

Report to the Ministry
of Higher Education and
Scientific Research of
the Republic of Cameroon

**AN ANALYSIS OF STRUCTURE AND
MANAGEMENT OF THE INSTITUTE OF
AGRICULTURAL RESEARCH (IRA) AND
THE INSTITUTE OF ANIMAL RESEARCH
(IRZ) OF CAMEROON**



International Service for National Agricultural Research

The International Service for National Agricultural Research (ISNAR) began operating at its headquarters in The Hague, Netherlands, on September 1, 1980. It was established by the Consultative Group on International Agricultural Research (CGIAR), on the basis of recommendations from an international task force, for the purpose of assisting governments of developing countries to strengthen their agricultural research. It is a non-profit autonomous agency, international in character, and non-political in management, staffing, and operations.

Of the thirteen centers in the CGIAR network, ISNAR is the only one that focuses primarily on national agricultural research issues. It provides advice to governments, upon request, on research policy, organization, and management issues, thus complementing the activities of other assistance agencies.

ISNAR has advisory service, research, and training programs.

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September 1988

ISNAR

International Service for National Agricultural Research

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EXECUTIVE SUMMARY

At the request of the Minister of Higher Education and Scientific Research of the Republic of Cameroon, in 1987 ISNAR conducted a management review of the Institute of Agricultural Research (IRA) and the Institute of Animal Research (IRZ), in order to produce independent proposals for enhancing their efficiency and effectiveness. An ISNAR mission visited IRA and IRZ headquarters, centers, and stations throughout the country, and interviewed research managers, researchers, and technical and support staff. It also held discussions with senior officials of the Ministry of Higher Education and Scientific Research (MESRES) and other ministries, and visited the University Centre of Dschang (CUDS) and several parastatals and development projects. ISNAR expresses gratitude for the cooperation the mission received throughout its time in Cameroon.

Comments and observations on the draft report from MESRES and institute staff were incorporated into this final version. The analysis and recommendations are summarized below, organized under the general headings of research policy, organizational structure, planning and programming, personnel, administration and operational support, and research funding.

Research policy

According to the texts governing the Council for Higher Education and Scientific and Technical Research and MESRES, the Council has the task to give its views on the definition and orientation of Government policy in the area of scientific research and technology development, while MESRES assures the implementation of Government policy. The Council has met infrequently and has given little policy guidance to research leaders. More frequent meetings of the Council are recommended, based on preparatory work done by MESRES in collaboration with MINPAT and technical ministries.

Organizational Structure

Three complementary aspects must be considered when trying to identify suitable organizational structures and mechanisms for agricultural research: scientific competence of the researchers, coherence and comprehensiveness of the research program, and relevance to client needs. ISNAR recommends improvements in each of these areas for both IRA and IRZ.

Scientific competence is much enhanced by peer interaction across institutions through periodic seminars by discipline, for which the concerned institutions need to make financial provisions.

Program integrity is increased by formally recognizing the position of research institute program chiefs, and by creating national program committees, one for each main program.

Closeness to the clients is best achieved through structuring and developing the institutes on the basis of agro-ecological zones, accompanied by the creation of zonal research advisory committees or research-development liaison committees, preferably for IRA and IRZ together. Thus, IRA and IRZ research centers would be conceived as zonal entities and a 15 to 20-year development plan for research drawn up accordingly. This would involve regrouping stations, substations and antennae by zone, rationalizing research infrastructure within each zone, fostering IRA/IRZ collaboration in certain support services and joint research, and stimulating cooperation with academic institutions, CUDS in particular. Phased development of infrastructure would be planned as a function of projected economic and demographic changes in the different zones and likely available staff and funds.

To promote IRA/IRZ relations, it is recommended that their directors be members of each other's Management Board and Program Committee. A more integrated approach to agricultural research would be further promoted by representation of MINASRI and MINEPIA in the Management Board and the Program Committee of each of the two institutes. Strengthening relations with CUDS would be facilitated if both IRA and IRZ were represented on the CUDS Management Board and planning committees, and if staff exchanges were facilitated. Formal linkages of research with development organizations and extension organizations at provincial and divisional levels are needed to assure research relevance. This requires special budgetary and political support from all parties concerned.

Research Planning, Programming, and Evaluation

The preparation of a long-term national agricultural research plan which takes account of all relevant research capability in the country is a necessary condition for making the most effective use of both Cameroonian resources and external cooperation and assistance. In the absence of comprehensive planning at national and institute levels, the research programs vary considerably in their level of priority, scope, staffing, and leadership.

While personal initiative of researchers and station chiefs must remain a key ingredient in research planning, informal contacts should be complemented by some formal mechanisms. In developing these it is entirely appropriate to maintain the principle that research planning must begin at local and regional levels, with active involvement of the Government administration, the extension services, and development organizations. Such formal contact is best achieved through a research advisory committee per agro-ecological zone, as indicated above. This committee might involve outside individuals and create ad hoc working groups for special advice.

Whereas a center chief would be responsible for the broad research priorities for his zone, a program chief would continue to be responsible for the scientific integrity of his programs nationwide. The creation of a national committee for each major program, as recommended above, would be a desirable complement to the proposed consultative committee in each zone. Such measures to improve the process of research planning, and a

more focused documentation, would enhance the effectiveness of the central Program Committees of IRA and IRZ.

A thorough review of all research programs is recommended to improve program structure, discontinue unpromising work, pay more attention to comprehensiveness in the interest of practical applicability of findings, and identify gaps in research coverage.

Both IRA and IRZ should pay more attention to economic aspects of ongoing research, and IRZ is urged to place greater emphasis on research in the farmers' environment.

Expanded formats are needed for the research program data sheets ("fiches programme") and operation data sheets ("fiches opération") to turn them into more useful planning and evaluation tools. Stress must be placed on justification of program thrusts, definition of targets, description of linkages, and an indication of needs for personnel, finance, and infrastructure.

A thorough review of all programs every 4-5 years is advisable, with external participation. Annual evaluation-and-planning meetings should be held for all main programs. Explicit financial provision for such meetings is recommended.

Personnel

There are serious imbalances in the composition of the research personnel, with surpluses in middle-level administrative personnel and field labor in several stations and, especially in IRA, shortages of technicians. Without redressing these imbalances, the institutes cannot be efficient research organizations. Good manpower planning requires reasonably precise indications from the Government of the maximum size of the research system likely to be sustainable from public funds in the longer term, and of the likely evolution in external support.

For proper staff development, both IRA and IRZ need an up-to-date data base, which is being created. With this tool, combined with the necessary job descriptions, and the program reviews referred to earlier, it will be possible to better match staff to research priority needs.

The institutes, IRA in particular, need a better technician/researcher ratio, but a motivated and stable technician cadre depends critically on implementation of the promised statute to reduce the emolument and opportunity gap between them and researchers.

To avoid unsuitable staff assignments in the future, it is strongly recommended that all Government departments involved in assigning civil service personnel to the research institutes accept that the final selection of candidates must take place at the institute level.

Inconsistencies in assignment of grades, emoluments, and secondary benefits between civil servants and researchers on contract should be corrected.

The annual civil service personnel evaluations using the "Bulletin de Note" could be made more meaningful if the research institutes used a supplemental form to cover managerial, supervisory and coordinating responsibilities. The currently automatic bonuses for researchers should rather be based on research quality and productivity. Promotion criteria should be expanded to include performance of management duties, staff supervision, training and coaching of younger staff, and liaison with extension agents and farmers. Merit evaluation of technicians is also highly advisable, but can only be applied in the context of a proper career structure for this category.

Both institutes suffer from a lack of discipline. Accurate evaluation of all personnel is very important. When submitting cases for sanctions, research managers at various levels must be able to rely on strong backing from their superiors, and speedy verdicts.

Administrative and Operational Support

Standard operational guidance documents need to be developed and issued for all administrative and support tasks and responsibilities, including reporting requirements, for both management and other personnel. Compliance and accuracy, especially in the case of financial procedures, should be ensured by the introduction of independent review mechanisms at the station level. Disciplinary action is called for in the event of recurrent non-compliance. Improvements in several deficient administrative and financial procedures are recommended.

For stations which generate sizable revenues from production and sales, it is recommended that Government apply separate budgeting and accounting of production costs and revenues.

The management of transportation in both IRA and IRZ requires improvements. These include definition of tasks and responsibilities for record keeping, maintenance, use and replacement, preparation of a complete inventory, and authorization to dispose of derelict vehicles. Some of the loan funds for new vehicles under the National Agricultural Research Project (NARP) might be reallocated to finance spare parts, repair facilities, and training. Some stations where outside repair and maintenance facilities are not available need their own workshops. Before buying new vehicles, realistic provisions for operations and maintenance must be made.

Critical to both institutes is the training of Cameroonian staff in documentation, and in scientific journalism, editing, and publishing.

It is recommended that creation of the post of farm manager be given serious consideration for the larger stations. Their responsibilities and position in the management hierarchy should be clearly defined before recruitment, and well understood by all concerned.

Before investing in computers under the NARP, a strategy should be developed to cover the future needs for data processing in the institute directorates and central administrative services, and in the stations.

Research Funding

IRA and IRZ face serious budgetary problems. These are aggravated by over-recruitment in past years, which now causes personnel charges to consume nearly the entire operating budget. Apart from extreme care in new appointments at any level, and a freeze in some categories, additional approaches are needed to move towards a situation in which personnel charges consume no more than 60 or 65% of the operating budget, instead of the 80-90% in 1987/88. The institutes should try to redeploy redundant personnel, perhaps in income-generating operations, preferably outside the institutes. If this is impossible or insufficient, termination of service should be considered. If civil service regulations prevent this, it would help the institutes to be given a more autonomous statute with greater authority in recruitment and termination of service.

A second approach in some cases might be for national authorities and donors to reallocate investment funds to operating funds, particularly non-personnel operating funds. All investments entail increased operating expenses in the future, and these should be calculated before the investments are decided upon.

Third, IRA and IRZ should discontinue unpromising or low-priority activities after in-depth program reviews. If budget constraints remain at their 1987/88 level of severity, the institutes will be compelled to selectively reduce their work.

IRA is facing major problems with collecting payments from parastatals for work done under special agreements. This issue must be resolved at a high level by the ministries and other parties concerned. In this context it is also imperative that all future activities of the research institutes for third parties, whether of a research or a service nature, be fully agreed in the institutes' Program Committees, matching available personnel and facilities to areas of priority concern. To plan the service activities while taking into account public and private requirements in Cameroon, IRA and IRZ together should carry out a study of present and future demands for soil testing, analysis of plant and animal material, seed production, etc., including the requirements for their own research programs. The costs of providing such services should be assessed realistically, and compared with alternative solutions. Any services performed by the institutes for other organizations should be budgeted and accounted for separately, and be billed at their full cost, including staff emoluments.

To ensure that researchers do not deviate from their primary task, which is to do research, the production for sale of plant and animal material at research stations should, in general, be discouraged beyond what is generated in the context of research. In those cases where research stations have produce to sell, the Government should not impose price restrictions, and the institutes themselves should ensure the best possible pricing of salable produce and the monitoring of quantities sold.

Other approaches for reducing dependence of research on Government funds might be possible. Cess taxes might be used to help finance research on a few enterprises such as marine fisheries, forestry in the rainforest

zone, and perhaps certain export crops. Some research would lend itself to private funding, and it is recommended that the Government promote this.

External support, including expatriate personnel valued at local emolument levels, added about 30% to IRA's local resources in recent years, against less than 5% in the case of IRZ. This support is accompanied by the need for substantial Cameroonian contributions from the regular operating budget. As originally envisaged, the NARP, financed with a World Bank loan with additional grant contributions from the United Kingdom and Germany, would require that IRA and IRZ together dispose of additional operating funds of 1.6 billion FCFA per year in constant 1991 terms, not counting 0.8 billion a year for servicing the loan. In view of the current financial constraints (1988), it will probably be impossible to increase the medium-term recurrent budget for research to the level foreseen in the World Bank Staff Appraisal Report (No. 4796-CM) of October 1986.

Given these consequences of external support for operating budgets, it is in the interest of both the Government and donors to carefully assess the long-term advantages and possible disadvantages associated with different kinds and levels of foreign support. In this context, special attention is needed for the transfer of knowledge and organizational capacity to Cameroonians.

1. INTRODUCTION

1.1 Origin of Study

In recent years, both the Government of the Republic of Cameroon and donors have very significantly increased their financial support for the two national agricultural research institutes, the Institute of Agricultural Research (IRA) and the Institute of Animal Research (IRZ)*). The leaders of these institutes and their parent ministry, the Ministry of Higher Education and Scientific Research (MESRES), have recognized that the rapid and continuing growth of IRA and IRZ calls for improved management of programs and resources.

A preliminary management review was conducted by the International Service for National Agricultural Research (ISNAR) and the Pan-African Institute for Development/Central Africa in 1983/84, which resulted in MESRES/ISNAR collaboration in management training. MESRES requested ISNAR, in a ministerial letter dated May 28, 1986 and in subsequent correspondence, to conduct a more detailed review of the management of IRA and IRZ, and to make concrete proposals for enhancing their efficiency and effectiveness.

1.2 Scope of Study

The terms of reference for the review, agreed between MESRES, IRA, IRZ and ISNAR in November 1986, appear in Annex 1. The main areas addressed were:

- * organization and structure of the agricultural research institutes and linkages with the policy environment, other research institutions, university centers, and users of research results;
- * the processes of long-term planning, research program formulation, program budgeting, program monitoring, and evaluation of research relevance and quality;
- * development and management of scientific, technical, administrative, financial and other personnel;
- * operational support;
- * funding of agricultural research.

The review was not meant to and did not include an in-depth study of the content and methodologies of the various research programs in IRA and IRZ, and it did not include a detailed analysis of agricultural research capacity outside these two institutes.

One of the terms of reference, to identify scientific and technical manpower needs over a ten-year period and prepare a ten-year training plan, could not be met because of an inadequate personnel data base in the institutes and the need for prior program reviews.

1.3 Methodology

ISNAR assembled a review team composed of ISNAR staff members R.B. Contant (mission leader) and D.E. McLean and ISNAR consultants A.C. Green, M. de Lattre, W.J.A. Payne and E.P. Riezebos. Documentation was collected in IRA

*) List of acronyms: see Annex 8.

and IRZ in November 1986. The main mission to Cameroon took place from February 16 to March 10, 1987. After a briefing by the Minister of Higher Education and Scientific Research, the team interviewed MESRES policy staff as well as senior officials in the Ministry of Agriculture (MINAGRI), the Ministry of Livestock, Fisheries and Animal Industries (MINEPIA), the Ministry of Planning and Regional Development (MINPAT) and the Ministry of Finance. Extensive discussions were held with the directors and other headquarters staff of IRA and IRZ, and sixteen stations and antennae of IRA and six of IRZ were visited (Annex 2). Team members spoke with more than ninety persons in IRA and IRZ, including heads of research centers, stations and administrative and financial services, accountants, researchers, senior and junior technicians, clerks and other personnel. The team also visited the University Centre of Dschang (CUDS) and a number of parastatals and projects. A questionnaire had been sent in advance in January 1987 to twenty-five of Cameroon's main agricultural production parastatals and rural development organizations. To complete the work in Cameroon in the allotted time of just over three weeks the team divided into sub-groups to travel to different parts of the country. The team worked together in Yaoundé the first four days, at Dschang during the field visits, and again in Yaoundé the last five days.

A draft report was submitted to MESRES and the IRA and IRZ directorates in June 1987, and the ISNAR mission leader visited MESRES and the institutes in October for a detailed discussion of all comments and in order to obtain some further information. After the Minister of Higher Education and Scientific Research had authorized the report's publication, with the agreed amendments, the English edition was finalized in December 1987. The French translation was undertaken simultaneously.

The report is intended primarily for the authorities of MESRES, IRA and IRZ. It therefore provides little general information which would be either known to this primary readership or could be gathered from readily available documents.

This study was financed jointly by the German Federal Ministry for Economic Cooperation (BMZ) and ISNAR.

2. THE AGRICULTURAL RESEARCH SYSTEM

2.1 Context and Historical Perspective

The Cameroon Government's institutional framework for agricultural research and development is complex. Most agricultural research is conducted within MESRES, a separate ministry from the technical development ministries, MINAGRI and MINEPIA. This separation, which has a long history prior to the creation of MESRES, constitutes a structural barrier to coordinating research and extension activities. MESRES has tried to overcome part of this problem by devising means of bringing research closer to its clients (pre-extension work, field days). Within the agricultural domain there are also structural divisions: the development of crops is administered in a separate technical ministry from that of livestock, and this is mirrored in research by separate research institutes for crops and forestry on the one hand (IRA) and livestock and fisheries research on the other (IRZ). The institutes and the ministries are all operating independently and have few functional ties.

Agricultural research in Cameroon is well developed compared with most countries in Africa. Before independence in 1960, most research was carried out by foreigners in dispersed institutions. Between the early 1970s and 1984, a national research system gradually emerged. The present structure and organization of IRA and IRZ has evolved from a number of centers and main stations originally created by the French and British for very specific roles, primarily for research on export crops, highland food crops, forestry, animal husbandry and veterinary medicine. To transform these stations into a cost-effective national network has been a long-term process which is still under way. In 1984 the governance of the research system was fused with that of the institutions of higher education in a new ministry, MESRES, so as to facilitate collaboration between them.

2.2 Present Structure

Agricultural research in Cameroon. MESRES supervises five research institutes, a national education center, and two national committees, as well as the university institutions.

IRA and IRZ conduct most of the crop, forestry, livestock, and fisheries research in Cameroon. Agricultural and related research also takes place at CUDS and the University of Yaoundé, most of it in relation to students' theses. CUDS is being developed as a major teaching-research-extension establishment, and is potentially the main collaborator of IRA and IRZ in Cameroon. There is also room for enhanced collaboration with other MESRES bodies, particularly the Institute of Human Sciences (ISH) in developing the field of agricultural economics. A primary management challenge for MESRES is to bring about the functional integration between all of its research and educational institutions.

A significant amount of adaptive agricultural research, as well as some socioeconomic and marketing research, is conducted in other ministry departments, various projects, parastatal development organizations, and in private institutions, or by researchers working for foreign public research organizations (e.g., ORSTOM). Some of this work is done in

conjunction with IRA or IRZ, with or without formal written agreements ("conventions"), but much of it takes place independently.

Functions of MESRES in relation to IRA and IRZ. When the Council of Higher Education and Scientific Research was established by Decree No. 74/358 of 17 April 1974, it was made responsible for the definition and orientation of Government policy in higher education, scientific research, and technology development. This was amended by Decree No. 82/465 of 4 October 1982, to the effect that the Council's function is to express an opinion on ("donner un avis sur") the definition and orientation of policy in the areas specified. Article 6 of the Decree of 1974, not amended in 1982, specifies that the Council meets once every year and as frequently as necessary. In fact, it has met only in 1974 and 1982.

Despite the paucity of meetings of this high-level Council, MESRES itself, according to the Decree establishing this Ministry (No. 84/158 of 18 April 1984), is not a policy-making body. In the research domain, it is responsible for: the implementation of the Government's policy for science and technology, the coordination and supervision of all research activities in the country, the projection of research results, the promotion and development of endogenous technologies and appropriate technologies, the setting up of teaching-and-research units and associated research teams within university institutions and research organizations, and the scientific and technical cooperation with foreign, national and international scientific and technical bodies. There are differences of view within MESRES, and between MESRES and its institutes IRA and IRZ, about the Ministry's exact role in defining and interpreting science policy in terms of guidelines for agricultural and animal production research. While these differences are understandable, given the infrequency of views coming from the Council, it would be important to straighten them out. Even if annual Council meetings were held to formally express itself on science policy, as appears highly desirable, it would seem natural that the preparatory work leading up to the formulation of these policies would be one of MESRES's major responsibilities.

In any event, the attributes of MESRES are such that IRA and IRZ can expect MESRES to both support and supervise their management and their research activities, and to create the legal and operational framework for their collaboration with the CUDS and other national academic establishments, and with institutions abroad.

To execute the various support, supervisory and linkage roles, there is a hierarchy of statutory bodies: the Department of Scientific and Technical Research (DRST) of MESRES, the Management Board and the Program Committee of each institute, the Evaluation Committees for the assessment of both programs and researchers (chaired in each case by the institute director), and the Recruitment Committee for deciding on recruitment and promotion (chaired by the Minister of MESRES, with representation from the Ministry of Finance and the the Public Service Ministry).

The department most directly concerned with the work of the institutes is the DRST. It is responsible for implementation of scientific and technical policy, coordination and control of all research activities, and the other functions of MESRES in the area of research mentioned above. Despite its efforts, the DRST has problems in carrying out these various functions effectively. Although MESRES has the supervision over the research institutes, and the Minister presides over their Management Boards, the Decree establishing the Ministry does not seem to enable it to impose itself when it discovers discrepancies in rules or areas for greater collaboration between the institutes.

The DRST has a Sub-Department of Programming and one of "Valorisation" and Development of Technology. That of Programming has three services, each having a potentially important role to play in the institutes: the Studies and Projects Service is charged with coordinating relations between the institutes and major donors and external research organizations; the Scientific and Technical Cooperation Service oversees cooperation agreements and monitors their implementation; and the Programmes Follow-up Service is charged with monitoring research programs and evaluating the scientific work of researchers. This third service acts as an independent inspectorate. According to information obtained from MESRES staff, it operates through three groups of staff officers visiting stations about once in two years, to check against the operation data sheets whether objectives are being followed and operations carried out according to plan, to find out what recommendations are made by researchers, and to examine any problems related to personnel or other issues. Although this service may exercise the independent role described here, the mission is of the opinion that its aim can only be achieved if the monitoring and evaluation functions are first strengthened in the institutes themselves.

The Sub-Department of Valorisation and Development of Technology is responsible for helping the institutes promote and disseminate their research results, and for assuring the legal protection of these results. This Sub-Department has three services, for Technological Development, Exploitation and Valorisation, and Scientific Promotion. The mission questions whether the first two of these services can effectively fulfill their assigned roles from MESRES headquarters: choosing the right technologies to develop and promoting their subsequent utilization are best done within the institutes themselves. The third service could be of real help to the institutes. Its Media Bureau publicizes research activities in the newspapers and on radio and television; it programs researchers on the radio and introduces their talks. Some criticism by IRA and IRZ staff of the performance of this Bureau could probably be defused by more open discussion.

The Department of General Administration intervenes in the preparation and processing of the institutes' budgets and the administrative aspects of personnel promotion. It thus acts as an intermediary for the Ministry of Public Service and the Ministry of Finance.

The third department of obvious importance to the research institutes is the Department of Scholarships and Infrastructure.

The Director of the DRST is a member of the Management Board and Chairman of the Program Committee of both IRA and IRZ. A direct line of responsibility exists between the institute directors and the Minister, who is also the chairman of the institutes' Boards of Directors. This direct contact is of utmost importance for the management of the institutes.

The institute directors are often constrained by the complex of departments and sub-departments in MESRES involved in the affairs of the institutes. While relations are generally cordial, the multiple contacts are time-consuming, and efficiency is impaired by delays in processing papers, postponed appointments, and lost files. Simplifying procedures to significantly improve the amount and quality of support given to the institutes, and this at minimum cost and without duplication, could become a priority issue in the relationship between MESRES and the institutes, especially if funding constraints continue.

Some of the relations with other departments of Government, though formally a function of MESRES, are currently handled by the institute directors. This usually increases efficiency. An important case is budget presentation: the director himself rather than a ministry official defends the operating budget in the Ministry of Finance, and the investment budget in the Ministry of Planning.

Organizational structure of the institutes. IRA and IRZ have a very similar hierarchical structure, the major difference being that IRA is a larger and more complex institute than IRZ (Figures 1 and 2). In IRA there are four commodity- or region-based centers, one center based on a discipline (soils), and one which is partly discipline-based and partly commodity-based (forestry). IRZ has two centers, both of which are region- and commodity-based; there are also two stations (for fisheries) that are not controlled by a center, but directly by headquarters.

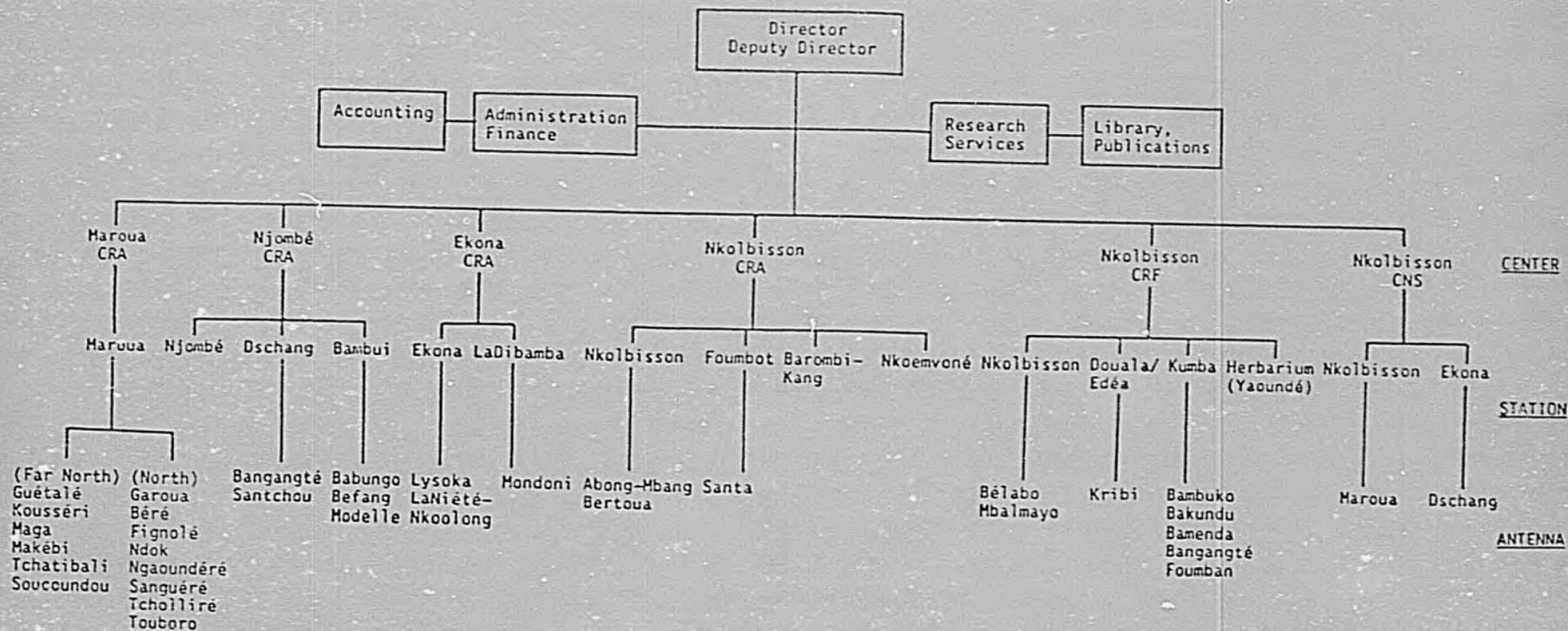
IRZ has a limited number of antennae (Figure 2); the Garoua antenna formally belongs to the Yagoua station, but for practical reasons operates under the Wakwa station. From past history IRA possesses a complex of antennae that now, in changed circumstances, appears rather haphazard (Figure 1). Some antennae were created to conduct specific research that may no longer be required, or as a first outpost for a future station; a few are no more than trial sites. Some stations also have designated trial sites ("points d'essai") which have a lower formal status and are not shown in the organizational chart, although some of them are larger than antennae; one even has a resident researcher. Possibilities for reorganization of this complex to make it more rational are discussed in section 2.6.

Linkages between IRA and IRZ. At present there are no formal links between IRA and IRZ at the directorate level. As the directors of both institutes report to the same Minister and the administrative affairs of the two institutes are dealt with by the same departments of MESRES, there should in theory be some coordination by MESRES, but in practice this is not evident. The mission recommends that a partial solution to this problem would be the mutual participation of institute directors in each other's Management Board; similarly, the institute directors and Research Service chiefs should be members of the other institute's Program Committee and other relevant committees (Recruitment Committee, Evaluation Committee).

At lower levels in the hierarchy there are examples of cooperation between the institutes, both in administration and research: at Nkolbisson the vehicles of both institutes are maintained at a joint workshop; at Maroua there is a large sylvo-pastoral experiment organized jointly by researchers from the IRA forestry program at Maroua and the IRZ agrostology program at Garoua. The directors and the research staff feel that a closer collaboration between the two institutes would be advantageous. For 1986/87 they actually proposed a joint IRZ/IRA farming systems operation; while this was adopted by the IRZ Program Committee, IRA's rejected it because the reduced budget precluded the initiation of new activities. More initiatives would be possible to take fuller advantage of the opportunities for IRA/IRZ collaboration in both research programs and services.

Figure 1

Organization of present research facilities at IRA¹

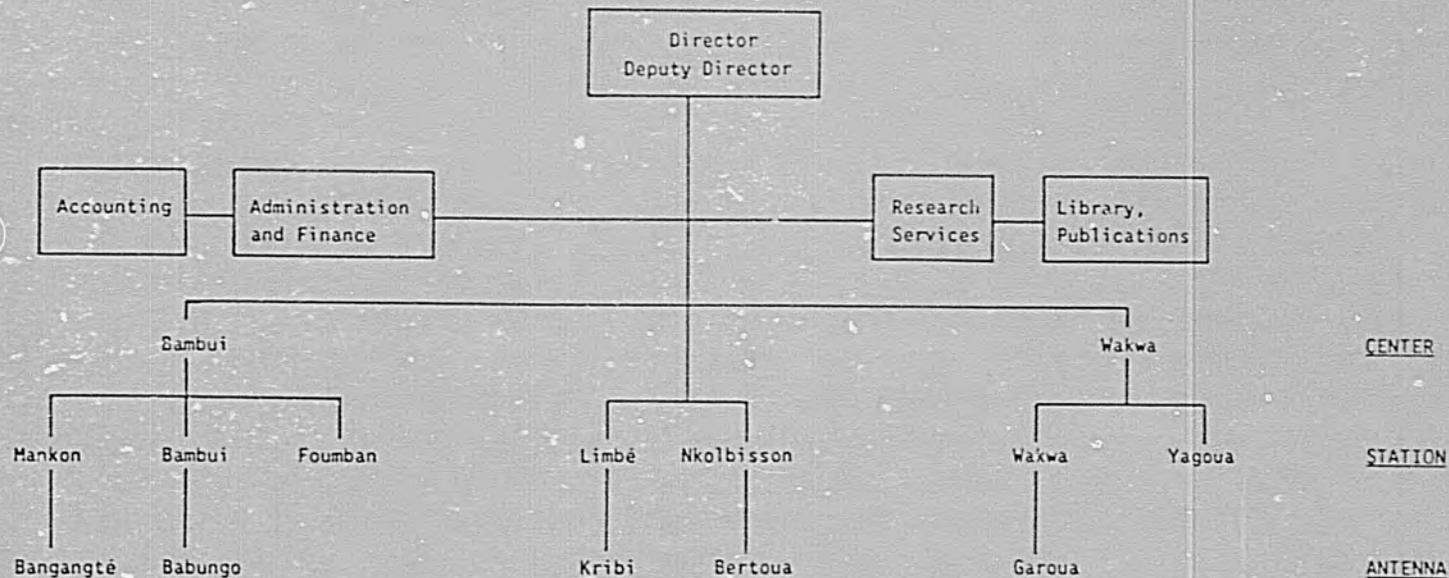


¹ Not including trial sites ("points d'essais")

CRA = Centre de Recherches Agronomiques
 CRF = Centre de Recherches Forestières
 CNS = Centre National des Sols

Figure 2

Organization of present research facilities at IRZ



2.3 The Research Programs

Priority setting and long-term planning. Government desires that publicly funded agricultural research concord with national agricultural development objectives and available resources. The clients of research results -- farmers, extension services and development organizations -- want rapid solutions to their problems of the day. Research institute directors and researchers wish to ensure that their programs and experiments are relevant to these various needs, are of a high scientific standard, and give good value for money. As resources do not allow all identified needs for research to be met, effective communication between all parties concerned is crucial for a correct identification of research problems, balanced judgment on priorities, judicious program planning, informed assessment of suitable technologies, and identification of non-technical constraints to the adoption of such technologies.

