they be reinforced through retraining.

Third, although the various project documents did not emphasize project/program management skills development, past experiences have demonstrated that unless these skills are transferred, even superb technical programs often are not sustainable. Program management training should be included in the remaining month of the schistosomiasis project and as part of the next phase of IMPM participant training plan.

#### 5. LONG-TERM TRAINING PROCESS

The training purpose of the project is to assist the GRC to develop a schistosomiasis research facility capable of training Africans in laboratory and field methodologies. In order to build this in-country capability for training at the local level, a cadre of trained Africans would have to be established at the research center. This will be achieved by long-term participant training at Tulane School of Public Health and Tropical Medicine.

Therefore long-term training has been an integral part of the schistosomiasis project, and a number of technical researchers will benefit from the well planned, long-term training offered to established health professionals from IMPM and MOH. The original long-term training plan was designed to provide graduate training for 10 Cameroonians and 12 non-Cameroonians in the region as indicated below.

##### a. CAMEROONIAN TRAINEES

###### 1. Doctoral Level

Four individuals were scheduled for doctoral level training in the following specialty areas: epidemiology, malacology, medical parasitology and biostatistics.

## 2. Masters Level

Six individuals were scheduled for masters level training in the following specialty areas: epidemiology, malacology, biostatistics, health economics, environmental engineering and behavioral sciences.

The Cameroonian trainees were to be nominated by the DGRST, with the agreement that the specific specialties could be altered when all parties agree that a change is desirable. All trainees must fulfill requirements for admissions to the appropriate degree program in the Tulane School of Public Health and Tropical Medicine at New Orleans in the US. It was further agreed that all trainees at the doctoral level would conduct their dissertation research in Cameroon, under the supervision of Technical Assistance Team's Chief of Party, and the students' major faculty advisor at Tulane.

### b. NON-CAMEROONIAN TRAINEES

The training program for the non-Cameroonian trainees would consist of 12 masters' level degrees. The process would be that officials in each individual country, in consultation with USAID and the U.S. contractor, would select 12 individuals. Approval for each trainee must be concurred by USAID/Cameroon in consultation with the Technical Assistance Team's Chief of Party. All participants, as for the Cameroon trainees, would be supported by project funds.

The non-Cameroonian trainees would be selected for training in these specialties: epidemiology, malacology, biostatistics, environmental health engineering, parasitology, water chemistry, health economics, and behavioral sciences. Tulane School of Public Health and Tropical Medicine would provide the training for the non-Cameroonian trainees as well as the Cameroonian trainees.

## 6. EXPECTED OUTPUTS FROM THE PROJECT

The project outputs directly related to training included:

- A cadre of trained Africans capable of staffing the research center and continuing multi-disciplinary research on schistosomiasis in the sub-Saharan African region.

- An inter-agency and research network of governments and other institutions cooperating in schistosomiasis research, training and dissemination and application of new knowledge to be achieved through participant and on-the-job training.

The long term participant training program was started in 1984 with the selection and placement of the first trainee at Tulane University to obtain a doctoral degree in epidemiology. Later that year IMPM received a proposal for training in which 26 potential candidates had been preselected. This group of proposed candidates were interviewed by the TAT and most of them were found to be highly qualified and acceptable for admission at Tulane University.

Early in 1985, the President of the Republic of Cameroon sent a list of candidates and 9 alternates to IMPM for the following training slots to be supported by the project:

- Doctoral degrees
  - Parasitology (2)
  - Biostatistics (1)
- Masters degrees
  - Malacology (1)
  - Parasitology (1)
  - Epidemiology (1)
  - Medical psychosociology (1)
  - Environmental engineering (1)
  - Water Chemistry (1)

TAT was not completely in agreement with the adequacy of the specialties selected, especially due to small number of candidates to be trained in epidemiology and malacology. However, since the candidates had been contacted and requested to submit applications, this group of candidates was accepted by TAT and USAID/Cameroon.

Later a decision was made by USAID at the request of IMPM to increase the number of training fellowships supported under the project from the original 10 to 12, including the candidate already studying at Tulane. A final selection of 11 additional candidates agreeable to IMPM, the Presidency, Tulane and USAID was made. It was during this period that the decision was made by USAID, IMPM and Tulane University that those students who did well in the master's program would be given the opportunity to continue on for doctoral degrees. The extension of training from 8 masters' degrees to doctoral degrees, providing a total of 12 doctoral degrees, was agreed to by all parties based on the fact that:

- a. All the trainees were already health professionals and training at the masters' level was not enough of an incentive to encourage them to change professional careers; and
- b. All were to return to Cameroon to occupy positions of senior responsibility in IMPM for which they had little formal education, and training at the doctoral level would reflect this reality.

