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**FINAL REPORT ON U.S. AID  
GRANT NUMBER DPE-5543-G-SS-8057-01  
3 December 1991**

U.S. AID Grant Number DPE-5543-G-SS-8057-01 was awarded to the American Association for the Advancement of Science (AAAS) to support a program of activities designed to strengthen the role of science and technology in development. AAAS received this three-year grant in July 1988, with its effective dates running from 1 September 1988 to 29 August 1991, later amended by AID's contract office to 28 July 1991.

Two sets of activities were made possible by this AID grant: (a) partial support of the Sub-Saharan Africa Journal Distribution Program, which provides current subscriptions to US scientific and engineering journals to African universities and research institutes, funded at \$43,866; and, (b) a feasibility study of a program to promote the maintenance and repair of research equipment in developing countries, funded at \$39,366, for a total of \$83,232 over the three-year period. A description of the accomplishments of these two sets of activities is contained in this report.

The work carried out under this AID grant has constituted program areas that AAAS is uniquely qualified to perform: (1) providing expert advice to the development community on selected questions related to science, technology, and development; (2) convening meetings addressing science, technology, and development problems; (3) initiating, fostering, and strengthening science and engineering networks that contribute to development; and (4) administering, with affiliated societies, other specialized scientific and technological programs.

AAAS has appreciated AID support over the past three years and looks forward to exploring new opportunities for cooperation in the future.

**I. Journal Distribution Program**

The three-year grant to the Sub-Saharan Africa Journal Distribution Program covered a modest amount of staff time and allowed AAAS to convene two meetings of the Journal Distribution Program Advisory Committee. See Attachment 1 for the roster of Advisory Committee members.

During the three years of the grant, the number of participating groups grew dramatically. Today 100 learned societies and organizations make available almost 200 journal titles to more than 250 institutions throughout sub-Saharan Africa. See Attachment 2 for a timeline and list of participating organizations and the journals they provide.

The Advisory Committee met for the first time at AAAS headquarters in Washington on June 8, 1989. Brian Kline represented AID at this meeting. See Attachment 3 for agenda and list of participants. The day before the Advisory Committee met, AAAS arranged a briefing (also at AAAS) for African diplomats stationed in Washington, DC.

The second Advisory Committee meeting was held on October 31, 1990, in conjunction with the annual meeting of the African Studies Association in Baltimore. An agenda and list of participants will be found in Attachment 4. With funding from the Carnegie Corporation of New York, AAAS was able to add an African librarian, Mrs A.O. Ike of Abubakar Tafawa Balewa University in Bauchi, Nigeria, to the Advisory Committee. Mrs Ike met with Judith Filmore, AID, on October 30, 1990.

The 1989 and 1990 Advisory Committee meetings were particularly useful for they provided a forum for a concentrated discussion of program mechanics and, more importantly, a sustained discussion of broader capacity and building issues. Full agenda books for both meetings have previously been provided to AID.

Other related activities of note, not funded by AID, but perhaps of interest to the Agency, include:

1. Journal Distribution Program biannual newsletter, NOTES. Volume 1, Issue 1 will be found as Attachment 5.
2. Survey of computer and CD-ROM capabilities in sub-Saharan African university and research libraries. The 1991 report will be found as Attachment 6.

## II. Feasibility Study of a Program to Promote the Maintenance and Repair of Research Equipment in Developing Countries

This U.S. AID grant also provided the support necessary for the AAAS Program on International Scientific Cooperation, in collaboration with counterpart organizations overseas, to develop a plan of action to address the equipment maintenance and repair problem. Collaborating organizations included member societies of the AAAS Consortium of Affiliates for International Programs; the Federation of Asian Scientific Academies and Societies; the African Academy of Sciences; the Association of African Universities; Asociación Interciencia; and the Continuing Committee on the Role of Scientific and Engineering Societies in Development. The agreement with AID provided AAAS with modest staff support and office costs associated with preparing project documentation, convening one domestic and one international meeting, conducting surveys, and compiling and disseminating project results.

As a first step, a worldwide survey of selected governmental, non-governmental, and scientific institutions was conducted concerning experience in dealing with the equipment problem. Based on the responses to this survey, draft recommendations were developed by US experts at an October 1988 meeting held at the headquarters of the Instrument Society of America, in Raleigh, North Carolina. John Daly represented AID at this meeting. The Raleigh recommendations then provided the focal point for deliberations at a December 1988 meeting of the Continuing Committee held in Cairo, Egypt. Howard Minners, AID Science Advisor, participated in the Cairo meeting. Participants from research institutions, donor organizations, disciplinary societies, and governmental agencies discussed the track record of programs initiated to address the equipment problem and then formulated a Plan of Action, outlined in more detail in the attached Final Report (Attachment 7). The Plan of Action consisted of four steps to be taken by disciplinary societies.

- **Establishment of a communications network to facilitate transfer of information and experience among equipment users in like disciplines.**
- **Formulation of a standard procurement policy for donor agencies, which would consider all aspects of equipment acquisition and treat it as a financial investment in the future with long-term implications.**
- **Convening of topical conferences to bring together the principal parties involved in the equipment problem: donors, intermediaries, manufacturers, policymakers, users, trainers, and accountants.**
- **Encouragement and examination of pilot projects already underway around the world so that experience gained from these efforts can be applied to other projects. This information could also be shared via the communications network proposed above.**

**The Final Report containing the Plan of Action formulated at the Cairo meeting was disseminated widely among scientific and engineering societies, donor agencies, governmental organizations, research institutions, and universities. Additional funding would be needed to implement the Plan's recommendations.**

ATTACHMENT #1

SUB-SAHARAN AFRICA JOURNAL DISTRIBUTION PROGRAM  
ADVISORY COMMITTEE

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American  
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1333 H STREET, N.W., WASHINGTON, D.C. 20005 (202) 326-6650  
CABLE ADDRESS: ADVANCESCI

Directorate for International Programs  
Telex: 248933 SCIEN UR  
Fax: (202) 371-9526

**PARTICIPATING SOCIETIES AND ORGANIZATIONS  
SUB-SAHARAN AFRICA JOURNAL DISTRIBUTION PROGRAM**

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**TIMELINE AND TRENDS**

**Pilot Phase  
1985-1987**

- o 7 societies
- o 26 titles
- o 10-40 subscriptions to each title
- o 40 recipient institutions
- o 30 countries

**1988**

- o 45 societies and organizations
- o 120 titles
- o 3-100 subscriptions to each title
- o 200+ recipient institutions
- o 38 countries

**1990**

- o 95 societies and organizations
- o 191 titles
- o 5-100 subscriptions to each title
- o 250+ recipient institutions
- o 38 countries

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**Summary**

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CABLE ADDRESS: ADVANCESCI

Directorate for International Programs  
Telex: 248933 SCIEN UR  
Fax: (202) 289-4958

Organizations Participating in Journal Distribution Program

African Studies Association

AFRICAN STUDIES REVIEW (3 times a year)  
ISSUE: A JOURNAL OF OPINION (bi-annually)  
ASA NEWS (quarterly)  
(100 subscriptions to each journal)

American Academy of Arts and Sciences

DAEDALUS (quarterly)  
(25 subscriptions)

American Academy of Pediatrics

PEDIATRICS  
(40 subscriptions)

American Academy of Religion

JOURNAL OF THE AMERICAN ACADEMY OF RELIGION  
(15 subscriptions)

American Anthropological Association

AMERICAN ANTHROPOLOGIST (quarterly)  
AMERICAN ETHNOLOGIST (quarterly)  
(50 subscriptions to each journal)

American Antiquarian Society

PROCEEDINGS (biannual)  
(25 subscriptions)

American Association for the Advancement of Science

SCIENCE (weekly)  
(65 subscriptions)

American Association of Cereal Chemists

CEREAL CHEMISTRY  
CEREAL FOODS WORLD  
(25 subscriptions)

American Economic Association

AMERICAN ECONOMIC REVIEW (quarterly)  
JOURNAL OF ECONOMIC LITERATURE (quarterly)  
JOURNAL OF ECONOMIC PERSPECTIVES (quarterly)  
(25 subscriptions to each journal)

American Folklore Society

JOURNAL OF AMERICAN FOLKLORE (quarterly)  
(25 subscriptions)

American Geological Institute

GEOTIMES (monthly)  
BIBLIOGRAPHY AND INDEX OF GEOLOGY  
(10 subscriptions to each journal)

American Historical Association

AMERICAN HISTORICAL REVIEW (5 times annually)  
(25 subscriptions)

American Institute of Physics

APPLIED PHYSICS LETTERS (monthly)  
JOURNAL OF APPLIED PHYSICS (monthly)  
JOURNAL OF CHEMICAL PHYSICS (monthly)  
JOURNAL OF MATHEMATICAL PHYSICS (monthly)  
PHYSICS OF FLUIDS (monthly)  
PHYSICS TODAY (monthly)  
REVIEW OF SCIENTIFIC INSTRUMENTS (monthly)  
GENERAL PHYSICS ADVANCE ABSTRACTS (monthly)  
(25 subscriptions to each journal)

American Mathematical Society

PROCEEDINGS OF THE AMS (monthly)  
TRANSACTIONS OF THE AMS (monthly)  
BULLETIN OF THE AMS (quarterly)  
MATHEMATICS OF COMPUTATION (quarterly)  
(9 subscriptions to each journal)

American Medical Association

JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION (weekly)  
(40 subscriptions)

American Musicological Society

JOURNAL OF THE AMERICAN MUSICOLOGICAL SOCIETY (3 times annually)  
(25 subscriptions)

American Numismatic Society

NUMISMATIC LITERATURE (3 times a year)  
(25 subscriptions)

American Philological Society

TRANSACTIONS (ANNUALLY)  
(25 subscriptions)

American Philosophical Association

PROCEEDINGS AND ADDRESSES

THE JOURNAL OF AESTHETICS AND ART CRITICISM (quarterly)  
(50 subscriptions)

American Society for Eighteenth-Century Studies  
EIGHTEENTH-CENTURY STUDIES (quarterly)  
(75 subscriptions)

American Society for Legal History  
LAW AND HISTORY REVIEW (biannually)  
(25 subscriptions)

American Society for Metals  
ADVANCED MATERIALS AND PROCESSES (monthly)  
(10 subscriptions)

American Society for Microbiology  
JOURNAL OF BACTERIOLOGY (monthly)  
APPLIED AND ENVIRONMENTAL MICROBIOLOGY (monthly)  
JOURNAL OF VIROLOGY (monthly)  
INFECTION AND IMMUNITY (monthly)  
ANTIMICROBIAL AGENTS AND CHEMOTHERAPY (monthly)  
JOURNAL OF CLINICAL MICROBIOLOGY (monthly)  
MICROBIOLOGICAL REVIEWS (quarterly)  
MOLECULAR AND CELLULAR BIOLOGY (monthly)  
INTERNATIONAL JOURNAL OF SYSTEMATIC BACTERIOLOGY (quarterly)  
ASM NEWS (monthly)  
(10 subscriptions to each journal)

American Society for Horticultural Science  
JOURNAL OF THE AMERICAN SOCIETY FOR HORTICULTURAL SCIENCE  
HORTSCIENCE  
(3 subscriptions to each journal)

American Society for Quality Control  
QUALITY PROGRESS (monthly)  
(10 subscriptions)

American Society for Theatre Research  
THEATRE SURVEY  
(25 subscriptions)

American Society of Agronomy  
AGRONOMY JOURNAL (bimonthly)  
(10 subscriptions)

American Society of Animal Science  
JOURNAL OF ANIMAL SCIENCE (monthly)  
(50 subscriptions)

American Society of Civil Engineers  
CIVIL ENGINEERING MAGAZINE (monthly)  
(20 subscriptions)

American Society of Plant Physiologists  
PLANT PHYSIOLOGY (monthly)

YEARBOOK OF MEDICINE  
(10 subscriptions to each disc)

College Art Association of America  
THE ART BULLETIN (quarterly)  
ART JOURNAL (quarterly)  
(25 subscriptions to each journal)

Crop Science Society of America  
CROP SCIENCE (bimonthly)  
(10 subscriptions)

Federation of American Societies for Experimental Biology  
THE FASEB JOURNAL (25 subscriptions)  
JOURNAL OF LIPID RESEARCH (10 subscriptions)

History of Science Society  
ISIS (quarterly)  
(25 subscriptions)

Institute of Electrical and Electronics Engineers  
IEEE SPECTRUM (monthly)  
PROCEEDINGS (monthly)  
(55 subscriptions to each publication)

Institute of Food Technologists  
FOOD TECHNOLOGY (monthly)  
JOURNAL OF FOOD SCIENCE (bimonthly)  
(10 subscriptions to each journal)

Institute of Industrial Engineers  
INDUSTRIAL ENGINEERING (monthly)  
INDUSTRIAL MANAGEMENT (bimonthly)  
IIE TRANSACTIONS (quarterly)  
THE ENGINEERING ECONOMIST (quarterly)  
(10 subscriptions to each journal)

Institute of Management Sciences  
MANAGEMENT SCIENCE (monthly)  
INTERFACES (bimonthly)  
MATHEMATICS OF OPERATIONS RESEARCH (bimonthly)  
MARKETING SCIENCE (quarterly)  
(10 subscriptions to each journal)

Institute of Mathematical Statistics  
THE ANNALS OF STATISTICS (quarterly)  
THE ANNALS OF PROBABILITY (quarterly)  
STATISTICAL SCIENCE (quarterly)  
(10 subscriptions to each journal)

Instrument Society of America  
IN TECH (monthly)

Organization of American Historians  
JOURNAL OF AMERICAN HISTORY (quarterly)  
(25 subscriptions)

Phi Beta Kappa  
THE AMERICAN SCHOLAR (quarterly)  
(20 subscriptions)

PRITECH (Technology in Primary Health Care)  
THE TECHNICAL LITERATURE UPDATE (approximately 10 times a year English/French)  
(up to 100 subscriptions)

Renaissance Society of America  
RENAISSANCE QUARTERLY (quarterly)  
(25 subscriptions)

Rural Sociological Society  
RURAL SOCIOLOGY (quarterly)  
(100 subscriptions)

School Science and Mathematics Association  
SCHOOL SCIENCE AND MATHEMATICS (8 times per year)  
(10 subscriptions)

Sigma Xi  
AMERICAN SCIENTIST (bimonthly)  
(50 subscriptions)

Society for Applied Anthropology  
HUMAN ORGANIZATION  
PRACTICING ANTHROPOLOGY  
(100 subscriptions)

Society for Ethnomusicology  
ETHNOMUSICOLOGY (3 times per year)  
SEM NEWSLETTER (quarterly)  
(25 subscriptions)

Society for Range Management  
JOURNAL OF RANGE MANAGEMENT (bimonthly)  
(5 subscriptions)

Society for the History of Technology  
TECHNOLOGY AND CULTURE (quarterly)  
(25 subscriptions)

Society of Biblical Literature  
JOURNAL OF BIBLICAL LITERATURE (quarterly)  
(25 subscriptions)

Soil Science Society of America  
SOIL SCIENCE (bimonthly)

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Agenda  
Journal Distribution Program Advisory Committee Meeting

June 8, 1989  
10:00 - 4:00 pm

AAAS  
10th Floor Conference Room

- 10:00 am Coffee/Introductions
- 10:15 am Program Update and New Developments  
--basic parameters of the program  
--participating organizations  
--AAAS/ACLS collaboration  
--criteria for choosing recipient institutions  
--recipient institutions  
--cost-sharing pilot projects in Ghana, Kenya, Nigeria, and Senegal
- 12:30 pm Working Lunch
- 1:30 pm Next Steps  
--enlarging the number of participating organizations  
--monitoring and follow-up  
--criteria for evaluation  
--use of new technologies such as CD-ROM  
--possible innovations for strengthening African research capabilities  
--long-term sustainability
- 4:00 pm Adjourn

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**Agenda**  
**Sub-Saharan Africa Journal Distribution Program**  
**Advisory Committee Meeting**

Wednesday, October 31, 1990  
9:00 am - 1:00 pm

Omni Inner Harbor Hotel  
Baltimore, Md.