The degree to which agricultural research activities correspond with national objectives can be assessed, in principle, by checking research programs against two references: the Five-Year Development Plan, and the reports of the National Council for Higher Education and Scientific and Technical Research. As stated earlier, the Council meets infrequently, so that it cannot exercise its policy-making and macro-level prioritizing functions. Thus, the main reference is the Development Plan. The Sixth Plan, for the first time, contains some statements of research objectives and programs for the different research institutes, including IRA and IRZ. These statements, however, are not based on a thorough analysis of projected long- and short-term, national and farmer needs and priorities; nor are the required resources, notably funds, scientists, and technicians, indicated. Thus, the Plan does not give sufficient guidance to the institutes.

Yet, the institutes have responded to the broad, long-term objectives expressed in the Plan. The increased attention to food crops, stressed in the Fifth Plan (1981-1986), has led IRA to expand its activities in this field. IRZ's programs in dairy and beef cattle correspond closely to Plan objectives. Regional and local research needs have received considerable attention from individual researchers and station administrators. In fact, research staff and station chiefs participate in Divisional and Provincial Development Committee meetings where local and regional needs are expressed, on the basis of which the institutes formulate their research goals for the regions in which the institutes have stations. Good contacts of IRA with the Government organizations charged with integrated rural development also help orient that institute's research to specific regional needs. Finally, most of IRA's planning of food crops research benefits from consultation with farmers and extension agents through researchers belonging to Testing and Liaison Units (TLUs) based at four, shortly five, stations in different agro-ecological zones of the country. IRZ has expressed its intention to emulate IRA's TLU approach. Thus, there are several, more or less informal, processes through which the research institutes interpret national and regional development goals and farmers' needs in terms of research activities.

However, there is a need for more formal research planning mechanisms and procedures. The mission recommends that the long-term research planning process follow the same pattern as the preparation of the contributions of the various technical development ministries to the National Development Plan. This means institutionalizing what is already happening to some extent through research participation in meetings of Divisional and

Provincial Committees: starting the formal planning process at local and regional levels, then vetting, harmonizing, and synthesizing the regional plans at the national, i.e. institute, level, for their ultimate inclusion in the Five-Year Development Plan.

Such an approach would involve ongoing dialogue between researchers, extension officers, development organizations, and policymakers at the regional level. Extension officers, and to a varying degree representatives of rural development organizations, are probably the best proxies for small-farmer interests. Harmonizing needs and priorities at the directorate level of the research institutes needs to formally involve the program chiefs. At this level, there should be close consultation between the institute directorates and the political leaders in the various agricultural development sub-sectors. In fact, the section on agricultural research in the Plan should be drafted by MESRES/IRA/IRZ, MINAGRI and MINEPIA acting together, and it should reflect in some detail the results of the above stepwise planning process from the local and regional levels upwards. Once the Plan is formulated, MESRES and the institutes should organize themselves to provide all researchers with detailed information on the national research policy objectives. It will be shown later in this report how the research planning process could be facilitated by a reorganization by agro-ecological zones of the research institutes.

There are several organizational weaknesses in the annual program planning and evaluation processes, which need to be addressed by the two institutes and MESRES. The remainder of this section will elaborate on the need for the entire research program development process to be rationalized and tied together: (i) setting national agricultural research objectives and allocating priorities, (ii) preparing and obtaining approval of a staffing plan according to priorities, (iii) developing sub-programs, themes, and research operations within that context, (iv) complete costing of proposed operations, including personnel charges, (v) explicit and timely funding of approved operations, and (vi) formal evaluation of research operations every 4-5 years, with written adjustments in operations determined in the evaluation.

Program formulation procedures. The program formulation process brings long-term national priorities and objectives down to operational terms. It defines the research program, based on realistic information about the resources available. The process allocates the time of researchers and technicians, the facilities and equipment needed, and budgetary requirements. It should facilitate monitoring of program implementation and the evaluation of results.

Program formulation has both medium-term and short-term dimensions. Both involve thinking about all levels in the structural hierarchy of programs, from sub-programs down to types of experiments, but in medium-term planning the emphasis is at the levels of sub-programs and themes, while in annual planning emphasis lies at the other side of the spectrum, research operations and individual experiments.

Several groups of people should be, but are not always, involved in the definition of research programs, sub-programs, themes and operations in IRA and IRZ. These are: the scientists, chiefs of section (a section being that part of a program conducted at a given station), and chiefs of program; the station chiefs, the chief of the institute's Research Service, and the institute director; and the clients of research results --

parastatals, extension agents, farmers, and private enterprises. In particular, there must be close interaction between program chiefs, who watch over program comprehensiveness and scientific quality, station chiefs, who are responsible for the relevance of the program activities to development needs of the region, and different client groups. The extent to which this complex interaction takes place varies between programs. It is of utmost importance for both institutes to develop a conceptual and operational basis for this interaction so that all parties concerned better understand and fulfill their roles. This should lead to more even performance and a better response to society's needs.

Planning and evaluation at program level

New research programs (to be distinguished from "themes" and "operations" within programs) in IRA and IRZ are developed in response to emerging priorities as perceived or defined by higher authorities, donors, or researchers. At this stage, program data sheets ("fiches programme") are prepared. There is a standard format for this. This format was designed to succinctly inform high-level decision-makers and politicians of broad program outlines, and it was adequate for that original purpose. However, it is not adequate for program planning. For example, while soliciting a statement of general objectives, the form does not require any definition of specific objectives and a corresponding specification of sub-programs and themes. Nor does it require the development of a long-term resource plan. Moreover, perhaps because of the sketchy nature of these program data sheets, once they have been completed and approved, the institutes rarely update and use them. Many researchers have never seen them. In their present form, they offer little operational guidance to researchers who are designing research operations, and they are not useful in program evaluation.

The mission considers that the program data sheets should include: title, program chief, locations, detailed research objectives and development objectives, description and justification of sub-programs and themes, summary of results to date in the various operations, including titles of publications, linkages with other research programs within and outside the institute and with local development organizations, number of scientists and senior technicians involved and needed, past and projected expenditures, and physical infrastructure requirements. Regular updating is essential.

What is strangely lacking, despite the formally existing disaggregation of each program into sub-programs, themes and operations (reflected in a cumbersome coding system), is any organized manner of describing and justifying sub-programs and themes. This omission can have repercussions on program orientation and balance, especially when program data sheets are deficient and out of date, as stated above. It is at the intermediate levels of sub-programs and themes that the main program thrusts would be most explicit, reflecting the principal program objectives. And it is these specific objectives against which the choice of operations would be assessed, and the reason why these objectives ought to be checked annually for their continuing validity. It is mainly up to the institute directors and the program chiefs to remedy these deficiencies.

Each program should be evaluated every 4-5 years, by a committee composed of, for instance, the chief of the Research Service, the chief of program, at least one eminent external scientist working in the same disciplinary area, and client representatives. Changes resulting from these periodic

evaluations should be entered in the program data sheets. Funds for such evaluation exercises should be provided as a separate budget item. These periodic reviews will improve program integrity and serve to reorient programs and operations to evolving needs.

Planning, design and evaluation of operations

The initiative for proposing research activities within a program usually rests with the individual researchers, on the basis of their own observations and discussions with colleagues, and to a varying extent with farmers and extension personnel. The operation data sheets ("fiches opération") on which they present their proposals require administrative information, a brief account of past results, specification of planned activities, a listing of participating researchers and technicians with indication of their time involvement, and details of resource needs. Fresh operation data sheets are required every year; they form the basis for annual program and budget determination in each institute. As stated above, the sub-programs and themes under which the operations are formulated are hardly reviewed.

A major remaining shortcoming is that the operation data sheets do not demand a precise statement of research objectives; little more than the titles or topics of experiments is required. In addition, some researchers have not been compelled to complete their data sheets thoroughly, nor is there a requirement to add experimental protocols to the file of the operation, as annexes to the data sheets. Section and program chiefs, who are the guardians of well-articulated operations, require more information than is formally demanded if they are to properly judge the value of the work proposed. A big step forward is that, contrary to earlier practice, researchers are now required to justify their budget figures and assessments of needs for personnel, equipment, and services.

The quality of research planning and programming varies considerably according to circumstance. In some programs, notably cotton, banana, rubber, coffee and cocoa, the parastatals which use the results give precise indications of their problems. The researchers then try to design operations to answer such stated needs. In many other programs, notably on food crops and animals, for which there is no organized client constituency or where clients' interests are diverse, or in cases where relations with the relevant parastatals are not good, the researchers have a far more difficult task in ensuring that their work addresses the greatest needs.

In some programs, notably in IRA, one meeting per year, involving all researchers, is held to discuss past results and to plan for the following year. This is a very good practice. Other programs have been handicapped by a lack of budget provision for these meetings, despite the fact that six out of eleven programs of IRZ and eight out of twenty-two in IRA would require such provision because they are conducted at two or more stations and thus involve travel. When funds are very scarce, as they are today, evaluation-cum-planning meetings are among the first items to be scrapped. But this is the wrong place to effect savings.

In certain programs, notably those dealing with cereals, root and tuber crops, and farming systems, the annual meetings comprise not only research workers from IRA, but also university staff, scientists from other research organizations, ministry extension staff, and representatives of parastatal development organizations. This is excellent; the quality and

relevance of these research programs can be greatly enhanced by the active participation of all concerned parties. Unfortunately, such a thorough program evaluation on a national scale largely depends on external financing, usually in the context of major foreign support of the program in question. The mission considers that such annual evaluation-cum-planning meetings should be held for all major programs, as an integral part of the research programming process. To facilitate these meetings it is recommended that the participants' cost of attendance should be included in the annual budgets of their respective organizations, Government departments, or research programs.

Apart from an opportunity to hold meetings, research program quality depends upon the ability of program chiefs to proficiently analyze and discuss research results and proposals, and to provide scientific leadership to the program. Not all program chiefs meet these requirements. In addition, not all of them are sufficiently mobile to meet with researchers in the field to discuss their experimentation and proposals.

A further problem is that the authority of program chiefs vis-à-vis station chiefs in the matter of program execution at station level is still controversial, and in some cases is a source of conflict.

The role of center chiefs in program matters is ambiguous, particularly in IRA: while the center chiefs are ex-officio members of the Program Committee, they do not appear to participate in program formulation or approval at an earlier stage, except when they also occupy the post of station chief or program chief. In present circumstances, one may question the logic of their Program Committee membership. However, the situation would be very different if the centers were more systematically developed as zonal entities (cf. section 2.6), and center chiefs were consequently the principal spokesmen for research interests at the regional level.

Program chiefs should ensure, and the central Research Service of the institutes should verify, that any new research operation is fully consistent with the program's objectives, that it is well-conceived scientifically, and that the experimental methods, including the procedures for analysis and interpretation, are explicit and correct. Evidence that the researcher has adequately studied the available literature should be attached to the operation data sheets in the form of an analytical summary. A seminar at the station to discuss the proposed operation would be a very important first step to ensure that there is some initial evaluation by the researcher's peers, including those who are not intimately familiar with the subject.

Approval procedures at directorate and higher levels

After (ideally) passing the program chiefs, the research proposals in the form of operation data sheets are examined at the directorate level by the chief of the institute's Research Service and the director. Often, this examination is insufficiently critical, due to limited staff with broad experience in the directorate. Even so, such a review does lead to changes in research operations. After the approval of all operations, the directorate compiles a document "Research programs for the year 19.." for the whole institute.

This compilation, which shows only the codes and titles of the programs, sub-programs, themes, and operations, is submitted to the Program Committee (Annex 4) and, after discussion and approval, to the Management Board

(Annex 3) for endorsement. Unfortunately, the limited information presented to these bodies restricts their ability to critically assess the intended activities. In particular, explanatory or justificatory notes are lacking, and there is no reference to specific objectives, let alone an analysis of how the research operations in combination accord with program objectives and address national development needs. A digest of such analytical information would be far more useful for the Program Committee and the Board to consider than a compilation of titles.

Researchers' time allocations to different operations, useful for internal management, are not recorded in any compilations. To ensure that work loads are realistic and that research personnel address priority needs, time allocations would have to be determined by the researchers in consultation with their program chiefs and station chiefs. The directorates of both institutes should require and analyze estimates of the allocation of researchers' time to different programs and operations as part of the review and planning process.

Apart from this problem of providing the IRA and IRZ Program Committees with the right kind of material for critical review, these Committees do not function effectively because of irregular attendance of members, delegation of participation to subordinates, and lack of preparation. Many committee members are based in Yaoundé and are not well-informed as to what is happening in the field. The committee meetings usually are reactive, addressing themselves to what they receive, allegedly often late. Technical ministry officials complain that these meetings are rubber-stamp exercises. There is a widespread feeling that the annual two-day Program Committee meetings do not provide an adequate opportunity for a responsible discussion of proposed programs in relation to national research needs. Staff at the research stations, as well as field staff of the technical ministries, rarely receive feedback from their respective headquarters on Program Committee meetings. Although discussions between research and development at the grassroots level are expected to have taken place prior to the meeting, it is only recently that technical ministry headquarters are beginning to stimulate such cooperation from their delegates in the regions.

Although committee membership does not in itself solve all communication problems, it is recommended that both MINAGRI and MINEPIA be represented in the Program Committee and Management Board of each of the two institutes. Currently, MINAGRI does not sit on either IRZ body, nor is MINEPIA represented in IRA. The proposed representatives on the Program Committees should include a high official responsible for sector planning from each Ministry. This mutual representation across sub-sectors, in addition to stimulating IRA/IRZ cooperation, would permit a more comprehensive expression of national needs and concerns, and could also help improve linkages for (pre-)extension purposes between the ministries and the institutes at the regional and local levels. It is encouraging to note that recent meetings of the IRA and IRZ Boards (February 1987) were attended by, respectively, the Minister of MINAGRI and the Minister of MINEPIA in person. Another very important step is that agreements have been signed (June 1987) between MINAGRI and MESRES and between MINEPIA and MESRES to facilitate cooperation at the regional level without prior reference to headquarters.

The Management Board of each institute meets twice yearly: in February to review the proposed research programs and budgets as approved by the Program Committee in November or December; and in June or July to examine

the new budget (after revision by the institute directorate to take into account cuts made by the Ministry of Finance and the final budget figure approved by Parliament), to shift funds between programs if deemed necessary, and to examine and approve the balance sheet and the administrative account. In actual fact, there is insufficient correlation between the approved operations and the approved budget. Neither the Board nor the Program Committee sets priorities among sub-programs, themes, or operations. Problems arising from resource constraints are therefore resolved at the directorate level. Before the recent financial crunch, cuts were usually applied across programs, often without consultation with heads of programs, centers and stations; and, in the absence of clear priorities, researchers tended to respond to cuts by devoting most of their attention to the least costly operations rather than basing their choice of activities on scientific merit or national importance. Since 1987, the process has been much improved. When the final budget figure is known, cuts are applied after careful consideration of each program, rather than across the board, and program chiefs are required to specify which operations will be reduced or suspended as a consequence of these cuts. Furthermore, the Board reviews the proposed program reductions and makes the final decisions.

Composition of the institutes' research programs. IRA has twenty-one active programs (Table 1). These vary greatly in scope, number of researchers and size of budget. Some programs cover an entire disciplinary area, such as soils, or a whole group of commodities, e.g. cereals, whereas others deal with a single commodity. This heterogeneity affects research management and scientific decision-making, and makes it difficult to judge to what extent resource allocations reflect national priorities.

Ten IRA programs deal with food crops, which in 1986/87 received 47% of the national budget of 350 million FCFA for program operation. Export crops continue to be important, with 32% of the program budget, forestry accounts for 7%, and basic and support programs 14%. The proportions are about the same for the allocation of research manpower. Over half of all foreign support for IRA goes to food crops and cropping systems research, supported predominantly by USAID through contracts with IITA (see Annex 6.5). Research on export crops is assisted mainly by France, notably through departments of CIRAD.

Many programs are conducted in more than one station (Annex 5.1). The export crops programs are more concentrated than those on food crops, with only coffee and cocoa at more than one station (not counting antennae and trials sites). Dispersed programs demand mature scientific leadership and strong managerial skills.

Within and between the different groups of programs there are problems of balance, which IRA must address. For instance, the cereals program, including the TLUs, had thirty-two researchers at post in December 1986, with five more nationals on training and some expatriates still to arrive, so that the total exceeds 40% of all food crops researchers. Conversely, the vegetable crops program must do with only one expatriate researcher and no nationals. Again, comparing across groups of programs, the share allocated to forestry seems far too low considering the extreme importance of the forest resource to Cameroon's economy and environment.

IRZ has eleven programs (Table 2), the main ones being the beef, veterinary, small ruminants, agrostology, fisheries and dairy programs. Most of these are carried out at more than one station, some at as many

Table 1. Research Programs at IRA: Researchers and Program Operating Funds from the Government Budget

Program	Progr. Oper. Funds (1986/87) ¹			Researchers ²						Senior technicians ⁵	Number of Res. Operations	Local program operating funds per researcher ⁶ (1000 FCFA)
	In '000 FCFA	% of total	Other funds ³	Nationals at post	Nationals away on training	Expatriates at post	Total number	Total at post	% of total			
Food Crops												
Cereals	46,000	13.1	yes	19	5	13	37	32	20	15	96	1,438
Tubers	30,000	8.6	yes	8	2	2	12	10	6	4	61	3,000
Farming Systems	18,000	5.1	yes	5	1	8	14	13	8	2	37	1,385
Fruits	17,000	4.9	no	1	-	3	4	4	2.5	3	16	4,250
Plantain	15,000	4.3	yes	3	-	1	4	4	2.5	1	12	3,750
Grain Legumes	14,000	4.0	yes	3	-	3	6	6	4	2	39	2,333
Banana	10,000	2.9	yes	1	-	2	3	3	2	1	10	3,333
Food Technology	10,000	2.9	no	7	-	0	7	7	4	1	11	1,429
Pineapple	3,000	0.8	no	1	-	0	1	1	1	0	6	3,000
Veget. Crops	2,000	0.6	yes	0	-	1	1	1	1	0	3	2,000
Subtotal	165,000	47.2		48	8	33	89	81	51	29	291	2,037
Export Crops												
Coffee	34,000	9.7	yes	5	1	4	10	9	5.5	3	34	3,778
Cocoa	23,000	6.5	yes	6	2	4	12	10	6.1	4	25	2,300
Oil Crops	20,000	5.7	yes	5	1	2	8	7	4.3	1	37	2,857
Rubber	17,000	4.9	yes	3	-	4	7	7	4.3	0	18	2,429
Cotton	17,000	4.9	yes	3	1	4	8	7	4.3	1	13	2,429
Subtotal	111,000	31.7		22	5	18	45	40	23.5	9	127	2,775
Forestry												
Dense Forest	15,000	4.3	no	6	1	2	9	8	5	0	9	1,875
Savanna Forest	11,000	3.1	no	2	0	2	4	4	2.5	0	5	2,750
Subtotal	26,000	7.4		8	1	4	13	12	7.5	0	14	2,167
Support/Basic												
Soils	32,000	9.1	yes	13	5	7	25	20	12	2	21	1,600
Botany	13,000	3.7	yes	5	-	0	5	5	3	0	12	2,600
Genetic Res.	2,000	0.6	yes	2	-	0	2	2	1	1	4	1,000
Medicin. Plants	1,000	0.3	no	2	-	0	2	2	1	0	4	500
Subtotal	48,000	13.7		22	5	8	34	29	17	3	41	1,755
Directorate												
				1	1	1	3	2	1			--
TOTAL	350,000	100.0		101	20	63	184	164	100	41	473	2,134.7

1 Approved amounts; reportedly received in full.

2 December 1986 data from IRA Research Service. IRA Director, Deputy Director and Chief of Research Service included, but as a separate line.

3 Figures by program not available at IRA. See, however, Annex 6.3 prepared by the mission.

4 Numbers of senior technicians per program as at Dec. 1986 not available separately from technicians in other categories; total all categories is 132. Data may be added by IRA later.

5 Counting only researchers at post, nationals + expatriates; no senior technicians included.

6 Forty-one out of 158 researchers at post work on several programs; as time allocations are unrecorded in IRA, the researchers have been assigned to only one program on the basis of IRA staff lists.

7 Weighted average.

Source: IRA Research Service and SAF.

Table 2. Research Programs at IRZ: Researchers and Program Operating Funds from the Government Budget

Program	Progr. Oper. Funds (1986/87) ¹			Researchers ²							Senior technicians	Number of Res. Operations	Local program operating funds per researcher ³ (1000 FCFA)
	In '000 FCFA	% of total	Other funds	Nationals at post	away on training	Expatriates at post	Total number	Total number	at post % of total	Working on other programs ⁴			
Beef	44,200	16	no	4	6	1	11	5	9	8	11	25	4,702
Veterinary	43,261	16	no	7	3	0.5	12	7.5	14	3	5	36	4,554
Small ruminants	42,925	15	no	2	5	0.5	5.5	2.5	5	5	8	29	7,530
Agrostology	40,670	15	no	7	3	3	14	10	19	3	10	31	2,905
Fisheries	33,650	12	no	6	3	-	9	6	11	0	11	28	3,236
Dairy	27,220	10	no	6	3	-	8	6	12	3	8	21	2,529
Pigs	19,925	7	no	3	2	-	4	3	6	2	2	19	5,243
Poultry	11,600	4	no	6	1	-	7	6	11	4	5	20	1,450
Rabbits	7,100	3	no	0	1	-	1	0	0	1	4	12	4,437
Horses	4,000	1	no	1	-	-	1	1	2	0	0	1	4,000
Wildlife	3,000	1	no	1	2	3 ⁵	8	6	11	0	12	1	278
TOTAL	277,551	100		43	31	8	80	53	100	29	76	223	3,540 ⁶

- 1 Data and information obtained from IRZ Directorate, February 1987.
 2 1986/87; IRZ Director, Deputy Director and Chief of Research Service all included in this list.
 3 Researchers at post (nationals + expatriates); senior technicians included with a weighting factor of 0.4.
 4 Over 60% of the researchers work on several programs; as time allocations are unrecorded in IRZ, the researchers have been assigned to only one program on the basis of the best information available to the mission.
 5 Collaborating foreign staff on a come-and-go basis.
 6 Weighted average.

Source: IRZ Directorate and various IRZ documents.

as six sites (Annex 5.2). Scientific coordination, supervision, and administration of these programs are difficult, all the more so because many researchers and technicians in IRZ are relatively inexperienced. Three programs are very small: rabbits, horses, and wildlife, the last two created only recently (1985). Of these three, only wildlife is set for major expansion in the longer term, and justifiably so. Taking into account staff in training (over 50% of all nationals) and expected GTZ staff, as well as some planned program reorientation to strengthen systems aspects, the anticipated program balance appears to be satisfactory, apart perhaps from some under-emphasis on small ruminants.

Those activities in IRA and IRZ most directly concerned with the conservation and management of the natural resource base (dense forest, savanna forest, botany, genetic resources, wildlife, soil survey, monitoring of ocean pollution, etc.) receive an estimated 10-12% of total research program funds. Although this compares favorably with many other African countries, it is still too low, given the vital interests at stake.

The budget allocation for research on natural resource conservation and management should be raised, with the proviso that each activity in this category be carefully scrutinized for relevance and quality. Increased attention is needed, especially for soil fertility maintenance, soil-plant-water relations, agroforestry, and management of the natural forest. All of these are locality-specific problems best handled at a decentralized level in the regions.

While IRA employs six agro-economists attached to the cereals and farming systems programs and IRZ has one livestock economist, all in all, economics is very thinly covered. Both institutes should pay greater attention to adding an economic dimension to ongoing and planned research. For instance, research should include more than hitherto the identification of farmers' production bottlenecks and the study of benefit/cost relations of proposed improvements, and should emphasize cost-reduction in the design of technologies for export commodities.

To improve priority setting and resource allocation it is important for both IRA and IRZ to review the delimitation of their different categories of activities: programs, sub-programs, themes and operations. At present, as stated earlier, the definition of these units and sub-units is extremely uneven. Some programs are very large, others minuscule. In many cases research operations cover a whole research topic, in others they virtually correspond with individual experiments. It has been argued that some programs, such as banana and plantain, or pineapple and fruits, should be merged. The mission shares this view, but feels that the possible advantages of splitting some of the largest programs (notably cereals) should also be considered.

However, it is not so much a question of aiming for uniformity in size but rather one of conceptual consistency. Factors to be taken into account include the need for communication between researchers in related disciplines or commodities, staff availability to provide program leadership, and cost. On the whole, limiting the number of programs seems preferable, but it would be erroneous to think that this by itself would be a major factor in cost-reduction. The mission recommends that the number and identity of programs, as well as the entire hierarchical structure of programs, sub-programs, themes and operations be reviewed to achieve greater consistency in the definition of these units. It also urges that this be followed or accompanied by an in-depth review of each program, aimed at improved balance and the weeding out of unpromising research lines, and to provide a basis for a long-term research plan for the institutes.

Analysis of operating funds by program. Good planning and programming require analyzing the operating funds available per researcher and per program. This has been tried in Tables 1 and 2, even though some of the necessary data, in particular those on foreign contributions per program, are not available. Another flaw is that all researchers are counted against one program only, whereas in fact many of them work in at least one other program. Calculations would be more reliable if staff time allocations to programs, expressed as proportions of a person-year, or in person-months, were available. This would have to include the time of senior technicians in so far as this is spent on research operations which they conduct independently. As an approximation, the senior technicians of IRZ have been included with a weighting factor of 0.4 in the calculations of Table 2, because -- contrary to the situation in IRA -- many IRZ senior technicians do their own research.

Given the inadequacies of the available data, Tables 1 and 2 are included in this report primary to illustrate an analytical process the institutes might find it advantageous to adopt, rather than for the value of the current data per se. Clearly, future data should permit the reliable estimation of total program non-personnel operating funds, as well as personnel operating funds, per researcher, for each program.

Such data make it possible to detect, and then to explain and where necessary correct, major discrepancies in resource use between programs. For instance, if data were more complete, the last column of Tables 1 and 2 would raise questions such as: in IRA, why are the program costs per researcher in coffee and fruit crops so much higher than in cocoa; in IRZ, does the wildlife program receive too little money per researcher, and could the small ruminants program be managed more cost-effectively? The relatively low figure for the cereals program (Table 1) probably can be attributed to the fact that this program receives external operating funds; with these (Annex 6.5) included, the amount available per researcher is well over 5 million FCFA. This extreme example shows the importance of the institutes obtaining reliable and detailed estimates of foreign operating contributions and including these in their calculations and comparisons. It is essential that technical assistance and funding agencies cooperate by providing details of all their non-personnel contributions.

The IRZ overall average of Cameroonian program operating funds per scientist is about 60% higher than that for IRA. The difference is less if one takes into account the additional operating funds which some of IRA's programs receive from external sources. Such a difference between IRA and IRZ is reasonable if one considers that comparative figures from advanced countries show that animal research can be up to twice as costly as crops research, while on the other hand IRA has emphasized off-station work, which is expensive, to a far greater extent than IRZ has done so far.

These few comments, based on incomplete data, are meant to persuade the institutes of the usefulness of obtaining the suggested kinds of records, and to use these in their planning, programming and budgeting.

Off-station research. Most IRA research programs include trials in plots belonging to parastatal commodity or regional development organizations. However, only six programs do on-farm testing with small farmers: cereals, roots & tubers, grain legumes, coffee, cotton, and farming systems. Most of IRZ's trials are on-station. Two of its programs, agrostology and

veterinary, involve both on-farm testing and work with parastatals, whereas the dairy program includes on-farm testing and the beef program works with parastatals. While underlining the crucial importance of on-station research for the development of new technologies for a modernized agriculture, the mission feels that a substantial part of the research conducted by IRA and IRZ must use the farmers' present socio-economic and technical conditions as its frame of reference. Therefore, the mission commends the steps taken by IRA in this direction, and recommends that IRZ place more weight on research and testing in the farmers' environment. Government should be aware that the current decline in the proportion of the budget left for research operations after personnel charges and other fixed costs have been deducted jeopardizes off-station research which, though costly, is an essential part of the needed multi-faceted approach to solving critical constraints of agricultural production.

2.4 Collaboration with Other Organizations

IRA and IRZ have developed a variety of national and international links with academic, research, development and funding organizations.

National academic and research institutions. The university centers are very important to the research institutes. First, they are the major source of scientific and technical manpower. Second, they can influence the program of the institutes through their representatives on the institute Boards and Program Committees. And third, they collaborate with the institutes, currently on a minor scale, for specific research. Conversely, the research institutes can be equally important to several of the university institutions.

The potential for collaboration with CUDS is of particular interest to both IRA and IRZ because this institution is evolving into a major agricultural university concerned with teaching, research and extension.

At present, two institutions on the CUDS campus award three diplomas:

- Ecole Nationale Supérieure Agronomique (ENSA), providing a 5-year course after A-levels ("baccalauréat"), leading to the Ingénieur Agronome degree;
- Institut des Techniques Agricoles (ITA), providing a 3-year course after A-levels or equivalent leading to the higher technical diploma of Ingénieur des Travaux Agricoles, and a 2-year diploma course after C-levels producing Techniciens d'Agriculture (TA).

With external assistance, it is planned to replace the ENSA and higher technician ITA programs with an integrated four-year BSc program, while a proposal to phase out the two-year TA program is still under discussion. The B.Sc. course will comprise a two-year core program, provided by a Department of Basic Sciences, followed by two years of specialized training, the options being crop production, animal production, forestry, rural engineering, agribusiness, and rural education and extension. In addition, a two-year equivalent of an MSc program is planned, which students will be allowed to enter after a minimum of two years of practical work following the completion of their B.Sc.

CUDS is also developing three demonstration farms, central analytical laboratories, a computer center and a major library. An antenna at Nkolbisson and five off-center facilities, at Bambi, Ebolowa, Maroua,

Ekona and Wakwa, are being developed for training and research in different agro-ecological zones. All these locations are in the vicinity of IRA and/or IRZ stations. The mission noted that the directorates of IRA and IRZ were not well informed of the stage of development and future plans of CUDS. This is particularly regrettable in light of CUDS's apparent expectation that the research institutes will play an important part in training by using and supervising students in their research programs, including their on-farm work. The CUDS off-center facilities should be fully exploited for the opportunities they offer to tie together CUDS, IRA and IRZ, with a special focus on the role of scientific disciplines in problem-solving research, and on coordination between research and teaching.

Opportunities for closer collaboration between the research institutes and CUDS abound and will be enhanced as the CUDS complex develops:

- cooperation between the respective computer divisions and libraries;
- coordination of laboratory analytical work;
- teaching at CUDS by IRA and IRZ staff;
- training of CUDS students at IRA/IRZ research stations;
- cooperative research, particularly where CUDS off-center facilities are located on or adjacent to IRA and/or IRZ stations;
- cooperation in farming systems research; and
- formal staff exchange between CUDS and the research institutes.