7. IMPLEMENTATION PROGRESS AND ISSUES

The following Table 2 is a list of Cameroon students selected for training at Tulane University School of Public Health and Tropical Medicine.

## ANNEX I

Table 2. Cameroon Students in Training at Tulane University

NAME	FIELD OF STUDY	ARRIVAL IN U.S.	RECEIVING DEGREES
ANYANGWE, Stella, DR.	Epidemiology	7/9/85	8/89
BEFIDI, Rosa, DR.	Parasitology	6/9/85	8/89
FOUMBI, Joseph, DR.	Epidemiology	9/84	12/88
KAMGUIA, Pierre, DR.	Biostatistics	7/9/85	8/89
MONKEIDZE, Adolphe, MR.	Environmental Engineering	6/12/85	8/89
MVONDO, Abana, DR.	Parasitology	6/12/85	8/89
NGOUMOU, Pierre, DR.	Parasitology	6/12/85	8/89
NJOCK, Emmanuel, DR.	Parasitology	6/12/85	8/89
SAMA, Martin, MR.	Epidemiology	6/12/85	8/89
TAKOUGANG, Innocent, MR.	Malocology	6/12/85	8/89
TCHOUNWOU, Paul, MR.	Water Chemistry	6/12/85	8/89
WANSI, Emmanuel, DR.	Epidemiology	6/12/85	8/89

## 8. LONG-TERM TRAINING BENEFITS

Training at various levels has been an essential component of the project and 12 Cameroonian health professionals have benefited from long-term training. Of the total number now in training for PhDs, 8 are already medical doctors and the remaining 4 already hold various university degrees. The long-term participant training up to this stage has been very successful and has exceeded the project outputs by including an additional three persons and expansion of the level of skills that the participants will acquire in training.

The long-term participant training attracted candidates of the highest academic qualifications existing in the Cameroon.

## 9. LONG-TERM TRAINING ISSUES

The main shortcomings of training component were:

- There was a long delay in selecting and placing trainees at Tulane. As a consequence there will not be time available for trainees to overlap with the TAT malacologist and the time available for overlapping with the TAT Chief of party epidemiologist will be extremely short.
- The decision to train only one person in environmental engineering and not any in the behavioral sciences may be counter-productive in the long term.
- There were not any program management training included in the training program. Tulane University should be requested to supplement the technical training of these trainees with short sessions on program management. In addition, IMPM needs to redirect its efforts toward training national staff in activities relevant to coordinating with MOH in schistosomiasis control and surveillance activities, which is the final goal of schistosomiasis research. The most heavy infection areas of schisto are in the Northern parts of Cameroon where health services are less well developed. As a result, health problems, including schisto, will tend to increase over time. The schisto project has demonstrated that schisto research services have been able to reach this disadvantaged rural population. During the final phase of the Schisto Project, when the 12 long-term trainees have returned to Cameroon, IMPM will cooperate with the MOH and other Cameroonian institutions to initiate school control services.

10. MAIN FINDING AND CONCLUSION

The schisto project's formal long-term participant training should have a tangible influence on IMPM capacity to sustain the activities jointly initiated under the project. With the increase in the total number of persons to be trained, and the expansion of training opportunities to the doctoral level for all participants, IMPM should possess the multi-disciplinary senior technical staff to plan, implement, train and evaluate schisto research and control program throughout Cameroon.

However, in order for these gains to be sustained, the evaluation team strongly urges that training types, levels, subject areas and locations be defined more clearly and that a special unit be established at IMPM to implement a more comprehensive training strategy. In addition to this technical knowledge and skill training, key IMPM staff would greatly benefit from receiving training in program management covering such areas as management planning, budgeting, personnel, and supervision and evaluation. These shortcomings should be addressed in the remaining years of the schisto project and by IMPM in the future at all levels.