- 9:00 am Coffee/Introductions
- 9:15 am Strategies to Meet S&T Documentation Needs in Nigeria  
A.O. Ike
- 9:45 am Science and Technology Information in Africa: a Study  
Project of the National Research Council  
Dave Wiley
- 10:00 am Program Update and New Developments  
--number of organizations now in program  
--management and logistics  
--Canadian Journals Program  
--computer/CD-ROM survey  
--ICSU Press Network
- 10:45 am Next Steps  
--use of new technologies  
--long-term sustainability  
--"gray" literature  
--new business
- 12 noon Working Lunch
- 1:00 pm Adjourn

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# Journal Distribution Program Notes



AAAS Sub-Saharan Africa Journal Distribution Program

Volume 1, Number 1

April 1991

## A Message from the AAAS Journal Distribution Program Staff

This is volume 1, number 1 of **NOTES**, a biannual newsletter for university and research institute libraries receiving journals under the auspices of the AAAS Sub-Saharan Africa Journal Distribution Program. The aim of the newsletter is to provide useful information, such as on:

- organizations in addition to AAAS that donate scientific and scholarly literature
- training possibilities for librarians
- new developments in computer hardware and software
- meetings and conferences

Please write us if there are additional topics that you would like addressed in these pages. In addition, although this first issue of **NOTES** was written

entirely by AAAS staff, for future issues we would welcome brief articles from you about your library, meetings you have attended or plan to convene, and other matters that you want to share with your colleagues in other parts of sub-Saharan Africa. We are looking forward to hearing from you.

## Behind the Scenes at the AAAS Sub-Saharan Africa Journal Distribution Program

### TIMELINE AND TRENDS

#### Pilot Phase

#### 1985-1987

- 7 societies
- 26 titles
- 10-40 subscriptions to each
- 40 recipient institutions
- 30 countries

#### 1988

- 43 societies and organizations
- 120 titles
- 3-100 subscriptions to each
- 200+ recipient institutions
- 38 countries

#### 1990

- 100 societies and organizations
- 191 titles
- 5-100 subscriptions to each
- 250+ recipient institutions
- 38 countries

The Journal Distribution Program has grown enormously since its inception as a pilot project in 1985. With grants from the Carnegie Corporation of New York, the Ford Foundation, and the Agency for International Development, we can now make available almost 200 individual journal titles to university and research institute libraries in 38 countries. The Ford Foundation grant has enabled AAAS, through active cooperation with the American Council of Learned Societies (ACLS), to increase social science participation and add the humanities.

The journals we send your library are donated to the program, primarily by professional societies affiliated to AAAS or ACLS. They are bulk shipped to the AAAS office in

Washington, where they are then individually addressed and mailed to Africa. About 85 percent of all journals within the program reach you via a commercial air freight distributor. The remaining journals are sent free of charge through the State Department or United Nations mail systems.

*Behind the Scenes (continued on page 3)*

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## AAAS Computer/CD-ROM Survey

The focus of the AAAS Journal Distribution Program is beginning to expand. Because an important factor in the high price of overseas subscriptions is postage, we are exploring new technologies, such as CD-ROM (Compact Disc-Read Only Memory), that can supplement hard copy. As a first step, in 1990 AAAS conducted a survey of its recipient institution libraries to ascertain which ones have been able to obtain computers and CD-ROM units.

In August 1990 questionnaires were sent to more than 200 libraries; to date we have received almost 100 responses, 33 of them from Nigeria. The AAAS will issue a report in 1991, and a copy of it will be sent to each library that responded.

Briefly, this is the picture that begins to emerge:

About half of the libraries that have written thus far have personal computers, although few of them are in Nigeria.

The situation in Nigeria might change dramatically, however, as a result of a World Bank loan to the Nigerian Federal Ministry of Educa-

tion, meant to strengthen that country's 21 federal universities. Several Nigerian librarians wrote AAAS that they expect to acquire computers in 1991 with funds obtained through the World Bank loan.

A few libraries indicated that although their library does not have computer capability, library staff are able to use computers located elsewhere in the institution.

Although several of the libraries have more than one computer, none has installed a local area network. The University of Malawi reported, however, that if the library acquires additional microcomputers, the university plans to network them.

An assortment of different software products is being used for database and word processing purposes. Almost every library has CDS/ISIS, which is distributed free of charge by Unesco.

Among the respondents, libraries of the University of Malawi, the University of Ibadan, the University of Nairobi, and the University of Zimbabwe appear to be among the best equipped in terms of hardware.

A little more than half of the computers were purchased through

grants from a variety of foundations and agencies—Unesco, the Ford Foundation, IDRC, SAREC, the Rockefeller Foundation, the Carnegie Corporation of New York, the French Mission of Cooperation, etc.

Many of the respondents, even those without computers, maintain their own database and research collections relevant to indigenous research. Some institutions, such as the University of Mauritius, contribute to international databases.

Only a handful of respondents has CD-ROM capability thus far. Examples include the University of Zimbabwe School of Medicine, the University of Ghana School of Medicine, the University of Malawi, the National Documentation Centre of Sudan, Université Cheikh Anta Diop, Université de Yaoundé Centre des Sciences de la Santé, and the University of Khartoum Medical School. The University of Ibadan expects a CD-ROM unit to arrive shortly.

Training has been sketchy for the most part. Both Unesco and PADIS (Pan African Development and Information Service) provide short

*Survey (continued on page 3)*

## BOSTID Program on S&T Projects in Africa

Access to information, particularly science and technology information (STI), is essential to development. BOSTID (the Board on Science and Technology for International Development), which manages programs with developing countries for the U.S. National Research Council, has underway an effort to expand and improve the planning, design, and management of STI resources and networks in Africa. BOSTID is reviewing the role information technologies can play in three major areas—database access and management, library development, and scientific publishing and communications.

The program, which is funded by the Carnegie Corporation of New York, began in 1989 when a panel of experts visited eight African countries: Senegal, Côte d'Ivoire, Sierra Leone, Ghana, Nigeria, Kenya, Ethiopia, and Zimbabwe. At the conclusion of the site visits, BOSTID staff, panel members, and African specialists met in Nairobi to discuss key issues facing governments, donors, and STI user communities and make recommendations for future development of STI in Africa. A report, "Science and Technology Information Services and Systems in Africa," is available at no cost on request.

BOSTID is now creating a database, using micro CDS/ISIS, with basic information on STI projects and experts in Europe, North America, and Africa. Using this database, BOSTID will, for example, be able to provide expertise in hardware and software selection and installation, training opportunities, and new developments in the field of information technologies. Access to the database will be free of charge.

In addition, BOSTID is working with the donor community to establish a small grants program to support innovative information projects. BOSTID is interested in receiving pre-proposals for projects that demonstrate the innovative applica-

*BOSTID (continued on page 4)*

## ICSU Press Launches Network

ICSU Press, the publishing service of the International Council of Scientific Unions (ICSU), is developing an international network to enhance the availability of scientific and scholarly literature in developing countries and Eastern Europe. The idea for such a network grew out of recommendations stemming from a 1988 workshop hosted by the International Centre for Theoretical Physics/Third World Academy of Sciences (ICTP/TWAS) in Trieste, Italy. Most recently ICSU and Unesco organized a two-day meeting in Paris to review the network's objectives and a three-year plan of action.

The AAAS is represented on the steering committee, as is Unesco, the Commonwealth Higher Education Support Scheme, ICTP/TWAS, and the International Book Bank. To be

established initially under the aegis of ICSU, the network will be open to ICSU members, professional bodies and learned societies, publishers, donor organizations, Third World and Eastern European institutions, and other interested agencies.

The network has already embarked on several activities, the first of which will be of particular interest to African librarians: a database with current information on existing sources of donated scientific and scholarly literature. Each entry will include details on the organization's geographic coverage, summary of available materials and services, and description of relevant activities, guidelines, and policies. Information from the database will be available to developing country or Eastern European institutions free of charge.

Other activities include an inventory of Third World and Eastern European institutions, which will contain a summary of donated materials now being received and a synopsis of that institution's specific needs for scholarly literature, with special emphasis on key journals. The Network is also preparing a handbook with guidelines to help individuals and organizations identify appropriate donated materials and recipients and to describe suitable distribution mechanisms.

The AAAS will keep you informed of progress pertaining to plans to launch the network. If you have any questions, write: Dr. Antony R. Berger, 3439 Caribou Drive NW, Calgary, Alberta T2L 0S4, Canada.

## A Progress Report on the Canadian Journals Program

In August 1990 we wrote recipient institution librarians with information about a possible Canadian journals program, conceived of by a group of Canadian scientists who have worked in developing countries. At that time we provided you with a list of journals that might become available were such a program to commence, and asked you to write AAAS with a list of journals required by your institution. Almost 100 librarians have responded to date.

We are pleased to tell you that the Royal Society of Canada and the Canadian National Research Council have recently agreed to cosponsor this activity. Funds to begin the program are now being sought. We will keep you informed of progress concerning the Canadian Journals program.

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*Survey (continued from page 2)*

courses of two-weeks' duration. Few of the libraries have programmers on staff.

Several librarians commented that there are problems when equipment malfunctions. Spare parts are not easy to come by and are expensive. In addition, the local vendors are not always knowledgeable or helpful.

Please keep AAAS informed of computer or CD-ROM-related developments in your library so that we can update our database and issue revised reports periodically.

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### *Behind the Scenes (continued from page 1)*

Because of the large number of journal titles in the program (published weekly, monthly, quarterly, biannually, and annually) and different methods of shipment, we have had to create a complex database and documentation system to track journal titles, recipient institutions, inventories, and methods of shipment.

Sometimes the system does not run as smoothly as we would like. Occasionally we receive too few copies of a journal title, which necessitates a call to the donor society or its printer. Other times packages of journals are returned to AAAS, either because they were damaged in transit or because mail service was suspended in the country to which they were addressed.

It would be very helpful if you would write us when you encounter difficulties in receipt of journals. Please remember that unless you tell us that there is a problem, we have to assume that the journals are arriving regularly.

## AAAS Holds Symposium on Science in Africa

On February 15, 1991, the AAAS Sub-Saharan Africa Program convened a symposium at the AAAS Annual Meeting in Washington, DC, **SCIENCE IN AFRICA: ACHIEVEMENTS AND PROSPECTS**. Our goal was to increase the awareness of U.S. scientists to important research being conducted in Africa by highlighting the work of several distinguished African scientists.

The AAAS Annual Meeting typically attracts several thousand scientists, engineers, and other professionals to the symposia, panel discussions, seminars, workshops, poster sessions, and plenary lectures that take place during the course of the meeting. The presence of several hundred media representatives contributes much to the impact of our Annual Meetings.

Nine eminent scientists were selected by an advisory group of US and African experts to present papers at the meeting. They are:

**C.J. Chetsanga**, Dean, University of Zimbabwe Faculty of Science; Director, Research Council of Zimbabwe

**Akiliu Lemma**, Deputy Director, International Child Development Center, UNICEF

**Lydia Makhubu**, Vice Chancellor, University of Swaziland

**Malu wa Kalenga**, Professor of Applied Sciences, University of Kinshasa, Zaire; General Commissioner of Atomic Energy for Zaire

**Melaku Worede**, Director, Plant Genetic Resources Center, Ethiopia

**Thomas Odhiambo**, President, African Academy of Sciences; Director, International Centre of Insect Physiology and Ecology

**Bede Okigbo**, Director, United Nations University Programme on Natural Resources in Africa

**Gabriel Ogunmola**, Professor of Chemistry, University of Ibadan, Nigeria

**Yeya Ttiemoko Touré**, Director General, National Center for Scientific and Technological Research, Mali

Walter E. Massey, former President of the AAAS and newly installed Director of the National Science Foundation, co-chaired the symposium with Dr. Odhiambo.

The AAAS will publish a book-length proceedings volume in early autumn 1991. A complimentary copy will be available on request to libraries receiving journals under the auspices of the Journal Distribution Program. Please write us if your library would like to receive a copy of the proceedings volume.

*BOSTID (continued from page 2)*

tion of an information technology in support of the scientific community.

If you are interested in competing for such a grant, please send a DRAFT pre-proposal to BOSTID. Staff there will informally review the pre-proposal and help identify an appropriate funding source. While BOSTID staff will have no influence on the actual funding decision made by the donor community, they can help to make the proposal as strong as possible by providing assistance in the pre-proposal stage. In submitting the pre-proposal, please provide a brief statement about the project's aims, methods, personnel, and the amount of financial support required. (This is a small program, and the grants will range from \$10,000 to \$50,000 annually.) Please also describe how the project will improve information services to the scientific community and how it will demonstrate the innovative application of an information technology. For further information, write: Wendy White, Information Services Manager, BOSTID, 2101 Constitution Avenue, N.W., Washington, D.C. 20418, U.S.A.

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### MEDICAL LIBRARIANS

An informal technical meeting on severe and complicated malaria, sponsored by the World Health Organization (WHO), was held in June 1985. In 1990 the Royal Society of Tropical Medicine and Hygiene published a special 65-page supplement to *TRANSACTIONS* based on the workshop papers. A limited number of copies of this volume, "Severe and Complicated Malaria," is available free of charge on request. If you are interested in receiving a copy, write: Ellen S. Nayerl, Information Specialist, Vector Biology and Control Project, 1901 N. Fort Meyer Drive, Arlington, Va. 22209, USA

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# **COMPUTER AND CD-ROM CAPABILITY IN SUB-SAHARAN AFRICAN UNIVERSITY AND RESEARCH LIBRARIES**

*Lisbeth A. Levey, Manager  
AAAS Sub-Saharan African Journal Distribution Program*



**American Association for the Advancement of Science**

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**COMPUTER AND CD-ROM CAPABILITY  
IN SUB-SAHARAN AFRICAN  
UNIVERSITY AND RESEARCH LIBRARIES**

**BACKGROUND**

The Sub-Saharan Africa Program of the American Association for the Advancement of Science (AAAS) has been working closely with university and research libraries in the region since the outset of the Journal Distribution Program in late 1987. The Journals Program, which is funded by grants from the Carnegie Corporation of New York, the Ford Foundation, and the US Agency for International Development (AID), provides current subscriptions to scientific and scholarly journals to libraries in some 35 countries in sub-Saharan Africa. These journals are provided to AAAS free of charge by their professional society publishers, most of which are AAAS affiliates. A description of the program will be found in Appendix 1.

The Journal Distribution Program does more than collect and ship journals. Increasingly, we are focusing our attention on how best to work with libraries to enhance their ability to serve the academic and research community.

In 1988 AAAS sent a questionnaire to recipient institution libraries to elicit information on equipment, training, and staffing, circulation practices, and readership. Approximately 50 percent of the librarians returned completed questionnaires; several went beyond the survey and supplied supplemental information and comments. Of the 74 libraries that responded, only about half of them had working photocopy machines at the time. Many of them had microfilm/fiche capability, but, as one librarian reported, "The equipment is available but not functioning because of lack of supplies." In fact, chronic shortages, both of supplies and of spare parts, make life extremely difficult for all who try to make libraries function efficiently.

**AAAS SURVEY OF COMPUTER AND CD-ROM CAPABILITY IN UNIVERSITY  
AND RESEARCH LIBRARIES**

At the time of the 1988 survey we did not think to ask about computer or CD-ROM capability, in part because so few microcomputers were observed during site visits to libraries throughout the continent. The genesis of this present survey, conducted in 1990, lies in AAAS interest in CD-ROM (Compact Disc-Read Only Memory) and other information technologies.

CD-ROM possesses enormous potential for African researchers in their efforts to gain access to scholarly data and literature. The discs can hold huge volumes of information and are inexpensive to ship, yet do not require special handling, storage space, or the large drives necessary for magnetic media. Hardware requirements are straightforward. Most IBM-compatible (and now Apple) personal computers with a memory of 640K are acceptable. The system is relatively inexpensive, even more so today as disc drives decline in price. It does not require an online telephone connection, and, equally important, power outages do not affect the disc or its memory.

There is a growing volume of scholarly material on CD-ROM, primarily bibliographic databases, but also abstracts, anthologies containing full-text articles, reference materials, such as encyclopedias, and, increasingly, complete journals. There are now more than 1,000 commercially available CD-ROM products, 38 percent of them in the social sciences and 30 percent in science and technology (Alice C. Littlejohn, "CD-ROM 1990: The Year in Review," CD-ROM Librarian, May 1991).

There are further advantages to compact discs. They are easier to read than microfiche or film, less difficult to store, and possibly more durable than fiche or film in difficult environments. Full-text compact discs might also prove more secure than print copy, for it is impossible to mutilate them by cutting out pages in order to take home a needed article or chapter.