Some of these links are already operational; in particular, researchers give lectures at CUDS and supervise practical training of students. This cooperation could be further strengthened, and in some other areas it could be easily implemented. University staff should engage in research more than they do today.

To strengthen the CUDS-IRA and CUDS-IRZ relationships, the mission is of the opinion that IRA and IRZ should be represented on the CUDS Management Board and planning committees. In general, both IRA and IRZ could and should play a more prominent part in CUDS planning, and the further development of the human and physical potential of IRA, IRZ and CUDS should be closely coordinated.

For IRZ, a major source of staff recruitment is the Faculty of Science of the University of Yaoundé. An agreement between these institutions covers staff recruitment, training and evaluation, and cooperative research (at present limited to nutritional physiology). Similar links do not exist in the case of IRA. The mission recommends that IRA recruit more science graduates, and establish a research relationship with the University of Yaoundé.

The University Centre at Ngaoundéré (food technology) has some linkages with the IRZ station of Wakwa, none with IRA. If this University Centre becomes the home of the planned veterinary faculty, much stronger links with IRZ will be required, and these should be institutionalized from the outset.

Research in economics falls under the competence of ISH, but at present only a fraction of its activities is devoted to agricultural economics. The need for increased inputs of socioeconomic disciplines into commodity research, and the growing emphasis on farming systems research in IRA and IRZ, should result in more cooperation with ISH, assuming that this institution is able to devote more of its efforts to research and advice in

agriculture. Although marketing studies are the domain of the Ministry of Commerce, it would be beneficial if the research institutes would widen their horizon to collaborate in the planning of these studies, and if there were a sharing of research results.

Research, academic and development organizations abroad. Because the agricultural research system in Cameroon has evolved from institutions created in colonial times, linkages with the research organizations of the ex-ruling power of the then French Cameroon are still much in evidence, mainly with the 'Centre de Coopération Internationale en Recherche Agronomique pour le Développement' (CIRAD) and the 'Institut Français de Recherche Scientifique pour le Développement en Coopération' (ORSTOM). But since the early 1980s, IRA in particular has forged additional, strong links with the international agricultural research centers (IARCs), and both IRA and IRZ have established new and varied relationships with overseas research, academic, and development organizations.

The relationship with CIRAD is still very important to the institutes: in 1986/87 its constituent departments provided a total of thirty-five senior researchers for the food and export crop research programs of IRA (Annex 6.3), and two veterinary and three agrostology research staff to IRZ (Annex 6.4). ORSTOM provided one expatriate soil researcher to IRA during the same period. CIRAD and ORSTOM pay the salaries and related expenses for their staff, as well as some of the transport cost; they also provide training for national staff. But they normally rely on the Cameroonian institutes to finance the operating costs of their staff. However, as from 1987/88 France has made available new loan funds for investment in the IRA station of Garoua and to cover the operating cost of the seven IRA antennae in the North. It also has provided loan and grant money for cotton and agricultural diversification research in that zone. This comprises funds for infrastructure and operating costs, including payment of French and Cameroonian researchers and Cameroonian senior technicians.

IRA has developed a close relationship with many of the IARCs, notably IITA, IRRI, WARDA, ICRISAT, CIP, and ISNAR. In some of its programs, such as cereals, tubers and grain legumes, the relationship, notably with IITA/USAID, is almost a dependency. IRZ's links with the relevant IARCs (other than ISNAR), notably the International Livestock Centre for Africa (ILCA) and the International Laboratory for Research on Animal Diseases (ILRAD), have been limited or non-existent. Its ties with ILCA will now be much intensified, with the recent IRZ/ILCA agreement for the appointment of a senior ILCA staff member as scientific adviser to the IRZ directorate.

Major impacts of the IARCs on agricultural research programs in Cameroon derive from:

- provision of biological materials, in particular breeding lines and varieties of various crops;
- support for farming systems research and the development of pre-extension units such as the TLUs in IRA;
- introduction of laboratory techniques and research methodologies;
- provision of expatriate senior researchers with consequent improvements in program leadership;
- provision of training;
- strengthening of cooperation with other countries in the region in both disciplinary and commodity research, through workshops and seminars; and
- diffusion of information through newsletters, annual reports and published research results.

Linkages of IRA and IRZ with academic institutions abroad are growing in importance. Until recently, IRA developed these linkages only for training purposes, but recently an overall cooperative agreement was signed with the University of Maryland/Eastern Shore (U.S.A.). IRZ has research linkages with overseas universities, primarily for cooperation in the wildlife program. These include the provision by IRZ of technicians for: (i) the Centre for Environmental Studies, University of Leiden (Netherlands) study of elephants and their effect on the vegetation of Waza National Park and Kalamaloué Wildlife Reserve; (ii) the Primate Laboratory, University of Kyoto (Japan) study of mandrills in the Kalamaloué and De Campo Wildlife Reserves; and (iii) a University of California (U.S.A.) study on birds.

Better financial arrangements sometimes need to be made for Cameroonian scientists who are studying abroad but conduct their thesis research in Cameroon. In particular, the completion of thesis research should not be left to the vagaries of operating budgets; instead, funds should be committed for the entire period.

The concept of "twinning" can be important for both institutes. Twinning may take different forms. It may be a comprehensive link between a Cameroonian institute and a foreign institution. Because this usually involves decisions at a high political level, such a very formal link may confer considerable operational latitude and funding advantages on the twinned institute. Or it may be a linkage between one or several IRA or IRZ stations and a faculty or station of an overseas university. Or it may concern only a specific research area or program. At IRZ, twinning the whole institute formally with an overseas university is under consideration. It already has a close relationship with the Centre for Tropical Veterinary Medicine (CTVM) in the University of Edinburgh (U.K.), which could be a very suitable choice. In IRA, there are specific areas which benefit from what amounts to a twinning relationship; an example is the link between the Maroua soils program and Montpellier (France).

The mission recommends that both institutes thoroughly explore, in all its aspects, the concept of twinning with overseas universities and research institutions. This could be particularly important for providing guidance to inexperienced researchers and for the formulation of research programs and operations.

Some problems in collaboration exist. First, IRA has not always been able to provide suitable counterpart staff for expatriate researchers. Second, expatriate researchers have not always been of the calibre desired by either the technical assistance organization or IRA. A third problem which recipient institutions always face when IARCs or other organizations provide major support to specific programs is the risk of distortion of program balance. In the mission's opinion, IRA has been successful in avoiding major foreign-induced program distortions. Even the cereals program, incorporating the USAID-funded National Cereals Research and Extension Project (NCRE), cannot be considered to be very much out of proportion: although it accounts for nearly 20% of the total IRA staff at post, 20% of the total number of research operations, and 20% of all expatriates (Table 1), it covers four major staples, and is also, through the TLUs, at the heart of IRA's working relationship with the rural areas in food crops. Furthermore, it operates efficiently and benefits from foreign operational support, so that it absorbs only 13% of national program funds. The risk of program distortion has hardly arisen in IRZ, but as it will soon be receiving major support from several external organizations, including GTZ and ILCA, all parties concerned should be

mindful of such risks. The best way for the research institutes to ensure program balance is by creating effective priority-setting, program formulation and program-budgeting mechanisms based on a proper management information system, which is currently lacking.

The following research and development organizations also contribute to the work of the institutes:

- FAO/UNDP has been instrumental in strengthening soil science in IRA and, in 1986/87, provided 4 expatriate soil scientists to work in the National Soils Centre. It also provides equipment and training fellowships.
- The Semi-Arid Food Grain Research and Development regional project (SAFGRAD) funded by USAID and the International Fund for Agricultural Development (IFAD) provided two researchers for farming systems research in 1986/87.
- The International Fertilizer Development Center (IFDC) is linked with IRA through IITA, and some work has been conducted on the value of rock phosphate.
- The Institute for Tropical Medicine in Antwerp, Belgium, collaborates with IRZ on sheep research.
- FAO has cooperated with IRZ in fisheries research.
- The International Foundation for Science (IFS) of Sweden provides limited grants for individual research workers in both IRA and IRZ.
- The International Development Research Centre (IDRC) of Canada has assisted in funding three IRA projects: root crop research at Njombé, plantain research at Ekona, and farming systems research at Nkolbisson; it is also funding some aspects of dairy research in IRZ.
- In the immediate past the "Administration Générale de la Coopération au Développement" (AGCD) of Belgium funded parts of the root crop program at Nkolbisson, Bertoua and on the Adamaoua Plateau.
- The Gatsby Foundation (UK) assists in the funding of IRA's root crop program.
- Heifer Project International has helped to fund the construction and equipping of nutrition laboratories within IRZ.
- The World Bank has provided a major loan for the National Agricultural Research Project (NARP), which will support both IRA and IRZ with scientific and managerial technical assistance, infrastructure, training and equipment. Under this loan, ILCA will provide a livestock research management specialist to IRZ, and ISNAR a research management specialist to IRA. This loan has been renegotiated in 1987/88.
- ODA (U.K.) will contribute to the NARP by providing the services of two biometricians (one each for IRA and IRZ), a computer specialist for the joint IRZ/IRA computer unit, a librarian/documentalist plus a scientific editor for the joint IRA/IRZ documentation service, and a banana/plantain nematologist at Njombé, all of these together with supporting equipment and training.
- GTZ of Germany will provide three researchers and related support to IRZ under the NARP.
- The International Council for Research in Agro-Forestry (ICRAF) will assist with IRA's research in agroforestry.

Clearly, both IRA and IRZ have done much to cultivate relationships with diverse research and development organizations, and should continue to do so within the limits of availability and technical capacity of their researchers. However, the preparation of a long-term national agricultural research plan that takes account of all relevant research capacity in the country is a precondition for making the most effective use, not only of Cameroonian resources, but also of the potential for external assistance and cooperation.

2.5 Relationships with Clients

Farmers. Some researchers maintain direct contact with farmers as part of their work. Nearby farmers often also seek personal contacts with researchers. Institutionally, contact with the farming community is accomplished mainly through field days ("journées portes ouvertes") which are held at research stations. Some field days have been extremely well attended, involving substantial numbers of farmers, women as well as men. One serious problem with this type of interaction is the shortage of material of improved varieties or breeds available for distribution or sale to farmers once their interest has been aroused. Field days are organized at the personal initiative of chiefs of centers and stations. They require a lot of preparation but are not necessarily very expensive. Yet, there is the tendency in some stations to delete these events from their activities, allegedly because of funding constraints. This argument is thin. When funds are so scarce that experimental work has to be reduced, the most productive occupation is undoubtedly to synthesize past results and present them to the public. The mission recommends that field days continue to be given a high priority.

The biennial technological fairs (Yaoundé June 1985, Douala June 1987) of MESRES, where all MESRES institutes as well as other organizations, public and private, are invited to present their results, constitute another major opportunity to bring research to the clients. To make these fairs more accessible to the rural people and more relevant to regional problems, MESRES's wish to organize such fairs at a regional level deserves strong endorsement and the required regular financial support.

In IRA, farmers participate in on-farm research, an increasing part of which is supervised by the TLJs; this sometimes involves the distribution of mini-kits. IRZ is planning to organize similar on-farm testing units. The extent to which farmers have a direct influence on the choice of research themes and operations depends largely on the receptivity of individual researchers, since farmers do not take part in any formal research planning. Methods will have to be found at the divisional and sub-divisional levels, in collaboration with the regional delegations of MINAGRI and MINEPIA, to enable farmers or their most suitable proxies to take part in discussions on farmers' needs, with a view to improving the relevance of research programs.

Extension services of ministries. IRA has an institutional link with MINAGRI (for crops and forestry), and IRZ has a similar relationship with MINEPIA (for livestock, fisheries and animal products): three department directors of MINAGRI participate in the Program Committee of IRA, and three department directors of MINEPIA in that of IRZ. There are no formal links between MINAGRI and IRZ, or between MINEPIA and IRA. The mission reiterates its recommendation that both ministries be represented in the Management Board and Program Committee of each of the two institutes.

There have been successful associations between the research institutes and the technical ministries. IRZ has supplied improved breeds of livestock as well as pasture and forage seeds to MINEPIA, and has helped in the diagnosis of livestock diseases. It has also assisted MINAGRI in organizing the Dairy Farmers Cooperative in Bamenda. IRA has produced a range of research results which have found practical application through MINAGRI or its parastatals. Both IRZ and IRA staff have helped train students from MINEPIA and MINAGRI technical schools.

Negative impressions about the research institutes and research in general were far more prevalent in conversations with officials in Yaoundé than with ministry representatives in the field. There, particularly where stations have conducted field days and/or convened planning meetings, extension staff and provincial and divisional delegates are more involved in contacts with research and are well informed. These regional MINAGRI and MINEPIA representatives cite problems in communication of research-related information and concerns within their own ministries. One of their comments is that their own directorates do not provide them with any feedback about the outcome of Program Committee meetings of the research institutes.

Extension staff from the technical ministries are inadequately involved in on-farm research, and in research planning. This is partly because of a shortage of extension staff, but also because they lack specific training as well as adequate transport. There is a widespread opinion that without upgrading the entire service, ministry extension agents will not be able to participate as full partners in the research and extension effort. Since IRA's TLUs are constrained in funds and manpower, they usually work in conjunction with the extension personnel of development organizations, who are often well-trained and have more resources than ministry extension personnel.

IRA and IRZ could make greater efforts to train and use field-level extension agents in on-farm research, verification trials and demonstrations in farmers' fields, and to formally involve them, as well as provincial and divisional extension officials, in research program planning at the regional level. In particular, extension officers should be involved in brainstorming over appropriate technological developments. MINAGRI and MINEPIA would need to mobilize some funds in support of such measures, and MESRES, MINAGRI and MINEPIA headquarters would be expected to encourage this type of interaction at the regional level, as indeed they have done in recent declarations.

While the production and diffusion of extension materials is a function of MINAGRI and MINEPIA, it is imperative that researchers communicate research results in an appropriate language. Researchers are making greater efforts than before to express their results in simple language and to write technical bulletins. Staff at some stations have taken the initiative to publish 'how-to' manuals. It is unfortunate that there have been instances where technical materials have been delivered to the extension services, only to find that they lacked the means to duplicate and distribute them. On the whole, communication between IRA and MINAGRI, and between IRZ and MINEPIA on the implementation of research results is far from adequate. Whatever can be achieved by good personal communication between senior research and extension staff, this is not a substitute for formal mechanisms to bring the research institutes and the extension services together on a regular basis.

Parastatal development organizations. IRA and IRZ have varying relationships with parastatal organizations, ranging from close and satisfactory collaboration -- sometimes jointly financed -- to problematic relations where parastatals cannot or refuse to pay for services rendered. They differ widely in their mandates, from narrow commodity interests to overall responsibility for regional rural development. Many of them are formal members of the Program Committee of IRA and/or IRZ (Annex 4), and their representatives participate in the annual meetings; but their interest is often limited to their particular sub-sector. Moreover, some of

these organizations conduct research or experimentation of their own, on which they do not necessarily expect comments from the MESRES institutes. Thus it is that many parastatal organizations do not really contribute much to reviewing the work of the research institutes in an integrated manner, as would be needed for these institutes to optimize their inputs into regional and national development.

There are, however, excellent examples of cooperation between the research institutes and parastatals and these should be encouraged and emulated. For instance, IRA has symbiotic and particularly productive relations with SODECOTON. This organization participates fully in research planning in the North and Far North at both regional and program levels, and it co-finances on-farm research through the TLUs. While its primary interest is cotton, it is also responsible for the diversified cropping systems of the North and relies on IRA to help serve these wider interests. These linkages have been working well, except where emerging problems with car maintenance have reduced the mobility of IRA staff. Another example is the Ferme de Karewa (AGRILAGDO). It conducts joint research with IRA, making 10% of its irrigated area available for experimental work. The two organizations share technical documentation, and IRA has trained AGRILAGDO project staff. In the animal field there are fewer parastatals, and IRZ on the whole has less close working contacts with those organizations than IRA has with some of the crops parastatals.

The main development organizations working with IRA are:

- AGRILAGDO irrigated perimeter, joint research on food crops;
- CDC Mondoni antenna, oilpalm, rubber and banana research;
- CENADEFOR study of forest dynamics (Deng-deng);
- HEVECAM rubber research;
- MIDENO research on maize, wheat, beans, coffee, and potato, and extension work with the TLU at IRA-Bambui; also working with IRA soil scientists on establishing land-use maps;
- MIDEVIV provision of seeds and fruit tree seedlings;
- OCB banana export problems;
- SEMRY Kousseri and Maga antennae, irrigated rice research;
- SOCAPALM oil palm material and agronomic practices;
- SODEBLE maize research;
- SODECAO cocoa: provision of seedlings, disease and pest control, other research; food crops research (maize and roots);
- SODECOTON research on cotton and food crops (cowpea, maize, peanut, sorghum) and major extension cooperation (TLUs);
- SODERIM irrigated and rainfed rice research;
- UCCAO extension of research results (arabica coffee, cowpea, fruit, plantain, haricot beans, maize, peanut, root crops, soil protection); grain legume research ("Projet SOJA");
- UNVDA irrigated rice research;
- ZAPI-EST Bertoua antenna, research on food crops (cowpea, maize, rice, root crops).

IRZ has linkages with:

- LANAVET cooperation with epidemiological surveys at IRZ stations;
- OPV national cooperation in the testing of imported pharmaceutical products;
- SODEPA assistance in livestock breeding and range improvement on the parastatal's ranches and some cooperation in research and extension.

2.6 Possible Structural Changes

Why consider changes in organization and structure? One must never change the organization and structure of an institution unless there is evidence of essential functions being poorly performed or important features inadequately expressed. In organizations for applied research such as IRA and IRZ there are three main factors to consider when trying to optimize their productivity: (i) the scientific competence of their professional staff, (ii) the coherence and comprehensiveness of their research programs, and (iii) their response to client needs. These factors correspond with a discipline focus, a program focus, and a zonal focus of research, respectively. The institutes' organization and structure should be such as to promote each of these.

With regard to (i), the most important need, after good training, is the opportunity for regular communication of staff members with colleagues within their discipline. This is of particular value to scientists in isolated places, and for young ones who need reinforcement of their discipline research skills. In Cameroon, where most disciplines are represented by few specialists, dispersed over different localities and institutions, the obvious answer is to encourage the organization of periodic seminars for all people working in the discipline throughout the country, in research institutes, universities, and development organizations and projects. Usually, scientists will spontaneously take initiatives of this kind if there is modest but regular provision for such meetings in the annual budgets of the concerned institutions. To the extent that there is a need for a formal mechanism which would take an overview of and stimulate the development of the disciplines in the system, MESRES is the obvious body to provide it. Its role would be mainly to ensure that a common approach is adopted and adequately publicized in all its research and academic institutions, and that budget provisions are made. This, therefore, is what the mission recommends.

Factor (ii) above, that of program integrity, is well served by the introduction over the last few years, in IRA and IRZ, of the position of Program Chief. There is a need to support this step by the creation of national program committees, one for each research program. Committee membership, usually not to exceed six or seven persons under the chairmanship of the program chief, should be drawn from the program's most senior researchers from different stations but should also include one or two senior technical staff from regional or commodity development organizations and, if available, a particularly relevant specialist from the university system. It is of the utmost importance to formally define the role of the program chiefs, notably in relation to center and station chiefs and the directorate. It is also necessary to formalize the appointment of program chiefs, grant them a duty allowance, and provide them with logistic means, including travel funds, to properly exercise their function.

This leaves factor (iii), response to client needs, and it is here that deficiencies occur which call for a rethinking of the institutes' structure in relation to their geographic, human, and political environment. The mission has found a wide consensus among Cameroonian Government officials and leaders of development organizations, and within both IRA and IRZ, that effective contact between the institutes and users of research results is better achieved in the regions than at the central level. The institute directorates are far removed from local and region-

al interests, their decisions seem too distant to motivate researchers and clients in the region, and lines of communication are often long and the cost of communication high. Since environmental and demographic factors are more relevant to research than administrative boundaries, any steps to bring research closer to its clients would best be organized on the basis of agro-ecological zones. The idea of more systematically structuring the institutes on this basis is already being pursued in IRA and IRZ, and apparently at higher levels of Government. In developing this same line of thinking, the mission has paid special attention to the need to ensure that the relationships of zonal centers with the nationally organized research programs (II, above) on the one hand, and with MINAGRI, MENEPIA and development parastatals in the regions on the other, can be well articulated.

Options for the structural development of the research institutes. In relation to the above there are three aspects to consider when discussing the institutional development of IRA and IRZ: the degree of their interdependence, the level of decentralization in the planning and administration of their research programs and infrastructure, and the extent of coverage of agro-ecological zones. The mission is aware that certain proposals for administrative reorganization and for extending the coverage of agro-ecological zones have already been put forward to the Government. Because the mission does not have any details of these proposals, the following observations and suggestions are made independently.

Interdependence between IRA and IRZ

The Cameroon/World Bank agreement on the National Agricultural Research Project, within which some common IRA/IRZ services are planned, indicates that the two institutes will become more interdependent in some respects. Although the option of a unified IRA/IRZ research organization has some positive features conceptually, there are also negative factors. First, a merger would create a large and even more diversified organization, of much increased managerial complexity. Second, most staff of both institutes are strongly opposed to a merger, so that at least initially there would be a considerable loss of motivation. Third, merger would dissolve the healthy element of competition between the two institutes. Fourth, there is no convincing evidence that merger would substantially reduce costs. Fifth, as long as there are separate technical ministries for crops and livestock, merging IRA and IRZ would have limited impact on the ease of communication with development. Lastly, merger is only one, and by no means the most obvious, approach to enhanced cooperation and efficiency. The need for more cooperation with development organizations and university establishments such as CUBS is at least as great as that for IRA/IRZ collaboration. The mission considers that it is more advantageous in the present circumstances to maintain IRA and IRZ as separate organizations than to contemplate their merger. However, it strongly supports plans to develop joint research in areas of common interest, such as farming systems and certain aspects of agroforestry. It also supports the creation of common services in order to economize on manpower and funds. Better coordination and sharing of resources to reduce costs can be further approached by:

- specific line items for shared programs in the IRA and IRZ budgets;
- special funds for jointly planned and implemented research projects;
- wherever possible, location of IRA and IRZ facilities in the same compound, or in close proximity of each other;
- joint committees at the regional level.

Decentralization

A greater degree of decentralization in research planning, as earlier discussed, would make the research programs more responsive to development needs, by facilitating the involvement at the local and regional levels of policymakers, development organizations, Government extension services, and farmers or their most suitable proxies. Ideally, this regional planning would integrate all crop and animal concerns, which would require closer coordination at the regional level between IRA and IRZ, and between them and MINAGRI and MINEPIA. This, however, is not easy to achieve with the present organizational structure and the very distinct physical infrastructure of the two institutes.

Centers as administrative units were introduced in the institutes to ease communication between the directorate and the operational units, and as focal points for the coverage of agro-ecological zones. However, partly for historic reasons -- inherited governing structures as well as research station networks, partly for economic and demographic reasons, and partly because of donor influences, there has been considerable diversity in the way the center concept has been applied within the institutes. In IRZ two centers administer five stations, but Limbé and Nkolbisson are administered directly by headquarters. In IRA, four centers either cover broad agro-ecological zones (Maroua), or continue past commodity-based research (Ekona, Njombé), or do both (Nkolbisson); but another is based on a discipline (soils), and one covers an entire sub-sector (forestry).

Given these structural inconsistencies and imbalances in station networks, there is no convincing need within the present command structure to maintain centers as an administrative layer in the hierarchy, as many people in both institutes agree. The director of IRZ favors eliminating the two IRZ centers from the administrative structure and allowing all chiefs of station to deal directly with headquarters, which he would then like to see strengthened by two deputy directors, one for the northern zones (including the Adamaoua Plateau) and one for the southern and western parts of the country. In IRA, without centers a rather large number of station chiefs would be reporting directly to headquarters, but for most matters this is happening already. If the present setup is maintained, the answer to some of the management problems would lie not in maintaining the centers, but in strengthening both the Research Service and the SAF at IRA and IRZ headquarters. This might be done, for instance, by creating distinct units for the Research Services' three main functions (program formulation, program monitoring and evaluation, and publications & documentation) and for SAF's three main functions (administration, accounts, and personnel).

However, this does not necessarily bring the research institutes any closer to their clients in the regions. To achieve the decentralized planning and management which are required for doing this, a restructuring of the institutes is inevitable. But then a consistent definition and strengthening of the research centers as agro-ecological entities, and close coordination between IRA and IRZ in the application of this view of centers, seem to provide the most suitable base for designing a coherent long-term development plan for the two institutes. Although agro-ecological zones would not be identical to the politico-administrative divisions of the country according to which the ministries operate, there is sufficient correspondence to facilitate relationships.

Developing IRA and IRZ on an agro-ecological basis

There are several scientific, technical and managerial advantages of organizing and developing research on a regional basis:

- once a target group or region is well defined, and relatively homogeneous, it becomes easier to deal with research problems on a systems basis, integrating all the relevant scientific specializations; this is particularly so when the regions are defined on an agro-ecological basis;
- by concentrating on a specific and more homogeneous zone, researchers will find it easier to grasp and identify themselves with the technical, social and economic constraints and potentials;
- formal and informal interaction with policy-makers are facilitated; contacts in the region are less burdened with protocol than those at central level, and there is a stronger focus on specific development problems;
- extension services, development organizations, and farmers would be more likely to participate in the planning and carrying out of research which they perceive as being closer to their needs, and would be more ready to try out research findings.

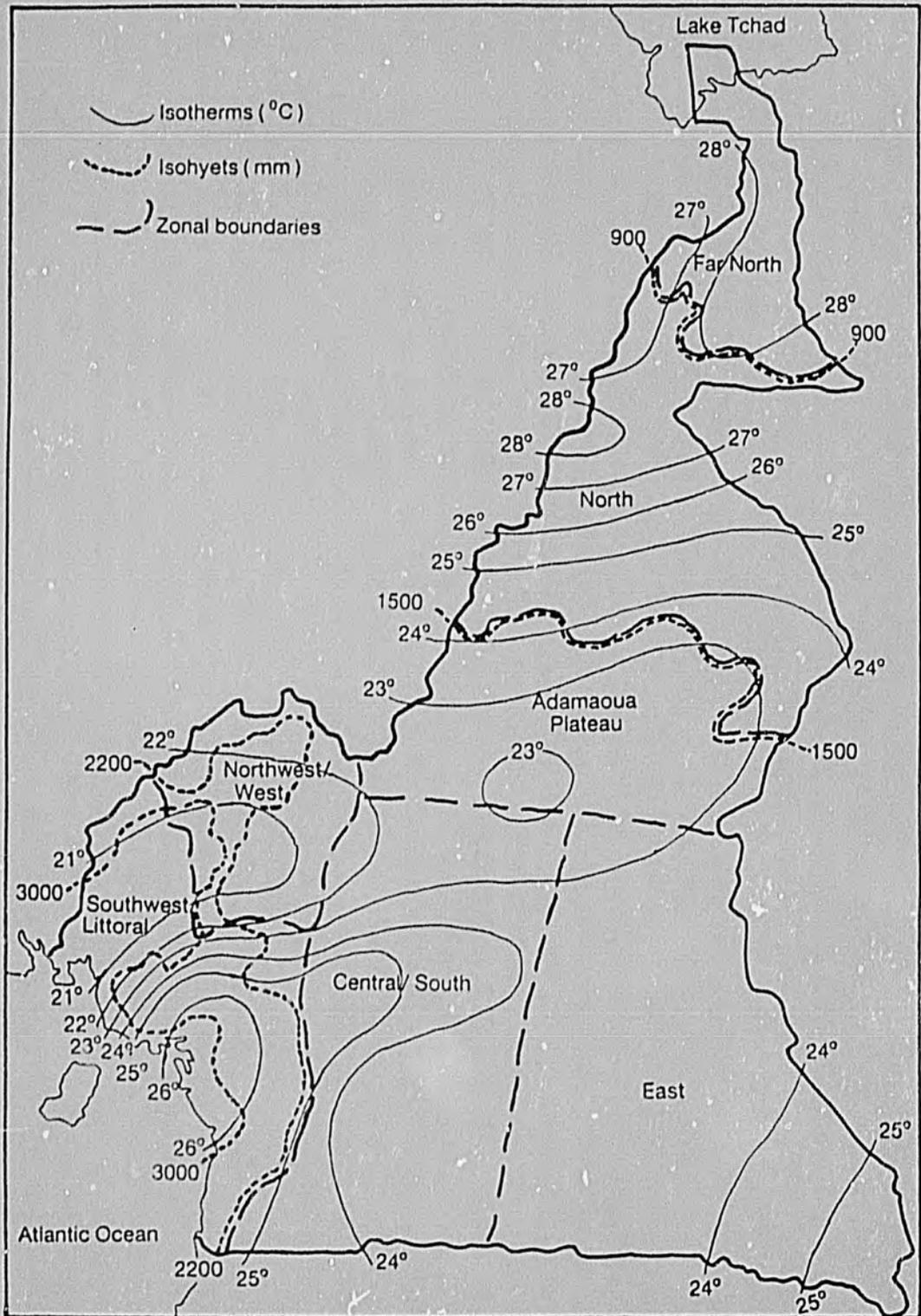
To systematically develop the idea of organization by agro-ecological zones, it will be necessary to define the number and boundaries of these zones, and make a strategic plan to ensure that, over time, there would be viable IRA and IRZ stations in all zones.

It is generally agreed that at least seven major agro-ecological zones can be defined in Cameroon (Figure 3). These are:

- the Far Northern (sudano-sahelian) zone of mainly low elevation, in which annual rainfall is less than 900 mm, decreasing from south to north;
- the Northern (guinea-sudanian) zone of low elevation, in which rainfall is 900 to 1500 mm;
- the Adamaoua Plateau, 1000 m or more in elevation, ecologically distinct, in which the rainfall is 1000 to 1500 mm;
- the Northwest/Western highland zone, with an altitude ranging from 1200 to 1800 m, in which the rainfall is 1500 to 2500 mm;
- the Southwest/Littoral humid forest zone, in which rainfall exceeds 2500 mm;
- the Central/South zone, covering areas of sub-humid savanna and forest receiving 1500 to 2500 mm of rainfall, with a considerable degree of agricultural development and a fairly high population density;
- the Eastern zone, ecologically broadly similar to the Central/South zone, but characterized by a low level of development and a very low population density, and consequently a largely undisturbed rainforest cover.

Neither institute is well represented in all zones. In the Far North and North, IRA has one station at Maroua, and a number of antennae scattered over the two zones. A new station is being developed at Garoua. IRZ has one station at Yagoua, on the southern border of the Far Northern zone, and an antenna at Garoua that is to be upgraded to a station. On the Adamaoua Plateau, IRA has no station but an antenna south of Ngaoundéré, whereas IRZ has a major station at Wakwa.

Approximate Boundaries of Seven Major Agro-Ecological Zones in Cameroon



In the Northwest/West, IRA and IRZ have adjoining stations at Bambui. IRZ has an additional station at nearby Mankon and an aquaculture station at Foumban, and IRA has stations at Dschang and Foumbot, each with several antennae and trial sites. A disproportionate number of IRA stations and antennae are concentrated in the Southwest/Littoral zone at Ekona, Njombé, La Dibamba, Kumba and Barombi Kang. IRZ has only a marine fisheries research station at Limbé, and is planning a new livestock station at Kumba.