## ANNEX J

TABLE 1  
CAMEROONIAN LONG-TERM TRAINING PARTICIPANTS

Name	Degree Sought	Doctoral Thesis Topic	1988				1989				1990		
			1	2	3	4	1	2	3	4	1	2	
Foumbi Joseph	PhD Epidemo	Haematobium morbidity Yagoua	FR		T	X							
Anyangwe Stella	PhD Epidemo	Alt. Methods of drug deliv.	P			FR			T			X	
Betidi Rosa	PhD Parasit.	Schisto and anemia	P		FR				T			X	
Kamguia Pierre	ScD Biostat	Sensitivity of Schisto diag	P	V				FR			T		X
Monkiedje Adolphe	ScD Env hlth	Schisto Control Using Endod	P		TR			FR		T		X	
Mvondo Joe Louis	PhD Parasit.	Malaria and pregnancy	P				FR			T		X	
Njoumou Pierre	PhD Parasit.	Sickle cell & malaria	P					FR		T		T	X
Njock Emmanuel	PhD Parasit.	Transmission of Guinea Worm	P					FR				T	X
Takougang Innocent	PhD Malacology	Taxonomic studies/snail Hosts	P					FR				T	X
Tchoumwou Paul	ScD Env hlth	Physical & chemical parameter	P		TR		FR			T		X	
Teyha Sama Martin	ScD Epid./Soc.	Water contact studies	P			FR				T		X	
Wansi Emmanuel	PhD Epidemo	Intercalatum morbidity	P	V			FR					T	X

## ANNEX J

TABLE 2  
NON-CAMEROONIAN LONG-TERM TRAINING PARTICIPANTS

Name	Masters Students Degree Sought	Country	1988				1989				1990			
			1	2	3	4	1	2	3	4	1	2		
Sima Ovana Victor	MPH-TM	Trop Med.	Eq. Guinea	X			V							
Laopan Pare Jean	MSPH	Parasito.	Burk. Faso	M		XV								
Houkounnou Victor	MPH	Epidemio.	Benin	M			XV							
Ndihokubwayo Hilaire	MPH-TM	Trop. Med.	Burundi	M			XV							
Fatchou Gakitingou	MPH	Epidemio.	Chad	M			XV							
Utshuli Lumbu	MPH	Inter. Health	Zaire	X				V						
Nkinsi Luc	MPH	Inter. Health	Zaire	M						XV				
Kpizingui Eugene	MPH	Epidemio.	C.A.R.	M						XV				
4. Additional Non-Cameroonian Students at MPH level									LANG	M				XV

- M = Masters course work  
P = Write doctoral prospectus  
V = Visit to Cameroon  
TR = Thesis research at Tulane  
FR = Field Research in Cameroon  
T = Write thesis  
X = Finish degree requirements

## ANNEX J

TABLE - LOCAL TRAINING

YEAR	DATES	COURSE TOPIC SCHEDULE TYPE OF COURSE	TOTAL HOURS FACULTY	NAME OF PARTICIPANT	EDUCATION	JOB TITLE	EMPLOYER
1985 1986	OCT 01 - - NOV 05	EPIDEMIOLOGY OF SCHISTO MED. STUDENT THESIS DISCUSS, DEMO, JOB	40 RATARD	SOP LUC	MD	PHYSICIAN	PREV. MED.
1986	JAN 10 - JUL 04	DATA PROCESSING, COMPUTER WEEKLY, 2H LECTURE, DEMO, HOMEWK TALBOT	50	NGOA BEKONO NINGOULOUBEL JEAN NDAMKOU CHISTIAN AGBORTABI DEBORAH	BEPC BLAW MSC MPH	ACCOUNTANT ADMINISTRATOR EPIDEMIOLOGIST EPIDEMIOLOGIST	IMPM SCHISTO IMPM SCHISTO IMPM SCHISTO IMPM SCHISTO
1986	JAN 10 - JUL 04	BASIC EPIDEMIOLOGY WEEKLY, 2H LECTURE, EXERCISE RATARD	40	EKANI MARIE KOUEMENI LISETTE NDAMKOU CHRISTIAN	MD PHD MSC	RESEARCHER RESEARCHER EPIDEMIOLOGIST	IMPM SCHISTO IMPM SCHISTO IMPM SCHISTO
1986	JUN 02 - JUL 28	SCHISTO MICROSCOPIC DIAGNOSIS DAILY, 2H LAB DEMO, JOB	40 STAFF, GREER	FOUDA MESSI IVINA RENE	CEP CEP	MICROSCOPIST MICROSCOPIST	IMPM SCHISTO IMPM SCHISTO
1986	JUL 01 - SEP 30	MALACOLOGIC TECHNIQUES DAILY, 2H LAB DEMO, JOB	60 GREER	NGONSEU BRNEST	MSC	SENIOR TECHNICIAN	IMPM SCHISTO