In 1990 AAAS decided to survey its recipient institution libraries to ascertain which of them have been able to obtain CD-ROM units. At first the survey was to focus exclusively on CD-ROM capability, but Donald Ekong, Secretary General of the Association of African Universities (AAU) convinced us that it was essential to expand the scope of the survey to include computers as well. Libraries that have begun to computerize are generally less apprehensive about and more receptive to new information technologies. In addition, those libraries with computers have already purchased the most expensive component of CD-ROM. We also worked with the Pan-African Development Information System (PADIS), an arm of the UN Economic Commission for Africa, in conceptualizing the project and revising the survey document.

The questionnaire, which was mailed in August 1990, was sent to every library receiving journals under the auspices of the Journal Distribution Program, with informational copies to the vice chancellor, rector, or director of the institution. Separate copies of the questionnaire were mailed to libraries within faculties of agriculture and medicine, so that, in all, approximately 200 individual libraries were surveyed. The questionnaire was also translated into French for libraries in francophone Africa.

The eight-section questionnaire requested information on hardware and software, funding, maintenance and training, user access, and interlibrary cooperation. At the suggestion of PADIS the survey included questions on the documentation of indigenous research. Many libraries in developing countries possess collections of "gray" or "fugitive" literature that would be of great interest to researchers in other developing countries and also in the industrialized world. Yet information on where collections are housed and what they contain is, in many instances, sketchy at best. Finally, each section of the questionnaire included room for comments, and in many cases librarians provided us with extremely valuable information on their libraries.

This report, which is based on the 1990 survey, correspondence with librarians, and site visits, is meant to provide guidance to institutions as they plan the purchase of computers or CD-ROM units for their libraries. We also hope that the inclusion of the respondents' names and addresses (Appendix 2) will lead to increased networking among African librarians interested in these issues. Finally, we hope that donor agencies and others involved in the application of information technologies in sub-Saharan Africa will find the

points raised in this report relevant to their concerns.

#### WHO RESPONDED TO THE QUESTIONNAIRE?

As the table below demonstrates, we received responses from a sizable number and representative cross-section of the libraries with which AAAS collaborates. More than half the libraries surveyed returned questionnaires, including those located in almost every major university in sub-Saharan Africa. Completed questionnaires reached AAAS from universities and other tertiary level institutions, research institutes, and a sprinkling of other libraries (national libraries, documentation centers located in councils for scientific research, etc.). A good number of the responses came from specialized libraries--primarily in agriculture or medicine. Thus, we are in a reasonably good position to assess and evaluate the extent to which computers and CD-ROM are being used in African academic libraries and for what purposes.

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#### WHO RESPONDED TO THE QUESTIONNAIRE?

- 106 libraries in 28 countries
- 17 anglophone
- 12 francophone
- 2 lusophone

#### TYPES OF INSTITUTIONS

- 58 universities or other tertiary-level institutions
- 36 research institutes
- 13 other organizations (national libraries, etc.)

#### SPECIALIZED LIBRARIES:

- 20 in agriculture, animal sciences, or fisheries
- 18 in medical sciences
- 8 in social sciences or humanities
- 6 in technology or industry

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#### COMPUTER CAPABILITY

Forty-eight libraries have computers, only seven of them in Nigeria (although there were 38 responses from the country as a whole). Of these seven, only three are in universities--Ibadan, Ilorin, and Abubakar Tafawa Balewa. Several Nigerian universities wrote us that they expect to obtain computers in 1991 through the World Bank loan to the Nigerian Federal Ministry of Education, which is meant to upgrade the capabilities of Nigeria's 21 federal universities. A few respondents, such as the Tropical Diseases Research Centre in Zambia, reported that although the library has no computer, the librarian has access to computers located elsewhere in the institution. Others, such as the University of Zambia, indicated that they expect to acquire computers later in 1991 or in 1992.

For the most part, the libraries have IBM or IBM-compatible microcomputers,

almost all of which were purchased in 1988 or thereafter. One or two, such as the Balme Library at the University of Ghana, acquired theirs somewhat earlier--a Wang personal computer with a hard drive and 512K memory, purchased by the university in 1985. There are Apples being used at two institutions, although not in the libraries. The Botswana Technology Centre in Gaborone and the African Academy of Sciences in Nairobi each has a Macintosh, which is being used for desktop publishing purposes.

Typically the libraries have one or two computers. Although several have more than one computer station, none has a local area network. Six of the libraries responding to the survey stand out as being particularly well equipped--the University of Zimbabwe, the University of Nairobi, the University of Mauritius, the University of Malawi system, the University of Botswana, and the Documentation Centre of the National Council for Research in Sudan. The University of Zimbabwe library, for example, purchased its first IBM microcomputer in 1988. Since then, it has been able to acquire an additional IBM for the periodicals section of the main library, and four IBMs for the medical library (three of them acquired in 1991). The University of Mauritius is the only one of the six to have purchased all of its equipment (four Sanyo microcomputers) entirely with its own funding.

All but a handful of the 48 libraries have at least one microcomputer with a hard drive. The Tanzania Library Services Board is the only respondent to mention difficulties in using software because of inadequate memory. It acquired a Wang microcomputer in 1988 through UNESCO and later was able, with some difficulty, to obtain a memory expansion card. It is possible that the problems encountered by the Library Services Board are compounded by the need to use an MS-DOS emulator for its software programs, which also takes up memory.

#### PURCHASE, INSTALLATION, AND MAINTENANCE

Somewhat more than half the computers were purchased through grants from a variety of international agencies and foundations. A strong preponderance of funding was derived from UN agencies--UNESCO, IAEA, UNIDO, FAO, UNDP, and UNICEF. Other funding has come from the World Bank, the British Council, the International Development Research Centre, the Swedish Agency for Research and Cooperation with Developing Countries, the US Agency for International Development, the French Mission of Cooperation, the Carnegie Corporation of New York, the Rockefeller Foundation, the Ford Foundation, and la Banque Internationale d'Information sur les Etats Francophones (BIEF).

Although the questionnaire did not ask whether equipment had been purchased locally or abroad, the experience of the Bunda College of Agriculture in Malawi is instructive. Because the local vendor wanted "a maintenance contract of K4,000 per annum [about \$1,400], which is too much, we got our computer from a Hong Kong company." But when the printer arrived broken, the Hong Kong supplier was of little assistance. In the end, the librarian's husband was able to repair the printer. The librarian of the University of Malawi Library System made much the same point: "When computer equipment is purchased from abroad, local dealers refuse to service or maintain it, or they will accept to do so at exceptionally exorbitant prices."

About one third of the respondents reported problems with installation of

their computers and also with maintenance. The Tanzania Library Services Board commented, "Installation was delayed because we had no computer expert until we requested a consultant from UNESCO who came to conduct an in-house training course for one week." Although there is a computer center or support group at almost every institution, several librarians mentioned that they receive little or no assistance from their center.

Installation of equipment at the Ministry of Health Library and Documentation Centre in Malawi has proven a challenge because of circumstances relating to donor regulations and poor communications. The librarian reports, "There was no difficulty from this end--however, not all equipment ordered or needed was shipped. Some equipment delivered was not what was specified and has had to be replaced." He went on to say, "Equipment obtained from USAID grants must be purchased from US suppliers who may provide equipment that cannot be serviced in Malawi." The local USAID office was helpful, but hampered by restrictions beyond its control.

At Abubakar Tafawa Balewa University in Nigeria, the library has been confronted with tremendous obstacles in its efforts to computerize, in large part because it chose an unreliable vendor:

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"In 1989, the Library's computerization plan received a boost with the grant of N54,000 [about \$5,400]...With this research grant, it ordered its first and only microcomputer from Datamatics (Nigeria) Limited, one of the three computer companies which submitted quotations."

"The Library has had a most frustrating experience...The library ordered a Turbowriter microcomputer with 640K RAM, which was reported to be expandable to IBM. Datamatics refunded the money for expansion pleading that the system they said was expandable was no longer expandable!..."

"Datamatics delivered a functioning Central Processing Unit but a non-functioning keyboard and printer. No manuals whatsoever were supplied. Later, items not ordered were supplied...In the end Datamatics replaced the Turbowriter with a Wang PC 250/16 at an additional sum of N17,787."

"Over the year, the Library was inundated with visitors from Datamatics, including 'Managers (branch and regional),' 'Engineers,' and 'Sales Executives.' Each set of visitors bringing bits and pieces of hard or software for just one microcomputer."

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Many libraries wrote that servicing and spare parts are significant issues. In Sudan "maintenance of any equipment is a problem." The librarian of the National Research Council Documentation Centre went on to recount that when "our PS/2 model 60 broke down, computer companies were not able precisely to identify the problem. On a trial and error basis spare parts were purchased from abroad from project funds. It took a year to get the computer fixed." This is perhaps an extreme, but not totally untypical, example of comments we received.

A little more than half the libraries reported that they must also deal with

power outages and surges. Some, but not all, have obtained a supplemental UPS (Universal Power Supply) for their equipment. The Kawanda Research Station in Uganda plans to order a generator for its library. The librarian of the University of Ilorin in Nigeria delineated his frustrations with the following account: "Unreliable electricity/power supply, available UPSs are not too reliable, unsatisfactory after-sales service, problem of obtaining spare parts."

In some instances, the difficulty lies not with the vendor, but rather with the institution's bureaucracy or inability to pay for spare parts. At the Balme Library in Ghana this is the case, for "Wang Ltd. fixes any breakdowns and is usually paid in cash by the university finance department, but it takes about two months for equipment to be repaired or replaced because of the payment delays."

A few (but not many) libraries are pleased with local service. The Tanzania Library Services Board, for example, reports that "We have a maintenance agreement with the Computer Corporation of Tanzania, Ltd. which is responsible for all repairs of our microcomputer and the printer, except for the defective power stabilizer which was bought elsewhere. Their response to problem solving is very encouraging." In Mauritius the local Sanyo dealer "provides maintenance--the same day for minor problems; one-to-three days for a major problem..."

#### TRAINING AND STAFFING

Although almost all the libraries indicated that staff has received some computer training, the training has been limited for the most part. Both UNESCO and PADIS conduct short courses of two weeks' duration. The Deutsche Stiftung für Internationale Entwicklung (DSE) has provided considerable funding for short courses. Initially DSE training was conducted in Germany, but increasingly its short courses are being offered in developing countries. In June 1991, for example, DSE funded a two-week course at the University of Botswana on CDS/ISIS.

The training received by the librarian responsible for computerization at the University of Cape Coast in Ghana is illustrative. In September 1989 he participated in a two-week course in Berlin on CDS/ISIS software (provided free of charge by UNESCO), followed by two weeks in Leicester to learn about microcomputers for library and information work. Then, in April 1990, he attended a two-week workshop in Accra on PADIS methodologies.

The Director of the University of Dar-es-Salaam library had a similar experience. He participated in a two-week course in 1988, and was then able to supplement it two years later with a summer course on information technology at the Asian Institute of Technology.

At the University of Khartoum Medical School library, initial computer training was carried out by a professor in the anatomy department, who installed the equipr at in addition to training library staff.

African librarians appear caught in a double bind. On the one hand, scant training assistance is available at home. On the other hand, there is little money available to travel abroad. The librarian of the University of Science

and Technology in Ghana wrote, "No specialized training is provided for library staff locally, and funds are not readily made available for their training or attendance at short courses on the use of computers in libraries abroad..." He lays at least part of the blame on the fact that "the use of microcomputers in library and information work is not appreciated."

Few of the libraries have computer specialists on staff. Addis Ababa University is the only library in the AAAS survey with its own technical group, headed by a staff member with an MS in information sciences. There are two librarians responsible for the computer at the Balme Library. One took an elective course on the use of computers in libraries for her M.LIB degree; the other completed a one-year program in computer science. At the Council for Scientific and Industrial Research in Ghana, which also serves as the national focal point for GHASTINET, a national S&T documentation effort, computer operations are in the hands of a staff member with a BS in computer science/statistics.

#### SOFTWARE AND COMPUTER USAGE

An assortment of different software products is being used for database and word processing purposes. Almost every library uses CDS/ISIS, which was developed by UNESCO and provided to developing country institutions free of charge. Respondents from both Malawi and Kenya mention belonging to national CDS/ISIS support groups. A few libraries, such as the University of Ilorin and the University of Ghana, have developed their own in-house software. It appears that CDS/ISIS is rapidly becoming a standard software for database management in sub-Saharan Africa. It is both free and powerful, two advantages that cannot be matched.

The National Research Institute for Chemical Technology library in Nigeria stands out for its software acquisitions: Harvard Graphics 2.12; Microsoft Serial Mouse with Paint Brush; Ventura Desktop Publishing 2.0; D-base III and IV; SPSS 3.0; Lotus 1-2-3 (version 3.0); and Word Perfect 5. For now, the library is using only the word processing, data processing, and statistical software. Although the library's printer, an Epson FX-1050, can print graphics, it is a dot matrix printer and not suitable for Ventura.

A significant issue raised by the University of Mauritius concerns access to information. The librarian wrote: "No library software supplier is represented in Mauritius. The Chief Librarian has had to resort to library literature and demo diskettes to try to investigate the usefulness of certain library software."

Another problem relates, once again, to donor agency requirements. The Centre for Social Research library in Malawi received funding from UNICEF to purchase a microcomputer and create a computerized database of its holdings. Because UNICEF uses Cardbox software, it asked the library to do the same so that its bibliographic database can be easily integrated with the one maintained by the UNICEF office in Malawi. Other libraries in Malawi, however, have adopted CDS/ISIS. If the Centre for Social Research accedes to the UNICEF request, the funder will be pleased to the detriment of Malawi's efforts to create a national documentation network. The librarian would prefer to use CDS/ISIS because although Cardbox is a simpler program, CDS/ISIS has a more powerful search mechanism.

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**FOR WHAT PURPOSES ARE THE COMPUTERS USED?**

**Library Administration**

Bibliography/Library Data Base Management	39
Word Processing	32
Numerical Statistical Applications	5
Financial/Management Applications	4
Other	5

**User Services**

Bibliographies	25
Selective Dissemination of Information	19
Current Awareness Lists	17
Online Searches	11
Other	2

Numbers refer to "yes" responses.  
Libraries indicated multiple purposes.

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Almost every library is beginning to computerize its union list of periodicals and other bibliographic databases, which will ultimately permit them to exchange information on holdings and accessions. In Tanzania, for example, the University of Dar-es-Salaam, the Sokoine University of Agriculture, and the Muhimbili Faculty of Medicine have completed a project funded by SAREC to create a national database of their holdings in periodicals. Other libraries will be added to the network during phase two.

In Mozambique, the National Archives has received funding from SAREC to create a bibliographic database of its collection. The Archives is using a Portuguese-language version of CDS/ISIS, "PORBASE," which was developed by the National Library of Portugal

and costs \$1,000. A Portuguese technician has visited Mozambique twice to conduct training, and is expected back to help solve some technical problems. Because the Archives collection is so large, a decision was made to start with recent acquisitions and work back. Ten thousand entries have been made thus far, and the director was unable to estimate how long the job would take.

Only about one third of the libraries use computers to provide services to users. A few librarians mentioned desktop publishing as an option for the future. Perhaps because the computers are used primarily for internal library purposes, about 75 percent of the librarians indicated that access to them is restricted to library personnel. Only one university--the University of Khartoum--has instituted nominal charges for users other than library staff.

**DATABASE AND DOCUMENTATION ACTIVITIES**

There are major national documentation efforts, primarily in science and technology (S&T), under way in several countries. In Tanzania, the Commission for Science and Technology has embarked on a two-year project, funded by IDRC, which will include inventories of research, manpower, and equipment, and reports on research and development in the country. Similar documentation activities are in the planning or early implementation stages in Ethiopia, Malawi, Nigeria, and Sierra Leone.

The Council for Scientific and Industrial Research (CSIR) of Ghana began to conceptualize its national documentation strategy in 1984 when a UN consultant visited Ghana to assess the country's information needs and existing infrastructure. This was followed in 1987 by a three-day workshop to discuss draft proposals and funding possibilities. With support from IDRC, GHASTINET (the Ghana National Scientific and Technological Information Network) was

launched in 1989.

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### GHASTINET

A national S&T information system for Ghana has been established by the Council for Scientific and Industrial Research (CSIR). The main focal point is at CSIR, with key nodes in the libraries of the country's three major universities, research institutes, and ministries.