In the Central/Southern zone, both institutes have their headquarters as well as research facilities at or near Nkolbisson, and IRA also has a station at Nkoemvoné and an antenna at Mbalmayo. In the Eastern zone, IRA and IRZ plan to upgrade their separate antennae at Bertoua to stations, and IRA has two other antennae in the zone.

Currently, agro-ecological zones are not all of equal importance, given the marked differences in degree of development and population density. But in planning for the future the research services must anticipate the opening up of vast regions such as the Adamaoua Plateau and the Eastern forest zone, so that they can promote orderly development in these areas using appropriate technologies.

The mission recommends that MESRES/IRA/IRZ, in consultation with other concerned parties, prepare a 15- to 20-year strategic plan for organizing agricultural research by agro-ecological zone, rationalizing research infrastructure within and between zones, and over time developing this infrastructure for future needs as staff and funds permit, without reintroducing undesirable dispersion.

A stepwise approach to structural development is the most rational. This would entail:

- the regrouping of IRA and IRZ stations and antennae along agro-ecological lines;
- the selection of one station in each area as a zonal center, with IRZ and IRA zonal centers in each other's proximity where this is possible;
- a gradual increase in infrastructure in relation to projected zonal and national development needs;
- a gradual expansion of IRA/IRZ common services where this makes logistic and economic sense. A zonal decentralized approach to research planning and execution can only be really effective if it involves closer cooperation between IRA and IRZ at all levels.

Choice of locations for zonal centers

Close proximity of IRA and IRZ zonal centers would facilitate their communication with each other and with their partners in agricultural development: policymakers, extension services, and development organizations, as well as with farmers and other clients of research results. However, in selecting sites, existing infrastructure and special considerations related to the distinct mandates IRA and IRZ cannot be ignored. On the other hand, the location of a center need not be a large experiment station. Of greater importance is easy access to all parts of the zone and to provincial capitals. Depending on circumstances in a given zone, IRA might be accommodated at an IRZ site, or vice versa. Clearly, MESRES and the two institutes would need to consider the choice of center locations very carefully in the context of long-term plans for institutes.

It is important also that future station development be similarly coordinated to promote opportunities for long-term collaboration in research on certain aspects of agro-silvo-pastoral systems, such as utilization of herbaceous fodder crops and multipurpose trees in animal production, utilization of crop residues in livestock and fish production, and the economics of the total farming system.

To properly plan zonal centers, each managing one or several stations and antennae, it is essential to define from the outset what their relationship will be to the management of individual research programs. For some programs, the zonal center or one of its stations would have the principal research capability, and the program chief might be based there. Depending on the national and/or zonal importance of the program, for example that of a staple commodity, this main capability might include a capacity for multidisciplinary applied research. For other programs the main research location might be elsewhere, and the capability in the zone in question would be limited to adaptive on-station and on-farm testing of varieties, agronomic or animal husbandry packages, etc. For programs of minor importance to the zone, the research capability might be very small or nil.

Clearly, especially under existing resource constraints, all elements of a future structure, and the corresponding staff at the appropriate level, cannot be in place, let alone of equal weight, in all zones all at once. A fifteen- to twenty-year time horizon for the less urgent infrastructural developments seems realistic. But it seems both necessary and feasible to plan for the anticipated changes now, to regroup stations (see Figure 4), to rationalize the network of antennae and trial sites, and to set up some high priority IRA/IRZ common services.

Even for the long term, a compromise is unavoidable between desirable coverage of all agro-ecological zones and what seems feasible, given the cost in terms of scientific and administrative personnel and center operating expense. Moreover, a legitimate wish to be closer to the clients should not result in undue staff dispersal.

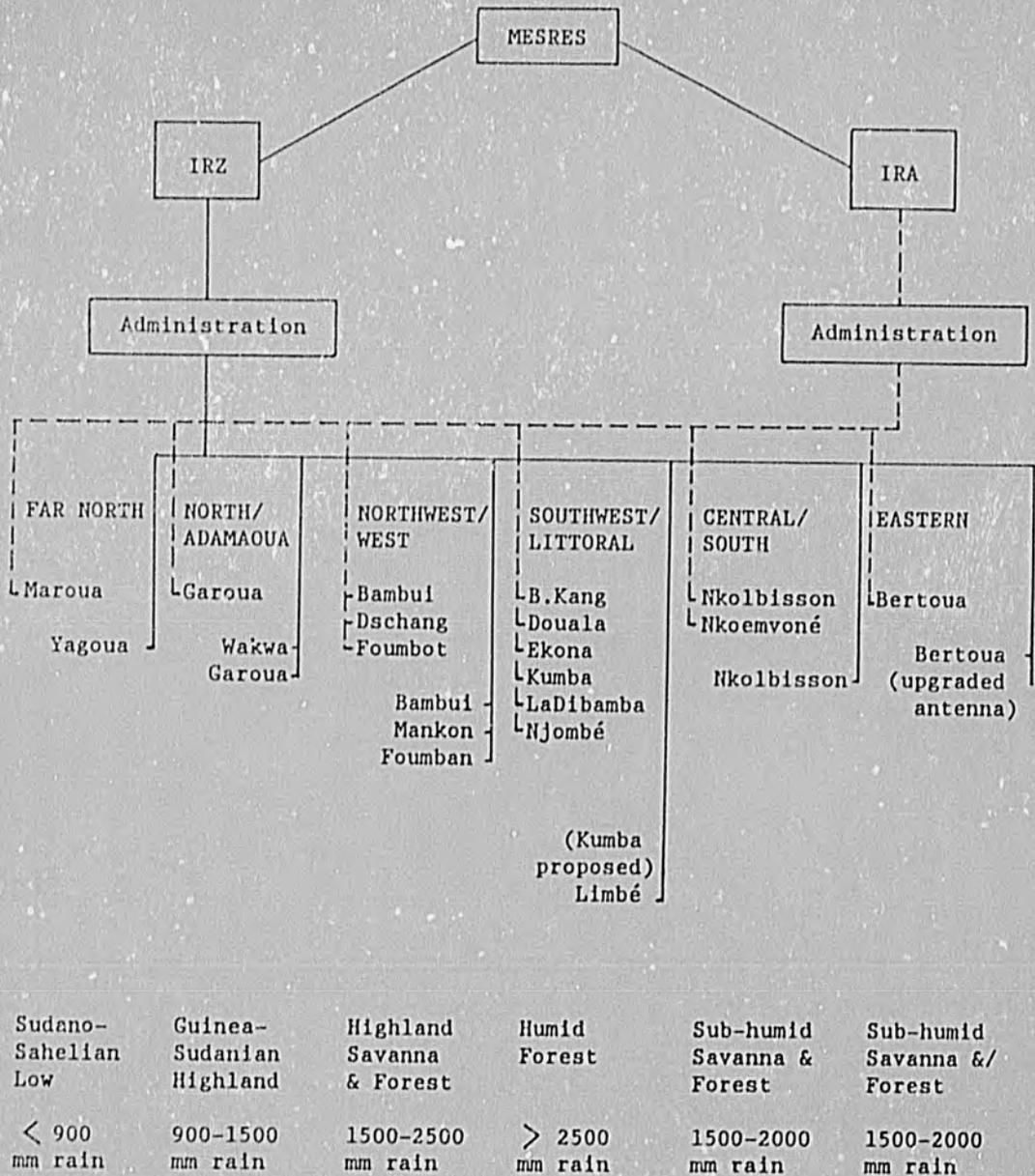
If complete coverage of all seven zones can be envisaged in the long term, it would seem that the best locations for zonal centers might be Maroua for the Far North, Garoua for the North, Wakwa for the Adamaoua Plateau, Fombot for the Northwest/West (with perhaps Fomban for IRZ?), Ekona for the Southwest/Littoral, B'olbisson for the Central/South zone, and Bertoua for the Eastern zone. N'jombé might be maintained as an IRA center if its planned specialized facilities materialize, notably laboratories for plant pathology, nematology, tissue culture, and food technology.

Such a long-term proposition would be quite consistent with interim solutions in which one location would be the headquarters for more than one zone. The problem with accepting a smaller number of centers as the ultimate target is that this would almost certainly complicate attempts towards structured, intensive communication and collaboration between agricultural research and development at the level where it is the most appropriate, namely that of reasonably homogeneous agro-ecological zones.

A practical interim solution might be to consider four centers initially, each for several zones combined. For IRA the most likely combination would be: North/Far North; Northwest/West/Adamaoua; Southwest/Littoral; and Central/South/Eastern. This might also be suitable for IRZ, except that it might feel the need for separate centers for the Northwest/West and Adamaoua, in which case it might prove difficult to identify IRA and IRZ center locations in each other's vicinity.

Figure 4

Regrouping of Existing Stations in Accordance with a National Agro-ecological Research Structure



Regrouping, phasing out, and merger of stations and antennae

After thorough examination, the mission has concluded that the units making up the National Soils Centre (CNS) could be absorbed into the stations where they are located, Ekona and Nkolbisson, without any loss of program integrity. The CNS antenna at Dschang, which has only rudimentary infrastructure, could be closed down and its work incorporated into the soils laboratory of the nearby CUDS. This would eliminate the need for the center itself. A different issue altogether is that of the weight to be accorded to soils research (as distinct from routine analyses). At present, this is inadequate. But before reinforcing it, it will be necessary to first redefine sub-programs and themes, and then perhaps split the pedology program.

Forestry (and agroforestry) research is highly zone-specific, and it would be advantageous for the existing research units to be integrated into the proposed agro-ecological zonal structure, which would obviate the need for a separate Forestry Research Centre (CRF). The Herbarium, currently part of CRF, should become a truly national entity covering the entire national flora (including the permanent collections of all important species, indigenous and imported). It might be managed as a common IRA/IRZ research-and-service unit, administered by IRA.

In Figure 4, the mission has suggested a provisional regrouping of existing IRA and IRZ stations by zone. The mission is of the opinion, however, that the IRA station of Dschang could be phased out. This station has no trial fields and no particularly valuable physical assets. IRA is under pressure to give up the site for urban development. The University Centre of Dschang should soon be in a position to conduct research and should then be able to cooperate with IRA so that research relevant to the area, as well as soil analyses, could be carried out. The administration of antennae and trial sites currently under the Dschang station could be entrusted to other stations. Finally, the managerial, scientific and technical staff of the station, of which the mission has formed a very favorable opinion, would be better employed in a more favorable research environment.

It would also be worth examining whether Barombi-Kang and Kumba could be merged by developing the facilities of the former and giving up the small office building of the latter. Although it will be very difficult to provide even such a combined station with an adequate number of scientists and technicians in the foreseeable future, it seems necessary on environmental grounds to keep a station there. Also, Nkoemvoné would need to be expanded, notably by strengthening research on food crops. It might be desirable to locate IRZ researchers in both Barombi Kang and Nkoemvoné.

There is also much scope within IRA for creating a more rational network of antennae. Some are little more than trial plots, while others are larger than some stations. The zonal approach implies that antennae in the same geographic area would be administered by one station. Currently, mainly for historical reasons, several stations maintain distant antennae or trial sites. Some of these are on the premises or in the immediate vicinity of other stations. This causes serious management inefficiencies and sometimes conflict. For example, three IRA stations (Dschang, Foubot and Kumba/forestry) manage antennae in Bangangté. CNS-Ekona has an antenna at the Dschang station, and CNS-Nkolbisson one at Maroua. IRZ has fewer problems of this kind.

Some sites could possibly be developed for joint use by IRA and IRZ. For instance, at Fouban there is both an aquaculture station of IRZ and an antenna of Kumba/forestry; perhaps the hillsides of the IRZ station could be used for forestry research. Similarly, IRA and IRZ manage separate antennae at Bertoua; it would be advantageous if they were adjacent, especially if they are planned to be upgraded to stations.

Common services

The National Agricultural Research Project proposes the development of two common services: a joint IRA/IRZ library/documentation unit administered by IRA, and a joint IRZ/IRA computer unit administered by IRZ, both at Nkolbisson, with regional documentation and computer units at Foubot, Njombé, Maroua, Bambui and Wakwa. Two observations are in order. First, the location of these units should be reviewed when final decisions have been taken with regard to the proposed zonal reorganization of the institutes. Second, the role of a central computer center should be carefully studied before making irrevocable investment decisions.

Other common services could be envisaged to economize on manpower and funds. In particular, as the servicing of complex laboratory equipment poses considerable technical and financial problems, a combined unit for maintenance and repair of such equipment might be highly desirable. For such a unit, IRA and IRZ might employ, perhaps jointly with one or several of the university centers, one or two highly qualified equipment specialists. Such persons are in scarce supply and should be remunerated accordingly.

Any common service requires an appropriate mechanism to guarantee efficient operation and impartial service to both institutes. While the management of these services would be entrusted to one or the other of the two institutes, it is recommended that there be a technical supervisory committee comprising the Directors of IRA and IRZ, as well as the Director of the DST of MESRES, who would act as chairman and arbiter. The technical committee would define the tasks the common service would perform and establish the general procedures under which it would operate. It would also determine how the operating costs would be shared between IRA and IRZ. The success of any common service or research unit will ultimately depend on the vision and determination of the two institutes.

Formulation and administration of research programs. If a national research structure by agro-ecological zones is adopted, research advisory (or research-development liaison) committees could be established in all agro-ecological zones where there is a research facility of one or both of the institutes. To foster an integrated development focus, these zonal advisory committees might serve IRA and IRZ jointly. Their membership, not to exceed ten to twelve, should comprise IRA and IRZ researchers, provincial and divisional leaders and extension agents from MINAGRI and MINEPIA, and representatives of development organizations. These last, as well as the extension agents, would be expected to speak for small farmers' situations, interests, and needs. Depending on the characteristics of the zone, the chairmanship might rotate between MINAGRI and MINEPIA regional delegates, or between the IRA and IRZ zonal center heads, or be given to another senior person with a fixed term of office. Since all parties will benefit from such a committee, it would be best if each paid for the participation of its own representatives. The advisory committees would meet annually to review zonal research and development programs. Their comments on the research programs would be incorporated

into the zonal research program which, after analysis and integration with the other zonal programs at the directorate level, would be submitted to the national Program Committee of each research institute.

The membership of the institute-level Program Committee, especially that of IRA, could perhaps be reduced once the proposed research advisory committees per zone would be established satisfactorily.

These zonal research advisory committees would be complemented by program committees to be set up for each of IRA's and IRZ's research programs at the national level. Such committees by program would be chaired by the Program Chief. They would report to the overall Program Committee of the corresponding institute, and would prepare most of the substance of that Committee's annual meetings. There would also be intensive two-way communication between the zonal research advisory committees and the individual program committees. In fact, these two complementary types of committees would be the custodians of two of the main concerns identified at the beginning of section 2.6: good response to client needs, and program coherence and comprehensiveness.

The success of research planning at the zonal level, which would culminate in the annual zonal program review meeting, depends on four distinct kinds of inputs. First, the institute directorate must indicate to the centers and program chiefs, well in advance, the resources likely to be available for research in the zone, and must communicate changes in policy or levels of support for specific commodities or areas. Second, an active role of the Government administration, the extension services, development organizations, and producers in communicating development constraints and opportunities to research is crucial. Third, center chiefs, who will have been given zonal responsibilities under these proposals, must stay in communication with all interested parties in the zone to enable them to identify the broad research priorities for their zone. Fourth, the program chiefs, who have the responsibility for the scientific integrity and coherence of their program country-wide, must assume the leadership in developing the research activities in all zones where their program is relevant. Whenever unresolved problems remain, due to a lack of resources or a possible discordance between regional and national program perceptions (i.e. center chiefs vs program chiefs), the institute directorate will arbitrate.

Laboratory facilities and services. Laboratories have been and are still being developed in both institutes. IRZ has established, in a relatively short period a network of laboratories: a nutrition and biochemistry laboratory at Mankon; a milk technology laboratory at Bambui; a main veterinary laboratory at Wakwa; a meat technology laboratory at Mankon; and a small fish technology laboratory at Limbé. The nutrition, milk technology and veterinary laboratories are organized as service labs as well as for research. Several important labs have also been developed by IRA: soils laboratories at Nkolbisson and Ekona (the former not yet equipped); plant pathology and physiology labs at Nkolbisson and Ekona; a latex laboratory at Ekona; and a pilot fruit juice plant at Njombé. Tissue culture and nematology laboratories are planned for Njombé. The soils laboratories are organized primarily as service units, while the other labs are used for both research and services. There are also some smaller, generally poorly equipped, laboratories in both institutes. The operational efficiency of many laboratories is low, the standards of utilization and maintenance of equipment poor, and their output limited.

With increasing development and further sophistication in agricultural production, some institute laboratories are likely in future to have to assume a more important service role. In particular, this is likely to be true for the soil testing and plant protection laboratories of IRA and the nutrition laboratory of IRZ. To permit proper planning, it is recommended that the institutes together carry out a study of present and future demands on them for soil testing, analysis of plant and animal material, seed production, etc. This should include the requirements for their own research programs, as well as external demands for services. They should realistically determine in which areas they have the capacity to perform an external service function, assess the full economic costs of providing such services (including personnel charges), and compare these with alternatives overseas.

3. DEVELOPMENT AND MANAGEMENT OF HUMAN RESOURCES

3.1 Introduction

Personnel costs are the largest expenditures in IRA and IRZ, claiming in 1986/87 an estimated 79 and 74 percent of total Cameroonian operating funds (Annex 6.11). This in itself raises the question of efficiency in the utilization of their human resources. A research system must ensure that there are sufficient operating funds and adequate buildings and equipment for conducting research. Appropriate recruitment practices and operational job descriptions must go together to ensure a proper balance in scientific specializations, an efficient ratio of researchers to technicians, and administrative and support personnel of the right kinds and in the right numbers. A research institute also requires a long-term plan for the development and management of its personnel, and this should be based on a thorough analysis of research objectives, program needs, and funding prospects. Other matters which personnel management must address are salaries and benefits, and the creation and operation of a performance evaluation system. The extent to which these requirements are met in IRA and IRZ are considered here.

3.2 Long-term Personnel Planning

Good personnel management is possible only if there is an indicative long-term plan, outlining future research orientation, and a more detailed comprehensive medium-term research plan. Some medium-term research objectives for IRA and IRZ have been included in the Sixth Five-Year Plan. Improving the process of long-term planning has been discussed in Section 2.3, as has the recommendation that each institute undergo a thorough review of programs for priority and balance. This review might result in the elimination, reduction, or addition of certain programs, sub-programs or operations, thus permitting a more rational assignment of existing staff to better match priority program needs and the resources available.

Existing personnel development plans. Specific proposals for staff development in IRA and IRZ over the period 1987-1991 are included in the 1986 World Bank Staff Appraisal Report for the National Agricultural Research Project (NARP). The report suggests recruiting, over the project period, seventy-eight Cameroonian researchers, technicians, and administrators in IRA and twenty-one in IRZ. In addition, there would be five nationals employed in the proposed joint services. Up to eleven expatriates would also be placed in the initial project years. However, the research priorities and recruitment are being re-assessed as part of the technical assistance provided under the NARP. In the first years of the NARP, the recruitment of additional nationals will probably be less than originally projected, due to the country's severe financial problems.

Constraints to personnel expansion. Since 1981/82, the proportion of the institutes' budgets going to personnel salaries and support costs has increased in relation to the general operating budgets and the research program budgets. As discussed in Section 5.3, the institutes are now at crisis point, having too few non-personnel operating funds available to adequately conduct research. In the light of serious constraints in the

financial environment, which are expected to continue in the medium-term, the projected expansion of personnel and infrastructure under the NARP should be reviewed to ensure that sufficient funds for operation and maintenance exist and will be available in the future.

Fundamental questions must be answered about the maximum size of the research system sustainable by Government in the long term. Also, Government must decide what level and type of external support, including the numbers of expatriate staff, are acceptable and probable in the longterm.

Matching personnel with programs. For good management, both IRA and IRZ need to have a personnel database which contains adequate and up-to-date information on all staff. Both institutes have begun compiling such a database on researchers and technicians. IRA is inputting data from a standard form into a computer for storage, updating, and analysis. The information recorded for researchers includes: details of highest degree and most recent short-term training, present post, research program affiliation, current research, and publications. IRZ is considering using the same format, and MESRES might wish to use it in all of its institutes. While satisfactory, some additional information would be useful, such as the percentage of time spent by researchers and technicians on different research programs.

As soon as the database is completed for researchers and technicians, a thorough analysis of personnel profiles in relation to their assignments to programs, sub-programs, and operations is required. The primary purpose of this analysis is to ensure that priority programs are carried out and that scientific and technical staff are used in the most effective manner. This requires that all programs, sub-programs, and operations be thoroughly reviewed and prioritized. The reviews should be conducted against clearly specified objectives, research program requirements, and likely resources. The database also permits an analysis of the education, training and experience record of each individual against present duties, aspirations for the future, and the institute's medium-term research plan. This facilitates matching staff members to research activities and the development of individual career and training plans.

The body of scientists in a viable research system should include a mix of scientific, agricultural, socioeconomic and technological disciplines; and there should be on average at least two qualified technicians per senior scientist, and one per junior researcher. Strong administrative and other support, both skilled and semi-skilled, is also necessary.

The directorates of IRA and IRZ were able to give total numbers and qualifications of their researchers. Currently in both institutes the overall balance of disciplines is reasonably good. However, the scientific staff are disproportionately young, and many of them have no academic specialization.

The IRA directorate did not possess usable records of the numbers and qualifications of its technicians. IRZ had better data, though these too were incomplete. It is evident, however, that both the numbers and the formal qualifications of technicians are inadequate for an optimal use of scientific manpower, much more so in IRA than in IRZ.

In IRZ the overall senior technician-to-scientist ratio is about 0.8:1, and most senior technicians have a B.Sc. or "Licence". In IRA the ratio

is much more unfavorable, and most senior technicians have an ITA diploma which, though appropriate for some tasks, by these technicians' own admission does not provide the science base required for a critical understanding of agricultural research. The institutes seem to face a dilemma. Technicians with a university degree often aspire to receive higher training and move up into the research ranks, and this may have a destabilizing effect. On the other hand, it may also improve morale by offering possibilities for advancement as a reward for good performance. ITA diplomates do not easily qualify for advanced training or promotion; while constituting a stable category of technicians, they feel more limited and tend to become demotivated.

In addition to senior technicians, both institutes have roughly twice as many junior technicians, whose schooling varies considerably but corresponds to about six years of post-primary education. Specialized laboratory technician training opportunities are lacking in Cameroon except for medical technologists, who could be suitably employed in both institutes. The idea of turning the TA program of the University Centre of Dschang into a specialized agricultural research technician training program deserves serious consideration. On the whole, research technicians should have at least three years of professional training after A-levels or the "baccalauréat", and this training should include a fairly thorough grounding in basic sciences.

It is advisable that senior staff in each research program be asked to write personnel profiles (qualifications, experience, personal traits) required for maximizing research productivity. A thorough analysis of staffing needs in relation to programs, and a reshuffling of existing personnel could help improve productivity under existing constraints. Because the institutes cannot afford indefinite growth in staff numbers, matching existing staff to priority needs and upgrading staff should be given top priority in manpower planning.

In matching personnel to programs, it is particularly important to assure that all priority programs have senior scientific leadership. If junior

Table 3. Researchers and Technicians in IRA and IRZ, 31 Dec. 1986 (1)

<u>Category</u>	<u>IRA</u>	<u>IRZ</u>
Cameroonian staff:		
- Chief Research Officers	3	0
- Senior Research Officers	2	3
- Research Officers	46	17
- Research Assistants	70	54
- Senior Technicians	(2)	61
- Junior Technicians	132	120
Expatriate researchers	63	8 (3)

(1) Including staff members away on training.

(2) Civil servants, holding an agricultural college diploma or a university "licence". In addition, there are about 44 laboratory assistants and 'observateurs' of varying background but without a professional qualification, though some of them have advanced-level general secondary schooling and even a year of university education; in some reports they are loosely described as technicians.

(3) Including 3 person-years of expatriate scientists on short assignments in the wildlife program.

researchers are working in isolation from experienced scientists, for example in outlying stations with only a few staff, either a strategy must be developed to provide them with adequate guidance or structural changes would need to be considered to eliminate the problem. Inexperienced scientists need to learn about all facets of research, including program formulation, budgeting, experimental design, data analysis and interpretation, and communication of results. With help from senior scientists, they should be able to identify areas of professional weakness and propose remedial short-term training and support.

Currently, there are not enough senior scientists in IRA and IRZ to provide the needed guidance and support to younger colleagues. The program chiefs and other senior Cameroonian and expatriate staff should play a more prominent and structured role in training and supervision. Some of this guidance could also come from national and international universities and institutions. Periodic contact with specialists abroad can be organized as a training function. Peer interaction, through disciplinary seminars and workshops at the national level, can also reinforce scientific staff.

Administrative, financial, and other support personnel are in place at most stations, and their levels of training and competence range from excellent to fair. The heads of these services are experienced in their areas of concern. Throughout IRA and IRZ there are excess office staff, who report to the unit head of the administrative and financial services (SAF). The planned computerization of administrative and financial tasks would further increase redundancy of clerical personnel. The mission's review of daily workloads identified cases where these people perform little or no work. For example, a person hired to prepare the payroll, which takes only one week, may have no other tasks for the rest of the month. This lack of activity leads to absenteeism, and situations exist where up to half the administrative employees go home before the working day is complete, and still receive their full salary.

Less visible but also significant are surpluses of field labor. The productivity of field labor is low to very low in many stations. It is necessary in both institutes to review daily workloads against rationally defined norms. In the few stations where this has been done and where steps have been taken to increase productivity, very significant gains have been made.

Neither IRA nor IRZ has been able to provide the mission with a proper breakdown of all personnel by station according to functional (as distinct from administrative) categories, so as to permit a detailed assessment of personnel ratios. For example, numbers of field and laboratory technicians cannot be gleaned from existing records. However, the available figures (Annex 6.13) show that, in June 1987, there were on average 11.2 technical and support personnel per researcher in IRA and 9.0 in IRZ. The IRA ratio has tended to improve somewhat since 1984/85, when it stood at 13:1, but the IRZ figure has increased from 8:1 in that same year, though it may have peaked at 10:1 in mid-1986/87. The average number of technicians (senior + junior) per researcher is about 2.0 in IRZ and less than 1.0 in IRA. This leaves approximately 10.3 other support personnel per researcher in IRA and 7.0 in IRZ. As these include permanent field labor, it is logical that the IRA figure should be higher than the IRZ figure, but the difference is rather substantial and not in IRA's favor. However, in both institutes the numbers of support personnel per scientist are higher than in many comparable institutions, and this bears out the mission's observations of redundancies in middle-level administrative personnel and wastefully low productivity of field labor in certain stations.

There is no doubt that redundancies in certain categories of support personnel, including field labor in several stations, constitute a major drain on institute resources. This is examined in further detail in Chapter 5, where it is shown that personnel costs account for a disproportionate part of total operating costs. An analysis of personnel and the jobs they perform will certainly indicate that in some job categories staff reductions are possible. The remedy to low productivity is not to hire more people but rather to improve work habits and redeploy redundant personnel elsewhere, perhaps in income-generating operations within, or preferably outside, the research institutes.

Developing a training plan. The mission was requested in its terms of reference to identify scientific and technical manpower needs for a ten-year period in conjunction with a training plan. Without an existing personnel database and until the institutes have undergone a thorough program review as recommended by the mission, a detailed long-term staffing and training plan is not possible. When these steps have been taken, the institutes should have a much better understanding of their gaps in scientific leadership and expertise, and in technical support. IRA has a training plan for the period 1984-1988, which will have been executed almost completely by the end of this period. It intends to prepare a new medium-term plan for the subsequent quinquennium. There is evidence of insufficient training opportunities having been available to staff members in some programs, notably the perennial crops programs, but it seems that with CIRAD assistance this problem is gradually being resolved. IRZ too has a detailed and well-conceived training plan for the period 1983-1988, and is adhering to it. Future plans for both institutes, adjusted to the outcome of the recommended program reviews, should be of two kinds: a long-term indicative staffing and training plan, and a detailed medium-term one relating to specific posts and individuals.

In both IRA and IRZ, the planned staff reinforcement of the directorate in research planning and programming should facilitate personnel planning and management, and IRA's rapid advance in computerized personnel data collection and processing is an asset which should be fully exploited. Because IRA is larger and has a greater number and diversity of programs, program and manpower planning will require substantial external assistance, especially in identifying program gaps in the more basic sciences, environmental factor research, and post-harvest processing, and in assessing the staffing and (supplementary) training implications. Some areas of specialization need to be added or strengthened: soil/plant/water relationships, plant and crop physiology, animal physiology, microbiology, agroforestry, range management, management of the natural forest, agricultural economics, various disciplines related to food technology, and apiculture. But even in the range of scientific disciplines in which the institutes have designated posts and assigned staff, these designations often do not reflect real specialization, which in many cases is lacking. Additional training of existing staff is a primary requirement, and needs to be given particular attention in IRA, where the proportion of researchers sent on training is much lower than in IRZ.

Some basic questions must be answered about the levels and types of training necessary for accomplishing the defined research objectives. While Ph.D.-level training may be desirable for most scientific posts, this is not always necessary or feasible. Much well-conceived research can be conducted by M.Sc.-level staff, provided adequate program leadership and guidance are available. To achieve this internal capacity some, but not

all, researchers will require training for an advanced university degree, often overseas. This training demands careful planning and organization, especially to schedule training absences in such a way as to minimize disruption of research activities.

The possibilities of educating graduate-level scientists in universities in the region, or in special programs which allow thesis research to be conducted in Africa (e.g., with IITA) or in Cameroon should be encouraged. This could reduce costs, make research programs more relevant to problems confronted in Cameroon, and at the same time permit the execution of some research of value to the nation. Of paramount importance is the role expatriate technical assistance staff could play in strengthening the Cameroonian scientific cadre. Currently, some expatriate scientists have no Cameroonian counterparts and are not transferring knowledge to national staff.

Because of the management and supervisory responsibilities of directorate staff, program chiefs, station chiefs and senior scientists, short courses for awareness and skills training are recommended in selected aspects of personnel management, facilities management, time management, team building and communications, on the lines of the MESRES/ISNAR workshops held with IRA and IRZ. It is recommended that MESRES and its institutes thoroughly examine to what extent the Higher Institute of Public Management of Cameroon (ISMP) in Yaoundé, managed in collaboration with the National School of Public Administration of Quebec, Canada, could assist with this type of training.

IRA must remedy its low technician-to-scientist ratio and recruit a number of technicians with a stronger science base to adequately operate its existing and planned laboratories. It should also find ways to prepare the most meritorious ITA graduates for higher academic training. IRZ has largely recruited science graduates as senior technicians, and this has made it possible to satisfy its laboratory needs. As this institute moves toward an increasing proportion of off-station work, the need for general field technicians, possibly recruited from ITA, will become stronger. In their own interest, both institutes should participate in curriculum development of the proposed BSc program at CUDS to ensure that the objective of having graduates with a strong scientific base is achieved. In addition, they should encourage the provision of specialized technician training at CUDS.

The administrative, financial, and other support personnel do not need much additional training in specific skills. Most senior administrative staff at the stations know the requirements of their jobs adequately, and reinforcement can be achieved by regular professional contact with their supervisors, notably from headquarters. In most cases where some specific training is needed, this could be done on the job under appropriate guidance; in some instances a short course outside the institutes is needed. Cameroon has suitable training opportunities for all required skills for these personnel categories, including mechanics and artisans. To promote the understanding among personnel of their roles, to improve their self-assessment of performance, and to enhance their knowledge of procedures, the institutes could organize periodic in-house training workshops, if necessary with some external assistance.