## ANNEX J

1987	JAN 02 - MAR 31	SCHISTO MICROSCOPIC DIAGNOSIS DAILY, 2H LAB DEMO, JOB	100 KOUEMENI, EKANI	SOPI BERNADETTE BENGOVO NSIA YAKAN BESSONG MBARGA BRUNO NTAH HENRI	BEPC BEPC BEPC BEPC BEPC	MICROSCOPIST MICROSCOPIST FIELD TECHNICIAN MICROSCOPIST MICROSCOPIST	IMPM SCHISTO IMPM SCHISTO IMPM SCHISTO IMPM SCHISTO IMPM SCHISTO
1987	FEB 09	BASIC EPIDEMIOLOGY DAY LECTURE, EXERCISE	3 RATARD	CARE PERSONNEL 3 ADMINISTRATORS 4 PH. TECHNICIANS	BS BN	3 ADMINISTRATORS 4 PH. TECHNICIANS	CARE CARE
1987	MAR 05 - JUN 30 MAR 05 - JUN 30	SCHISTO MICROSCOPIC DIAGNOSIS DAILY, 2H LAB DEMO, JOB	100 KOUEMENI, EKANI	MA'A NGUELE CHARLES KWATI BEATRICE	BEPC BEPC	MICROSCOPIST MICROSCOPIST	IMPM SCHISTO IMPM SCHISTO
1987	MAR 02 - MAR 05	VILLAGE CENSUS AND MAP DAILY, 4H FIELD DEMO	12 RATARD	YAKAN BESSONG	BEPC	FIELD TECHNICIAN	IMPM SCHISTO
1987	MAR 02 - MAY 31 87	BASIC MALACOLGY, TAXONOMY, FIELD DAILY, 3H DEMO, LECTURE, FIELD GREER	180	TCHUENTE LOUIS	B. SC	SCIENCE STUDENT	NONE
1987	SEP 01 - NOV 30 87	SCHISTO MICROSCOPIC DIAGNOSIS DAILY, 2H LAB DEMO, JOB	100 KOUEMENI, EKANI	NGUE MONIQUE	BEPC	MICROSCOPIST	IMPM SCHISTO
1987	SEP 01 - DEC 31 87	EPIDMIO SURVEY TECHNIQUES WEEKLY, 6H FIELD DEMO JOB	6 RATARD	BOMBA LAURENT	TEC	PUB. HLTH. TECH.	IMPM SCHISTO

ANNEX J

1987	SEP 01 - OCT 31 87	MALACOLOGIC TECHNIQUES DAILY, III LAB DEMO, JOB	GREER	60	NEZOA POLYCARPE	BAC	TECHNICIAN	IMPM SCHISTO
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## ANNEX J

TABLE 4

**IMPM Schisto Project**  
**Cameroonian Personnel Expertise in Computer Use**

PERSONNEL	COMPUTER PROGRAMS			
	<u>Wordstar</u>	<u>Lotus</u>	<u>Dbase</u>	<u>SPSS</u>
Project Secretary	++	0	Enter Data	0
Assist. Admin.				
Ningouloubert	+	+	++	0
Koungou	++	++	+++	0
Mimpfoudi	0	0	0	0
Kouemeni	0	0	0	0
Ekani	0	0	0	0
Accountant (gone)	++	++	++	0
IMPM				
Bene	+	+	++	0
2 Secretaries	+	0	0	0
Students				
Foumbi	+++	++	++	BMDP
Sama	++	?	+	+
Stella	++	?	+	BMDP
Rosa	++	?	?	BMDP
Kamguia	?	?	?	+++
All remaining	++	?	?	?

Code: +++ very good; ++ good; + fair; 0 none; SPSS and BMDP are two social science statistical packages

## ANNEX K

ACTIONS TAKEN BY IMPM, TULANE AND A.I.D. ON  
RECOMMENDATIONS OF IMPLEMENTATION REVIEW,  
BUCK/SHEPPERD, 1986

1. General Recommendations and Actions

- Develop a set of administrative procedures to facilitate communication between interested parties by coordinating inputs, approval and decision-making.

Bibi Essama developed a handbook on administrative procedures.

- The USAID project officer should facilitate communication and support the role of the Cameroonian project director (Prof. Abondo).

George Vishio took over role of facilitating communication between IMPM Director and the Tulane TAT.

- A specific, comprehensive work plan should be developed, as some activities are successful but others need to be modified.

A work plan was developed under the direction of Bibi Essama, completed in September 1986. A Lotus Program file has been kept on project progress.

2. Recommendations by Objectives

Objective 1: MOH should take over treatment of positive children found during school surveys as proposed in the national Plan of Action (Mott et al.).