Nine S&T sectors have been identified as essential to the country's development and for inclusion in the information system: agriculture, forestry and fisheries; energy; geology, mining and metallurgy; health and environment; industry; public construction; housing and engineering; social sciences; transport and communications; and water resources.

The first phase of the project involves putting in place basic infrastructures and facilities for bibliographic control of indigenous S&T literature. Expected results include databases of national literature, ongoing research projects, and technical expertise. CSIR will also publish a Ghana Science Abstract Bulletin and a variety of directories.

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Through the survey, we also learned of several important discipline-specific documentation and database projects, particularly in medicine and agriculture. Several university and research libraries are actively engaged in collecting information on their country's literature holdings and research in health and medicine. To cite just a few: the Ministry of Health Library and Documentation Centre in Malawi, the University of Ibadan in Nigeria, and the University of Zimbabwe. The documentation effort carried out by the University of Ibadan is illustrative of many.

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### UNIVERSITY OF IBADAN E. LATUNDE ODEKU MEDICAL LIBRARY NIGERIA

Recently embarked on a project to create a database of published and unpublished documents to include:

- biomedical literature on Nigeria by Nigerians
- literature on tropical diseases in West Africa
- biomedical section of Nigerian Periodicals Index
- indices from locally produced biomedical journals and monographs

16 university and research institute libraries cooperating in project

Project a part of an effort organized by Nigeria's university and research libraries to create a National Documentation and Information Centre for Science and Technology

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Although Malawi is not the only African country to undertake a major

documentation effort in agriculture, it is certainly one of the pre-eminent success stories.

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#### MALAWI NATIONAL AGRICULTURAL RESEARCH PROJECT

- Project to catalog holdings in country began in January 1986
  - Developed by Ministry of Agriculture with funding from World Bank
  - Main library of Chitedze Research Station coordinates effort
  - Six libraries in network, each with a subject specialization--four research libraries, one extension library, and one planning library
  - Three libraries have IBM-compatible computers and entered data using INMAGIC software. Remaining three libraries entered information on input sheets
  - At outset floppy discs or input sheets were sent to Chitedze to update master file. Now acquisitions information entered on input sheets only
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#### BUNDA COLLEGE OF AGRICULTURE MAIZE DATABASE

- Project to create a bibliographic database on CDS/ISIS of all information about or relevant to maize production in the country, 1900-1990
  - Funded by Rockefeller Foundation
  - Project carried out by a team of Bunda library staff and three Chancellor College students
  - Seven of country's eight agricultural development stations visited to identify, collect, and photocopy relevant documents
  - Photocopies of every document brought to Bunda, where data entry took place
  - 353 documents (primarily gray literature) now in database.
  - Library hopes to receive funding for phase two
-

## DOCUMENTATION OF INDIGENOUS RESEARCH

Although the survey focused on computers and new information technologies, we included questions on the documentation of indigenous research, at the request of PADIS. Indeed, almost every library responding to the survey indicated that it maintains bibliographic or other records relevant to indigenous research, many of them without the assistance of a microcomputer.

Kenyatta University in Kenya, which does not yet have a microcomputer, is among the most active libraries, for "apart from compilation of bibliographies...we index on a daily basis all articles in the fields of education, social sciences, humanities, science and technology, and presidential speeches appearing in daily newspapers...We produce on an annual basis, the Kenya Education Index." The librarian went on to say, however, that although "There are several bibliographies under preparation, publishing may be hampered by lack of funds."

Most university libraries have collections of theses written by their graduates. In addition, quite a few are designated national repositories for government and other publications (although it is not certain whether such publications are regularly sent to all repositories). Several libraries keep files and records of newspaper clippings. Eduardo Mondlane University in Mozambique, for example, plans to create a computerized database for newspaper articles pertaining to "anthropological and sociological issues in Mozambique." In addition, many university and research libraries also maintain specialized collections. The National Institute for Rural Development in Senegal maintains a "collection of (almost) all publications in agriculture in Senegal, before independence and after." The Bunda College of Agriculture maize database is described on the previous page. In her letter to AAAS, the librarian wrote, "Our project is exciting--small budget but effective."

With funding from IDRC and technical assistance from PADIS, the National Institute of Development Research and Documentation (NIR), which is a part of the University of Botswana, has underway a project to document, collect, and disseminate information on gray literature pertaining to the economic and social development of Botswana. As a first step, NIR created a bibliographic database of its own extensive holdings, after which it published four issues of Devindex-Botswana in 1990. NIR hopes to continue this effort by working with other libraries in the country in order to create a national database of development-related information in Botswana.

A full list of the libraries and their collections they maintain will be found in Appendix 3, beginning on page 34.

## CD-ROM

Sixteen of the libraries responding to the AAAS survey have CD-ROM units--nine university and seven research libraries. In addition, the University of Ibadan (Nigeria), the University of Science and Technology (Ghana), l'Université du Bénin (Togo), and l'Université de Yaoundé Centre des Sciences de la Santé (Cameroon) expect to acquire CD-ROM drives this year. At the University of Nairobi medical school, there is no CD-ROM unit in the library,

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### LIBRARIES WITH CD-ROM CAPABILITY

- University of Botswana
- Addis Ababa University
- Centre d'Information Bantu (Gabon)
- GHASTINET National Focal Point
- University of Ghana Medical School
- University of Nairobi
- Chitedze Research Station
- Health Documentation Centre (Malawi)
- University of Malawi System (Chancellor College and Bunda College of Agriculture)
- Université Cheikh Anta Diop
- Centre de Documentation de l'ORSTOM (Senegal)
- National Documentation Centre, Sudan
- University of Khartoum Medical School
- Centre de Documentation de l'ORSTOM (Togo)
- University of Zimbabwe Medical School

but the departments of OB/GYN and Microbiology each have CD-ROM capability. Kenyatta University has a CD-ROM drive (donated by the International Committee for Social Science Information and Documentation), but no microcomputer, and therefore no way to operate the drive. The librarian wrote, "We hope to acquire at least one microcomputer in 1991."

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Just as is the case for microcomputers, the CD-ROM drives have, for the most part, been obtained through grants. Funding agencies include UNESCO, the British Council, the Carnegie Corporation of New York, BIEF, l'Association des Universités Partiellement ou Entièrement de Langue Française (AUPELF), the Royal Tropical Institute of the Netherlands, USAID, and the Health Foundation.

Many libraries have had great difficulty with the installation of their CD-ROM drives. Some examples: Insufficient memory is a problem at le Centre d'Information Bantu in Gabon. The library is using a microcomputer with a memory of 512K, whereas 640K is needed. The University of Zimbabwe Medical School ordered an incompatible drive, which was ultimately replaced. The GHASTINET drive is still inoperative because it arrived with the wrong extension card, and the library is waiting for the right card to arrive.

The fundamental obstacle is the lack of in-country expertise with CD-ROM, which is still a very new technology in sub-Saharan Africa. The librarian of the University of Ghana Medical School had no one in Ghana to whom to turn when he had trouble installing his CD-ROM drive, for his is the first library with CD-ROM in the country. Ultimately he called New York to receive instructions over the telephone.

Yet long distance advice is frequently a less than satisfactory solution. The librarian of the University of Zimbabwe medical library wrote AAAS: "We need more technical assistance, though the main near-disaster (buying a non-compatible CD drive) was on the basis of advice from our New York software vendors, who are otherwise very helpful and reliable. CD-ROM is such a new and fast-changing field that even experts can go wrong, it seems, and they too work on trial and error, which we can't afford to do here."

Three libraries do not subscribe to any CD-ROM product to date, even though they have been able to obtain a microcomputer and a CD-ROM drive. The remaining libraries typically subscribe to one or two discs--bibliographic databases, some with abstracts, but no full text collections. MEDLINE is the

most commonly cited, followed by POPLINE (available to developing countries free of charge from the Johns Hopkins University Center for Communication Programs). Other discs mentioned include ERIC, the Social Science Citation Index, Cambridge Scientific Abstracts, Toxline, NTIS, Sesame (a French-language agricultural database), and Bibliofile.

With subscriptions to seven discs, l'Université Cheikh Anta Diop appears to be among the best endowed of any of the libraries to respond to the AAAS survey. With assistance from BIEF, the university library has been able to acquire: MEDLINE, Cancer CD, Sociofile, Psyclit, Compact Cambridge Life Sciences, LISA (bibliographic references and abstracts in the information sciences), and Dissertation Abstracts on Disc. The university also has online subscriptions to the following bibliographic databases: Bibliodent (a francophone database in odontostomatology), Maghreb (a multidisciplinary database on the countries of the Maghreb), Delp (an economic and industrial database), Agra-Aeco (an economic database), and Telebank (an inventory of research conducted at the university and the National Center for Scientific Research).

Some libraries actively encourage users to avail themselves of CD-ROM services. L'Université Cheikh Anta Diop, which acquired its CD-ROM unit three years ago, has produced two attractive brochures that describe the CD-ROM products located in the library and their applicability to research. With his CD-ROM unit in place for less than a year, the University of Ghana medical librarian produces a quarterly brochure with selected MEDLINE citations, which he sends to relevant institutions throughout Ghana (the University of Science and Technology, district hospitals, research centers, etc). The first issue (December 1990) contained bibliographic references only; subsequent issues will also include abstracts. This is being done entirely with funding from the University of Ghana Medical School. The University of Zimbabwe Medical Library performs a similar service through the CHIZ bulletin (Current Health Information Zimbabwe).

Of the 16 libraries with CD-ROM, only four of them indicated that they have funding for subscriptions in the future. Eight of them receive regular updates of available CD-ROM databases, almost certainly from the publishers of the CD-ROM products to which they now subscribe.

About half the libraries use the microcomputer connected to the CD-ROM drive for other purposes in addition to CD-ROM. Because in most instances literature searches are conducted by someone on the library staff rather than by the end user, it should be fairly easy to construct a flexible work schedule for switching from one task to another--assuming that requests for literature searches do not increase to a degree disproportionate to the computer time available for them. Should that happen, the libraries will then be hard put to juggle conflicting demands for use of the microcomputer.

As stated above, literature searches are primarily conducted by the librarian, which can be a frustrating experience if the researcher cannot articulate his needs clearly and if the librarian does not ask the right questions. Some libraries, such as at the University of Botswana, will permit computer literate faculty to use the CD-ROM unit. The University of Zimbabwe Medical Library will take this a step further with the initiation of a "public access workstation," an innovation that will greatly broaden the impact of CD-ROM because it will allow researchers to take control of their own literature searches. The equipment has been ordered, and the library hopes for delivery

shortly.

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**UNIVERSITY OF ZIMBABWE MEDICAL LIBRARY  
PUBLIC ACCESS CD-ROM WORKSTATION**

"The most effective way of increasing the accessibility of the system is to offer our users a public access CD-ROM workstation - one for end-users, placed conspicuously in the library's reference area."

"There will be two microcomputers, two printers and two disc drives for each computer in the public access workstation with the MEDLINE current 5-year package...The discs will be inaccessible to users...Thus, no (potentially damaging) disc-swapping by users will be necessary."

"Library staff will continue to do current awareness and CHIZ [Current Health Information Zimbabwe] searches, back searches, and searches for absent users, at a separate work station, using the full 7-disc MEDLINE database covering 1966 to the present."

"The user work station will be supervised by a roster of senior librarians, who will give assistance when necessary, and carry out the evaluation process."

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Once a literature search is conducted, many librarians have difficulty supplying full-text articles when a researcher requests one. The University of Zimbabwe Medical School, for example, reports that "perhaps one-third of the references are available" from its own library. If this is the case at the University of Zimbabwe, which has a very good medical library, the situation elsewhere is surely the same or even worse, as is the case at the University of Botswana. With assistance from SAREC, the university obtained a CD-ROM unit. Then, with purchase of the hardware assured, the university purchased ERIC (1976 to present) as its first CD-ROM product. ERIC was chosen because education is "a pioneer" in the university's fledgling MA program. With the unit in place only a short time, three of the 17 MA students and an equal number of faculty members have availed themselves of ERIC. Yet, once the literature search is successfully completed, it is impossible to access full-text articles from the library's own holdings and the ERIC abstracts are too brief to serve as a replacement.

With the exception of the francophone institutions, the librarians almost unanimously go to the British Library Document Supply Division when they need to order articles, although at f10 for ten pages, it is considered by many librarians to be prohibitively expensive. La Bibliothèque Nationale in Paris provides a service similar to that of the British Library for the francophone countries. The University of Malawi and the University of Zimbabwe also use the State Library in Pretoria for interlibrary loans or photocopying articles. L'Université Cheikh Anta Diop was the only library to mention that it writes the author for article reprints. Several librarians indicated that they request document delivery assistance from other university libraries, either in their own country or abroad.

## CONCLUSIONS

It is apparent from even this limited survey that university and research libraries in sub-Saharan Africa have begun to benefit from new information technologies. The impact of microcomputers and the electronic transmission of information will certainly grow dramatically in the years to come.

Even though in most instances it is not yet possible or economically feasible for African libraries to subscribe to online bibliographic databases, CD-ROM offers the researcher an acceptable alternative.

CD-ROM will become even more attractive to African librarians and scholars once essential full-text literature is routinely published on disc as well as in print copy. This is happening increasingly, spurred on by both the market economy and also philanthropy. The Rockefeller Foundation, which was responsible for initiating the Selected Medical Library on Microfiche (SMLM), has funded the Mann Library of Cornell University to produce a comprehensive list of core agricultural literature for mastering on CD-ROM. The foundation hopes that it will be able to interest commercial publishers in producing and marketing a CD-ROM product for agriculture similar to SMLM once the Mann Library project is completed.

It should be noted, however, that CD-ROM is not the only electronic medium of relevance to African researchers, however. The Institute for Scientific Information (ISI), for example, is now publishing Current Contents (life sciences; agriculture, biology and environmental sciences; physical, chemical and earth sciences; and clinical medicine) on a floppy disc, with abstracts. For institutions that have not yet acquired a CD-ROM drive, this product and others like it could be an extremely valuable addition to the university or research library.

Nevertheless, there are a number of issues pertaining to the acquisition of microcomputers and CD-ROM drives that emerge from this survey and are of concern:

### Advice and Training

Librarians need more (and better) advice about what kind of equipment to buy and where to purchase it, particularly in the case of CD-ROM. Should equipment be purchased in-country so that maintenance contracts can be easily arranged or is it sometimes better to purchase abroad where everything is so much cheaper? This question is particularly relevant for countries where it is difficult to find a reliable computer vendor.

Training needs should be addressed. Are two-week courses sufficient for librarians who are, for the most part, not technically knowledgeable? These courses are an excellent way to introduce the novice to the computer-- hardware, operating software, and applications software (data processing, word processing, etc.). But without longterm follow-up, the librarian does not become sufficiently proficient or self-confident to innovate and troubleshoot when the need arises.

### Equipment Issues

Installing the equipment, servicing it, obtaining spare parts, and buying supplies are substantial problems almost everywhere. Securing the appropriate

customs exemption is also a problem. It can take months to clear equipment from customs after it arrives in-country.

#### CD-ROM

CD-ROM presents unique opportunities and also challenges, a few of which are listed below.

Some librarians who already have a microcomputer will learn to their dismay that their computer is not suitable for CD-ROM because of insufficient memory.

In general, librarians are frequently unable to make knowledgeable purchasing decisions, and have difficulty installing their new disc drive (sometimes because they have purchased the incorrect interface card).

Librarians should have sufficient funds to subscribe to CD-ROM products, which can be expensive, but all too often do not.

Librarians need to be able to access full-text articles when an end-user requests them following a literature search. If it is frustrating to be cut off from scientific and scholarly literature entirely, it must be equally disheartening to know that an important journal article exists and not be able to obtain it. Donor agencies might want to think of ways to couple provision of CD-ROM capability with document delivery in order to circumvent this problem. The Johns Hopkins University Center for Communication Programs, for example, provides free document delivery to developing country institutions that receive POPLINE. Each document on the POPLINE database is assigned a number, so that the librarian need only write to request the full-text article if it is unavailable locally.

The AAAS will continue to monitor and analyze the environment for information technologies in sub-Saharan Africa. In the period ahead, we plan to concentrate increasingly on CD-ROM, including the possibility of mastering discs in Africa, based on indigenous research conducted there. As a first step, in 1992 we expect to survey CD-ROM production in other developing regions, where there is now considerable expertise in putting the results of national and regional research on disc. The experience (and lessons learned) in Latin America and Asia will be of great assistance to African organizations interested in embarking on CD-ROM projects of their own.