It should be noted that many support staff, especially mechanics, cannot perform well because the facilities are inadequate. In such cases the remedy is investment in equipment and tools rather than training.

Both institutes have an urgent need to train a few administrative staff as "operational auditors", whose task would be to verify that administrative and financial procedures are being correctly applied at the stations. With the present structure of the institutes, these operational auditors should belong to the directorate, even though some of them might be out-posted to cover one or more distant centers. If and when a decentralized structure is put into operation, their most appropriate placement would be in the office of the chief of center.

Apart from the above skills training, the mission observed an immediate need to enhance in all institute personnel the awareness and understanding of the role of research in national development, the long-term objectives and priorities of the institutes, the essential functions of all personnel categories in the system, and the current financial constraints affecting operations, their causes, and the long-term prospects. A rational explanation, given orally at the stations or in seminars by institute leadership, will create a greater personal commitment among staff toward a cohesive, productive institution. A common understanding on these matters is especially important for the researchers and the administrative and financial staff, particularly in light of the extreme financial difficulties experienced since 1986/87.

3.3 Recruitment

At present, researchers and technicians are recruited through public announcements of position vacancies or through the mandatory assignment of recent university graduates. The graduates have not always displayed an aptitude for or interest in research and their assignments do not necessarily correspond with the needs expressed by the institutes. The institutes are quite aware of these problems and are trying to take a more active role in recruitment at this level. It should be quite normal for senior researchers of the institutes to be involved in the selection of new researchers. The mission strongly recommends that all parties involved in the assignation of civil service personnel to the research institutes allow final selection of candidates to take place at the institute level. The research institutes should not be repositories for excess agriculture graduates.

The assignment of grade (e.g. senior research officer) to researchers is based on a review of the candidate's academic qualifications, former research, and publications. This is true for both permanent and contracted researchers. There are instances in both institutes of alleged inconsistencies in assignment of grades, e.g., cases of similarly qualified staff receiving appointments in different researcher grades, or as technicians and research assistants, the former receiving far fewer benefits. Such perceived inconsistencies affect morale, particularly because of the influence grade can have on income and career prospects. MESRES and the institutes should resolve these problems and explain the decisions case by case, irrespective of whether grievances are real or stem from a lack of understanding of recruitment criteria.

3.4 The Need for Job Descriptions

The long-term plan of a research institution would logically outline the numbers and qualifications of personnel needed to accomplish defined objectives. Job descriptions are an indispensable aid. They can be used

to accomplish four important things. First, they can define the personnel structure of an organization, permitting the recruitment and dismissal of staff according to clearly defined needs. Second, they can articulate the role, functions, and responsibilities of each employee. Third, they serve as a framework for evaluating individuals. Fourth, they help management identify the causes of inadequate performance.

All personnel should have job descriptions. The detail will vary with the category of personnel. Care must be taken to select an appropriate format which can be easily understood, utilized and updated. Once the format has been chosen, job descriptions can be maintained on computer. Good job descriptions use plain language and operational terms. At present in IRA and IRZ, partial job descriptions exist only for research management personnel and for the chiefs of programs. General job descriptions by function should be established jointly by the institute directorate and program chiefs. These should be complemented by more detailed and specific work objectives, to be jointly defined by the immediate supervisor and the employee. Much of the needed information would be available from annual workplans. Job descriptions should be discussed every year, and updated to reflect changes in program, primary tasks, or supervisory roles.

3.5 Remuneration of Researchers and Technicians

Many employees are discontented with the existing remuneration structure which, particularly through bonuses, greatly favors researchers over all other staff. Steps have been taken to remedy this situation for technicians, but Government approval of the proposed statute has been pending since 1983. Opinions within the institutes are divided as to whether all personnel, including administrative and other support staff, should have a special statute.

Considering the crucial part technicians play in meeting the research objectives of the institutes, the mission firmly endorses a statute for technicians which would bring their remuneration package closer to that of junior researchers. There need not be special statutes to cover all personnel categories. It is necessary to underline, however, that in research institutes there should always be a possibility to construct special remuneration packages for critically needed personnel with rare skills. For example, it should be possible to employ a highly qualified farm manager at the rank of research assistant, or to provide special allowances and fringe benefits for such a post.

To reduce inequities, the bonuses currently awarded automatically to researchers should be based on research quality and productivity. In the longer term, one would hope to see a new remuneration structure, which would extend grades to cover both technicians and researchers, and have longer and overlapping salary scales which incorporate the performance-based bonuses.

The mission also recommends that inconsistencies in assignment of grades, remuneration and secondary benefits between civil servants and researchers on contract be removed.

3.6 Personnel Evaluation and Professional Advancement

There are two personnel evaluation systems in IRA and IRZ. The first is a general annual civil service evaluation which is the basis for allocation of salary increments within a grade every two years. The second is an internal periodic evaluation of scientific merit which is used to advance a researcher into a higher grade. Neither of these evaluations is comprehensive enough for its intended purpose. As stated earlier, comprehensive job descriptions have not been developed, so measuring performance is difficult.

Annual assessment of civil servants. All civil service employees, regardless of category, undergo a standard yearly evaluation, using a "Bulletin de Note", to determine whether or not a promotion to a subsequent salary step ("echelon") is justified. The administration of this process is apparently slow, and there are numerous complaints from employees rated 'satisfactory' who are still awaiting their salary increase.

The cursory nature of the Bulletin de Note makes it inadequate as a management tool. Points considered are general and apply equally to janitors and institute directors, having no correspondence with the tasks actually performed. There is no place for recording special scientific, technical, managerial and supervisory responsibilities. Furthermore, the space provided in the form for comments is insufficient for a discussion of the real strengths and weaknesses of the rated employee or for a description of the expected and attained achievements in relation to objectives. Some improvements have occurred in recent years: the form is now more explicit, and employees receive copies of their completed evaluations.

Scores and remarks made are rarely discussed or contested, and a low score is rarely given. An estimated 4% of the total personnel receive a score which disqualifies them for a salary increment; this in spite of the fact that absenteeism, improprieties, and lack of initiative are widespread.

The annual civil service personnel evaluations could be made much more meaningful if the research institutes used a supplemental form to cover managerial, supervisory and coordinating responsibilities, as well as a self-assessment of an employee's work objectives, achievements, problems, needs and expectations. This would give second-line supervisors more contact with employees. Such supplemental information would make the evaluation more adequate and impartial, which should then to the extent possible find expression in reward and sanction.

Merit evaluation of researchers and technicians. Researchers undergo periodic technical evaluations which determine their advancement into the next grade. Advancement criteria are academic achievement, research productivity, and publications. This evaluation process is limited in that it focuses on more classical, scientific achievement. It does not adequately gauge the contribution a researcher may make to the country's development objectives, the building of a strong national research system, or the diffusion of research results. Nor does it consider research leadership, performance of management duties, personnel supervision, training and coaching of younger scientific staff, liaison with extension and farmers, etc., as criteria for promotion. ISNAR could assist Cameroonian research leaders in refining these important criteria.

The mission has noted that some obviously senior researchers go abroad for long periods to acquire a doctorate, merely to satisfy the criteria for promotion, and without there being any advantage to the institute or

the country. Obviously, there is every interest, while maintaining standards of performance, to have sufficient flexibility in promotion criteria to avoid an unproductive insistence on paper qualifications.

The mission emphasizes that a fundamental improvement of the research system is not possible without determined corrective action on this issue of evaluation criteria, and the underlying value system.

The routing of the evaluation papers to headquarters also needs to be improved. For example, when the Chief of Station evaluates a researcher, the papers are forwarded to the Chief of Center. Clearly, it would be at least as important, if not more so, to send the evaluation documents to the Chief of Program who, as the technical head of the researcher, should be in frequent touch with him, and is therefore well placed to add his evaluative comments before the papers are sent to the director.

The merit evaluation process is also quite long and, due to unclear interpretation of the terms for advancement, some inconsistencies still exist in the treatment of individual scientists, particularly when comparing contracted employees to civil servants of the same category.

It is recommended that expatriate scientists also be evaluated according to the above procedure, using criteria established jointly between the institute directorate, the technical assistance organization to which the researcher belongs, and the researcher himself, before or at the start of his assignment.

The lack of a merit evaluation of technicians, using appropriate criteria, should be resolved in the context of a proper career structure for this category of personnel, which should be one of the key features of the promised statute.

Discipline and sanctions. Research management must have at its disposal mechanisms for disciplining employees as well as for rewarding them. Currently, there are six mechanisms of sanction, relegated to different levels of management:

- warning
- blame
- suspension of pay for 1-8 days
- delayed promotion for 1-2 years
- demotion by one echelon
- dismissal.

The first three can be imposed within the institute. The last three must be decided by a multi-ministerial body. In all cases, a written account of actions taken is placed in the personnel file.

In both IRA and IRZ there is a general problem with absenteeism, inactivity, tardiness, etc. Administrative procedures for recording unsatisfactory conduct are in place. However, as earlier stated, it is rare for inadequate performance to be reflected in the annual evaluation, and it is rarer still that the above sanctions are levied. Formally, center and station management are at fault, but they complain that processing a sanction request, even for suspension of pay, takes far too long to be effective. When a sanction is finally imposed, the offender often regards it as arbitrary and unjust. The same argument is heard at the level of first- and second-line supervisors, who sometimes claim that station chiefs do not back them up. Maintaining discipline without sanctions is impossible.

The institute directors should ensure that center and station chiefs maintain appropriate discipline by insisting on performance-based personnel evaluations and the imposition of sanctions where necessary.

Supervisors at all levels must feel assured of support of proposed disciplinary action from the next higher level in the hierarchy all the way up to the director. At the same time, all personnel must feel confident that adjudication will be fair and prompt. When submitting cases for more serious sanctions the institutes need to be able to rely on strong backing from MESRES, and on a mechanism for speedy verdicts, including dismissal when warranted. Dismissal of deficient personnel is difficult in any civil service, but it is unsatisfactory that some very serious cases have been pending for years.

4. OPERATIONAL SUPPORT

4.1 Introduction

In a constrained financial environment, good management and administration become priority issues. Some major areas of research program management have been dealt with in Chapter 2 and others are treated in the context of funding in Chapter 5. This chapter focuses on several aspects of resource administration: description, execution and control of administrative functions, budgeting, transportation, documentation and publication, station management, and computer services. Personnel administration has been treated along with manpower development and management in Chapter 3. Significant discrepancies occur in many statistics provided by both IRA and IRZ, even at the directorate level. These shortcomings obviously affect not only the mission's analysis but, more importantly, the institutes' ability to manage their human, physical and financial resources. The setting up of an adequate and reliable information system must therefore be a priority concern.

4.2 Administrative Structure of the Institutes

IRA and IRZ are public institutions subject to all civil service laws, regulations, and procedures. At headquarters, the director and his deputy are assisted by the Service for Administration and Finance (SAF), a chief accountant ("chef comptable") and a supplies officer ("comptable des matières"). The latter two are trained by and are employees of the Ministry of Finance. The same distribution of tasks is found at the station level, where the station chief is assisted by a Section for Administration and Finance under an administrative officer (station chief of SAF), an accountant and a supplies officer. Although these work under the direct authority of the station chief, they are technically supervised by their senior counterparts at headquarters. The administrative officer is usually responsible for the various technical support services of the station, including stores and workshops. On the whole, this structure of responsibilities is satisfactory.

In administrative and financial matters, the stations deal directly with headquarters, the centers having few administrative and no financial functions. The stations have considerable financial and administrative autonomy, and this makes strong central guidance and controls essential.

4.3 Description, Execution and Control of Administrative Functions

The effectiveness of such a decentralized structure requires that all functions be clearly represented and exercised in all units of the system. The objective of each function must be clearly defined, and tasks, responsibilities and interrelationships described in operational terms. These must be well understood and accepted. They must be periodically reviewed for effectiveness and continuing relevance. Lastly, the organization must exercise its own control function.

The objectives of most administrative functions in IRA and IRZ are defined by the civil service. The tasks and interrelationships of management, the administrative service, the accountant, and the supplies officer are clearly laid down. Periodically, written and verbal reminders are issued.

One institute held a three-day seminar in 1985 on the subject. However, what the mission did not find at the research stations was an up-to-date formal description in operational terms of how to accomplish the tasks, the most recent detailed instruction shown dating from October 1980.

The existence at all research units of standard-format documents for each of the defined tasks illustrates that a standardized administrative concept exists. However, these documents are not always properly used, and the need for operational guidance was expressed at most stations. In addition to a lack of complete understanding of procedures, there were some cases of willful non-compliance among staff, which undermined the execution of research. Both of these problems can be resolved by management interventions, the former through in-house training, the latter by tighter controls.

The following kinds of non-compliance with procedures in place were encountered at one or more stations:

- Bank and cash reconciliations are sometimes delayed or not performed at all, preventing the preparation of a real cash position.
- Expense records are not always kept up-to-date.
- Large arithmetical errors occur in recording or totalling expense on individual lines.
- Expenditures are sometimes posted to the wrong budget line, and station expense may be posted to research program expense. Accurate records are necessary for assessing past budgets, to help expense control, and to improve subsequent budgeting.
- Station chiefs often do not receive detailed monthly expense statements as required.
- Cases exist where the figures in the official expense control reports do not match their back-up documentation.
- The statement of funds utilization for headquarters is prepared every six months instead of every three months in one of the institutes.
- Donor fund utilization is inaccurately reported.
- There are aged outstanding cash advances to personnel.
- There are cases of payments without payment order, and of payment orders without advice from the supplies officer of goods received.
- Documents showing that invoices and delivery notes correspond with purchase requests are not always maintained.

These examples of non-compliance with established procedures are not necessarily visible to central management due to the absence of regular independent controls. Controls are limited to occasional field reviews by the chief accountant or administrator, and personal interventions by the director. These are undertaken without clear goal statements, task definitions, reporting format, and control methods. The system has relied unduly on control through the responsibility interrelationships inherent in the civil service procedures. As a result, the ability of central management to act is intermittent and reactive rather than regular and creative.

IRA and IRZ should institute regular formal reviews of compliance with procedures. This could take the form of a periodic self-assessment or an independent review, but in all cases reliable information on staff discipline, quality of work and compliance is obtained, and these permit a systematic follow-up by management.

The mission recommends that the institutes reemphasize to their personnel the purposes, tasks and responsibilities of the various administrative, financial, and management functions, as well as the operational interactions between them. All these should be periodically reviewed for relevance and effectiveness.

Standard operational guidance should be developed and issued in document form for all tasks and responsibilities, including reporting requirements, for both management and other personnel. Compliance and accuracy, especially in the case of financial procedures, should be ensured by the introduction of independent review mechanisms at the station level. Disciplinary action should be taken in the event of recurrent non-compliance.

In addition, the mission recommends that the following deficient financial and administrative procedures be improved:

- Existing procedures require that physical cash, cheque, and receipt handling must not be performed by the person who makes the accounting entries or who performs bank reconciliations. Throughout both research institutes this is not being respected; accountants are handling cash and cheques and at the same time making the related accounting entries and reconciliations. This problem must be addressed by an effective separation of duties, using personnel independent of the accountant.
- Procedures should, but do not, include instructions for reconciliation of bank accounts. Consequently, reports do not show the relationship between funding, expenditures and cash-plus-bank balances. Unspent funds shown in the expense statement at the end of the accounting period are not verifiable because there is no documentation showing that the balance really exists. Both station managers and headquarters staff would greatly benefit from monthly reports on expenditures, and cash and bank position. Unpaid items and uncollected receipts should also be reported.
- Stations are not required to report on bank loans, which are quite common and very large in some cases. Without information on bank loans, management gets a distorted picture of the financial position of the research stations.
- Research program budgeting and accounting are incomplete. First, to improve the transparency as well as the planning of their operations, the institutes should try to include all foreign support into their budgets and accounts. Expatriate personnel should be valued at Cameroonian remuneration levels in the appropriate grades. Second, in order to determine the real costs of research programs, the remuneration of all research personnel should be apportioned to the various programs in which they work. Much of the necessary data exist or could easily be obtained. Third, the institutes should not only keep records of their personnel according to grade, as they do now, but also by function. This breakdown is at present not available. As a result of these shortcomings, comparative cost analysis is impossible, as are cost projections for long-term planning.

4.4 Budgeting

In both IRA and IRZ, budget preparation starts in December at the station level. Station budget requests are compiled and adjusted at institute

headquarters, presented to the Management Board in February, submitted by the director to the Ministry of Finance in March, and formally approved by Parliament in July; i.e., after the beginning of the budget year. Stations are normally notified about their allocation in September, but in 1986/87 this notification reached them as late as February. Clearly, notifying the institutes of available funds well into the budget year greatly complicates the management of the entire research system.

The operating budget consists of three major categories: (i) personnel (salaries, other personnel costs and training); (ii) general operating costs ("dépenses générales de fonctionnement") covering maintenance of assets and such costs as fuel, utilities and office supplies; and (iii) research program costs (including temporary labor).

Personnel expenses are accurately estimated, taking into account all relevant cost factors. However, as no task analysis matching personnel to functions is performed, redundancies and gaps are difficult to identify.

General station operating costs are estimated on the basis of the previous year's budget and overall guidelines issued by the Ministry of Finance. This procedure would be greatly improved if last year's expenditures rather than the approved budget were used to formulate the new budget request.

Research program operating budgets are estimated by the researchers, often in consultation with program chiefs. Researchers perceive that the considerable time spent developing research budgets is wasted because they regularly receive far less than they requested. To counter this, many of them inflate their estimates, which defeats the very purpose of budgeting. To resolve this dilemma, the institutes must ensure that budgets are realistic and related to distinct program activities. In order to administer budget cuts rationally, rather than across the board, as has been the case, these program activities must be prioritized, as recommended earlier in this report.

The few stations producing large quantities of produce for organized marketing -- La Dibamba and Njombé (IRA), and Wakwa and Mankon (IRZ) -- have an additional budget line for production costs. The IRA Board has decided that from 1987/88 the production budgets (both costs and revenues) for La Dibamba and Njombé will be separated from the research budgets. There appears to be a lack of understanding in the Ministry of Finance of the logic of this procedure. The mission recommends that separate budgeting and accounting be applied to all large-scale production activities of both institutes.

4.5 Transportation

The two institutes have not resolved the tremendous management problems associated with transportation, including vehicle procurement, maintenance, allocation and utilization. In all stations visited, the mission found clear evidence of inadequate maintenance and repair, resulting from an ill-defined vehicle strategy, poorly defined staff responsibilities, and insufficient operating and maintenance funds. An estimated 25-30% of all vehicles are derelict, and of the serviceable vehicles half are immobilized for minor maintenance or repair needs. Few stations could show a proper plan for vehicle allocation and utilization.

Central administration of this costly resource is limited to occasional inventories with little physical verification. The vehicles have no listed financial value attached to them, so that rational choices between replacement and repair often cannot be made. Frequently, new vehicles are bought when repairs of existing vehicles would cost a fraction of the purchase price, simply because investment funds are more abundant than operating funds. In addition, when new purchases are planned, the related increases in necessary operating funds are not assured.

The mission recommends that the institutes develop a strategy for transport, including general goal statements and definitions of tasks and responsibilities for record keeping, maintenance, use, and replacement. A complete and verified inventory of all vehicles supplied to the research institutes and their stations should be made, and authorization should be obtained to dispose of derelict vehicles. The institutes should place an amortized value on all usable vehicles. The cost of repairing vehicles should be calculated, and repair should be preferred over purchase where it is most cost-effective. Serious consideration should be given to setting up repair and maintenance workshops where off-station facilities are not available. In addition, if the purchase of new vehicles is deemed appropriate, realistic provisions must be made for operation and maintenance. Discussions should be held with the World Bank concerning the feasibility of reallocating some funds for new vehicles under the NARP to finance spare parts, repair facilities and training.

4.6 Library/Documentation Services and Publications

Attached to the directorate of each institute is a central library and documentation service. These services are not equipped, funded or staffed to support the centers and stations other than those at Nkolbisson. Neither institute has a fully qualified Cameroonian documentalist. Each station makes its own arrangements for acquisition of books and journals from its independent library budget. Because amounts fluctuate, journal subscriptions are irregular. Although block orders would theoretically diminish workload and reduce cost, most stations much prefer to handle subscriptions independently from the central library because delivery to outlying stations would be uncertain. Neither IRA nor IRZ has a central index of the books and journals acquired by the stations. At the station level, the collections are often dispersed and incompletely catalogued. Under the NARP, plans exist for a joint IRA/IRZ documentation center, and recruitment of an expatriate documentalist is foreseen. In addition, it is essential to upgrade Cameroonian staff in documentation. Furthermore, it is important to recognize that a joint central facility will not by itself assure the necessary integration of the library and documentation services between headquarters and stations, let alone the access of essential documentation to individual researchers.

MESRES should be commended for the publication of its Science and Technology Review, under the joint responsibility of IRA and IRZ. This journal is filling an important need. Until recently, there were justified complaints about slow processing of manuscripts, lack of status reports on submitted papers, and delayed issues. At present, the processing of manuscripts is proceeding diligently, accurate status records are being kept, and the large backlog of manuscripts is gradually being cleared.

The planned trimestrial frequency of the Review should be attained as soon as possible. This requires that editing and publishing capacity be strengthened. Apart from the planned recruitment of an expatriate science

editor under the NARP (ODA), at least one Cameroonian in each institute should be sent on extended training in agricultural journalism. Some simple procedures (Annex 7) would ensure the timeliness of reviewers' comments. The list of reviewers should be longer and more diversified. The Editorial Committee should solicit manuscripts in a wider range of topics, including interdisciplinary ones related to the environment.

4.7 Station Management

The management of stations involves a multiplicity of important functions. These include: allocation of land for experiments; management of station crops and livestock, including production units; hiring casual labor and task allocation; maintenance of station buildings, other facilities, and field equipment; ordering and allocating supplies and research requisites such as fertilizers and seeds; and maintenance and allocation of vehicles.

At small stations and antennae all these managerial tasks are performed by the officer-in-charge. At larger stations, several different managerial methods are being employed. For example, allocations of land, labor, and other resources for research are determined either by: a consensus reached at periodic meetings of research section chiefs; one researcher appointed as coordinator by the station chief; meetings of the station's chief of SAF with the heads of all labor sections, with decisions referred to the station chief; or the station chief making allocations unilaterally or after discussions with the staff.

With one exception, the chiefs of IRZ stations favored the idea of a special post of farm manager, though they differed as to the type of person required. IRA station chiefs were less enthusiastic and three of them were convinced the presence of such a person would reduce efficiency. Scepticism in certain stations derives partly from the fact that labor is allocated to and managed by individual programs. This system permits labor to become specialized to some extent, and this is said to improve performance. The disadvantage, of course, is that there is limited scope for smoothening out workload peaks by shifts of laborers between programs. The mission feels that the justified arguments in favor of labor specialization could be accommodated very well in a more streamlined system of labor management. Moreover, not all stations and programs have a preponderance of very specialized tasks for field labor. Then also, as outlined above, the farm manager's job consists of more than labor allocation. Experience in other countries shows that a well-qualified farm manager can relieve the research station head of most of the routine work involved in station management. The mission therefore recommends that creation of the post of farm manager be given serious consideration for the larger stations, albeit only where station chiefs, after thorough discussion of advantages and disadvantages, need and welcome assistance. The issue should be examined on a station-by-station basis, and there is a need to break with the rule of allowing senior managerial posts for one station to be created only if, in principle, all stations will have that post.

If the appointment of farm managers is envisaged, provision must be made for their recruitment (or their identification from among existing staff) and training. Their position in the management hierarchy and their tasks and responsibilities must be clearly defined and agreed upon. In particular, the relationship between the farm manager and the station chief should be well defined. One of several possibilities is to regard the

farm manager as an assistant chief of station. However, clarity of definition is more important than the exact formula adopted. In any event, it would greatly improve station management if station chiefs were to delegate more of the day-to-day tasks. Steps to promote such delegation should certainly not be regarded as infringements upon their authority.

It is essential that the role of a farm manager be conceived at a sufficiently high level, so that salary and bonuses would be similar to those for research officers. Their formal qualifications should be correspondingly high. Prospective farm managers should be agriculture graduates interested in farming operations. They should receive postgraduate farm management training followed by short-term managerial training, first at a large-scale farm (preferably in Africa) and then at an IARC or similar large research center, so that they will understand the special needs of researchers.

4.8 Computerization

Computerization is currently under way in IRA. The present activity at headquarters consists of supporting research requirements in terms of microcomputers and dedicated software, and the creation of a facility for processing administrative and financial data. Senior staff of the IRA computer unit also conduct training sessions for both IRA and IRZ personnel. IRZ has plans to computerize some of its administrative operations. Under the NARP, there are plans for a joint IRZ/IRA computer facility at Nkolbisson administered by IRZ. Its mode of operation is under discussion between the two institutes.

IRA's efforts to provide their researchers in the field with hardware, dedicated software and systems support are an important step in the right direction and deserve every encouragement. Both institutes have definite needs in this area to facilitate experimental design, statistical analysis of research data, and the storage and analysis of historical records. Associated word processor and graphics facilities will improve the presentation and thereby the utilization of research results. This is an area that needs to be invested in, but care must be taken to avoid classic pitfalls. User needs must be understood. They can change in nature and quantity and the ability to accommodate these changes must be built into computer system planning. Mobility, flexibility, and ease of use by several researchers require standardized and compatible equipment. This is not fully effective at present, and consideration should be given to selecting one type of microcomputer that presents favorable price, maintenance, and user-friendly characteristics, on which dedicated software can be run and exchanged.

The mission considers that, in contrast to computerization of research data analysis, for which there is a strong case, there is no need at present for financial and personnel administration at the stations to be computerized. Administrative tasks are simple to perform. Time and manpower are available to process increased quantities of information using the existing procedures at no extra cost.

There is a case, however, for computerizing administrative and accounting data at headquarters level. But before investing in such a project a strategic plan should be developed that identifies future data processing requirements. These should determine the design and characteristics of

the initial system. By designing at the start for future requirements, considerable investment risks are avoided. The institutes' decentralized operations and dispersed structure lend themselves in the future to small standardized computing facilities at each center and station, with on-line data entry and enquiry/formatting facilities.

Under the present IRA strategy, a central processing capacity would be created for administrative and financial information. As currently conceived, it would use an enquiry and formatting system which images the administrative formats and procedural requirements currently handled manually. Raw data would be entered by a secretary at the station level. Disquettes would be sent to the directorate for information processing, formatting, and generation of reports. This data processing system was planned with only headquarters data requirements and personnel savings in mind. Stations would be regarded merely as suppliers of data.

Contrary to the assumptions of these plans, central data processing will not on its own greatly improve the completeness or accuracy of accounting and administrative information. Raw data input will continue to contain errors, omissions, and incorrect accounting transactions. Benefits can only be expected from computerization if data are first verified and analyzed at the station level.

It is recommended that the institute directorates and their heads of SAF define in more detail their own information processing and reporting requirements as users, and develop a well documented and costed information processing strategy which meets not only their own requirements, but also the future data processing needs for management at the station level. This strategy should then form the basis for the BARP central computerization development project, its implementation calendar and future investment policy.

Meanwhile, the completeness, accuracy and timeliness of data processing at the stations could be improved using existing manual procedures. IRA should revise its current idea of requesting raw administrative and financial data from the stations, as it is contrary to the operational management characteristics of the institutes. Instead, both institutes should require monthly reports of processed administrative and financial information from the stations, using the existing civil service formats. This monthly information is needed for effective station management, and could be consolidated at the central processing unit at headquarters for directorate use.

Monthly reporting creates a desirable routine and ensures that both the chief of station and the institute directorate always have the up-to-date information they need. It would also provide section chiefs and researchers with monthly updates of the status of expenditures in their research operations. None of this applies at present. The station chiefs often receive data from their SAF and accountant at irregular intervals, and the directorates require some station reports only every three months (or six months in the case of the "compte de gestion" of IRZ), by which time data are too old or too voluminous to be of use.

Finally, to facilitate the transition to computerized data recording and processing at the stations, units that have microcomputers for research purposes should be encouraged to allow the appropriate administrative and financial staff to get acquainted with computers and simple administrative software readily available on the market. Experienced researchers should be asked to assist with and hands-on guidance.

5. FUNDING OF AGRICULTURAL RESEARCH

5.1 Introduction

The financing of research was perceived by staff at all levels in both IRA and IRZ to be the single greatest current threat to the functioning of research. To unravel this issue, the mission devoted much effort to understanding the various sources of funding, the budget levels over the last five years, and the nature of the problem. It also tried to assess funding prospects, particularly in view of planned growth of the institutes. The mission found that the two institutes had made few attempts to analyze their financial situation, and therefore undertook its own analysis in the brief time allowed. Unfortunately, data are not complete, because some figures on donor contributions were difficult to obtain. Moreover, many records provided by the institutes contained inconsistencies; some of these could be satisfactorily reconciled in this report. The data bring out certain uncomfortable facts which reinforce some of the conclusions drawn and recommendations made in earlier chapters.

In this analysis, a distinction is made between operating (recurrent) funds and investment funds, and also between national funds (governmental and non-governmental) and external contributions. An attempt is also made to assess research efficiency in terms of resources used per researcher. The results of the analysis are presented in the form of thirteen tables in Annex 6. MECPES, IRA and IRZ may wish to complete and update these tables for further analysis. This is not as easy as it may seem. Some data obtained from the central accounts offices of both IRA and IRZ were inconsistent and could not be used. Often, errors are only detected when cross-checking data in different combinations between different tables.

These tables may also assist the institutes to develop models for future information gathering, analysis and presentation, with further refinement needed, particularly for analysis of resource use on a program-by-program and station-by-station basis.

5.2 Sources of Funds

Research activities are financed by Government funds, receipts from sale of research, services and produce, bank interest, carry-over funds, bank overdrafts, miscellaneous revenue, and external support. These resources are briefly described below.

Government funds. These are provided under two categories: funds to cover operating expenditures and funds for investments. Operating funds are allocated annually by the Ministry of Finance. Investment funds are allocated by the Ministry of Planning on the basis of the Five-Year Development Plan. No transfer is allowed between these two categories. Inadequate communication between the ministries involved has resulted in cases of imbalance between investments and operating funds.

The operating funds category is subdivided into two budget sub-categories: general operating funds and operating funds for research programs. The former comprise the costs of permanent personnel, administration, and operation and maintenance of the installations. The latter include all

expenses directly related to individual programs, including temporary labor. Beginning in 1987/88, the research operating funds, but not the general operating funds, will be included in the public investment budget. Because investment funds have a five-year planning horizon, they are less susceptible to annual fluctuations than operating funds. This step could thus help bring about a five-year research planning cycle. It will also provide a clearer separation between research program operating funds and general operating funds, thus reducing disputes over expense imputations, and enabling research program chiefs to properly exercise their responsibility over expenditure decisions within their program.

Receipts from sale of research and services. A number of Government and parastatal development organizations have agreements ("conventions") with IRA under which they commission research and/or services. IRZ does not have this type of arrangement. Client organizations enter into these agreements voluntarily, and the research and services performed address their priorities. There have been problems associated with some of these agreements. Some client organizations do not pay the agreed remuneration, either because of financial constraints, or because they consider that a state organization (such as some institutions and projects dependent on MINAGRI) should not pay for research or services supplied in the national interest by another state organization. In the latter case, of course, there is a clear breach of contract.