This was not done. Ethical reasons demand that the project treats infected school children with Praziquantel immediately after detection. If the list of names of infected school children were turned over to MOH for treatment, it could result in delays in treatment that local people might interpret as promises for treatment not kept. Also for maintaining the good will of the people under study for future research, it was necessary that treatment be carried out right away by the research team, so that people would feel that the research benefited them directly.

- New non-invasive techniques for morbidity evaluation should be added to the project.

This was done. Ultra sound equipment for detecting morbidity was purchased.

Objective 2: Schistosomiasis control strategy - no recommendation.

Objective 3: Training

- Enlarge scope of in-country training. Offer annual refresher courses for technicians and epidemiologists in collaboration with MOH/OCEAC.

This was not done. Prof. Abondo objected on the grounds that MOH has no schisto control strategy and so the training at IMPM expense would be inappropriate.

- No overall training plan; confusion of responsibilities. A partial training plan was made.

Objective 4 - Regional status (data processing, storage and dissemination center, etc.)

- Study tour to OCCGE Niamey/GTZ Mali/Sudan/Ndola for "team leader".

Not done. The team leader did not want to give Prof. Abondo the impression that the expatriate just wanted to travel around Africa. Some money used for attending conferences.

- Newsletter: outside contributions to be encouraged.

Done

- IMPM should arrange for TAT to participate in teaching curricula of CUSS.

Not done. CUSS does not need them as teachers. They volunteered twice, but CUSS did not follow up.

Recommendations on Inputs

- Seek technical advice available in Cameroon and in Africa.

This was done especially for the longitudinal studies. Monthly meetings were held with Cameroonians outside the project.

- Peace Corps participation to depend on Work Plan findings.

Peace Corps participation had been proposed by Dr. Cline and agreed to by Prof. Abondo for the longitudinal

studies. There were to be 10 Peace Corps volunteers, one in each longitudinal study site, 10 Cameroonian counterparts, and one Peace Corps volunteer to manage these personnel. Postponing their recruitment until after the Work Plan had been devised effectively killed the idea, because Peace Corps need a great deal of lead-time to recruit volunteers. By the time it was decided that they were still needed, it was too late for Peace Corps to come up with the people.

#### 4. Organization Support System

- Parasitologist - extend period from 2 to 3 years.

Not done because it was more important to extend the malacologist. This was agreed to by Prof. Abondo and Dr. Cline.

- Additional MPH training in U.S. for 15 Cameroonians. This should depend on satisfactory absorption schedule by IMPM for current trainees.

Not done because there was no money.

#### 5. Outputs

- Schisto Research Center - No recommendation
- Increased knowledge on schisto.

Epidemiologic studies to be planned in conjunction with snail studies and behavioral patterns. Need to seek collaboration with CRESS, CUSS and University of Yaounde.

Partially done. Collaboration was sought with CRESS, CUSS and University of Yaounde. Epidemiologic studies were planned in conjunction with snail studies, but the behavioral studies were never well planned and carried out.

- Cadre of trained Africans

Develop comprehensive training plan for staff of Center and allied institutions.

Done

- Inter-agency and regional research network - No recommendation.

## ANNEX L

## PROJECT BUDGET

USAID

USAID's original budget contribution for the Health Constraints to Rural Production Project was obligated at \$7,353,900. This life-of-project budget has been increased by \$130,000 to cover the additional costs for the construction of a new schistosomiasis laboratory and office rather than renovate an existing building as was originally planned for in the Project Paper and Project Grant Agreement. In addition, in order to accommodate modifications to carry out essential project activities, which were agreed to by all parties, the project budget has been amended twice, on February 15, 1985 and January 20, 1988. Both amendments were used to transfer funds between various budget categories, with the bulk of the budget transferred from the contingency/inflation category to various other categories.

The primary purpose of the first budget amendment was to increase the Tulane technical assistance contract by \$486,250, from \$4,054,621 to \$4,540,871. This amendment provided funding for: (1) rental of temporary office and laboratory space for 12 months; (2) vehicle and laboratory equipment-operations, maintenance and repairs for 24 months; (3) recruitment of local project personnel to assist the US project team; and (4) for international travel for Cameroonian scientists to attend an international conference and consultations.

This budget modification was essential for the implementation of the project because the GRC did not provide the building for the Project office and schistosomiasis laboratory and IMPM did not provide the project vehicles and laboratory support staff to the US project team as stipulated in the Grant Agreement. The rationale for GRC/IMPM's actions is discussed in other sections of the evaluation report.