APPENDIX ONE

*AAAS Sub-Saharan Africa Journal Distribution Program*

The Journal Distribution Program provides subscriptions to more than 200 scientific, engineering, and other scholarly journals to some 175 university and research libraries in 35 countries. The journals provided through this program are primarily published by AAAS affiliated societies, and are made available to AAAS at little or no cost.

Established as a pilot project in 1985, the program is now funded by the Carnegie Corporation of New York, the Ford Foundation, and the US Agency for International Development. The Ford Foundation grant has enabled AAAS, through active cooperation with the American Council of Learned Societies to increase social science participation and add the humanities. The US Information Agency provides some shipping assistance, as does the United Nations Centre for Science and Technology for Development.

Recipient institutions are identified through in-country needs inventories, supplemented by advice from donor societies and from experts on teaching and research in Africa.

To ensure the optimal match between journal and recipient institution, especially where demand far exceeds supply, AAAS formed an advisory committee that includes representatives of the international development community, representatives of donor societies, and others who are knowledgeable about academic conditions in sub-Saharan Africa. With special funding from the Carnegie Corporation, AAAS was able to add an African librarian to the Advisory Committee in 1990.

In 1991 the program initiated an biannual newsletter for the libraries that receive journals under the auspices of the program. The newsletter will provide useful information, such as details on organizations in addition to AAAS that donate materials (textbooks and other books, journals, CD-ROM); training possibilities; new developments in computer hardware and software, and meetings and conferences. Equally important, the newsletter will also provide an opportunity for African librarians to write brief articles, sharing their experiences and informing colleagues of meetings they have attended.

**APPENDIX TWO**

***Institutions Responding to the Survey***

**Angola**

Biblioteca Nacional de Angola  
PO Box 2915  
Rua Cte Gika, Luanda  
Contact: Dr. Gabriela Antunes, Director

**Bénin**

Université Nationale du Bénin  
Faculté des Sciences Agronomiques  
Campus Universitaire d'Abomey - Calavi  
Abomey - Calavi  
Contact: Mathurin C. NAGO, Doyen

**Botswana**

Botswana National Library Service  
Private Bag 0036  
Gaborone  
Telephone: 352288, 352397  
Contact: Gertrude Kayaga Mulindwa  
Senior Librarian, National Reference and Special Libraries

Botswana Technology Centre  
P/Bag 0082  
Gaborone  
Telephone: 314161  
Telex: 374677  
Contact: Mrs. Tiro Ngidi

National Institute of Development Research and Documentation  
University of Botswana  
P.M.B. 0022  
Gaborone  
Telephone: 267-356634/5  
Telex: 2429 BD  
Fax: 267-357573  
Contact: Stella Monageng, Librarian/Documentalist

University of Botswana  
P.M.B. 0022  
Gaborone  
Telephone: 351151  
Telex: 2429 BD  
Contact: H.K. Raseroka, University Librarian

Burkina Faso

Institut Panafricain pour le Développement  
BP 1756

Ouagadougou 01

Telephone: 30-03-90

Telex: 5423 BF

Cable: PANINSTITUTE

Contact: Amadou Diop, Responsable du Centre de Documentation

Cameroun

Institut Panafricain pour le Développement (Région Afrique de l'Ouest)

PO Box 133

Buea

Telephone: 32-21-82, 322186

Telex: 5735 KN

Cable: PAID BUEA

Contact: Rev. D. M. Lubansa, Librarian

Université de Yaoundé, Centre Universitaire des Sciences de la Santé  
Yaoundé

Contact: V. Boumsong, Bibliothécaire

Ethiopia

Addis Ababa University

Box 1176

Addis Ababa

Telephone: 251-1-115673

Telex: 21205 AAUNIV ET

Fax: 251-1-552688

Contact: Getachew Birru, University Librarian

Alemaya University of Agriculture

PO Box 138

Dire Dawa

Telephone: 111399 or 111400

Contact: Asheber Haile, Assistant Librarian

Jimma Medical Science Institute

PO Box 378

Jimma

Contact: Genetu Melese, Assistant Head Librarian

National Research Institute of Health

PO Box 1242

Addis Ababa

Telephone: 75-34-70

Telex: 21522 NARIH ET

University of Asmara  
PO Box 1220  
Asmara  
Telephone: PBX113600/226  
Telex: 42091ASMUNIV  
Cable: ASMUNIV  
Contact: Abdulkader Zekaria, Assistant Librarian

### Gabon

Centre International des Civilizations Bantus (CICIBA)  
BP 770  
Libreville  
Telephone: 72 33 14  
Contact: Pierre Dandjinou, Responsable du Centre d'Information

### Gambia

Gambia College  
Brikama  
Western Division  
Telephone: 84812, 84748  
Contact: Mrs. R. A. N. Jallow, Librarian

### Ghana

Ghana Atomic Energy Commission  
PO Box 80  
Legon-Accra  
Telex: 2554 Ghanatom  
Cable: GAEC GH ACCRA  
Contact: Elizabeth A. Agyeman, Librarian

Council for Scientific and Industrial Research  
(Ghastinet National Focal Point)  
PO Box M32  
Accra  
Telephone: 777651-5  
Cable: SCIENCES  
Contact: J.A. Villars, Coordinator

University of Cape Coast  
Private Mail Bag (The Library)  
Cape Coast  
Telephone: 2482  
Telex: 2552 GH  
Contact: V. T. Ankoma-Sey, Senior Assistant Librarian

University of Ghana  
School of Medicine  
PO Box 4236  
Accra

Telephone: 663445  
Fax: 233-21-668425  
Contact: D. B. Addo, Librarian

University of Ghana  
Balme Library  
PO Box 24  
Legon-Accra  
Telephone: 775309  
Telex: 2556UGL GH  
Contact: Matilda Amissah-Arthur, Assistant Librarian

University of Ghana  
Faculty of Agriculture  
PO Box 68  
Legon-Accra  
Contact: Kwabena Yeboah-Asuamah, Library Assistant

University of Science and Technology  
Kumasi  
Telephone: 5884, 5350-9x219  
Telex: 2555 UST GH  
Contact: Moses Osei-Bonsu, Senior Assistant Librarian

#### Kenya

African Academy of Sciences  
PO Box 14798  
Nairobi  
Telephone: 802176, 802183  
Telex: 25446 AFACS KE  
Fax: 254-2-802185  
Contact: Dr. Alex R. Tindimubona, Assistant Program Officer

Kenya Medical Research Institute  
PO Box 54840  
Nairobi  
Telephone: 722541  
Contact: Nancy Kamau, Senior Librarian

Kenya National Library Service  
PO Box 30573  
Nairobi  
Telephone: 729853, 725550/1  
Cable: KENLIB  
Contact: Clement Wachira Kabiru, Librarian, Head of Department

Kenyatta University  
PO Box 43844 (Moi Library)  
Nairobi  
Telephone: 810901  
Telex: 25483  
Contact: James M. Ng'ang'a

Moi University  
PO Box 3900  
Eldoret  
Telephone: 0321/43001-7  
Telex: 35047  
Contact: Tirong arap Tawui, Acting Head, Library Services

National Museums of Kenya  
PO Box 40658  
Nairobi  
Telephone: 742131  
Telex: 22892  
Fax: 741424  
Contact: Japhet Ofike, Librarian

University of Nairobi  
PO Box 30197  
Nairobi  
Telephone: 334244, x2501  
Contact: Mr. J. M. Mulwa, Acting Deputy University Librarian

University of Nairobi  
Medical Library  
College of Health Sciences  
PO Box 30197  
Nairobi  
Telephone: 726300, x2375  
Contact: Mrs. Rosemary Kiathe, College Librarian

#### Lesotho

Lesotho Agricultural College  
P/BAG A4  
Maseru  
Telephone: 322464  
Contact: Joel T. Malelu, Librarian

#### Madagascar

Université de Madagascar  
Observatoire de Madagascar  
Faculté de Sciences  
PB 3843  
Antananarivo  
Telephone: 253-53  
Contact: M. Rakotoniaina Solofoarisoa, Assistant d'Enseignement et de Recherche

#### Malawi

Bunda College of Agriculture  
PO Box 219  
Lilongwe

Telephone: (265)721-455  
Fax: (265)721-624  
Contact: Margaret Ngwira, College Librarian

Chitedze Library  
Chitedze Agricultural Research Station  
PO Box 158  
Lilongwe, Malawi  
Contact: Kathy Wern

Ministry of Health Documentation Centre  
PO Box 30377  
Capital City, Lilongwe 3  
Telephone: 265-730-099  
Telex: 44558  
Fax: 265-730-161  
Cable: MINMED, Lilongwe  
Contact: Marc Lippman, Health Librarian and Documentation Officer

University of Malawi Libraries  
PO Box 280  
Zomba  
Telephone: 522 222  
Telex: 44742 CHANCOL MI  
Fax: (265)523-225  
Contact: Foster G. Howse, Chief Cataloguer

#### Mali

Ecole Nationale de Médecine et de Pharmacie  
BP 1805  
Bamako  
Telephone: 225277, 225923  
Contact: Mme. Semoulou Sidibi, Responsable de la Bibliothèque

Ecole Normale Supérieure  
BP 241  
Bamako  
Telephone: 22-21-89  
Contact: Konimla Doumbia, Bibliothécaire

#### Mauritius

Mauritius Sugar Industry Research Institute  
Library and Scientific Information Service  
Rduit  
Telephone: 230/45411061  
Telex: 4899MSIRI IW  
Fax: 45541971  
Cable: SIRI, Mauritius  
Contact: Mrs. Rosemary Ng Kee Kwong  
Head, Library and Scientific Information Service

University of Mauritius  
University of Mauritius Library  
Rduit  
Telephone: 454-1041  
Telex: 4621 UNIM IW  
Fax: 230/454-9642  
Contact: Mr. B. R. Goordyal, Chief Librarian

Mozambique

Arquivo Historico de Mocambique  
POB 2033  
Maputo  
Telephone: 21177/8  
Contact: Sra. Maria Ines Nogueira da Costa, Director

Universidade Eduardo Mondlane  
PO Box 257  
Maputo  
Telephone: 49-00-81/9-229  
Contact: Wanda do Amiral, University Librarian

Nigeria

Abubakar Tafawa Balewa University  
PMB 0248  
Bauchi  
Telephone: (077)43724  
Contact: Mrs. Adebimpe O. Ike, University Librarian

Ahmadu Bello University  
Kashimi Ibrahim Library  
Zaria  
Telephone: 069-50553  
Telex: 75241 NG  
Contact: Mr. M. M. Zaki

Bayero University  
PMB 3011  
Kano  
Telephone: 064-601280/202  
Telex: 77189 UNIBAYERO  
Contact: Sani Mohammed Gwarzo, Reference Librarian  
Dr. Nassir Bello, Deputy University Librarian

Bendel State University  
PMB 14  
Ekpoma, Bendel State  
Telephone: 055-98048  
Contact: Mr. J. L. Ibrahim, Principal Librarian

Nigeria

Federal University of Technology, Akure  
PMB 704  
Akure, Ondo State  
Telephone: 034/232221  
Contact: E. K. Adegbule-Adesida, Principal Librarian

Institute for Agricultural Research  
Ahmadu Bello University  
PMB 1044  
Zaria  
Telephone: (069)50571-4PBX  
Contact: R. Salami, Agricultural Librarian

Institute of Agricultural Research and Training  
PMB 5029  
Moor Plantation, Ibadan  
Telephone: 312523, 312861  
Cable: INSTAGRIC  
Contact: Mrs. B. O. Ikhizama, Librarian

Lake Chad Research Centre  
Gamboru Road  
PMB 1293  
Maiduguri  
Contact: Dr. M. Aminu-Kano, Assistant Chief Research Officer

National Animal Production Research Institute  
PMB 1096  
Shika-Zaria  
Telephone: 096/50596  
Contact: Seun Adewole, Librarian

National Cereals Research Institute  
Badeggi  
PMB 8  
Bida, Niger State  
Telephone: 066-461233  
Telex: CERESARCH  
Contact: Mrs. R. E. Udoh, Assistant Chief Librarian

National Crop Root Research Institute  
PMB 7006  
Umudike, Umuahia, Imo State  
Telephone: 220188  
Contact: Kingsley F. Okocha, Assistant Chief Librarian

National Horticultural Research Institute  
Idi-Ishin  
PMB 5432  
Ibadan, Oyo State  
Telephone: 022/412490 or 96  
Contact: Mrs. P. I. Adefolaju, Head, Library and Documentation Division

Nigeria

National Institute for Freshwater Fisheries  
PMB 6006  
New Bussa, Kwara State  
Contact: M. O. Ibeum, Institute Librarian

National Institute for Medical Research  
PMB 2013  
Yaba, Lagos  
Telephone: 800090-4, 861732  
Contact: Mrs. H. M. Fayiga, Chief Librarian

National Mathematical Centre, Abuja  
PMB 118  
Abuja  
Telephone: 09/5230-783/784  
Fax: 9/5230-783  
Contact: Jigekuma A. Ombu, Librarian

National Research Institute for Chemical Technology  
Kaduna State  
PMB 1052  
Zaria, Kaduna State  
Telephone: 069-50508, 50510  
Contact: Mrs. E. G. A. Fatuyi, Assistant Chief Librarian

National Veterinary Research Institute  
Vom near Jos  
Plateau State  
Telephone: 073/81811, 81812  
Contact: Dr. Linus N. Ikpaahindi, Assistant Chief Research Officer  
(Documentation)

Nigerian Institute for Trypanosomiasis Research  
PMB 2077  
Kaduna  
Contact: Mr. G. A. Thompson, Head of Library and Publications

Obafemi Awolowo University  
Hezekiah Oluwasanmi Library  
Ile-Ife  
Telephone: 036-230290  
Telex: 34261 OAU  
Contact: M. A. Olaosun, Reference Librarian

Plateau State Polytechnic Library  
PMB 02023  
Bukuru  
Cable: Plaspoly Bukuru  
Contact: J.E. Kotso, Chief Librarian

Nigeria

University of Agriculture, Abeokuta  
PMB 2240  
Abeokuta  
Telephone: 039-233194  
Contact: Mrs. S. O. Ogunmoyela, Librarian

University of Agriculture, Makurdi  
PMB 2373  
Makurdi, Benin State  
Telephone: 044-933204 x219, 31460, 33204  
Contact: J. A. Achema, University Librarian

University of Calabar  
PMB 1115  
Calabar, Cross River State  
Contact: Sunday G. Utuk, Senior Librarian

University of Cross River State  
PMB 1017 (Library Department)  
Uyo, Cross River State  
Telephone: Uyo 503  
Telex: UNICROSS, UYO  
Contact: Johnson Okwong, Visiting University Librarian

University of Ibadan  
Ibadan  
Telephone: 022-400550  
Contact: Olifunmilayo G. Tamuno, University Librarian

University of Ibadan  
College of Medicine  
E. Latunde Odeku Medical Library  
Ibadan  
Telephone: 410516, 410519  
Contact: Mr. F.O. Aramide, College Librarian

University of Ilorin  
PMB 1518  
Ilorin, Kwara State  
Telephone: 031-221715  
Contact: Mr. Dokun Fadiran, Deputy University Librarian

University of Jos  
PMB 2084  
Jos, Plateau State  
Telephone: 55930 x223, 273, 283  
Telex: 81136 UNIJOS NG  
Contact: Audrey B. Ojoade, Deputy University Librarian

## Nigeria

University of Lagos  
Akoka  
Yaba, Lagos  
Telephone: 01-821273  
Contact: E. A. Popoola, Principal Librarian

University of Lagos  
College of Medicine  
PMB 12003  
Idi-Araba, Lagos  
Telephone: Lagos 801500-20  
Cable: UNIMEDYABALAGOS  
Contact: Mrs. J. A. Osun-Benjamin, Cataloguing Librarian

University of Nigeria, Nsukka  
Nnambi Azikiwe Library  
Nsukka, Anambra State  
Telephone: 042-771444  
Telex: 51496 ULIONS NG  
Contact: Dr. M. W. Anyakoya, Chief Cataloguer

University of Port Harcourt  
PMB 5323  
Port Harcourt  
Contact: George B. Affia, University Librarian