IRA, on its part, has made errors in preparing the conditions of these agreements. It has underestimated the costs involved, inasmuch as overhead costs and major salary components have not been included. Also, IRA has not required even partial advance payment, so that it has been obliged to pre-finance much of the work. Given the primary mandate of research institutes, and the limited resources available, IRA should have been more critical in judging which activities to accept, particularly in the case of services which might have been carried out by others.

Receipts from sale of produce. Some IRA and IRZ stations generate, mainly as a byproduct of their research but in a few cases from production units, large quantities of salable products. In some cases sales are part of an agreement (e.g., seed coffee beans for UCCAO); in other cases produce is sold on the market (e.g., bananas). Often the prices are fixed at a level which does not reflect market value; usually, the price does not cover full production costs (e.g., breeding rabbits, chicks, juices). Although the revenue must eventually be remitted and is not additional to Government funds, it represents for the producing stations a temporary means to overcome cash flow problems.

Bank interest. The institutes used to earn appreciable amounts of interest on bank deposits. This is no longer the case for several reasons: transfers of operating funds by the Ministry of Finance no longer occur at the beginning of each trimester but towards the end. The investment budget, which used to be paid to the institutes at the beginning of the year, is now administered directly by the Ministry of Finance, and an earlier decree which prohibits interest on current accounts is gradually being implemented.

Carry-over funds. Unspent investment funds may be carried over and added to next year's investment budget. Unspent operating funds cannot be carried over, except by special agreement with the Ministry of Finance. For funds that are committed but not yet spent, this agreement is easily granted, but other unspent operating funds are deducted from the subsequent budget allocation.

Bank overdrafts. Loans are legally valid resources of the research institutes (Decree no. 79/495 of December 4, 1980, Part V, Art. 34). Bank overdrafts have recently become an important source of funds at the directorate as well as at the station level. Due to a 7-month delay in Government communicating the 1986/87 operating budget, which included sharp reductions for non-salary items, and due to a severe delay in actual disbursement by the Treasury, recourse to bank credit has been inevitable to keep essential activities going. Obviously, this has given rise to an additional expense item: Interest for which there is no budget line under existing rules.

Miscellaneous revenue. Some funds could be generated by the sale of unusable vehicles and equipment. In many stations much space is taken up and depreciation expense incurred by derelict vehicles and other disposable inventory. In principle the institutes can sell this material after review by a "commission de réforme", but in practice this commission has not met for many years.

External grants and loans. Cameroonian research receives support from various external agencies. With the notable exceptions of the large, not-yet-effective, interest-bearing World Bank loan and important recent loans for IRA from the Caisse Centrale de Coopération Economique of France, nearly all of this external support is on a grant basis. Also, most is in the form of technical assistance personnel, although some donors provide funds for equipment and, less commonly, operating expenses.

5.3 Available Funds and Expenditure

This section briefly discusses a time series of the funds available to IRA and IRZ and the amounts spent; reference is made to the tables of Annex 6. Since external funds are not included in the accounts of the institutes, most of the analysis refers only to funds from Cameroonian sources. However, in Annexes 6.3 and 6.4, estimates of external contributions have been assembled for each institute, and these data are taken into account in Annexes 6.5 - 6.7, 6.12 and 6.13. Data available were inadequate to permit separate estimation of total resource use of each research station, and even more so of each research program. (It may be recalled that Tables 1 and 2 on pages 16 and 17 only relate to direct costs of research programs, excluding general station operating costs and personnel costs.)

While there are only rather small and occasional differences between approved budgets and funds actually received (except, perhaps, since 1986/87, due to extreme constraints in the national budget), large differences often exist between funds received and actual expenditures (Annex 6.8).

Overall funding trends. Total funding of IRA and IRZ, after correction for inflation, increased by 38% between 1981/82 and 1985/86; but in 1986/87 there was an overall drop to well below the level of 1981/82 (Annex 6.6). The consequences of this plunge are more serious than they might seem. The demands on the institutes have increased over the years, resulting in very substantial increases in staff (Annexes 6.6 and 6.13), expanded programs and greater operating expenses. Because personnel costs are difficult to compress, any reduction in the recurrent budget has an immediate adverse effect on the implementation of research programs.

Operating funds and expenditures. Government provides the lion's share of the institutes' operating funds: in IRA, 83-86% in the early 1980's, dropping to 78% in 1986/87; in IRZ, a stable 94-96% (Annex 6.5). For IKA, amounts earned from sales of services and produce represented 17% of all operating funds in 1981/82 and 10% in 1982/83. Thereafter, the income from produce sales has been stable in nominal terms, while that from the sale of services has decreased. As the Government budget contribution has increased, the share of income from sales in the IRA budget has decreased to 7% or less in 1986/87 and 1987/88 (Annex 6.1). For IRZ, earnings from sales have increased somewhat, both in absolute terms and as a percentage of the total operating budget, from 3% in 1984/85 to 6% in 1986/87 and a much higher percentage is anticipated in 1987/88 (Annex 6.2).

During the last six years, total operating funds from Cameroonian sources have increased in nominal terms, but rather erratically (Annexes 6.1 and 6.2). For IRA, yearly increases in the period 1982/83 through 1985/86 were 25, 13, 19, and 9 percent, respectively, in nominal terms, followed by a drop of 19% in 1986/87. Taking into account a 12% inflation rate, this recent drop means that IRA's total operating funds (including those for meeting all personnel charges) have declined by over one-quarter in real terms in one year. Although the approved 1987/88 budget is higher than the amount received in 1986/87, it is not at all unlikely that the amount IRA will actually receive will be well below the previous year's level. In the case of IRZ, operating funds increased by 66, 44, 20, 12 and 12 percent in nominal terms in the period 1982/83 through 1986/87. For IRZ, therefore, operating funds matched inflation even in 1986/87, assuming the approved budget was actually received. But in 1987/88 there is a drop in the approved budget of 25%, which makes the situation of IRZ as precarious as that of IRA. The patterns are about the same if estimated foreign contributions, including expatriate staff (valued at local levels), are taken into account. However, as from 1987-1988 increased French support has improved the operating conditions of IRA.

Since 1984/85, the growth in the number of Cameroonian researchers has considerably outstripped operating funds (Annex 6.6). For IRA, the share of personnel costs in total operating expenditure increased from 59% in 1981/82 to 65% in 1985/86 (Annex 6.11). Although final data were not yet available for 1986/87, an even higher percentage for personnel expenses, perhaps as high as 79%, is expected because a certain category of personnel ("en cours de recrutement") budgeted for by IRA but previously paid by the Ministry of Finance, were charged to the IRA budget.

Correspondingly, the operating expenditure directly related to research programs decreased from 25% to 19% of total operating funds spent over the period between 1981/82 and 1985/86, and was only 12% in 1986/87. It will be even lower in 1987/88.

Despite the overall growth of IRA in personnel and investments, research program operating expenditures remained virtually stagnant in real terms between 1981/82 and 1985/86 (Annex 6.10), thus causing a substantial and alarming decline in research funds per researcher for several years. The amounts allocated for this category of expenditures in 1986/87 were halved compared to 1985/86, and although this led to the recognition that major improvements in efficiency were necessary and possible, it also brought the decline in research program operating funds per researcher to crisis proportions.

IRZ shows a similar trend to IRA for personnel expenditures in relation to total operating costs (Annex 6.11). The percentage of the budget spent

on personnel rose from 49% in 1981/82 to about 66% in 1985/86, with a concomitant decrease in research program and general operating expenditure. IRZ's personnel cost has also been affected in 1986/87 by the shift of "personnel en cours de recrutement" to its own budget. On the whole, in contrast to IRA, IRZ's research program operating funds have more or less kept pace with the expansion of personnel until 1985/86, although operating funds for general purposes did not. However, the approved budget for 1986/87 shows a steep drop in both categories of non-personnel operating funds (Annex 6.10).

Comparing the structure of operating expenditures of IRA and IRZ on the basis of Annex 6.11 (Cameroonian funds only) has only limited validity. In the first place, IRA has relatively more expatriate researchers. Their remuneration is not included in the personnel costs but, for most of them, IRA is responsible for meeting their operating costs. IRA should therefore have more non-personnel operating funds. On the other hand, animal research usually entails higher program costs per researcher than crops research. Lastly, there are considerable differences between IRA and IRZ in the extent and nature of the external support they receive, and these are not reflected in the data.

Investment funds and expenditures. IRA's funds available for investment have grown spectacularly between 1981/82 and 1985/86. For IRZ, the growth has been somewhat more moderate (Annex 6.5), although the overall levels of available investment funds on a per-researcher basis were equally favorable, if not more so.

In both Institutes, actual spending has been far less than the amounts available (Annex 6.8). The indices of investment spending in real terms of local funds are shown below (1983/84 = 100; price deflators adapted from Tables 2.1 and 2.2 of the Sixth Five-Year Plan):

	1981/82	1982/83	1983/84	1984/85	1985/86
IRA	48	89	100	112	145
IRZ	n.a.	n.a.	100	95	95

While IRA's annual investment spending in real terms has tripled between 1981/82 and 1985/86, that of IRZ has remained more or less the same. IRZ had been allocated a rather low investment budget for 1986/87 (Index 90), and substantially less than half of that amount for 1987/88.

A comparison of investment spending with total operating expenditure in the two Institutes over the period 1981/82 to 1986/87 (Annex 6.8) shows that in IRA increases in investments have consistently outpaced increases in operating funds, to the effect that investment expenditure in 1985/86 was two-thirds

the level of operating expenditure, while in 1981/82 the ratio was only 1:4. In IRZ, investment expenditures were high in relation to operating costs (2:3 or even 3:4) in all three years for which data were available. To properly interpret these data, and especially to assess the additional operating funds required as a result of the investments, one would need more details of the composition of these investments (which include not only construction and equipment, but also scholarships for training). It is recommended that the Institutes study the budgetary implications of past and current investments, and avoid investments beyond levels for which incremental operating funds can be assured. Meanwhile, the available data, especially if viewed together with figures on staff increases,

clearly suggest that there has been for some time a worsening imbalance between investments and increases in operating funds. If balance is not achieved, the utilization and maintenance of facilities will suffer increasingly, as is already evident in some of the research stations.

Although the annual accounts prepared by the institutes break investments down into a few broad categories, they do so only for items paid for by the end of the financial year. Committed funds for items not yet paid for, in some years as much as 30-50% of all investment expenditure, are lumped together in the accounts. Furthermore, there is no inventory of new and existing investments, including unpaid commitments. Without rectifying these deficiencies it is impossible to correctly estimate and justify yearly incremental requirements for operation and maintenance in budget preparation.

Some of the investments for IRA and IRZ (e.g., housing) are financed from the budget of the General Services of MESRES. Until these expenditures are made explicit, the levels of investment in IRA and IRZ will be underestimated by an unknown amount.

Assessing the total effort in funding IRA and IRZ, Annex 6.7 shows that the total allocation of resources to IRA and IRZ combined, including expatriate staff valued at local levels, amounted to 0.82% of the agricultural gross domestic product (AGDP) in 1981/82. Since then, the percentage has risen to about 1.2% in the period 1983-1985. More recent figures are not available, but it may be assumed that there was a further rise in 1985/86, probably followed by some decline in 1986/87. Although the mission has no detailed information on the size of the agricultural research efforts outside IRA and IRZ, it is estimated that its total cost may represent 0.10-0.15% of AGDP. Total resources, domestic plus foreign, allocated to agricultural research would therefore amount to about 1.3% of AGDP. With this percentage, Cameroon occupies a favorable place in sub-Saharan Africa, where few countries surpass 1%.

Annex 6.7 provides three indicators of the level of fund allocation to agricultural research from the Government budget; i.e., excluding external support. The figures permitting the estimations are taken from the World Bank's February 1987 Economic Memorandum on Cameroon, which based them on Cameroon National Accounts and Ministry of Planning data. If these data are correct, they show that IRA and IRZ received a very significant share of Government resources for the agricultural sector. First, in 1984/85 the allocation of Government funds to IRA and IRZ was about 25% of its total funds allocated to agriculture. Second, in 1983/84 the total number of personnel in IRA and IRZ, all categories compounded, represented 18% or more of the total number of public service personnel in the agricultural sector. Third, in the period 1982/83 - 1985/86 Cameroon spent, on IRA and IRZ together, about 1000 FCFA per rural inhabitant. Obviously, with current budget cuts, this figure has decreased substantially. It was about 640 FCFA in 1986/87, and certainly lower still in 1987/88.

In conclusion, therefore, the overall level of resource allocation to agricultural research in Cameroon has been rather satisfactory, although imbalances between budget categories have been developing for some time. It might be said, therefore, that the primary concern should be to improve utilization efficiency rather than funding level. On the other hand, even without considering the recent budget crisis, there is no reason for the Government to be complacent about its allocation to agricultural research in a situation, notably in IRA, where the level of foreign support for

essential program components is still extraordinarily high. Furthermore, the rapid deterioration in funding which both Institutes have undergone since 1985 has caused a serious predicament, because even if the absolute levels of funding at first glance are still relatively favorable, the bulk of the money is tied to obligations to pay personnel costs, so that little is left for actually carrying out research.

In fact, due to a rapid and not altogether judicious personnel expansion over the past five years, the Institutes are left not only with badly underemployed personnel and low labor productivity in several stations and services, and with suboptimal researcher/technician ratios, but also with fixed personnel charges which in 1987/88 consume almost the entire operating budget. Thus, the recent budget cuts, which could have been absorbed if they had come more gradually, and particularly if care had been taken over the years to curb staff additions to keep personnel charges to 60 or 65% of the operating budget, now risk bringing research to a grinding halt. Consequently, while there is an immediate need for decisions -- difficult in any civil service -- to redress the noted imbalances, there is an equal need for additional operating funds to allow the necessary adjustments to take place without undue program disruption.

5.4 Funding Prospects, and Optimizing Fund Utilization

The future quality and extent of agricultural research depends on finding solutions to a number of problems, of which funding is only one. A major complicating factor has been highlighted in the previous paragraph. Other important factors, such as the relevance of research programs, the quality of researchers and support personnel, the organization and structure of the research institutes, and the correct application (and where necessary introduction) of administrative and accounting procedures have been discussed in earlier chapters of this report.

Government funding. The various projections of the Cameroonian economy made by MINRAT for the 6th Five-Year Plan and by the World Bank all indicate a considerable slowing down of Government revenue growth rates. The most optimistic is the 6th Plan, projecting Government revenue to grow by 3% p.a. in real terms over the period 1986/87-1990/91. Operating funds are projected to grow by 1% p.a., investment funds by 10% p.a.

In all likelihood, Government funding of agricultural research will grow more slowly than the above percentages. Funds will not be applied evenly to all sectors, Government having singled out education and health as priority areas. This means that Government operational support for agricultural research is likely to decline in real terms, and investment funds will at best remain at their present level.

Improved fund utilization. The likely continuation of the gradual decline in real terms of total funding should compel the Institutes and their parent ministry to search for a more rational use of existing resources. The mission has identified four approaches, which can be adopted singly or in combination.

First, a growing and by now disproportionate part of operating funds is spent on personnel salaries and benefits. In some job categories important staff reductions are possible, particularly in clerical and other middle-grade personnel and field labor. While stations vary and

some are short of personnel, generally speaking many persons in both categories are under-employed, due to lack of work or low productivity (cf. Section 2.2), and this contributes to high personnel costs. Annex 6.12 shows that, per researcher, some 8.2 million FCFA (US\$ 27,300) in IRA and perhaps 9 million FCFA (US\$ 30,000) in IRZ are spent on technical and support personnel (all categories including permanent labor), assuming that the average personnel charges for a researcher have been correctly estimated at 5 million FCFA. The average cost of support personnel per researcher in IRZ will come down somewhat when young researchers return from overseas training.

To give the institutes a better insight in their personnel costs, it is recommended that they institute the calculation of their expenditures for the various functional personnel categories separately. This would also help them to assess the possibilities of redeploying redundant personnel, perhaps in income-generating operations within or outside the research institutes. If this proves to be an impossible or insufficient outlet, and if civil service regulations also prevent a significant reduction in numbers by terminations of service, there are two alternative courses of action.

One, probably the least likely if the more desirable, is for the Government to grant the research institutes a more autonomous statute with greater flexibility in matters of personnel recruitment and dismissal. The other is for the institutes to let normal retirement and other attrition take its course. About one-fifth of the personnel are aged between 50 and 60 years, so that normal retirement alone will lead to a 10% personnel reduction in about five years. As there is attrition in the other age groups as well, a reduction in numbers on the order of 20% over a five-year period might be achieved. The big disadvantages of this approach are its relative slowness and its passivity: there is no room in this process to select for good performance or against poor quality and redundancy. In speculating about these alternatives, it is assumed that the January 1987 budget instruction from the Minister of Finance, which blocks all new recruitments in all categories except specialized manpower, continues to be in force. It is also assumed that the Presidential Decree of June 1987, which fixes the retirement age at 50 years, will not immediately come into effect.

In an attempt to economize on operating costs, IRA and IRZ have temporarily reduced certain individual staff benefits, notably medical costs and leave transport. The mission recommends that these measures (particularly coverage of medical expenses) be reconsidered, as they undermine staff morale, while affording only marginal savings.

Second, the institutes should aim at maximum efficiency in the use of available operating funds. An important example is the area of transportation, where savings are not only a question of rationalizing vehicle utilization by individual staff members, and between research programs, but also of restructuring the research station and antenna networks which would reduce travel distances. However, because contacts with farmers and tests in different environments are vital to research and must be safeguarded, realizing economies in transportation is not simply a matter of cutting travel opportunities.

Approved non-personnel operating funds per researcher, including general operating funds, in 1986/87 were roughly 4.3 million FCFA (US\$ 14,300) for IRA and 4.8 million FCFA (US\$ 16,000) for IRZ. In the case of IRA,

this also included foreign operating support (Annex 6.12). These figures, lower than those for earlier years, are not inadequate in an effectively structured and efficiently functioning system. However, the approved budgets for 1987/88 are substantially lower, and there are risks of incomplete disbursements and encroachment on operating funds to pay salaries. In these circumstances there may not be much room left for further savings to increase efficiency, although there is an overriding need for careful planning and scheduling so as to spend available funds in those priority areas of the research program which most usefully occupy the researchers' and technicians' time at the least cost.

A third possibility is a conversion of investment funds to operating funds. In 1986/87, 30 to 40% of all available Cameroonian funds were earmarked for investment, including facilities, equipment, and training (Annex 6.12). The functional limit to investments in buildings and equipment is determined by the available annual operating funds, commonly 25-30% of the value of the capital investment. A complete inventory should be made of existing and planned investments, and the corresponding increase in necessary operating funds calculated. The Institutes should try to convince national authorities and foreign assistance agencies to reallocate investment funds, where necessary, to operating funds, particularly non-personnel operating funds. However, here again, the 1987/88 budget leaves little latitude as far as Cameroonian funds are concerned. IRZ, for example, has been allocated only 80 million FCFA for investment (including training), a very sharp decline from the 1112 million FCFA in the previous year. Therefore, the suggestion would apply to donor contributions in the first place.

Fourth, IEA and IRZ should discontinue unpromising or low-priority programs, sub programs, themes, operations, or experiments on the basis of a critical examination of all these program entities, starting at the program level, with regard to their priority, total cost (including that of personnel), and potential results.

Under normal circumstances, these measures together should permit the reinforcement or addition of research activities of long-term national importance, such as those related to conservation and management of the natural resource base. If, however, serious budgetary problems continue, the institutes would be compelled to selectively reduce their research activities. This would waste part of a very precious asset -- researchers' time, jeopardize ongoing efforts, as well as the exploitation of past achievements, and compromise the effectiveness of the research system in the future.

Revenue from sale of research, services, and produce. The issue of collecting payments from parastatals for work done by IEA under special agreements must be resolved by the ministries and other parties concerned. As existing disagreements have shown, the very principle of providing research or services against payment to other Government organizations is in question. There are several aspects to this problem.

First, research institutes must draw a line between research, which is their proper task, and performing services of a routine nature. In the absence of other specialized laboratories, the research institutes may well be best equipped to perform some of these services. All activities of the research institutes, whether research or service, must be fully agreed upon in the Program Committees of the Institutes, matching available personnel and facilities to areas of priority concern.

If an institute accepts to perform services for any other organization, this should be budgeted and accounted for separately, and be billed at its full cost, including staff costs. If the activity requested by another organization is truly of a research nature and is acceptable to the Program Committee, it should be fully integrated into the institute's program and its cost would be included in the institute's budget.

Second, producers of export crops are represented more adequately by parastatal and private organizations than are producers of livestock and food crops. They have therefore been able to obtain services from the research institutes which have not been available to small producers. Care must be taken not to orient research unduly to paying clients, as this would put small farmers at a disadvantage and would conflict with the national policy of promoting self-sufficiency in food.

Third, trying to produce revenues to supplement the research budget can gravely compromise the quality and quantity of research conducted. If, however, no other agencies are providing certain important products, notably genetically improved or disease free stock such as breeder rabbits or selected coffee plants, the institute might continue to provide these services for the time being. The production for sale of plant and animal material from research stations should, in general, be discouraged beyond what is generated in the context of research. A special case of the latter is experimental production units, such as those of IEA in Njombe, whose primary purpose is to assess the viability of research results on a commercial scale. Such large units constitute a valid and important part of the research enterprise, but they are not relevant to peasant farming, and are limited for the most part to estate crops and forestry. In any event, production operations, whether experimental or not, should have separate accounts from those of research. They also should also involve researchers and research technicians to a minimum extent, and their time involvement should be realistically budgeted and monitored.

If redeployment of excess field labor and middle level personnel into production operations appears feasible as a partial solution to the problem of redundancies, accompanied by measures to increase labor productivity, it would be imperative to ensure that suitable managers are appointed, so that such operations will not require much researchers' and technicians' time. Logically, special production operations should not fall under MESRES. If this cannot be avoided, however, it would be the responsibility of MESRES to ensure that the Government contribution to research is not reduced indiscriminately as a result of increased income from production operations.

Fourth, in those cases where research stations have produce to sell, the Government should not impose price restrictions, and the institutes themselves should ensure the best possible pricing and the monitoring of quantities sold.

Census. The mission has considered the possibilities, advantages and disadvantages of census taxes on the major cash products such as cocoa, coffee, palm oil, rubber, timber, and marine fish, as a source of finance for research. Because this complex question was raised repeatedly in discussions with members of the mission, the main considerations are briefly discussed here.

First, this solution can only be applied to part of the national research program. It should not lead to neglect of less conspicuous, though not

necessarily less important, areas of research for which cesses cannot be levied, and which would continue to depend on funding by the Treasury. This is the case for all commodities of which only part is marketed, i.e., most food crops as well as farm animals, and it also applies to all non-commodity research, such as that on factors of the natural resource base, production inputs, and farming systems.

Second, such taxation would have to be for the exclusive benefit of the commodity or product on which the tax is levied. But even then, the question will be asked why research on this particular commodity or product is not financed from the Government budget, as is other research. If the cess were not earmarked for the specific commodity, it would simply amount to adding to general state revenue.

Third, extreme care is required, commodity by commodity, in examining whether a cess for research is practical and fair for the industry in question. For example, it might be difficult to collect the cess from all producers, or it might constitute a heavier burden on one category of producers than on another.

Fourth, it is necessary to ask whether benefits from cess-financed research would accrue equitably to all producers. Large producers often benefit more than peasant farmers.

Fifth, while cess-financing works well when commodity prices and volume of production are stable, it may lead to funding insecurity when prices or volumes are low and/or unstable.

A final consideration is that, if a particular industry finances research, it will logically claim considerable authority over the research program, possibly through an advisory committee with heavy growers' participation. This has obvious advantages, even though it may complicate the management of the research institute. In the extreme case, the industry may insist on taking over the full control over such research, thus fragmenting the research system. But if this then means that the cess-financed research can be managed independently from civil service rules and regulations, and with reasonable funding security, such a solution can be effective, and might have much to commend it.

All factors considered, and taking into account the extreme difficulties in which most agricultural industries find themselves in Cameroon today, the mission has concluded that the possibility of imposing cesses as a means of funding commodity research must be weighed carefully on a case-by-case basis. This option might be considered for research in areas such as forest management in the rainforest zone, marine fisheries, and perhaps certain export crops.

Promoting private research. Privately sponsored research could play a role in agricultural development. Hybrid maize development, screening of agricultural chemicals, and produce processing and preservation are areas handled and funded elsewhere by private companies. Also, certain service activities, such as soil testing and pest management, are being increasingly handled by the private sector, freeing public funds for other research and service activities.

External grants and loans. Currently, the major donors to agricultural research in Cameroon are the USA and France (Annexes 6.3 and 6.4). Since 1984/85, USAID has provided several hundred million FCFA annually for technical assistance, capital investments, equipment and operating costs.

This will continue at least to 1995. France, through CIREAD and ORSTOM, provides thirty-five to forty researchers to IRA and five to six to IRZ. This amounts to about 300 million FCFA per year if these researchers are valued at local levels. For the year 1986/87 France has also provided IRA with some fifty million FCFA of operating funds. Other donors have provided both funds and researchers on a more limited scale.

External support to IRA, including expatriate personnel valued at local levels, constituted 23% or more of IRA's total resources (or, expressed differently, added 30-50% to its local operating and investment funds) in recent years (Annex 6.5), amounting to an annual total of over 1.4 billion FCFA (Annex 6.3). As a percentage of funds actually spent (see Annex 6.3), the foreign contribution is even higher. The bulk of this support has been, and still is, in the form of expatriate research staff and investments, including training, although the part that goes to non-personnel operating funds has increased from 1-3% in the period 1981-83 to 9% in 1984/85 and 1985/86 and 12% in 1986/87. External support for IRZ is much more modest, but the percentage it added to local resources rose from 6% in 1981/82 to over 10% in 1986/87. Almost all of it was in the form of facilities and equipment, training, and expatriate staff, and very little for non-personnel operating expenses (Annexes 6.4 and 6.5).

The fact that the foreign support received is heavy on research staff and investments, and very light on operational support, means that the institutes, particularly IRA, spend a great part of their operating funds on servicing these external contributions. It also means that the effectiveness of most foreign assistance is as vulnerable to sudden cuts in Government derived operating funds as is that of Cameroonian researchers (the notable exception being the NCRE project in IRA).

However, it is worth recalling and emphasizing that, with effect from 1987/88, France has provided new loans for investment in the Garoua station of IRA, and to meet operating expenses of the IRA antennae in the North. It has also provided loan and grant money for research on cotton and agricultural diversification in this zone. This comprises funds for both infrastructure and operating expenses, including salaries of French and Cameroonian researchers, and of Cameroonian senior technicians.

The forthcoming World Bank loan for IRA and IRZ totals US\$ 17.8 million. It will substantially raise the percentage of external funding of both institutes. It provides funds for infrastructure, equipment and vehicles, technical assistance, and training, as well as for operating costs. In addition to this loan, but in the same context (NARP), the UK will grant approximately US\$ 1.5 million and the Federal Republic of Germany \$ 0.8 million, for expert staff and related support. This loan and these grants, along with their counterpart Cameroonian investments of US\$ 9.3 million in local currency - assuming that the loan would be executed as originally agreed - will require additional operating funds of 1.6 billion FCFA per year in constant 1991 terms, not including interest payments (World Bank Staff Appraisal Report, Cameroon National Agricultural Research Project, October 14, 1986, Annex 6: 'Illustrative Government cash flow'). However, the financial crisis will reduce the available Cameroonian funds by comparison of the amounts originally planned.

Speaking generally and without particular reference to Cameroon, there are risks to be taken into account when accepting sizable foreign support of national research systems. First, such assistance is rarely committed

for more than 5 to 10 years, which is insufficient time to build up a stable cadre of adequately trained researchers and support staff, build a conducive institutional framework, and develop a strong and balanced national research program. Second, the research topics which receive funding often accord more with the perceptions, interests and priorities of donors than with those of the recipient Government. Third, the knowledge and experience of technical assistance personnel are seldom fully transferred to national staff. The long-term gains of strengthening national capability are often sacrificed to short-term research productivity. Fourth, a lack of donor coordination and uniformity of procedures makes it difficult for institutes to properly manage the resources made available. Fifth, external funds are usually provided for expatriate personnel and equipment, but rarely for operating costs, which are often in short supply.

As stated earlier, external funds account for a substantial proportion of the total annual resources of IRA and, so far to a lesser extent, IRZ. It is recommended that the Institutes and MESRES, jointly with the main donors and technical assistance agencies, carefully assess the longer-term benefits and disadvantages associated with increased foreign support, and try to assure that the above risks are minimized, should greater assistance be accepted. Particular attention is needed for the incidence of external assistance on future requirements for operating funds, and the transfer of knowledge and organizational capacity to Cameroonians.

6. RECAPITULATION OF MAIN FINDINGS AND RECOMMENDATIONS

The mission's analysis and recommendations can be summarized in six major areas: research policy, organizational structure, planning and programming, personnel, administration and operational support, and research funding.

6.1 Research Policy

According to the texts governing the Council for Higher Education and Scientific Research and MESRES, the Council has the responsibility to express itself on science policy, while MESRES implements policy. Until now, the Council has met infrequently and has given little policy guidance to research leaders. This guidance is important for developing coherent research programs which conform to the priority concerns of Government. More frequent meetings are recommended, based on preparatory work done by MESRES in collaboration with MINREY and technical ministries. For the agricultural sector this would require effective communication at national and regional levels, between MINAGRI and MINREYA departments and delegations, extension services, development organizations, and research institutions, to arrive at a balanced judgment on priorities at the macro-economic level, informed assessment of suitable technologies, identification of non-technical constraints to the adoption of such technologies, correct identification of research problems, and judicious research program planning.

6.2 Organizational Structure

Three axes for research organization: discipline, program, and region. Three complementary aspects are to be considered when trying to identify suitable organizational structures and mechanisms for agricultural research: scientific competence of the researchers (discipline focus); coherence and comprehensiveness of the research program (program focus); and relevance to client needs (regional focus).

- * Scientific competence is much enhanced by peer interaction across institutions through periodic seminars by discipline; MESRES, the research institutes and the university centers need to make financial provisions and provide organizational support.
- * Program integrity is furthered by reinforcing the position of program chiefs in the research institutes, and by creating national program committees, one for each main program, with some membership from outside the research institutes.
- * Closeness to the clients, involving, as it must, research planning from local and regional levels upwards, is best achieved through structuring and developing the institutes on the basis of agro-ecological zones, accompanied by the creation of zonal research advisory committees or research-development liaison committees, preferably for IEA and IRZ together.

Strategic planning by agro-ecological zone. Defining IEA and IRZ research centers as entities with zonal responsibilities might be the best basis for drawing up a 15 to 20-year development plan for research.

Such a long-term strategic plan, with suitable intermediate stages, would involve:

- * institutionalized consultation between MESRES, IRA, and IRZ, and between these and other interested parties, notably CUDS, ministries (MINACR., MINEPIA, MINPAT), and development organizations;
- * a formally redefined role of research centers as guardians of zonal interests; and, at the central level, mechanisms for harmonizing zonal responsibilities of center chiefs with program integrity responsibilities of program chiefs.
- * agreement on the number and boundaries of agro-ecological zones;
- * regrouping stations and substations/antennae by zone, and rationalizing research infrastructure within each zone, with maximum collaboration between IRA and IRZ, and between these and academic institutions, CUDS in particular;
- * selecting suitable locations for headquarters of zonal centers;
- * phased development of infrastructure as a function of projected economic and demographic changes in the different zones and likely staff and finance, avoiding undesirable dispersion;
- * strengthened monitoring and evaluation functions at institute headquarters to support decentralized planning;
- * gradual expansion of common IRA/IRZ services and joint research.