The main objective for the second budget amendment was to increase the funding levels for long-term training and to continue local support for the schistosomiasis laboratory. In addition, small increases in funding were provided to the field expenses category to support the US TAT. At the same time, a small funding reduction was made in the home expenses of the technical assistance contractor, Tulane University.

This amendment provided funding for the continuation of vehicle operation, maintenance and repairs and for laboratory equipment and supplies. This part of the budget was increased from \$54,000 to \$315,617 for these activities. The other primary budget shifts with the second amendment were:

- (1) Schistosomiasis laboratory rental and operation category was increased from \$25,000 to \$129,160;
- (2) local personnel support was reduced from \$220,000 to \$171,163; and
- (3) training expenses received the largest percentage increase of 203%, shifting from \$884,027 to \$2,797,064.

The overall breakdown of USAID's contribution to the project and the various budget shifts is as follows:

<u>Original Budget Category</u>	<u>Budget</u>	<u>Amendment No. 1(2/15/85)</u>	<u>Amendment No.2(1/20/88)</u>
1. FIELD Expenses	\$1,337,482	\$1,723,732	\$2,661,581
2. HOME Expenses	1,833,112	1,833,112	1,660,732
3. TRAINING Expenses	884,027	884,027	1,797,064
4. INTERNATIONAL Travel For Conferences	0	100,000	100,000
TOTAL TULANE TECHNICAL ASSISTANCE CONTRACT	\$4,054,621	\$4,540,871	\$6,219,377
5. Commodities (A.I.D. Procurement)	480,000	0	557,000
6. CONSTRUCTION/ RENOVATION	255,000	0	280,000
7. APPLIED Field Research	0	0	187,000
8. Contingency/ Inflation	1,923,000		<u>19,523</u>
TOTAL			\$7,352,900

An additional budget amendment must be executed to extend the technical assistance contract with Tulane University. The project was designed to be implemented for seven years, from January 1983 to December 1990, but the technical assistance contract awarded to Tulane was only for five years, ending in July 1989. Therefore, there is a need to provide funding to continue long-term training, home office support and short-term technical assistance during the last 18 months of the project, from July 1989 to December 1990. The evaluation team recommends that the technical assistance contract with Tulane be extended to cover the last 18 months of the project.

The evaluation team concludes that USAID/Cameroon has executed the project budget effectively and efficiently to accommodate unforeseen project constraints and changing circumstances existing in Cameroon during the implementation of the project.

#### GRC/IMPM

The evaluation team was not able to review the budget of GRC/IMPM in any detail. The team was assured by the IMPM Director and the USAID Project Officer that the following budgetary situation of GRC/IMPM exists:

1. The GRC contributed 550,000,000 CFAs or \$1,945,000 to IMPM to cover project expenditures.
2. The majority of GRC's contribution for project expenditures still exist in a separate bank account which is controlled by the IMPM Director.

\$1.00 = 280 CFAs for this calculation.

3. IMPM did not assume operating and maintenance costs of four USAID procured project vehicles beginning in the third year of the project. Since the beginning of the project, IMPM has provided three vehicles. Due to difficulties of obtaining spare parts, IMPM refused to maintain the four American-made project vehicles. And due to the current economic crisis in Cameroon, MESRES has been unable to authorize the purchase of the fourth vehicle. IMPM requested USAID to continue the maintenance/operating costs of the four US made vehicles and USAID agreed to do so.
4. IMPM did not assume the costs of providing laboratory maintenance and supplies beginning in the third year of the project as agreed to in the Grant Agreement. IMPM agreed to begin funding all costs associated with laboratory maintenance and supplies once laboratory operations shifted from the temporary site to the new laboratory at IMPM's headquarters. The newly constructed laboratory was due to be completed by May 1988. Due to difficulties with the local contractor, the laboratory will not be constructed on time. However, IMPM will assume all costs associated with laboratory maintenance and supplies beginning May 1988.
5. GRC has provided the schistosomiasis project with 25 local staff members, with the salaries paid by a variety of government agencies (see the list in Annex F).

Based on discussions with IMPM and USAID, both parties conclude that GRC/IMPM contributions to support the schistosomiasis project for FY 1987/88, excluding the maintenance and repairs of the four American-made vehicles, laboratory maintenance and supplies costs, indicates that IMPM has met all local currency/recurrent cost requirements.

The evaluation team advises USAID to complete a detailed review of GRC/IMPM contributions to the project, since the team was unable to do so.