Usmanu Danfodiyo University  
PMB 2346  
Sokoto, Sokoto State  
Telephone: 232058  
Telex: UDUSOK 73134NG  
Contact: Abdullahi Alhaji Ahmed, Reference Librarian

## République Centrafricaine

Université de Bangui  
BP 1450  
Bangui  
Telephone: 61-20-00  
Contact: Joseph Goma-Bouanga, Director, University Library

## Rwanda

Institut Africain et Mauricien de Statistique et d'Economie  
BP 1109  
Kigali  
Telephone: 84989  
Contact: Dominique Majoro, Bibliothécaire, Documentaliste

Université National du Rwanda  
UNR BP 117  
Butare  
Telephone: 302-71/72/73  
Telex: 22605 UNR RW  
Contact: Ndayisaba Faustin, Directeur

### Sénégal

Institut Francais de Recherche Scientifique pour le  
Développement en Coopération (ORSTOM)  
BP 1386  
Route des Pères Maristes, Dakar  
Telephone: 323476, 323480  
Telex: 51468 SG  
Fax: 221/324307  
Contact: Mme. V. Rotival LeBlanc

Institut National de Développement Rural  
BP 296-A  
Thies  
Telephone: 51-12-57  
Contact: Modou Fall Sall, Documentaliste

Université Cheikh Anta Diop de Dakar  
B.P. 2006  
Dakar  
Telephone: 221-24-69-81  
Telex: 221-24-23-79  
Contact: Mr. Herri Sene

### Sudan

National Documentation Centre  
National Council for Research  
PO Box 2404  
Khartoum  
Telephone: 70776  
Cable: BUHUTH  
Contact: Cecile Wesley, Director, National Documentation Centre

University of Khartoum  
Faculty of Medicine  
Khartoum  
Telephone: 77435  
Contact: Dr. A. Mouniem, S. El Mardi

### Swaziland

University of Swaziland  
Faculty of Agriculture Library  
PO Box Luyengo

Telephone: 84011/4, 83021/3  
Telex: (09268)55270  
Cable: 2087 WD  
Contact: Makana Mavuso, Senior Assistant Librarian

### Tanzania

Directorate of Information and Documentation  
Tanzania Commission for Science and Technology  
PO Box 4302  
Dar Es Salaam  
Telephone: 73261/3, 73266

Sokoine University of Agriculture  
PO Box 3022  
Morogoro  
Telephone: 056-4639  
Telex: 55308UNIVMOG TZ  
Contact: Eckhard Strohmeier, Senior Librarian

Tanzania Library Services Board  
PO Box 9283  
UWI ST., Dar Es Salaam  
Telephone: 26121/2  
Contact: Mrs. Lina Lengaki, Principal Librarian & Head of National  
Bibliographic Agency

University of Dar es Salaam  
PO Box 35092  
Dar Es Salaam  
Telephone: 48235  
Contact: D. R. M. Katundu, Librarian (Periodicals)

### TOGO

Centre de Documentation de l'Institut Français de Recherche  
Scientifique pour le Développement en Coopération (ORSTOM)  
BP 375  
Lomé  
Telephone: 21-23-44  
Telex: 5045 TG  
Contact: Devatchagni M. Kokou, Bibliothécaire

Université du Bénin  
BP 1515  
Lomé  
Telephone: 21-48-43  
Fax: 21-66-03  
Contact: Amah Ekwe, Directeur de la Bibliothèque Universitaire

## UGANDA

Centre for Basic Research  
PO Box 9863  
Kampala  
Telephone: 256-41-231228, 242987  
Fax: 256-41-235413 or 235043  
Contact: Mahmood Mamdani, Executive Director

Kawanda Research Station  
PO Box 7065  
Kampala  
Telephone: 67621/3 Kampala  
Contact: Miss Speciosa Nsimbi, Librarian

Uganda Virus Research Institute  
PO Box 49  
Entebbe  
Telephone: 20385-7/20631  
Telex: UG 61532  
Contact: Miss Namutebi Annet, Library Assistant

## Zaire

Bibliothèque EQUATORIA  
BP 276  
Mbandaka  
Contact: Honoré Vinck, Directeur du Centre EQUATORIA

Bibliothèque Service Présidentiel d'Etudes (SPE)  
BP 9797  
Kinshasa I  
Telephone: 50157  
Telex: 21490,21369 ZR  
Contact: Kambale Kombi, Section Formation et Documentation;  
Balenda Bambi, Centre de Calcul

Commissariat Général à l'Energie Atomique  
BP 868  
Kinshasa XI  
Contact: Ngindu Dikolela, Chef de Service Documentation & Publications;  
Kombele Gelembo, Chef de Département Electronique

Facultés de Théologie Catholique Saint Moulin, Bibliothèque  
BP 1534  
Kinshasa, Limete  
Telephone: 78476  
Contact: Léon de Saint Moulin, Bibliothécaire en Chef

## Zambia

National Council for Scientific Research  
PO Box CH. 158, 15302 Chelston,

Lusaka  
Telephone: 281081/6  
Telex: ZA40005  
Contact: B. M. Chisenga, Librarian

Tropical Diseases Research Centre  
PO Box 71769  
Ndola  
Telephone: 26 02 610961/4  
Telex: ZA 30180  
Fax: 26 02 614487  
Contact: C.J.J. Chisanga, Principal Librarian

United Nations Institute for Namibia  
PO Box 33811  
Lusaka  
Telephone: 228883  
Telex: ZA 41960  
Fax: 222661  
Contact: Prem Kulleen, Librarian

University of Zambia  
PO Box 32379  
Lusaka  
Telephone: 250845/see form  
Telex: UNZALU ZA 44370  
Fax: 260-1-253952  
Contact: Dr. H. Mwachalimba, Librarian

### Zimbabwe

Blair Research Laboratory  
Box 8105  
Causeway, Harare  
Telephone: 792747  
Contact: Caesar Vundule, Medical Research Officer

Bulawayo Polytechnic  
PO Box 1392  
Bulawayo  
Telephone: 63181, 63187  
Contact: Miss S. Moyo, Librarian

University of Zimbabwe  
PO Box MP 45  
Mount Pleasant, Harare  
Telephone: 303211, ext. 1164  
Contact: Mrs. D. Pakkiri, Acting Librarian

University of Zimbabwe  
Medical Library  
PO Box MP45  
Mount Pleasant, Harare  
Telephone: 791631, ext.237

Telex: 26580 UNIV ZW  
Fax: 263-4-732828  
Contact: Mrs. Helga Patrikios, Medical Librarian

Veterinary Research Library  
PO Box 8101  
Causeway, Harare  
Telephone: 705885  
Contact: Josia Kusena, Librarian

**APPENDIX THREE**

***Documentation of Indigenous Literature***

Each library that reported it maintains databases and/or research collections relevant to indigenous research will be found in this appendix. The information below is taken directly from the completed questionnaires.

**Angola**

Biblioteca Nacional de Angola

National repository for every publication published in Angola.

**Botswana**

National Institute of Development Research and Documentation

Bibliographic database and collection of development information produced in or about Botswana.

**Burkina Faso**

Institut Panafricain pour le Développement

Bibliographic database and catalogues of student theses on planning and land management; reports of projects carried out by the institute, such as women in development. Collection of documents pertaining to underground literature, administration, and land studies.

**Ethiopia**

Addis Ababa University

Computer databases and bibliographies of masters theses, 1980-86. 1986 to present in preparation. Ethiopian collection, which library plans to master on CD-ROM.

Alemaya University of Agriculture

Card catalogues and bibliographies of completed research publications, M.Sc theses, current research approved, and research project reports. Repository of FAO publications and a very few government publications.

National Research Institute of Health

Computerized databases and bibliographies of theses completed and articles published by staff, 1979-89. Publications are in different disciplines including bacteriology, entomology,

parasitology, virology,  
immunoematology, and veterinary  
public health.

### Gabon

Centre d'Information Bantu

Database of theses from Zaire and  
Gabon (anthropology, traditional  
medicine, archaeology, and  
linguistics. Bibliographies of  
monographs, theses, and articles  
about Bantu Africa (Central and  
Southern Africa). Collection of  
research reports, information  
bulletins, and studies.

### Ghana

Council for Scientific and  
Industrial Research

Manual version of Ghana Science  
Abstracts. List of CSIR  
publications. AGRIS and CARIS  
(Ghana). Library is a repository  
for all locally published material.  
CSIR is also main focal point for  
GHASTINET, described in detail in  
report.

University of Cape Coast

Africana collection; all Ghanaian  
publications, including those  
published by the government.

University of Ghana

Directory of S&T research projects  
in Ghana. Repository of government  
publications. Africana collection.

University of Ghana  
Medical Library

Card catalogue of all articles on  
Ghana in scientific and medical  
journals, 1900 to date. Once the  
database is automated, the library  
plans to expand coverage to include  
material on population, social  
pediatrics, and local gray  
literature. Also plans to produce a  
directory of ongoing biomedical  
research in Ghana.

University of Science and Technology

Catalogues and bibliographies of  
first and second degree theses.  
Ghana collection, which contains Law  
Reports, Forest Products and  
Building Reports, and Road  
Construction Research Reports, 1963-  
90. Also repository for government  
publications, especially  
parliamentary debates, gazettes and

legislative instruments.

Kenya

African Academy of Sciences

Database of scholarly journals published in Africa, 1990. Database of African scientists and scientific institutions.

Kenya National Library Service

Bibliographic databases on theses on library and information science, 1980 to the present. Collection of government publications; material in local languages, such as Swahili, Kikuyu, etc. Legal repository for everything published in Kenya.

Kenyatta University

Directory of research conducted in university (irregularly published). Bibliographies in a variety of subjects, primarily the social sciences. Card catalogue of newspaper articles on education, social science, humanities, science and technology, and presidential speeches. Annual index on education. Africana collection, very comprehensive for Kenyan material of all types, mainly published and university theses and dissertations.

Moi University

Collection of published and unpublished literature in all disciplines by Kenyans or about Kenya.

University of Nairobi

Computer database of theses. Legal repository for all publications in the country, including those published by the university.

Lesotho

Lesotho Agricultural College

Bibliographies of project reports written by year 2 diploma students in agriculture and home economics. Lesotho collection, including reports on ongoing agricultural development projects sponsored by international organizations.

Madagascar

l'Observatoire Géophysique

Bibliographic databases of doctoral

dissertations and theses (9 years); reports of activities (4 years); meteorological bulletin (98 years); magnetics bulletin (10 years); seismographic bulletin (9 years). Collection of publications of faculty of sciences and national scientific organizations.

### Malawi

Bunda College of Agriculture

Bibliography on women in development in Malawi, 1940-1990 (500 items), project funded by Royal Tropical Institute as part of a four-country bibliography on women in development. Compiling a national database on all aspects of maize in Malawi, 1900-1990, funded by the Rockefeller Foundation and to be published by the Royal Tropical Institute. Published bibliography on agriculture in Malawi, 1930-1980 (1,400 items). Collection of documents on agriculture in Malawi.

Ministry of Health  
Documentation Centre

Creating a database in which profiles of research projects, institutions, systems and services, and personnel will be incorporated with bibliographic records on health information in Malawi. Collection of health-related information in Malawi or about Malawi.

University of Malawi

Catalogues and collection of articles written or published by university staff. Annotated bibliography of education in Malawi. One Hundred Years of Chichewa in Writing, 1875-1985. Each college maintains its collection of Malawiana.

### Mali

Ecole Normale Supérieure

Collection of literature on development and on the Sahel.

### Mauritius

Mauritius Sugar Industry Research  
Institute

Card catalogues of all articles published by research staff since 1963 (date of creation of institute); papers presented at conferences, theses, reports

submitted by staff. Collection of indigenous material relevant to research: locally published journals; conference proceedings; prints, drawings, and paintings; early publications on the history of sugarcane.

University of Mauritius

List of theses, dissertations, and reports submitted to the University of Mauritius, 1969 to present. Library contributes to international databases, such as AGRIS, CADRIS, BIEF. Special Mauritiana collection. Since 1973 library is legal repository of all monographs published in Mauritius.

Mozambique

Arquivo Historico de Mocambique

Special collections relating to history of Mozambique; Portuguese colonization; anthropology; government, industrial, agricultural and commercial documents pertaining to Mozambique. Also microfiche collection of documents from National Library of Portugal.

Universidade Eduardo Mondlane  
Department of Archaeology and  
Anthropology

Card catalogue and database of published monographs, theses, working papers and reports, conference proceedings. Library plans to create a database for newspaper clippings on anthropological and sociological issues of Mozambique. Collection of field work diaries and ongoing reports about current research.

Nigeria

Abubakar Tafawa Balewa University

Collection of theses and dissertations written by staff and students of ABTU; conference, seminar, and workshop papers; books, and monographs published by ABTU staff; books about the university, its members, staff, and students. Bauchiiana: Publications on Bauchi state from government ministries, parastatals, organizations, public and private enterprises.

Bayero University

Catalogues and collections of MA and PhD theses; microfilms on Northern Nigeria, 1899-1910; Arabic manuscripts in university collection.

Bendel State University

Bibliographic record of theses completed. Collection of gazettes, reports of commissions of enquiry, official speeches, etc.

Institute for Agricultural Research

Catalogue of documents on Nigerian agriculture, 1924 to date; list of theses held in library; list of Nigerian journals; list of IAR publications. Crop and weather reports from the 11 northern states of Nigeria.

Institute of Agricultural Research and Training

Card catalogues and bibliographies of projects carried out by students, 1957 to date; articles written by staff; ongoing research. Collection of articles by research scientists; guides and advisory leaflets on the production of crops such as cowpea, maize, rice, okra, etc.

National Animal Production Research Institute

Bibliographies of seminar papers on livestock science, presented annually; theses written by institute scientists. Collection of government edicts and gazettes pertaining to agriculture, livestock, and research institutes.

National Horticultural Research Institute

Card catalogs and bibliographic databases of titles of completed research work in all areas of horticulture. Collection of theses of scientists attached to the institute. Logbooks of scientific research undertaken in the institute. Repository of all Nigerian horticultural publications.

National Institute for Freshwater Fisheries Research

Kainji Lake Basin, Nigeria; A Multidisciplinary Bibliography, 1957-1978 by M.I. Ibeum; Two Decades of Kainji Lake Research; A Multidisciplinary Bibliography 1968-1988 by M.I. Ibeum; Nigerian Fisheries and Aquatic Sciences Abstracts (Annually). Kainjiana Collection (works emanating from

- Kainji Dam and its environs); Nigerian Fisheries and Aquatic Sciences Collection (documents on Nigerian fisheries and water-related subjects).
- National Institute for Medical Research Bibliographies of West African Council for Medical Research publications, 1954-72; Malaria in Nigeria, 1950-75; Directory of Medical Research in Nigeria, 1976 and 1982. Collection of papers presented by staff at conferences; proceedings volumes; etc.
- National Research Institute for Chemical Technology Repository for federal/state government publications and gazettes; annual reports and guides of institutions; individual seminar and conference papers.
- Nigerian Institute for Trypanosomiasis Research Bibliographies of theses completed by research scientists; articles and conference papers; proposed, ongoing, and completed research projects.
- National Root Crops Research Institute Catalogues and indices of theses, published articles, annual reports, technical reports, and extension and research bulletins. Collections of institute's logbooks, annual reports, and bulletins.
- Obafemi Awolowo University Catalogues of theses and dissertations, 1962 to date (abstracts added in 1982); staff publications; and staff seminars.
- Plateau State Polytechnic Catalogues of written material about the Plateau State Polytechnic or by the members of the Polytechnic community.
- University of Agriculture (Makurdi) Collection of government publications and farmers' literature (primarily guides and publications of university's extension services unit).
- University of Cross River State Bibliography of first degree theses granted by university, 1986-89. Collection of Nyong Essien books and personal papers (an important politician from the early 40s to the

late 60s, the first President of the Eastern Nigeria House of Chiefs, who Essien died in 1976).

University of Ibadan

Abstracts of Ibadan University Theses and Dissertations, 1965-75 and 1974-86 (manual records only). Catalogue of staff publications (manual). Library maintains all publications on Nigeria by Nigerians. Also government documents, theses, and dissertations, newspaper and government gazettes, as well as archival materials from the personal collections of eminent Nigerians.

University of Ibadan  
Medical Library

Bibliographic records of all publications in medicine and its allied fields by members of the teaching faculty of the College of Medicine, University of Ibadan, 1948-1980. Database of biomedical literature relevant to West Africa in general and Nigeria in particular.