Planning for seven research zones or less? Cameroon has at least seven major agro-ecological zones, so that the long term target might be for each of these seven main zones (Far North, North, Adamaoua, Northwest/West, Central/South, Southwest/Littoral, and East) to have an IRA and an IRZ research center. However, restrictions on manpower and especially funds make it necessary to envisage an evolutionary process, with fewer than seven center chiefs at intermediate stages, each having the responsibility for two or three zones. A feasible interim solution could be four or five centers, having different weights in IRA and IRZ, responsible for: North/Far North, North-east/West/Adamaoua (or Northwest/West and Adamaoua separately in the case of IRZ), Southwest/Littoral, and Central/South/Eastern. The critical issue is choosing an organizational structure that promotes both decentralized planning and a more geographically balanced physical development over time, as a function of anticipated economic and demographic trends.

Consolidating Infrastructure

- * While strengthening soils research, the National Soils Centre (CNS) units could be absorbed into the stations where they are located without any loss of program integrity, thus eliminating the need for the CNS itself; the tasks of the CNS antenna at Dschang could be taken over by the CNS soils laboratory.
- * Similarly, IRA's forestry research units would benefit from integration into the proposed zonal structures, obviating the need for a separate Forestry Research Centre (CPE).
- * The Herbarium, now part of the CPE, should become a truly national entity for permanent collections in the entire botanical field, with IRA and IRZ stations maintaining working collections as necessary.
- * The IRA stations of Kouba and Barombi Eang could be combined, perhaps at Barombi Eang, and the mandate of the combined station expanded to create a more viable entity. *Récomvoné* also needs an expanded mandate and more staff to ever become a dynamic research entity.
- * The possibility of introducing some IRZ research into small IRA stations should be seriously considered, as should combined IRA/IRZ station development in regions such as the Eastern zone, where both

Institutes are underrepresented. By combining sites, IRA and IRZ could support each other appreciably in creating viable entities.

- * The IEA station of Dschang could be phased out and its antennae attached to other stations.

Linkages between IRA and IRZ. While merger is not a viable option under present circumstances, strong IEA/IRZ collaboration in research is desirable, notably in neglected areas of mixed farming, soil fertility maintenance, agro-silvo-pastoral systems, testing and improvement of fodder plants, and other areas involving both plants and animals. There is also some scope for joint services to economize on funds and manpower. Joint vehicle maintenance workshops already exist, and the Cameroon/World Bank agreement on the National Agricultural Research Project (NARP) provides for the development of joint IEA/IRZ services for a library/documentation unit and a computer unit. Another important possibility, perhaps in combination with CUDS and/or certain other university centers, might be a service for maintaining specialized laboratory equipment, staffed by a few highly qualified equipment specialists, who are scarce and difficult to retain.

To promote this diverse cooperation, more attention should be given to the potential significance of board and committee membership. The institute directors should be members of each other's Management Board and Program Committee. Similarly, the Research Service chiefs should be members of the Program Committee of each other's institute. Scientific and technical collaboration would be further promoted by representation of MINAERI and MINEPIA in the Management Board and the Program Committee of each of the two institutes.

Linkages with national academic and research institutions. It is essential that the relations of both IEA and IRZ with CUDS be strengthened. To plan these linkages, and to coordinate further infrastructural development, there is an urgent need for IEA and IRZ to be represented on the CUDS Management Board and planning committees. All three parties should make full use of the opportunities CUDS off-center facilities will afford to the research CUDS, IEA, and IRZ. Better financial arrangements need to be made for Cameroonian scientists conducting thesis research in Cameroon.

To ensure that socioeconomic considerations feature more prominently in crop and livestock research, IRA and IRZ should not only recruit more specialists in socioeconomic disciplines, but also seek support from ISH which might orient part of its program in this direction.

External Linkages. Both institutes, with donor support, should thoroughly explore the possibilities of twinning their stations or programs with overseas universities and research institutions, with a view to strengthening guidance to less-experienced researchers, broadening opportunities for training and exchange of knowledge and ideas, receiving collegial assistance in the formulation of research programs, and in some cases obtaining technical and financial assistance.

Linkages of IEA and IRZ with farmers and development organizations.

- * Field days should remain prominent, even in times of financial hardship, to relay research findings to clients and to maintain the visibility and sense of mission of the research stations.
- * Linkages with development agencies and extension services at provisional and divisional levels are needed for regional research

planning. In particular, ways and means need to be found in each region to enable the researchers to more formally discuss with various appropriate spokesmen for small farmers what technological developments, and hence research programs, are best suited on the one hand to answering farmers' short-term needs and on the other hand to modernizing agricultural production in the longer term. Good personal communication, of which there are excellent examples, is no substitute for formal mechanisms.

- * Research extension collaboration is needed at divisional and local levels for verification trials and demonstrations in farmers' fields.
- * While relationships with several parastatals are excellent, particularly in the case of IPA, there are also some negative cases, which always lead to a suboptimal use of national resources; in some cases high level interministerial intervention is necessary.
- * Parastatal development organizations will be essential partners in the national committees per research program, whose creation was advocated earlier.

6.3 Research Planning, Programming, and Evaluation

The preparation of a long-term national agricultural research plan that takes account of all relevant research capability in the country is a necessary condition for making the most effective use of Cameroonian resources and the potential for external cooperation and assistance.

Long term planning of research. Existing processes for defining research objectives in relation to national development goals and client needs include contacts of varying intensity between researchers and farmers, and also with development staff at divisional and provincial levels. While personal initiative of researchers and station chiefs must remain a key ingredient in research planning, informal contacts should be complemented by some formal mechanisms. In developing these it is entirely appropriate to maintain the institutes' principle that medium- and long term research planning must begin at the local and regional levels, with active involvement of the Government administration, the extension services, and development organizations. Such formal contact is best achieved through the creation of a program advisory committee in each agro-ecological zone, in which both IPA and IRZ participate, as mentioned on page 72. This committee might seek special advice on particular issues or commodities, from individuals or ad hoc working groups, as needed.

IRA and IRZ center chiefs would be responsible for the broad research priorities for their zone, while program chiefs, whose position in the management structure needs to be formalized, would continue to be responsible for the scientific integrity of their program nationwide. Zonal research programs would be harmonized and compiled by the Institute directorates and the integrated programs transmitted to the Program Committee of each institute. This process would also provide the basis for the writing of the agricultural research section of the Five-Year Development Plan, which should be done by MEREES, MINACKI, and MINEPIA, acting together. Thus, the development Plan would reflect a thorough analysis of projected needs and priorities, from the regions up, and would be related to available funds and scientific manpower.

The effectiveness of the institute Program Committees would be enhanced by this more adequate process of research priority setting and resource allocation at the macro-level, and by better documentation. This must

include an organized manner of describing and justifying programs, subprograms and themes, so that research operations can be considered in their appropriate context during the Committee's annual deliberation of next year's programs.

A thorough review of all programs is recommended: to improve program structure; to eliminate conceptual inconsistencies in the delimitation of programs, subprograms, themes, and operations; to discontinue unpromising work; to pay greater attention to complementarity of activities, with a view to practical application of findings; and to identify important gaps in research coverage. More research, mainly on a zonal basis, is needed in the areas of soil fertility, soil-plant water relations, conservation of indigenous genetic resources, agroforestry and agro-silvo-pastoral systems, and management of the natural forest. Better research planning leading to increased efficiency can make room for urgent new work, and is a particular challenge under resource constraints. Improved mechanisms and procedures are powerless, however, when abrupt major resource cuts and uncertainties are combined with bureaucratic restrictions on structural remedies.

Both IRA and IRZ should pay more attention to economic aspects of ongoing research, such as the study of benefit/cost relations of proposed improvements. IRZ is urged to place greater emphasis on social, economic, and technical research in the farmers' environment. On-station research is an expensive yet essential complement to on-station technology development; those responsible for fund allocation should realize that this type of research is all too often the first to suffer when operating funds are cut.

Research programming and evaluation. To develop research program data sheets ("fiches programmes") into useful planning and evaluation tools, MESRES, together with IRA and IRZ, is urged to devise a new format, in which stress is laid on specification of not only general but also specific research objectives, explanation and justification of program thrusts (i.e., subprograms and themes), definition of targets, description of research linkages, and a broad indication of requirements for personnel, finance, and infrastructure. All programs should then be reviewed every 4-5 years with some external participation, and data sheets updated as appropriate.

Similarly, operation data sheets ("fiches opérations") need to be expanded to provide more information for a proper assessment of proposed research activities, and for monitoring and evaluation of work in progress. Program chiefs should ensure, and the central Research Service should verify, that any new research operation is consistent with the program's accepted objectives and thrusts, that it is scientifically well conceived, that the experimental methods and design are appropriate, and that the literature has been studied. To assure that research personnel address priority needs and that work loads are realistic, estimates of the allocation of researchers' time to different programs and operations should be made and analyzed. The file containing data sheets on current operations should be updated annually as part of the review and programming exercise.

Annual evaluation and planning meetings should be held for each of the main programs. To underscore their importance it is advisable that financial provision for such meetings be made, preferably under a separate budget heading.

6.4 Personnel

Personnel planning. There are serious imbalances in the composition of the research personnel, with surpluses in middle-level administrative personnel and field labor in several stations in both institutes, and shortages of technicians, especially in IRA. Without redressing these imbalances, the institutes cannot be efficient research organizations. The Government's general prohibition of new appointments is helping to keep staff numbers down, although sole reliance on attrition is an indiscriminate way to achieve the necessary reductions in some personnel categories. Additional approaches are suggested in 6.6 below, to move towards a situation where personnel charges do not consume more than 60% or 65% of the operating budget. The projected expansion of personnel under the National Agricultural Research Project (NARP) needs to be reviewed in this light. Good planning requires reasonably precise indications from the Government of the maximum size of the research system sustainable from public funds in the longer term, and of the likely evolution in levels and types of external support.

Personnel data base. For proper staff development, both IRA and IRZ need an up-to-date database on all personnel. IRA has started a computerized personnel information system, and IRZ intends to follow suit. This can only work if station chiefs and researchers provide the needed data promptly, and if the central Research Service, SAR, and the computer service effectively share all pertinent information and keep the system current.

Matching personnel with programs. Matching existing staff to priority needs should receive top emphasis in manpower planning. This not only requires completion of the database for researchers and technicians, but also early program reviews.

Training and guidance.

- * The institutes should ensure that program chiefs and other senior researchers, both Cameroonian and expatriate, play a stronger and more structured role in training and supervision of younger colleagues. Additional guidance could come from institutionalized contacts with staff of national and foreign universities and international research institutes, and from attendance at seminars and workshops.
- * IRA needs laboratory technicians with a stronger science base. Apart from recruiting more science graduates, it could also try to upgrade the most deserving technicians with an ITA diploma.
- * As non-medical laboratory technician training is lacking in Cameroon, the idea of turning the TA program of CUBS into a specialized agricultural research technician training program deserves consideration.
- * A few administrative staff in both institutes should be trained as "operational auditors", whose task would be to verify that administrative and financial procedures are correctly applied in the research stations.
- * Personnel of all categories in IRA and IRZ require a better understanding of the role of research in national development, the long-term objectives and priorities of the institutes, the essential role of personnel at all levels in making the system function, and the causes and implications of the current financial crisis.

Recruitment, statutory position, and emoluments.

- * It is strongly recommended that all Government departments involved in assigning civil service personnel to the research institutes would accept that the final selection of candidates for appointment take place at the institute level.
- * Alleged inconsistencies in assignment of new personnel to researcher and technician grades need to be resolved, on a case-by-case basis.
- * Inconsistencies in assignment of grades, emoluments, and secondary benefits between civil servants and researchers on contract ought to be removed.
- * Technicians urgently need the promised statute which would bring their emoluments closer to those of junior researchers and provide them with a career structure. IRA's serious shortage of technicians, especially, cannot be solved without it.
- * The bonuses now awarded automatically to researchers should be based on research quality and productivity. In the longer term, a new remuneration structure might be advisable, with longer and overlapping salary scales for researchers and technicians, incorporating the bonuses, and with objective merit assessment for salary increments.

Job descriptions. All personnel should have job descriptions, of varying detail depending on the personnel category. The format used in each case should facilitate understanding, utilization in evaluation, and annual updating. For researchers and technicians, general job descriptions by function, established by the directorate in consultation with program and station chiefs, should be complemented by individually tailored descriptions

of work objectives, jointly formulated by the immediate supervisor and the employee.

Personnel evaluation

- * The annual civil service personnel evaluations using the "Bulletin de Note" could be made more meaningful if the research institutes used a supplemental form to cover managerial, supervisory, and coordinating responsibilities.
- * It would also be worth trying out, initially for higher and middle-level personnel only, a self-assessment of an employee's work objectives, achievements, problems, needs, and expectations.
- * Merit evaluation of researchers for promotion focuses on evidence of scientific achievement but does not take into account special contributions to national development objectives, performance of management duties, staff supervision, training and coaching of younger staff, liaison with extension and farmers, etc. The evaluation process is also quite slow. Determined corrective action on these points is essential for a fundamental improvement of the research system.
- * Merit evaluation of technicians is strongly recommended in the context of a proper career structure for this personnel category.

Discipline and sanctions. Both institutes suffer from lack of discipline. Institute directors should ensure that center and station chiefs insist on accurate personnel evaluations and the imposition of sanctions where necessary, while at the same time giving all personnel a sense of confidence that adjudication will be fair and prompt. When submitting cases for more serious sanctions, the institutes must be able to rely on strong backing from MESRES, and on a mechanism for speedy verdicts, including dismissal when warranted.

6.4 Administrative and Operational Support

Administrative and financial procedures. While most administrative and financial personnel seem competent to perform the tasks assigned to them, it is important for the institutes to reemphasize to their personnel the purposes, tasks, and responsibilities of the various administrative, financial, and management functions, as well as the operational interactions between them. All these should be periodically reviewed for relevance and effectiveness.

Standard operational guidance needs to be developed and issued in document form for all administrative tasks and responsibilities, including reporting requirements, for both management and other personnel. Compliance and accuracy, especially in the case of financial procedures, should be ensured by the introduction of independent review mechanisms at the station level. Disciplinary action is called for in the event of recurrent non-compliance.

In addition, improvements are recommended in several deficient administrative and financial procedures:

- * Physical cash, cheque, and receipt handling must not be performed by the person who makes the accounting entries or who performs bank reconciliations.
- * Procedures should include instructions for reconciliation of bank accounts. Both station management and headquarters would greatly benefit from monthly reports showing the relationship between funding, expenditures, and cash plus bank balances. Unpaid items and uncollected receipts should also be reported.
- * Research stations should be required to report on bank loans, so that management gets a realistic picture of their financial position.
- * Research program cost budgeting and accounting should be made more complete. In particular, personnel costs should be attributed to their respective research programs, using personnel records by function and grade, and foreign contributions should be included. If such information is incomplete or lacking, comparative cost analysis is impossible, as are long-term cost projections.

In stations which generate sizeable revenues from production and sales, such as La Dibamba and Njombe (IFA), Yekwa and Mankon (IRZ), it is recommended that separate budgeting and accounting of production costs and revenues be applied.

Transportation. The management of transportation in both IRA and IRZ requires improvement:

- * General goal statements should be made and tasks and responsibilities defined for record keeping, maintenance, use, and replacement.
- * A complete and verified inventory is needed, and authorization obtained to dispose of derelict vehicles.
- * The cost of repairing vehicles should be calculated, and repair preferred over purchase where it is most cost-effective. Some of the loan funds for new vehicles under the NARP might be reallocated to finance spare parts, repair facilities, and training.
- * Serious consideration may be given to setting up repair and maintenance workshops where off-station facilities are not available.
- * Before buying new vehicles, realistic provisions should be made for operation and maintenance.

Library/documentation services and publications

- * Of critical importance in both institutes is the training of Cameroonian staff in documentation.
- * Enhanced capacity is required in editing and publishing. Apart from the planned recruitment of an expatriate science editor, at least one Cameroonian in each institute should be sent on extended training in agricultural journalism.
- * The planned tri-annual frequency of the Science and Technology Review should be attained as soon as possible.

Station management. It is recommended that creation of the post of farm manager be given serious consideration for the larger stations, in those cases where station chiefs require and welcome assistance. If the appointment of farm managers is envisaged, their responsibilities and position in the management hierarchy must be clearly defined prior to taking steps for their selection, recruitment, and training. It is essential that they have an agriculture degree, with interest in farm equipment and operations; their professional rank must be more or less equivalent to that of researchers.

Computerization. It is recommended that the institute directorates and their heads or S&T define in more detail their own information processing and reporting requirements as users, and develop a well-documented and costed information processing strategy which meets not only their own requirements but also the future data processing needs for management at the station level. This strategy should then form the basis for the RARP central computerization development project, its implementation calendar, and future investment policy.

Meanwhile, contrary to research data processing, for which computers are an asset at the stations today, the completeness, accuracy, and timeliness of processing financial and administrative data at the stations could be improved using existing manual procedures. Both institutes should require from their stations monthly reports of processed administrative and financial information from the stations (not raw data), using the existing civil service formats.

To facilitate computerization at the stations, microcomputer facilities should be made available to those researchers, station administrators, accountants, and supply officers who wish to learn how to use them, and experienced researchers encouraged to assist with on-the-job training.

6.6 Research Funding

Improved Use of Funds. IRA and IRZ face serious budgetary problems which are likely to persist for some time. There are several ways to approach these problems:

- * The institutes should try to redeploy redundant personnel, notably a good many laborers and some administrative personnel, perhaps in income-generating operations, preferably outside the institutes.
- * If redeployment proves to be impossible or insufficient, termination of service should be considered. If civil service regulations prevent this, it might help the institutes to be given a more autonomous statute with greater authority in recruitment and termination of service.
- * There is an overriding need for careful planning and scheduling to spend scarce operating funds on those priority areas of the research program which most usefully occupy the researchers' and technicians' time.

- * The institutes should try to make further economies in the use of these funds, for instance in transportation. Structural adjustments can help to reduce travel distances.
- * National authorities and foreign assistance agencies might be persuaded to reallocate investment funds, where necessary, to operating funds, particularly non-personnel operating funds. A complete inventory should be made of existing and planned investments, and the corresponding increase in necessary operating funds calculated. The functional limit to investments in infrastructure and equipment is determined by the available operating funds.
- * IRA and IRZ should discontinue unpromising or low-priority programs, subprograms, themes, operations, or experiments after in-depth reviews of all program entities.

Normally, these measures together should enable the institutes to add some research activities of long-term national importance, such as those related to conservation and management of the natural resource base. But if budgetary problems continue at their 1987/88 level of severity, the institutes will be compelled to selectively reduce their work.

Revenue from sale of research, services, and produce

- * IRA is facing major problems with collecting payments from parastatals for work done under special agreements. This issue must be resolved at a high level by the ministries and other parties concerned.
- * It is imperative that all future activities of the research institutes for third parties, whether of a research or a service nature, be fully agreed in the Program Committees of the institutes, matching available personnel and facilities to areas of priority concern.
- * To permit proper planning, IRA and IRZ together should carry out a study of present and future demands for soil testing, analysis of plant and animal material, seed production, etc. This should include the requirements for their own research programs, as well as external demand for services. They should realistically assess the costs of providing such services and compare these with alternatives overseas. If an institute accepts to perform services for any other organization, these should be budgeted and accounted for separately, and be billed at their full cost, including staff emoluments.
- * The production for sale of plant and animal material at research stations should, in general, be discouraged beyond what is generated in the context of research.
- * In those cases where research stations have produce to sell, the Government should not impose price restrictions, and the institutes themselves should ensure the best possible pricing of salable produce and the monitoring of quantities sold.

Cesses. Cess taxes might be used to help finance research on a few enterprises such as marine fisheries, forestry in the rainforest zone, and perhaps certain export crops.

Private research. To promote private research, Government would need to make a determined effort to identify and eliminate impediments.

External grants and loans. External support, including expatriate personnel valued at local emolument levels, added about 30% to IRA's local resources in recent years, against less than 5% in the case of IRZ. IRA, especially, spends a considerable portion of its budget on

operating costs arising from these external contributions. The IBRD-loan-financed NARP, with additional grant contributions from the United Kingdom and Germany, if implemented as planned, for IRA and IRZ together will require additional operating funds to the tune of 1.6 billion FCFA per year in constant 1991 terms, not counting 0.8 billion a year for servicing the loan. It is in everyone's interest that the institutes and MESRES, jointly with the main donors and technical assistance agencies, carefully assess the long-term advantages and possible disadvantages associated with different kinds and levels of foreign support, in order to arrive at optimal packages in relation to national inputs. Particular attention needs to be given to the incidence of foreign assistance on future requirements for operating funds, and the transfer of knowledge and organizational capacity to Cameroonians.

TERMS OF REFERENCE

"The management review will be conducted by an ISNAR team which will work in close consultation with senior Government officials, research leaders, and the clientele of the two research institutes. The terms of reference are as follows:

- * To analyse those aspects of Government mechanisms, procedures, rules and regulations which have a bearing on the operations of the agricultural research institutes, and make proposals for improvements.
- * To review the mechanisms for determining agricultural research policy, and the management of research priority setting and resource allocation, formulation of objectives and programmes, and monitoring and evaluation of research activities in IRA and IRZ, and make proposals for improvements.
- * To examine the internal organization of IRA and IRZ, and make proposals for changes which could enhance the relevance, coherence, and efficiency of research.
- * To analyse the linkages and communications between the research institutes and their diverse groups of clients, including the relevant ministries, parastatal organizations and farmers, aimed at enhancing the relevance of the research undertaken and the utilization of research results, and make recommendations for improvements.
- * To analyse the linkages of IRA and IRZ with other research and academic institutions, in-country and abroad, and make proposals for their improvement.
- * To analyse the procedures involved in programming and budgeting, monitoring of research programs, and evaluation of the scientific and technical value of research results, as well as the management and administration of human, physical and financial resources, and of information. This analysis will be done at two levels: at IRA and IRZ headquarters, and at their respective centers and stations. This analysis should lead to proposals for improvement in procedures aimed at enhancing the efficient utilization of people, materials, and funds, including proposals for computerization of certain functions, and an estimation of corresponding changes in staffing pattern. At the research station level, special attention will be given to farm operations and management.
- * In collaboration with MESRES and the directorates of IRA and IRZ, to formulate proposals for human resource development and personnel policies for the two institutes, in particular:
 - identify scientific and technical manpower needs over a ten-year period.
 - prepare a ten-year training plan, with detailed proposals for the first year (1987-88), for:
 1. management training of senior staff of IRA and IRZ at headquarters, centres and stations, including centre and station chiefs, heads of administration and finance, and senior researchers;

- ii. supplementary training of researchers and technicians; and
 - iii. skills training for personnel of the administrative and accounting sections and of other support services, at headquarters, centres and stations.
- formulate proposals for career development and work incentives.
- * To make any additional recommendations to help improve the efficiency of the scientific services and of the technical, financial, and administrative support services."

INSTITUTIONS VISITED

MINISTRIES

Ministry of Higher Education and Scientific Research (MESRES)

- Minister and Minister's Cabinet
- Inspector General no.2
- Department of Scientific and Technical Research (DRST)
- Sub-Department of Programming, DRST
- Programme Follow-up Service, DRST
- Studies and Projects Service, DRST
- Department of Higher Education

Ministry of Livestock, Fisheries and Animal Industries (MINEPIA)

- Department of Studies, Projects and Training
- Experiment Station of Wakwa

Ministry of Agriculture (MINAGRI)

- Department of Studies and Projects
- Department of Agriculture
- Department of Forestry
- Extension Service
- Provincial Delegation of Agriculture for the South-West, Buéa
- Provincial Delegation of Agriculture for the North, Garoua

Ministry of Planning and Regional Development (MINPAT)

- Department of Projects and Programs

Ministry of Finance

- Department of Budget

INSTITUTE OF AGRONOMIC RESEARCH (IRA)

Directorate, Nkolbisson

Agronomic Research Stations and Antennae:

- Nkolbisson
- Ekona
- Njombé
- Maroua
- Bambui
- Barombi Kang
- Dschang
- Foubot
- La Dibamba
- Garoua
- Ngaoundéré
- Bertoua (interview at Nkolbisson)

National Soils Centre (CNS) Stations and Antennae:

- Nkolbisson
- Ekona
- Dschang

INSTITUTE OF AGRONOMIC RESEARCH (cont.)

Forestry Research Stations:

- Nkolbisson
- Kumba

INSTITUTE OF ANIMAL RESEARCH (IRZ)

Directorate

Livestock Research Stations and Antennae:

- Nkolbisson
- Bambui
- Mankon
- Wakwa
- Garoua

Fisheries and Aquaculture Research Stations:

- Limbé
- Foumban

OTHER INSTITUTIONS OF MESRES

University Centre of Dschang (CUDS)

- Directorate, Institut des Travaux Agricoles (ITA)
- Directorate, Ecole Nationale Supérieure d'Agronomie (ENSA)
- Soils Laboratory, ENSA

PARASTATALS

GENADEFOR, Yaoundé
MIDEVIV, Yaoundé
CDC, Bota/Limbé
ONDAPB, Yaoundé
SODECAO, Yaoundé
SODECOTON, Garoua and Maroua
SODEPA, Yaoundé and Ngaoundéré
SPA-Nord, Garoua
MEAVSB, Garoua
AGRILAGDO, Garoua
LANAVET, Garoua

TECHNICAL ASSISTANCE AND FUNDING ORGANIZATIONS

World Bank, Yaoundé
World Bank, Washington (visiting missions)
USAID-Cameroon, Yaoundé
USAID (visiting NCRE evaluation mission)

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MEMBERSHIP OF THE BOARDS OF GOVERNORS OF IRA AND IRZ

		<u>IRA</u>	<u>IRZ</u>
Chairman	Minister of Higher Education and Scientific Research (MESRES)	x	x
Vice-Chairman	Rep. Minister of Agriculture (MINAGRI)	x	
	Rep. Minister of Livestock (MINEPTA)		x
Members	Rep. Presidency of the Republic	x	x
	Rep. Minister of Finance	x	x
	Rep. Minister of Planning and Regional Development	x	x
	Rep. Minister of National Education	x	x
	Rep. Minister of Public Health		x
	Vice-Chancellor, Univ. of Yaoundé	x	x
	Director General or Rep. of CUDS	x	x
	Director of the DKST, MESRES	x	x
	Rep. Chamber of Agriculture	x	
	Director of Veterinary Pharmaceutical Office (OPV)		x
	Chairman of the Association of Veterinary Surgeons		x
	Director of IRA	x	
	Director of IRZ		x

Notes: - Rep. = Representative
 - Explanation of acronyms: See Annex 8.

MEMBERSHIP OF THE PROGRAM COMMITTEES OF IRA AND IRZ

		<u>IRA</u>	<u>IRZ</u>
Chairman	Director of the DRST, MESRES	x	x
Members	Director of IRA	x	
	Director of IRZ		x
	Rep. Minister of Agriculture (MINAGRI)	x	
	Rep. Minister of Livestock (MINEPIA)		x
	Director of Agriculture, MINAGRI	x	
	Director of Water & Forests, MINAGRI	x	
	Director of Studies & Projects, MINAGRI	x	
	Director of Livestock and Animal Industries, MINEPIA		x
	Director of Veterinary Services, MINEPIA		x
	Director of Fisheries, MINEPIA		x
	Head, Livestock Station, Wakwa, MINEPIA		x
	Dean, Faculty of Sciences, University of Yaoundé	x	x
	Director of ENSA, CUDS	x	
	Head, Livestock Department, ENSA, CUDS		x
	Director of National Meteorology	x	x
	Director of SEDA	x	
	Director of MIDEVIV	x	
	Director of SODECOTON	x	
	Director of SOCAPALM	x	
	Rep. of FONADER	x	x
	Rep. of SODECAO	x	
	Rep. ZAPI-EST	x	
	Rep. SODEBLE	x	
	Rep. UCCAO	x	
	Rep. SODERIM	x	
	Rep. CELLUCAM	x	
	Rep. SEMRY	x	
	Rep. CDC	x	
	Rep. HEVECAM	x	
	Rep. GENEEMA	x	
	Rep. CIRAD	x	
	Rep. ORSTOM	x	
Rep. Service Civique National de Participation au Développement	x		
Rep. SODEPA		x	
Rep. Pastoral Company		x	
Head of Research Service, IRA	x		
Heads of Centers, IRA (6)	x		
Head of Research Service, IRZ		x	
Heads of Centers, IRZ (2)		x	

Notes: - Rep. = Representative
- Explanation of acronyms: See Annex 8.

Annex 5.1. IRA: LOCATION OF RESEARCH PROGRAMS AT STATIONS (IIB, 1987)

Programme	Garoua	Maroua	Niameé	Ouchang	Sarroui	Évrou	Laikipia	Nairobi	Mogadishu	Mogadishu	Bukuru	Loumbot	Edéa	Kumba	Nat. Herb.
1. Cereals	+	+	+	+	+	+						+			
2. Roots & tubers		+	+	+	+	+									
3. Grain legumes			+	+								+			
4. Vegetable crops			+									+			
5. Banana		+													
6. Fruits	+	+	+			+									
7. Food technology			+												
8. Cocoa															
9. Coffee															
10. Oil crops															
11. Rubber															
12. Cotton		+													
13. Dense forest															
14. Savanna forest		+													
15. Botany															
16. Soils		+		+		+									
17. Plantain			+			+									
18. Medicinal plants															
19. Farming systems		+		+	+	+									
20. Pineapple			+												
21. Genet. resources															

+ Location where research is being done
H Head of program

Annex 5.2. IRZ: LOCATION OF RESEARCH PROGRAMS IN STATIONS AND ANTENNAE (FEB. 1987)

<u>Program</u>	<u>MESRES</u>	<u>Wakwa</u>	<u>Gareoua</u>	<u>Yagoua</u>	<u>Bambui</u>	<u>Mankon</u>	<u>Bangangté</u>	<u>Babouge</u>	<u>Nkolbisson</u>	<u>Bertoua</u>	<u>Limbé</u>	<u>Kribi</u>	<u>Foumban</u>
1. Beef		+		+	+		+	+	H	+			
2. Dairy		+H			+				+				
3. Small ruminants			+	+		+H	+		+	+			
4. Pigs						+			+H				
5. Poultry						+			+H				
6. Rabbits						+H			+				
7. Agrostology		+	+H		+					+			
8. Veterinary		+H		+	+	+							
9. Wildlife	H		+										
10. Horses			+H										
11. Fisheries											+H	+	+

+ Location where research is being done
H Head of program

IRA: OPERATING AND INVESTMENT FUNDS FROM CAMEROONIAN SOURCES¹
(Millions of FCFA)

1. Operating funds²

	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88
Government	1197	1573	2020	2317	2318	2309	2725 ²
Sale of produce ⁴	244	175	179	165	176	150	167
Sale of services	45	49	52	31	26	6	2.5
Interest earned	25	38	54	33	8	0	0
Miscellaneous	52	14	18	12	35	7.5	8
Carry-over from previous years	160	313	126	349	585	70	0
TOTAL	1723	2162	2449	2907	3148	2543	2902.5
% Increase over previous year	--	25%	13%	19%	9%	- 19%	(see *)

2. Investment funds

	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88 ¹
Government	618	1182	1236	701	1523	156	190
Carry-over from previous years ⁵	190	470	948	1258	812	914	681
TOTAL	808	1652	2184	1959	2335	1070	871
- Of which spent	343	712	908	1147	1878	1220 ⁶	n.a.
- % increase in spent over previous year	--	108%	27%	26%	64%	- 35%	

1 For period 1981/82 through 1986/87, funds received. For 1987/88, funds approved.

2 Operating funds include (i) funds for personnel charges, (ii) other general operating funds (for administration, operation and maintenance of the installations and general services), and (iii) funds to execute the research programs.