University of Ilorin

Abstracts of theses accepted by University of Ilorin, 1977-1986.

University of Jos

Catalogues of theses, publications of university staff; conference papers deposited in the library. Collection of items about Plateau State or by persons of Plateau State.

University of Lagos

Catalogues and bibliographies of theses and dissertations, 1968-89; staff publications. Collections of government publications; university archives; special holdings (private papers and manuscripts); house journals and trade literature; newspapers and local magazines; staff publications; conference papers.

University of Lagos  
Medical Library

Index to staff publications in the world's biomedical literature, 1962-86; catalogue of selected theses and dissertations. Collection of articles, theses, and dissertations by staff and students.

University of Nigeria

Bibliographic record of undergraduate, postgraduate, and doctoral theses and dissertations.

University of Port Harcourt

Nigerian Universities Dissertation Abstracts Index; Abstracts Index of Newspapers.

République Centrafricaine

Université de Bangui

Bibliographies of dissertation theses from the Faculty of Health Sciences; theses of the Faculty Institute of Technology, the Institute for Rural Development, and the Teaching Training College.

Rwanda

Institut Africain et Mauricien de Statistique et d'Economie Appliquée

Catalogue of postgraduate and field reports (statistics, economics, mathematics, sociology).

Collection of reports of organizations from countries of interest to the Institute; collection of several periodicals published in Rwanda.

Sénégal

Institut National de Développement Rural

Collection of almost all agricultural publications produced in Senegal, before independence and after. Government repository for agriculture and aquaculture.

Université Cheikh Anta Diop

Databases and bibliographies of articles, theses, and other academic works from the Faculties of Arts, Law, Medicine, and Sciences.

Repository for public records of the Faculties of Sciences and Arts; medical periodicals published by medical societies of Dakar (Dakar Medical, Afrique Medicale, Psychopathologie Africaine, Bulletin de la Société Médicale de Dakar); works and publications of la Banque Centrale des Etats de l'Afrique de l'Ouest (BCEAO); works and publications of CREDILA (jurisprudence).

## Sudan

National Council for Research

Responsible for preparation of Sudan Science Abstracts and the National Register of Current Research. Collection of articles, conference papers, technical reports, and dissertations relating to S&T in Sudan.

University of Sudan

Catalogue of theses. Bibliographic database of Sudan Medical Journal, 1962-88, the Al Hakeem Journal, 1957-90. Maintains collection of Ministry of Health publications.

## Swaziland

University of Swaziland

Card catalogues and bibliographies of theses and articles on Swaziland. Repository of government and other documents published in Swaziland. Collection of letters, diaries, and scientific notebooks.

## Tanzania

Sokoine University of Agriculture

Special collections on East Africana and university theses.

Tanzania Commission for Science and Technology

Bibliography of agricultural research in Tanzania. Directories of scientific personnel in Tanzania and technical information resources in Tanzania. Reports on research results.

Tanzania Library Services Board

Government repository for books, pamphlets, conference papers, serials, etc., published in Tanzania. Tanzania National Bibliography--a list of new documents published in Tanzania and deposited at the National Bibliographic Agency of the Tanzania Library Services Board.

## Togo

ORSTOM

Catalogues, databases bibliographies, and collections of reports and articles by students and staff of ORSTOM in pedology, geology, hydrology, anthropology, sociology, and economics.

Uganda

Centre for Basic Research

Collection of newspaper clippings on 33 topics relevant to Centre research; government publications; diaries/notes.

Kawanda Research Station

Databases of research projects, research institutions, and personnel within the agricultural research sector of Uganda. Compiling bibliographic records of papers, theses, and monographic publications produced by the staff of the national agricultural sector.

Uganda Virus Research Institute

Collection of scientific notebooks; AIDS newsletters, 1989-90; and weekly epidemiological records.

Zaire

ÆQUATORIA  
Centre de Recherches Culturelles  
Africanistes

Bibliographic databases of articles published at the center (including; those appearing in Annales et Etudes ÆQUATORIA); all publications about the city of Mbandaka; records collected and published by Tervuren between 1968 and 1976; imprints in African languages; maps. Collection of documents, letters, journals, official documents, etc. on the colonization of Zaire and the situation between 1930 and 1960. A detailed catalogue of this collection was published in Annales ÆQUATORIA 1 (1980), vol. II. Several updates have been published in the last several years.

Facultés Catholiques de Kinshasa

Catalogue of articles published in La Revue Africaine de Théologie et dans Les Cahiers d'Etudes des Religions Africaines.

Collection of material relating to Catholicism.

Service Présidentiel d'Etudes

Database, bibliographies, and collection of studies carried out for and by government organizations. SPE also publishes a journal, which is maintained at the library.

Fields of interest to SPE include economics, education, price index,

public debt, public health, treaties, accords, and conventions signed by Zaire and its partners, transport, rates of exchange, speeches and messages of the President of the Republic, decisions of the Central Committee, promotion of cadres, the constitution.

Zambia

National Council for Scientific Research

Databases of theses, Zambian science abstracts, published articles, and papers presented at seminars, workshops, and symposia. Collection of government records.

Tropical Disease Research Centre

Bibliographic and other records of published and unpublished documents originating in Zambia in biomedicine, 1983 to date.

Collection of theses, scientific reports, government publications, newspaper cuttings, and institutional reports.

UN Institute for Namibia

Computer database on socio-economic information on Namibia. Collection of research material on Namibia.

University of Zambia

Collection of government documents; materials relating to Zambia (including theses).

Zimbabwe

Blair Research Laboratory

Collection of reports on health research priorities, projects undertaken, proposals submitted to the Medical Research Council of Zimbabwe.

University of Zimbabwe

Collection of Zimbabwe government publications. Special collection in African languages, Rhodesiana/Zimbabweana, and the Astor Collection, which deals with the American Civil War.

University of Zimbabwe  
Medical School

Catalogue of faculty members publications, 1963-79. Collection of Ministry of Health publications. With funding from IDRC, the library plans to start a database (and collection) of local fugitive literature, using CDS/ISIS.

American  
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for the Advancement of  
Science

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Telex: 248933 SCIEN UR  
Fax: (202) 371-9526

F I N A L R E P O R T

**THE MAINTENANCE AND REPAIR OF RESEARCH EQUIPMENT IN DEVELOPING COUNTRIES:  
HOW SCIENTIFIC AND ENGINEERING SOCIETIES CAN CONTRIBUTE**

A feasibility study conducted by the

**American Association for the Advancement of Science  
Office of International Science**

May 1989

## BACKGROUND

In 1988, the American Association for the Advancement of Science (AAAS) initiated a short-term effort to evaluate the feasibility of establishing a program to promote a comprehensive and cost-effective approach to the maintenance and repair of scientific research equipment in developing countries. This joint effort initially involved members of the AAAS Consortium of Affiliates for International Programs (CAIP), a broad-based multidisciplinary network of U.S. scientific and engineering societies with interests in the international dimension of their disciplines. Cooperating were regional scientific and engineering groups in developing countries of Asia, Africa, and Latin America. At the global level, the Continuing Committee on the Role of Scientific and Engineering Societies in Development provided opportunities for exchange of information and for comparison of specific approaches to the problem. Background information on the CAIP and the Continuing Committee are Appendices 1 and 2 respectively.

The first step in the feasibility study was a worldwide survey of selected governmental, non-governmental, and scientific institutions concerning their experience in dealing with the equipment problem. Based on responses to that survey, draft recommendations were developed by U.S. experts at an October 5, 1988 meeting, which was held at the training facility of the Instrument Society of America (ISA) in Raleigh, North Carolina. Appendix 3 contains information on the meeting in Raleigh, including the preliminary report which served as a basis for discussion at the December 5-6, 1988 meeting in Cairo, Egypt of the Continuing Committee on the Role of Scientific and Engineering Societies in Development.

At the December 1988 Continuing Committee meeting, the major agenda item was the equipment maintenance and repair issue. Participants from research institutions, donor organizations, disciplinary societies, and governmental agencies reported on their experience in dealing with the problem and the track record of programs initiated to address it. Participants, as listed in Appendix 4, critiqued the draft recommendations from the October meeting in Raleigh, and contributed to the development of a plan of action for addressing the equipment problem. This report covers the deliberations at the Cairo meeting and outlines next steps recommended to be taken.

Discussion by participants in the Cairo meeting on December 5 is grouped in three general categories which:

- o characterize the problem, both quantitatively and qualitatively;
- o survey potential solutions, comparing successes and failures;
- o identify desirable next steps to be taken.

- o The status of technicians is also often perceived to be low. This lack of prestige discourages many from entering the field and reduces the effectiveness of those in it.
- o In addition to the lack of fundamental training in equipment maintenance and repair, there is a lack of continuing education for experts to keep abreast of recent developments in instrumentation.
- o Purchase may not be the best way of acquiring equipment. Equipment could be rented, or shared, provided there were a registry or coordinating mechanism for such arrangements.
- o User input in equipment design would help assure appropriate equipment.
- o Most research institutions suffer from a lack of spare parts and comprehensive documentation, including operating manuals and manufacturers' catalogues.
- o The suppliers generally have more influence than recipients in the equipment procurement process, and are not always responsive to user needs.
- o Purchasers suffer from a lack of advice from suppliers, other users and disciplinary experts, both at home and abroad. They often purchase the equipment sight unseen, and without information about the equipment's performance elsewhere.
- o Foreign exchange problems complicate equipment acquisition by developing country institutions.
- o There is no standard instrumentation policy, or "life cycle" approach to acquiring and maintaining equipment. Purchase decisions for equipment rarely include a plan for maintenance. The equipment is purchased without considering how long the equipment will work, how much maintenance will cost over the lifetime of the equipment, and how the post-purchase costs are to be covered.

Taken together, the quantitative and qualitative characteristics of the problem reveal areas which need to be addressed most urgently, and can assist in determining potential solutions.

#### SURVEYING SOLUTIONS

A number of efforts are underway around the world to address the equipment problem. From those cited by participants in the December 5 meeting, four models emerged as common approaches to dealing with the equipment problem.

## 1. Communications Network

A communications network should be established to facilitate transfer of information among equipment users in like disciplines. For example, a biologist would have access to information on his colleague's experience in using a certain type of microscope. Such information could include the manufacturer from whom the equipment was obtained, whether or not a maintenance contract was part of the purchase agreement, how reliable the equipment is, how responsive the manufacturer's representative is, what the estimated down-time for the equipment is, etc. Such a network would include international organizations as well, such as the United Nations agencies, the International Council of Scientific Unions, and the World Health Organization.

## 2. Procurement Policy

A procurement policy for research and medical equipment in developing countries should be developed which considers all aspects of equipment acquisitions, and use over its expected life. Involved would be all relevant individuals and institutions: users, donors, suppliers, accountants, and government officials. The elements of the procurement policy will be shaped by the local cultural, political and economic environment, with local working scientists themselves playing a major role in procurement policy formulation.

Participants agreed on the need for an overall equipment policy, or investment policy, which considers equipment procurement as a financial investment in the future, and makes decisions based on the long-term implications of such transactions. Problems associated with donors selecting inappropriate equipment, or with insufficient knowledge at the user end regarding equipment selection, could be solved by an overall instrumentation policy incorporating standardization, communications mechanism with policymakers, and a systematic approach to equipment procurement and utilization. One of the most important concepts would be that of "life cycle" costs, i.e., equipment that is inexpensive to purchase initially may actually be a very high cost item over time if substantial maintenance is required. The future cost of maintenance and repair must be a consideration in the decision to procure equipment.

## 3. Conferences/Meetings

Topical conferences should be held to bring together the principal parties involved in the equipment problem: donors, intermediaries, manufacturers, policymakers, users, and accountants. Examples of appropriate topics suggested by participants include:

- a. **Model Procurement Policy.** A conference should be convened to address this topic as discussed in Section 2 of the Plan of Action, above. Participants would include policymakers, donors, suppliers, manufacturers, recipients, users, and financial experts. The aim of the conference would be to develop a model procurement policy to be subsequently adapted to the specific needs of individual countries.

- o An institution such as the Cairo Scientific Instrumentation Center is a model worthy of emulation. The Center offers training courses taught by local personnel, tools, workshops, and other support services, including a library and a spare parts department.
- o The International Centre for Theoretical Physics and Third World Academy of Sciences (ICTP/TWAS) manages an equipment donation program, linking surplus equipment from European laboratories with requests from developing country institutions.
- o The American Physical Society, with support from the U.S. Department of Energy, provides certain relatively small yet essential research costs for Latin American colleagues, including the purchase of small equipment items. The program provides per diem for scientists visiting U.S. institutions, page charges to publish in U.S. journals, subscriptions to U.S. journals and small items of equipment. Equipment provided includes components to extend the range or capability of existing equipment, instruments to improve an experiment, different material samples, and replacements for broken parts.
- o The UNESCO-initiated African Network of Scientific and Technological Institutions (ANSTI), with support from the West German Agency for Technical Cooperation (GTZ), runs a technician training program. Training has taken place in fields such as biochemistry, agricultural engineering, electrical engineering, surveying, and remote sensing.

It is important to determine how success of pilot projects can be sustained. Projects will be studied to find the best means for continuing the results, such as the possibilities of privatization, joint ownership of a repair enterprise, or government subsidization. The results of this evaluation should be reported to donor organizations, policy makers, and research institutions to improve the maintenance and repair of research instrumentation in developing countries.

#### CHARACTERISTICS OF SCIENTIFIC AND ENGINEERING SOCIETIES

Participants at the meeting identified a number of characteristics which are unique to disciplinary societies worldwide, and which place these societies in a comparatively advantageous position for actively working on the equipment problem. These unique attributes include:

- o Human resources are available from volunteers and retired experts who have substantial experience. Participation in disciplinary society activities is of value to the members and actually enhances their regular work, thereby providing an incentive to do so.
- o Credibility is accorded the societies by equipment suppliers, donors, and users, and by the policy community, because of the reputation of disciplinary societies for giving objective, factual advice.

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**AAAS CONSORTIUM OF AFFILIATES FOR INTERNATIONAL PROGRAMS (CAIP)**

The AAAS Consortium of Affiliates for International Programs (CAIP) is a broadbased multidisciplinary network of scientific and engineering societies with interests in the international dimension of their disciplines. The Consortium is comprised of "regular members" drawn primarily from AAAS affiliated societies, and "corresponding members" representing foreign scientific and engineering societies.

OBJECTIVES

Formed in 1976 the objectives of the CAIP are to:

- o Facilitate communication among CAIP member societies about international concerns and programs of common interest.
- o Provide a forum and a mechanism for raising the concerns of the scientific and engineering community, through its professional associations, regarding international science policies and priorities and to present these to policymakers.
- o Encourage cooperation and coordination among members on multidisciplinary projects with international aspects.
- o Stimulate new and/or expanded international science activities by Consortium members.

MEMBERSHIP

Currently 70 AAAS affiliates belong to the Consortium as "regular members." An initiative undertaken in 1989, is the extension of CAIP membership to foreign societies as "corresponding members."

Regular members designate a representative and staff liaison from their society to the Consortium. There are no dues, however member societies do submit an annual letter report to the CAIP describing their international activities during the preceding year and are responsible for supporting their representative's expenses for participation in CAIP activities. This includes representatives' attending a minimum of one Consortium meeting each year and, if elected to the Steering Committee, to attend at least two steering committee meetings each year.

## ACTIVITIES

A cross section of Consortium activities is given below. Additional information on each activity can be obtained from the CAIP Coordinator.