3 Of this 1987/88 budget item, the approved "subvention de l'Etat" plus operating funds for the research programs total only 2,150 million FCFA, less than the expected total personnel charges; the balance of 575 million FCFA consists of a carry-over from the year 1984/85 which the Government has not paid until now, and of which there is no indication that it will be paid this year.

4 Including sales by the stations Njombé and La Dibamba.

5 Totals less amounts spent should, but do not always, correspond to carry-over figures for the following year; this is due to inconsistencies between different source documents and non-inclusion in amounts spent of sums committed.

6 Of this amount, 150 million FCFA are not covered by funds received; an additional sum totalling nearly 200 million FCFA is committed, with bills not received by the end of the financial year. Thus, over 350 million FCFA will have to be met from the 1987/88 investment budget. It should be noted that the Government contribution originally approved for 1986/87 was 1,700 million FCFA, against 156 million FCFA actually paid out.

* No estimate possible because of uncertainties regarding amounts to be received; see 3.

Sources: IRA, various budget yearbooks ("Rapports d'Exécution du Budget, Compte-Rendus de Gestion, Budget de Fonctionnement Exercice 1987-1988").

IRZ: OPERATING AND INVESTMENT FUNDS FROM CAMEROONTIAN SOURCES¹
(Millions of FCFA)

1. Operating funds²

	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88
Government	409	658	856	1000	1000	1126	788
Sale of produce	27	22	18	36	50	101	392
Interest earned	--	--	25	66	70	50	0
Miscellaneous	14	3	2	1	0	0	0
Carry-over from previous years	15	88	213	233	371	400	71
TOTAL	465	771	1114	1336	1491	1677	1251
% increase over previous year	--	66%	44%	20%	12%	12%	- 25%

2. Investment funds

	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88
Government	817	880	977	1000	1142	800	392
Carry-over from previous years ³	233	583	782	353	682	312	88
TOTAL	1050	1463	1759	1353	1824	1112	480
- Of which spent	467	600	977	1041	1215	n.a.	

1 For period 1981/82 through 1984/85, funds received. For 1985/86, 1986/87 and 1987/88, funds approved.

2 Operating funds include (i) funds for personnel charges, (ii) other general operating funds (for administration, operation and maintenance of the installations and general services), and (iii) funds to execute the research programs.

3 IRZ includes its carry-over funds with a delay of one year.

Sources: IRZ, various budget yearbooks ("Comptes de Gestion").

Annex 6.3. IRA: FUNDS FROM NON-CAMEROONIAN SOURCES
(Millions of FCFA)

Project and/or Activity ¹	Source	In Brackets: Number of Researchers					1986/87
		1981/82	1982/83	1983/84	1984/85	1985/86	
USAID/IITA, Cereals & FSR - of which non-personnel operating funds	USA	84 (10) (11) ²	237 (10) (20) ²	237 (10) (3) ²	837 (12) (130) ²	1087 (14) (168) ²	708 (15) ⁵ (180) ²
AGCD, Tuber Crops	Belgium	30 (1)	31 (1)	30 (1)	11 (1)	-	- (-)
IDRC, Tuber Crops	Canada	7 (1)	9 (1)	7 (1)	8 (1)	8 (1)	- (-)
IDRC, Production Systems	Canada	- (-)	- (-)	- (-)	18 (-)	14 (-)	15 (-)
IDRC, Plantain	Canada	8 (-)	13 (-)	7 (-)	36 (-)	-	- (-)
PHPO, Western Plateau	World Bank	22 (-)	18 (-)	24 (-)	30 (-)	20 (-)	47 (-)
CRSP, Cowpeas	USA	- (-)	36 (1)	18 (1)	- (1)	-	- (1)
SAFGRAD, FSR Garoua	International	- (1)	- (1)	- (1)	- (1)	37 (4)	64 (3)
Groundnut	USA	- (-)	10 (1)	22 (1)	- (1)	4 (1)	8 (-)
Crop Protection	USA	13 (-)	27 (-)	- (-)	- (-)	-	- (-)
PCN, Centre North	World Bank	180 (2)	110 (2)	110 (2)	110 (2)	110 (2)	- (-)
Soil Science	UNDP/FAO	n.a. (4)	n.a. (4)	n.a. (4)	n.a. (4)	n.a. (4)	n.a. (4)
Plantain and Banana	EEC	- (-)	- (-)	- (-)	- (-)	35 (1)	32 (-)
ORSTOM, various	France	- (2)	- (2)	- (2)	- (1)	-	- (3)
CIRAD, various ³	France	- (34)	- (34)	- (35)	- (34)	-	50 ² (35)
GATSBY, Tubers	U.K.	- (-)	- (-)	- (-)	- (-)	32 (2)	35 (2)
SUB-TOTAL		344 (55)	491 (57)	455 (58)	1050 (58)	1347 (66)	359 (63)
Valuation of Researchers ⁴		330	359	384	403	481	483
TOTAL		674	850	839	1453	1828	1442
of which:							
- Operating funds		341	379	387	533	649	713
- Investment funds		333	471	452	920	1179	729

1 Insufficient data available to permit breakdown by program so as to complement Table 1.

2 Non-personnel operating funds.

3 Including a major contribution to research on industrial crops.

4 Valued at 7.3 million FCFA per year in 1985/86, which corresponds to total personnel charges for a Cameroonian Senior Research Officer at the middle of this salary scale (index 940). Nominal increase in emoluments estimated at 5% per year.

5 Including 1 Netherlands Volunteer for Farming Systems research.

Sources: IRA Directorate Febr. 1987, except for PCN (Projet Centre Nord): Project Preparation Document, World Bank.

IRZ: FUNDS FROM NON-CAMEROONIAN SOURCES¹
(Millions of FCFA)

In Brackets: Number of Researchers

Activity	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87
Training overseas ²	40 ^{est}	70 ^{est}	100 ^{est}	140 ^{est}	52	52
Wildlife ³	- (1)	- (2)	- (3)	- (3)	- (3)	- (3)
Technical Assistance ⁴	- (6)	- (6)	- (6)	- (6)	- (6)	- (5)
SUB-TOTAL	40 (7)	70 (8)	100 (9)	140 (9)	52 (9)	52 (8)
Valuation of researchers ⁵	42	50	60	63	66	61
TOTAL	82	120	160	203	118	113
Of which						
- Operating funds (all personnel)	42	50	60	63	66	61
- Investment funds	40	70	100	140	52	52

- 1 Total external resources made available to IRZ are underestimated in this table as USAID and Heifer Project International (HPI) funded the National Research and Feed Laboratory at Mankon and some other items, for which IRZ has not been provided with the records.
- 2 Estimated cost/year per trainee overseas 7.5 million FCFA; in 1985/86 and 1986/87 there were 5 trainees in France, 5 in Belgium, 5 in USA, 11 in UK, and 1 in Nigeria. Most of these were financed by Cameroon from the IRZ budget, but French Cooperation (FAC) funded one in France, HPI four in the USA, and the British Council two in the UK. As from 1987/88 IRZ is reducing new departures because it has arrears to pay for current and past students overseas.
- 3 Wildlife research has been supported through consultancies from Japan, the Netherlands, the USA and Canada. The contribution of expatriate researchers to wildlife research has increased from about 1 person-year in 1981/82 to about 3 person-years in 1983/84 and subsequent years. As they operate on a come-and-go basis, a full-time equivalent has been estimated as shown in brackets. Their salaries and most of their operating costs are borne by their own institutions and the amounts involved are unknown; IRZ provides housing.
- 4 Full-time senior researchers from CIRAD financed by France.
- 5 Valued at 7.3 million FCFA per year in 1985/86, which corresponds to total personnel charges of a Cameroonian Senior Research Officer at the middle of this salary scale (index 940). Nominal increase in salary and benefits estimated at 5% per year.

est Estimate.

Source: IRZ Directorate, February and October 1987.

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IRA and IRZ: TOTAL FUNDING BY TYPE AND SOURCE 1
(Millions of CFA)

	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87
IRA²						
Operating funds						
- Cameroonian	1723	2162	2449	2907	3148	2543
- External	341	379	387	533	649	713
- Sub-total	2064	2541	2836	3440	3797	3256
Investment funds						
- Cameroonian	808	1652	2184	1959	2335	1070
- External	333	471	452	920	1179	729
- Sub-total	1141	2123	2636	2879	3514	1799
Cameroonian sources	2531	3814	4633	4566	5483	3613
External sources	674	850	839	1453	1828	1442
Total IRA	3205	4664	5472	6319	7311	5055
IRZ³						
Operating funds						
- Cameroonian	465	771	1114	1336	1491	1577
- External	42	50	60	63	66	61
- Sub-total	507	821	1174	1399	1557	1738
Investment funds						
- Cameroonian	1050	1463	1759	1353	1824	1112
- External	40	70	100	140	52	52
- Sub-total	1090	1533	1859	1493	1876	1164
Cameroonian sources	1515	2234	2873	2689	3315	2789
External sources	82	120	160	203	118	113
Total IRZ	1597	2354	3033	2892	3433	2902
IRA + IRZ						
Operating funds						
- Cameroonian	2188	2933	3563	4243	4639	4220
- External	383	429	447	596	715	774
- Sub-total	2571	3362	3970	4839	5354	4994
Investment funds						
- Cameroonian	1858	3115	3943	3312	4159	2182
- External	373	541	552	1060	1231	781
- Sub-total	2231	3656	4495	4372	5390	2963
Cameroonian sources	4046	6048	7506	7555	8798	6402
External sources	756	970	999	1656	1946	1555
Total IRA + IRZ	4802	7018	8505	9211	10744	7957

1 FOR IRA: funds actually received for all years. For IRZ: funds received except in the case of Cameroonian operating funds for 1985/87 and 1986/87, where approved funds are given; additional data from IRZ suggest that funds received in those years were probably much less than funds approved: 1160 and 1247 million versus 1491 and 1677 million, respectively.

2 Sources: Annexes 6.1 and 6.3 of this report.

3 Sources: Annexes 6.2 and 6.4 of this report.

IRA and IRZ: TOTAL FUNDING BY TYPE¹
IN CURRENT PRICES AND IN CONSTANT 1981/82 PRICES
(Millions of CFA)

	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87
IRA²						
Operating funds	2064	2541	2836	3440	3797	3256
Investment funds	1141	2123	2626	2879	3514	1799
Total	3205	4664	5472	6319	7311	5055
IRZ³						
Operating funds	507	821	1174	1399	1557	1738
Investment funds	1090	1533	1859	1493	1876	1164
Total	1597	2354	3033	2892	3433	2902
IRA + IRZ						
Operating funds	2571	3362	3970	4839	5354	4994
Investment funds	2231	3656	4495	4372	5390	2963
Total current prices	4802	7018	8505	9211	10744	7957
Implicit price deflator⁴						
	100.0	112.5	127.6	143.6	162.0	182.3
IRA + IRZ						
Operating funds	2571	2988	3111	3370	3305	2739
Investment funds	2231	3250	3523	3045	3327	1625
Total constant 1981/82 prices	4802	6238	6634	6415	6632	4364
Real increase over previous year (%)						
Operating funds		+ 16	+ 4	+ 8	- 2	- 17
Investment funds		+ 46	+ 8	- 14	+ 9	- 51
Total funds		+ 30	+ 6	- 3	+ 3	- 34
Index of real growth of funds⁵						
Operating funds	100	116	121	131	129	107
Investment funds	100	146	158	136	149	73
Total funds	100	130	138	134	138	91
Researchers IPA + IRZ						
Number of Cameroonians ⁶	91	112	132	169	185	195
Number of expatriates ⁷	62	65	67	62	60	71
Total researchers	153	177	199	231	245	266
Index of growth in number of researchers⁵						
Cameroonians	100	112	145	186	203	214
Expatriates	100	105	108	100	97	115

1. Cameroonian + non-Cameroonian resources, excluding General Services of MESRES.

2. Cameroonian funds approved or received, not necessarily all spent.

3. Source: Annex 6.5; based on Annexes 6.1 and 6.3 of this report.

4. Source: Annex 6.5; based on Annexes 6.2 and 6.4 of this report.

5. MINPAT, Vle Plan Quinquennal de Développement Economique, Social et Culturel, 1986-1991, Tableaux 2.1 et 2.2.

6. 1981/82 = 100.

7. Including researchers on training abroad, as well as institute Directors, Deputy Directors and Research Service Chiefs. Sources: IPA and IRZ Directorates, Febr. 1987. See Annex 6.13.

8. Sources: Annexes 6.3 and 6.4 of this report.

MEASURING THE FUNDING EFFORT FOR IPA AND IRZ¹

	1981/82	1982/83	1993/84	1984/85	1985/86	1986/87
Total funds for IPA + IRZ (millions of FCFA) ²	4802	7018	8505	9211	10744	7957
Agricultural GDP (billiards of FCFA) ³	587	607	702	785	n.a.	n.a.
Funds for IPA + IRZ as % of Agricultural GDP ⁴	0.82	1.16	1.21	1.17	n.a.	n.a.
Govt. funding of IPA + IRZ (millions of FCFA) ⁵	3023	4293	5089	5018	5983	4391
Other govt. funding of agriculture (millions of FCFA) ⁶	7370	10070	12220	14950	n.a.	n.a.
Govt. funding of IPA + IRZ as % of all govt. funding for agriculture	29%	30%	29%	25%	n.a.	n.a.
Number of Cameroonian IPA + IRZ personnel all categories ⁷	n.a.	2041	2502	2827	2982	3293
Other govt. personnel for agriculture ⁸	n.a.	n.a.	11546	n.a.	n.a.	n.a.
IPA + IRZ personnel as % of all agric. personnel	n.a.	n.a.	18%	n.a.	n.a.	n.a.
Total funds for IPA + IRZ, in millions of FCFA of 1981/82 ⁹	4802	6238	6634	6415	6632	4364
Rural population (in thousands) ¹⁰	6153	6279	6407	6538	6671	6804
Total govt. funds for IPA + IRZ per rural inhabitant, in FCFA of 1981/82	780	993	1035	981	994	641

1 IPA and IRZ together, but excluding General Services of MESPRES; additional agricultural research is carried out in certain other Cameroonian institutions and projects, but currently in financial terms it represents at most 10% of the amounts for IPA + IRZ.

2 Source: bottom line of Annex 6.5 of this report.

3 Source: World Bank, *Mémoire Économique*, 18 février 1987, Table 2.1; these figures, derived from Cameroonian National Accounts and World Bank estimates, represent the total gross domestic product at current market prices in agriculture, forestry, animal husbandry, and fisheries, not including higher agricultural education.

4 Including agricultural research (IPA and IRZ).

5 Sources: Annexes 2.1 and 5.2 of this report, excluding sales, interest, miscellaneous, and carry-over funds.

6 Source: World Bank, *Mémoire Économique*, 18 février 1987, Table 5.3; these figures comprise all current budgetary expenditures for agriculture, forestry, animal husbandry, and fisheries, not including agricultural research (IPA and IRZ) and higher agricultural education (C005).

7 Source: Annex 6.15 of this report.

8 Source: World Bank, *Mémoire Économique*, 18 février 1987, Table 1.3; these figures, derived from the Ministry of Planning, comprise all personnel in MINAGRI and MINAPIA in 1983/84; not included are personnel in higher agricultural education.

9 Source: Annex 6.6 of this report.

10 Source: MINAPIA, *Vision Plan quinquennal de Développement Économique, Social et Culturel*, 1985-1991, Section 1.2.1.

**COMPARISON OF AMOUNTS APPROVED, RECEIVED AND SPENT
FROM CAMEROONIAN SOURCES
(Millions of FCFA)**

	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87
IRA						
Operating funds						
Approved	1401	1793	2272	2913	3121	2800
Received	1723	2162	2449	2907	3148	2543
Spent	1293	1675 ¹	2053 ¹	2394 ¹	2793 ¹	n.a.
Investment funds						
Approved	771	1638	2158	2406	2791	2614
Received	808	1652	2184	1959	2335	1070
Spent	343	712	908	1147	1878	1220
Total						
Approved	2172	3436	4430	5319	5912	5414
Received	2531	3814	4633	4866	5483	3613
Spent	1636	2384 ¹	2961 ¹	3541 ¹	4671 ¹	n.a.
IRZ						
Operating funds						
Approved	416	646	953	1291	1491	1677
Received	465	771	1114	1336	n.a.	n.a.
Spent	378	524	721	936	n.a.	n.a.
Investment funds						
Approved	1050	1463	1759	1353	1824	1112
Received	1050	1463	1759	1353	1824	n.a.
Spent	467	600	977	1041	1215	n.a.
Total						
Approved	1466	2109	2712	2644	3315	2789
Received	1515	2109	2873	2689	n.a.	n.a.
Spent	1223	1124	1698	1977	n.a.	n.a.

¹ Excluding production costs, which in the years 1982/83 through 1985/86 amounted to 83, 88, 125, and 120 million FCFA, respectively.

Sources: IRA and IRZ, various financial yearbooks ("Budgets, Comptes de Gestion").

OPERATING EXPENDITURES¹ BY MAJOR CATEGORY
(Millions of current FCFA)

	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87
IRA						
Personnel cost ²	759	1063	1309	1498	1809	2203*
Other operating cost, of which						
- directly related to research programs ³	326	357	421	518	544	350*
- for general purposes ⁴	<u>208</u>	<u>255</u>	<u>323</u>	<u>378</u>	<u>440</u>	<u>247*</u>
Total ⁵	1293	1675	2053	2394	2793	2800*
<hr/>						
IREZ						
Personnel cost ²	n.a.	n.a.	421	533	981*	1236*
Other operating cost, of which						
- directly related to research programs ³	n.a.	n.a.	169	220	307*	277*
- for general purposes ⁴	<u>n.a.</u>	<u>n.a.</u>	<u>131</u>	<u>183</u>	<u>203*</u>	<u>164*</u>
Total	378	524	721	936	1491*	1677*

1 Funds from Cameroonian sources only, excluding bank loan financing.

2 Including fringe benefits, bonuses, allowances, etc. Excluding temporary labor.

3 Covers non-personnel operating expenses specifically incurred for research programs, including temporary labor and transport.

4 Includes such items as office costs, utilities, maintenance, and transport not attributable to specific research programs.

5 For IRA: excluding production costs of marketable produce.

* In the absence of final or consistent expenditure data, approved budget amounts are given here.

Sources: IRA and IREZ financial yearbooks ("Budgets, Comptes de Gestion") and information from the Directorates.

INDICES OF OPERATING EXPENDITURE¹ IN CONSTANT PRICES
(1983/84 = 100)

	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87
IRA						
Personnel cost ²	74	92	100	102	109	118*
Other operating cost, of which						
- directly related to research programs ³	99	96	100	109	102	58*
- for general purposes ⁴	82	90	100	104	107	54*
Total expenditure ⁵	80	93	100	104	107	95*
Indices of researchers IRA (1983/84 = 100) ⁶						
- Cameroonians	73	83	100	127	133	144
- Expatriates	95	98	100	91	88	109
<hr/>						
IRZ						
Personnel cost ²	56	76	100	113	183*	205*
Other operating cost, of which						
- directly related to research programs ³	69	80	100	116	143*	115*
- for general purposes ⁴	97	105	100	124	122*	88*
Total expenditure	67	82	100	115	163*	163*
Indices of researchers IRZ (1983/84 = 100) ⁶						
- Cameroonians	62	37	100	129	152	154
- Expatriates	78	90	100	100	100	90
<hr/>						
Price deflators used ⁷	78.4	88.2	100	112.5	127.0	142.9

- 1 Funds from Cameroonian sources only, excluding bank loan financing.
- 2 Including fringe benefits, bonuses, allowances, etc. Excluding temp. labor.
- 3 Covers non personnel operating expenses specifically incurred for research programs, including temporary labor and transport.
- 4 Includes such items as office costs, utilities, maintenance, and transport not attributable to specific research programs.
- 5 For IRA: excluding production costs of marketable produce.
- 6 Based on numbers in Annex 6.13.
- 7 Adapted from deflators used in Annex 6.6.

* In the absence of final or consistent expenditure data, approved budget amounts have been used here.

STRUCTURE OF OPERATING EXPENDITURE¹
(In percentages)

	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87
IRA						
Personnel cost ²	59	64	64	62	65	79*
Other operating cost of which						
- directly related to research programs ³	25	21	20	22	19	12*
for general purposes ⁴	16	15	10	16	16	9*
Total ⁵	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

IRZ						
Personnel Cost ²	49	54	58	57	66*	74*
Other operating cost of which						
- directly related to research programs ³	25	23	24	23	20*	16*
for general purposes ⁴	26	25	18	20	14*	10*
Total	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>

1 Funds from Cameroonian sources only, excluding bank loan financing.

2 Including fringe benefits, bonuses, allowances, etc. Excluding temporary labor.

3 Covers non-personnel operating expenses specifically incurred for research programs, including temporary labor and transport.

4 Includes such items as office costs, utilities, maintenance, and transport not attributable to specific research programs.

5 For IRA: excluding production costs of marketable produce.

* In the absence of final or consistent expenditure data, approved budget amounts have been used here.

SUMMARY OF TOTAL RESOURCES OF IRA AND IRZ¹

	IRA		IRZ		
	1985/86	1986/87	1985/86	1986/87	
Cameroonian funds ²					
- Personnel	1909	2203*	981*	1236*	Annex 6.9
- Other operating funds	984	597*	510*	441*	-ditto-
- Investment	1878	1220	1215	1112*	Annex 6.8
- Total	4571	4020	2706	2789	
Donor resources ²					
- Personnel (researchers valued at Camer.emol.)	481	483	66	61	Annexes 6.3 & 6.4
- Other operating funds	168	230	--	--	-ditto-
- Investment (including training)	1179	729	52	52	-ditto-
	1928	1442	118	113	
Total resources ²					
- Personnel	2290	2686	1047	1297	
- Other operating funds	1152	827	510	441	
- Investment (incl.train.)	3057	1949	1267	1164	
	6499	5462	2824	2902	
Number of researchers					
- Cameroonian	112	127	73	83	Annex 6.13 ⁶
- Expatriate ³	51	65	9	8	-ditto-
	163	192	82	91	
Average operating funds per researcher excluding their own personnel costs ⁴					
- Personnel ⁴	7.7	8.2	7.5	9.9	
- Non-personnel operating funds (incl.general purp.)	7.1	4.3	6.2	4.6	
- Total	14.8	12.5	13.7	13.8	
in thousands 1987 US dollars	49.3	41.7	45.7	46.0)	
Average investment per researcher (including training) ⁵	18.7	10.1	15.5	12.8	
in thousands 1987 US dollars	62.3	33.7	51.7	42.7)	

1. Amounts spent, except for figures marked * where approved budget amounts (not necessarily received) are shown.

2. Millions of FCFA.

3. For IRZ this includes 3 person-years of expatriate researchers taking part on a come-and-go basis in the wildlife program, see Annex 6.4.

4. Excluding researchers' own personnel charges, for Cameroonian researchers these are estimated at an average of 5 million FCFA per researcher (all grades), for expatriate researchers at 7.3 million FCFA. (These amounts correspond to 16,670 and 24,333 US dollars assuming an exchange rate of 1 US\$ = 300 FCFA.)

5. Not including investment funds for IRA and IRZ included in the general budget of MESRES.

6. For 1986/87, the end-of-year (30 June 1987) personnel situation is given.

IRA AND IRZ: NUMBERS OF PERSONNEL¹

	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	30.6.87
IRA							
Total all personnel (Camer.+ expatriate)	n.a.	1746	2036	2345	2329	2478	2351
Of which:							
Cameronian personnel all categories	n.a.	1689	1978	2292	2278	2415	2286
Cameronian researchers	61	70	84	107	112	121	127
Expat. researchers ²	55	57	58	60	51	63	65
Total researchers	116	127	142	167	163	184	192
Ratio researchers to other personnel ⁴	n.a.	1:13	1:13	1:14	1:13	1:12	1:11
IRZ							
Total all personnel (Camer.+ expatriate)	187	360	533	544	713	886	908
Of which:							
Cameronian personnel all categories	180	352	524	535	704	878	900
Cameronian researchers	30	42	48	62	73	74	83
Expat. researchers ³	7	8	9	9	9	8	8
Total researchers	37	50	57	71	82	82	91
Ratio researchers to other personnel ⁴	1:4	1:6	1:8	1:7	1:8	1:10	1:9
IRA + IRZ							
Total all personnel (Camer.+ expatriate)	n.a.	2106	2569	2889	3042	3364	3259
Of which:							
Cameronian personnel all categories	n.a.	2041	2502	2827	2982	3293	3186
Cameronian researchers	91	112	132	169	185	195	210
Expat. researchers	62	65	67	62	60	71	71
Total researchers	153	177	199	231	245	266	281
Ratio researchers to other personnel ⁴	n.a.	1:11	1:12	1:12	1:11	1:12	1:11

1 Excluding temporary labor.

2 Source: Annex 6.3.

3 Source: Annex 6.4.

4 Other personnel comprises all categories other than researchers; it includes research technicians, senior and junior. In IRZ there were 61 senior technicians and 120 junior technicians in December 1986; this amounted to an average of 2.2 technicians per researcher. For IRA, numbers as well as qualifications are less favorable; in December 1986 technicians comprised 132 civil servants with an IIA diploma or a first university degree, and 44 laboratory assistants and "observateurs" without a technical or university diploma. The overall technician/researcher ratio is thus less than 1.0. Moreover, although IRA was unable to separate out the numbers of senior and junior technicians, the proportion of senior technicians is obviously much lower in IRA than in IRZ.

EXAMPLE OF A FORM FOR REVIEW OF
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LIST OF ACRONYMS

AGCD	Administration Générale de la Coopération au Développement / General Administration for Development Cooperation, Belgium
AGRILAGDO	Projet Agricole de Lagdo / Lagdo Agricultural Project (now limited to the Experimental Farm of Karewa)
CDC	Cameroon Development Corporation
CELLUCAM	Cellulose du Cameroun / Cameroon Cellulose
CENADEFOR	Centre National de Développement des Forêts / National Forest Development Centre
CENEEMA	Centre National d'Etudes et d'Experimentation du Machinisme Agricole / National Centre for Study and Experimentation in Agricultural Mechanisation
CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement / Centre for International Cooperation in Agricultural Research for Development, France
CNS	Centre National des Sols / National Soils Centre, IRA
CRF	Centre de Recherches Forestières / Forestry Research Centre, IRA
CTVM	Centre for Tropical Veterinary Medicine, University of Edinburgh
CUDS	Centre Universitaire de Dschang / University Centre of Dschang
DRST	Direction de la Recherche Scientifique et Technique / Department of Scientific and Technical Research, MESRES
ENSA	Ecole Nationale Supérieure Agronomique / National School of Agriculture, CUDS
FAO	Food and Agriculture Organization of the United Nations
FONADER	Fonds National pour le Développement Rural / National Fund for Rural Development
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit / German Agency for Technical Cooperation
HEVECAM	Société Hévéa-Cameroun / Cameroon Rubber Company
IARC	International Agricultural Research Center
IDRC	International Development Research Centre, Canada
IFAD	International Fund for Agricultural Development
IFDC	International Fertilizer Development Center
IFS	International Foundation for Science, Sweden
IITA	International Institute of Tropical Agriculture
ILCA	International Livestock Centre for Africa
ILRAD	International Laboratory for Research on Animal Diseases
ISMP	Institut Supérieur de Management Public du Cameroun / Higher Institute of Public Management of Cameroon
IRA	Institut de la Recherche Agronomique / Institute of Agricultural Research
IRZ	Institut de Recherches Zootechniques / Institute of Animal Research
ISH	Institut des Sciences Humaines / Institute of Human Sciences
ISNAR	International Service for National Agricultural Research
ITA	Institut des Techniques Agricoles/ Technical Agricultural Institute; and diploma of "Ingénieur des Travaux Agricoles"
LANAVET	Laboratoire National Vétérinaire / National Veterinary Laboratory
MEAVSB	Mission d'Etudes et d'Aménagement de la Vallée Supérieure de la Benoué / Upper Benoué Valley Study and Development Authority
MESRES	Ministère de l'Enseignement Supérieur et de la Recherche Scientifique / Ministry of Higher Education and Scientific Research

MIDENO	Mission de Développement du Nord-Ouest / North-West Development Authority
MIDEVIV	Mission de Développement des Semences et des Cultures Vivrières (name as provided by MIDEVIV Directorate)/ Organization for the Development of Seeds and Food Crops
MINAGRI	Ministère de l'Agriculture / Ministry of Agriculture
MINEPIA	Ministère de l'Elevage, des Pêches et des Industries Animales / Ministry of Livestock, Fisheries and Animal Industries
MINPAT	Ministère du Plan et de l'Aménagement du Territoire / Ministry of Planning and Regional Development
NARP	National Agricultural Research Project / Projet National de Renforcement de la Recherche Agricole
NCRE	National Cereals Research and Extension Program / Programme National de Recherches et de Vulgarisation des Céréales, IRA-IITA-USAID
OCB	Organisation Camerounaise de la Banane / Cameroon Banana Organization
ODA	Overseas Development Administration, United Kingdom
ONDAPB	Office National de Développement de l'Aviculture et du Petit Bétail / National Poultry and Small Species Development Authority (NPSDA)
OPV	Office Pharmaceutique Vétérinaire / Veterinary Pharmaceutical Office
ORSTOM	Institut Français de Recherche Scientifique pour le Développement en Coopération / French Institute of Scientific Research for Development
SAF	1. Service Administratif et Financier / Service for Administration and Finance (at the level of the directorates of the research institutes) 11. Section Administrative et Financière / Section for Administration and Finance (at the level of research centers and stations)
SAFGRAD	Semi-Arid Food Grain Research and Development Regional Project
SEDA	Société d'Etudes pour le Développement de l'Afrique
SEMRY	Société d'Expansion et de Modernisation de la Riziculture de Yagoua / Company for the Expansion and Modernization of Rice Production in Yagoua
SOCAPALM	Société Camerounaise de Palmeraies / Cameroon Oil Palm Company
SODEBLE	Société de Développement du Blé / Wheat Development Company
SODECOTON	Société de Développement du Coton au Cameroun / Cameroon Cotton Development Corporation
SODECAO	Société de Développement du Cacao / Cocoa Development Company
SODEPA	Société de Développement et d'Exploitation des Productions Animales / Animal Production Development and Management Company
SODERIM	Société de Développement du Riz dans la Plaine des Mbos / Mbo Plains Rice Development Company
SPA-Nord	Société de Production Agricole du Nord
TA	Technicien d'Agriculture / holder of a TA diploma
TLU	Testing and Liaison Unit, IRA
UCCAO	Union Centrale des Coopératives Agricoles de l'Ouest / Central Union of Agricultural Cooperatives of the West
UNDP	United Nations Development Programme
UNVDA	Upper Noun Valley Development Authority
USAID	United States Agency for International Development
ZAPI-EST	Zones d'Actions Prioritaires Intégrées de l'Est / Priority Zones for Integrated Action in the East