- o International Seminar on the Role of Scientific and Engineering Societies in Development
- o Equipment Maintenance and Repair in Developing Countries
- o Journal Distribution Program
- o Caribbean Regional Seminar
- o U.S.-West German Seminar on Exchanges
- o Global Initiatives Project
- o NSF Bilateral Programs Review
- o African Regional Seminar on the Role of Scientific and Engineering Societies in Development in Sub-Saharan Africa.
- o Global Seminar on the Role of Scientific and Engineering Societies in Development
- o CAIP-sponsored symposia at AAAS Annual Meetings
- o CAIP-sponsored AAAS Science Attache Seminars

## CAIP MEMBERS

American Anthropological Association	American Speech-Language-Hearing Assoc.
American Association of University Professors	American Statistical Association
American Chemical Society	Association of College and Research Libraries, ALA
American Educational Research Assoc.	Association of Southeastern Biologists
American Geological Institute	Biophysical Society
American Geophysical Union	Ecological Society of America
American Institute of Aeronautics and Astronautics	Entomological Society of America
American Institute of Biological Sciences	Institute of Navigation
American Institute of Chemical Engineers	Institute of Electronics and Electrical Engineers
American Institute of Chemists	Instrument Society of America
American Mathematical Society	International Studies Association
American Medical Association	Linguistic Society of America
American Nuclear Society	Marine Technology Society
American Oil Chemists' Society	Medical Library Association, Inc.
American Physical Society	National Association for Research in Science Teaching
American Phytopathological Society	National Council of Teachers of Mathematics
American Psychological Society	National Science Teachers Association
American Society for Cybernetics	National Speleological Society
American Society for Engineering Education	Operations Research Society of America
American Society for Horticultural Science	Optical Society of America
American Society for Information Science	Population Association of America
	Rural Sociological Society
	Sigma Delta Epsilon
	Sigma Xi

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**CONTINUING COMMITTEE ON THE ROLE OF SCIENTIFIC AND  
ENGINEERING SOCIETIES IN DEVELOPMENT**

The Continuing Committee was formed following the Global Seminar on the Role of Scientific and Engineering Societies in Development, held in New Delhi, December 1980. The dominant theme of the Global Seminar was that scientific and engineering societies have certain characteristics which enable them to make unique contributions to the development process in any country, and they constitute a reservoir of talented scientists, engineers and technicians with special knowledge and expertise that can be mobilized to undertake specific development-related tasks.

With participants from all parts of the world, the Committee seeks to facilitate the exchange of information and ideas between scientific and engineering societies and other institutions and individuals interested in utilizing science and technology for development. Continuing Committee members serve as "focal points" for geographical areas of the world, channeling information specific to that area. The Committee provides advice and counsel to organizations involved in implementing the recommendations of the Global Seminar.

The Committee has fostered the creation and strengthening of regional scientific and engineering groups. In 1984 the Federation of Asian Scientific Academies and Societies (FASAS) was created with Committee co-chair A.K. Sharma as President. Leaders from Interciencia Association (IA) have participated in Committee meetings, and the Committee inspired the landmark African Regional Seminar on the Role of Scientific and Engineering Societies in Development in December 1984. Various international conferences have resulted from Committee initiatives.

AAAS shares responsibility for the Committee Secretariat with the Indian National Science Academy (INSA) and the Indian Science Congress Association (ISCA). The Committee has met annually since 1982 when it held its first session in Calcutta. Both the 1983 and 1985 meetings were held in New Delhi; in 1984 the Committee met near Munich at the conference center of the Max Planck Society. In 1986 the Committee met in Beijing, hosted by the China Association for Science and Technology. The 1987 Committee meeting in Puerto Rico focussed on regional activities of scientific and engineering societies and was held in conjunction with a Caribbean Regional Seminar. The 1988 Committee meeting, held in Cairo, was followed by an International Seminar on the Role of Scientific and Engineering Societies in Arab Development. In September 1989, the Committee will meet in Helsinki, hosted by the Work Efficiency Association.

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A G E N D A

Meeting on Maintenance and Repair of Research Equipment  
in Developing Countries

October 5, 1988  
8:00 a.m. - 5:00 p.m.

Instrument Society of America  
Raleigh, North Carolina

**M O R N I N G   S E S S I O N**

Chair: Al Novak

- 8:00 a.m. Continental Breakfast at ISA
- 8:30 a.m. Introduction and Welcome  
Glenn Harvey, Executive Director, ISA
- 8:45 a.m. Review of Project Background  
J. Thomas Ratchford, Associate Executive Officer, AAAS
- 9:15 a.m. CAIP Involvement: Role of ISA and Other CAIP Societies  
William M. Sangster, Chair, CAIP Steering Committee
- 9:45 a.m. Case Study: The APS Experience  
Roy Rubinstein, Fermilab
- Break
- 10:15 a.m. Role of Government, Universities and Other Organizations
- 10:45 a.m. Results of CAIP Survey and Other Sources
- Magnitude and Character of the Problem
  - Experiences with Addressing the Problem
- 11:15 a.m. Preliminary Report Overview
- 12:00 p.m. **W O R K I N G   L U N C H - DISCUSSION OF PRELIMINARY REPORT**

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**MEETING ON MAINTENANCE AND REPAIR OF RESEARCH EQUIPMENT  
IN DEVELOPING COUNTRIES**

October 5, 1988  
8:00 a.m. - 5:00 p.m.

Instrument Society of America  
Raleigh, North Carolina

Participant List

Satinder Ahuja, Ciba-Geigy Corporation, and Member, International Committee,  
American Chemical Society

Sandra M. Burns, Senior Program Associate, AAAS Office of International  
Science

Carolina Carter, Program Associate, AAAS Office of International Science

John Daly, Office of the Science Advisor, U.S. Agency for International  
Development

Glenn Harvey, Executive Director, ISA

Sam Joseph, Chairman of Microbiology Department, University of Maryland

Douglas Kolb, Director, Education Services, ISA

Al Novak, Technical Director, Swagelok Company, and ISA Representative to  
the AAAS Consortium of Affiliates for International Programs

Roy Rubinstein, Fermilab, and Chair, International Committee, American  
Physical Society

William M. Sangster, Dean of Engineering, Georgia Institute of Technology  
and Chair, Steering Committee, AAAS Consortium of Affiliates for  
International Programs

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**REVISED PRELIMINARY REPORT**  
**FEASIBILITY STUDY OF A PROGRAM TO PROMOTE THE MAINTENANCE AND**  
**REPAIR OF RESEARCH EQUIPMENT IN DEVELOPING COUNTRIES**

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11/28/88

*(Prepared for consideration at 12/5-6/88 meeting in Cairo of Continuing  
Committee on the Role of Scientific and Engineering Societies in Development)*

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- o lack of hard currency
- o logistical problems in procurement, such as customs procedures, transport, etc.
- o inaccessibility of spare parts

Although the equipment problem in developing countries is complex and multifaceted--ranging from technical barriers such as the increasing diversity and sophistication of scientific equipment and economic constraints such as lack of foreign currency for spare parts or servicing contracts to limitations in human factors such as lack of trained technical personnel--the problem nevertheless appears amenable to thoughtful, well-focused approaches.

### AAAS FEASIBILITY STUDY

The American Association for the Advancement of Science (AAAS) has initiated a short-term study to evaluate the feasibility of establishing a program to deal with the equipment problem. On the U.S. side, this will be a joint effort involving key members of the AAAS Consortium of Affiliates for International Programs (CAIP), a broadbased multidisciplinary network of U.S. scientific and engineering societies with interests in the international dimension of their disciplines. The Instrument Society of America (ISA), with an instrument repair training facility in Raleigh, North Carolina, which is unique in the world, will be the lead U.S. society in this effort. Financial support for the feasibility study has been provided by the U.S. Agency for International Development (AID).

On the developing country side, AAAS is cooperating through regional groups with which it regularly interacts in Asia (Federation of Asian Scientific Academies and Societies); Africa (African Academy of Sciences, Pan-African Union of Science and Technology, and Association of African Universities); and Latin America (Interciencia Association). At the global level the Continuing Committee on the Role of Scientific and Engineering Societies in Development, in which AAAS plays a major role, will provide opportunities for broadbased exchange of information and for comparison of specialized approaches to the problem.

The initial step in this feasibility study was to conduct a survey of institutions around the world, both governmental and non-governmental, concerning experience with the equipment problem and potential solutions. This involved two components. First, in August and September 1988, a survey was conducted among member societies of the AAAS Consortium of Affiliates for International Programs (CAIP). An article appeared in the Summer 1988 issue of the CAIP newsletter Consortium Notes, requesting that societies submit information on their activities addressing the equipment problem. Second, in addition to the survey conducted among CAIP members, AAAS contacted international organizations whose missions concern developing countries.

The data received was compiled into this preliminary report for consideration on October 5 during a meeting at the ISA facility in Raleigh, North Carolina. At the October 5 meeting in Raleigh, representatives from several U.S. scientific and engineering societies and donor organizations plus other experts reviewed the preliminary report and developed draft recommendations to discuss with institutions in developing countries. These

During the early 1980's, AIBS and AAAS explored the convening of joint workshops on biomedical engineering in cooperation with the Centre for Biomedical Engineering which is located on the campus of the All India Institute of Medical Sciences. The Centre is a particularly appropriate venue for examining the equipment problem because, in addition to developing new instrumentation and training personnel, it also services the medical equipment of the neighboring 1000-bed hospital.

Two workshops were planned to address the following areas of concern identified by the Centre:

- o diversity of equipment
- o preventive maintenance scheduling
- o equipment safety
- o medical school biomedical instrumentation courses.

Despite intensive efforts by AIBS, funding failed to materialize for this unique initiative.

#### The American Physical Society (APS)

The American Physical Society, working through Fermilab in Illinois, has had grants from the National Science Foundation and the Department of Energy to cover certain relatively small yet essential research costs for Latin American colleagues, including purchase of small equipment items. The program began in 1980 with the aim of primarily assisting the growth of Latin American physics and, to a lesser degree, stimulating the study of high energy physics. The current \$100,000 grant from the U.S. Department of Energy (DoE) being administered by Fermilab provides funds for: per diem costs of Latin American scientists visiting U.S. institutions; page charges for Latin American scientists to publish in U.S. journals; subscriptions to U.S. journals; and small items of equipment. Two representatives in Argentina, Brazil, Chile, Mexico and Venezuela solicit and judge requests for assistance from researchers in their countries. Grant administrators in the U.S. approve or disapprove the requests based on the proposed research plan, the physics involved, and how the equipment will be used. The purchasing and administration is then handled by Fermilab, with the equipment being shipped directly to the Latin American institutions. The biggest problems encountered involve the ever-changing and complex customs regulations of each country.

Most of the equipment shipped under this program is less than \$500, yet these small increments can make an enormous difference in outcomes. Such requests include:

- o components to extend the range or capability to extend the range or capability of existing equipment
- o instruments to improve an experiment
- o different material samples
- o replacements for broken parts

SAREC is currently completing two volumes for publication, one a comprehensive document on the equipment issue based on a number of cases and the other a report on policy issues with recommendations of future directions for donor agencies in dealing with the equipment problem. Although the major focus of SAREC's work is the donor community, it is also relevant for academic and research institutions, and the scientific community at large.

#### International Development Research Centre (IDRC)

The IDRC of Canada sponsored a 1985 investigation of "The Procurement and Maintenance of Scientific Equipment in the Southern African Development Coordination Conference (SADCC)." A representative of the National Council for Scientific Research (NCSR) of Zambia visited equipment centers in Kenya and Ghana, the result of which was a recommendation for a Central Workshop for Maintenance, Service and Repair of Scientific Equipment. In the NCSR representative's final report, reflecting his own views and not necessarily those of NCSR, the following ideas were put forth: establishment of a Central Workshop for the Procurement, Maintenance and Repair of Scientific Equipment in the SADCC Region; establishment of a directory of major scientific equipment in the area; identification of focal point institutions and individuals for communications purposes; discussion of equipment procurement problems. Consultations with experts in other African countries were also recommended.

#### U.S. Agency for International Development

The U.S. Agency for International Development (AID) has supported several programs to address the equipment issue. Through the National Institutes of Health, AID supported a project for biomedical equipment in Latin American countries. It also provided support for an initiative in the Caribbean wherein local entrepreneurs were encouraged to set up and run research facilities. (see NIH below) AID has also worked with RONAST, a scientific and technological organization in Nepal, to assist in establishing an equipment maintenance and repair facility. In addition, AID brings some 12,000 people per year to the U.S. for training, half of which involves mission-designed training programs.

#### U.S. National Institutes of Health (NIH)

Since 1981, the NIH and AID have jointly undertaken projects to improve the regional capability for the repair of hospital clinical care and laboratory equipment located in the Eastern Caribbean. This has included efforts to strengthen the maintenance of hospital clinical care and laboratory equipment in Jamaica, Grenada and Belize. The Regional Program for the Eastern Caribbean aims to: strengthen maintenance resources on each island; develop a regional cadre of maintenance personnel; and develop regional training capability. NIH determined that maintenance and repair centers were most successful in the region when run by local entrepreneurs.

NIH has also cooperated with the Pan American Health Organization and the Mexican Ministry of Health in a program to strengthen the capability to train hospital maintenance personnel in Spanish-speaking countries of the Americas. The program involved three major activities: development of a Spanish language training curriculum; training of technicians from Spanish-speaking countries in the basics of biomedical equipment maintenance; and

UNESCO and the International Union of Pure and Applied Chemistry conduct a program for manufacturing chemistry equipment in developing countries, thereby circumventing the problem of importation from abroad.

The British Overseas Development Agency (ODA) and the Swedish International Development Agency (SIDA) have assisted in the strengthening of technical colleges in Sri Lanka (see below for more details).

### DEVELOPING COUNTRY SITUATION

A number of institutions in developing countries have taken the initiative to address the equipment problem. Briefly, sample projects underway include:

The Third World Academy of Sciences (TWAS) in Trieste, Italy, has a program wherein small grants (up to \$500) are awarded to developing country institutions for the purchase of spare parts. Also in Trieste, an International Centre for Theoretical Physics (ICTP) program links developing country requests for equipment with equipment donations from industrialized country organizations. The ICTP has also organized a meeting on the manufacture of physics equipment, held in Tanzania with support from the Swedish Agency for Research Cooperation with Developing Countries (SAREC).

With assistance from the British Overseas Development Agency (ODA) and the Swedish International Development Agency (SIDA), Sri Lanka has undertaken a major effort to upgrade technical colleges. In Phase I of the program, British and Swedish consultants advised Sri Lanka experts in drawing up equipment specifications, formulating guidelines and setting up workshops on technical training. Such labs and workshops took place at 10 of the 24 Sri Lanka technical colleges, with many of the training sessions at the engineer-technician level or craft level. Such sessions address the important issue of training technicians sufficiently at levels which are traditionally accorded lower status but which are vital in maintaining equipment in operating condition. During Phase II, equipment will be upgraded and more technical colleges are expected to be established. A major National Technical Training and Teaching Development Center is also planned. The Asian Development Bank provided a \$16 million loan for Phase I; a loan for \$30 million is anticipated for Phase II.

To address the problem of traditionally low status accorded technicians, equipment experts at the H.E.J. Research Institute in Karachi are employed at pay scales like those of the researchers. The result is that the Institute, which uses a great deal of advanced chemical equipment, is notably very productive.

A substantial training program is conducted at the Central Science Workshop in Dar-es-Salaam, Tanzania. For managerial responsibilities, however, the facility still depends on experts from other countries.

The International Centre for Insect Physiology and Ecology (ICIPE) in Nairobi provides maintenance and repair services to outside organizations as well as to the Centre's own research staff. This provides both additional revenues for the Centre and additional experience for the equipment staff.

regional groups in implementing an equipment maintenance and repair initiative in their respective regions of the world. Such regional organizations include:

- o Federation of Asian Scientific Academies and Societies
- o African Academy of Sciences
- o Pan-African Union of Science and Technology
- o Association of African Universities
- o Interciencia Association.

At the meeting in Cairo, participants will pay particular attention to recommendations formulated at the October meeting in Raleigh (see "Recommendations" below) and to sample pilot projects also proposed in Raleigh (see "Proposed Pilot Projects" below).

### FINAL REPORT

By April 1989, the final report of this feasibility study, with recommendations for a plan of action, will be issued by AAAS and distributed among U.S. and international scientific societies and other interested organizations. A major gap identified by several institutions over the last few months concerns a regional approach to addressing the equipment problem. This is an area where AAAS, its affiliated societies, and regional organizations with which it cooperates worldwide, can provide a unique approach to tackling the equipment problem. It is anticipated that a comprehensive program will be formulated involving several discrete projects tailored to regional needs for addressing the equipment problem. Several potential projects are noted below.

### RECOMMENDATIONS

The following recommendations were formulated at the October 5 meeting in Raleigh, North Carolina by representatives of U.S. scientific and engineering societies and donor agencies. These recommendations and the proposed pilot projects noted in the subsequent section will be considered by developing country experts at the December 1988 meeting of the Continuing Committee on the Role of Scientific and Engineering Societies in Development, to be held in Cairo.

1. In considering requests for equipment support, donor agencies should require that the proposed project include a plan for ensuring maintenance, repair and calibration. Donor agencies should also have the proposals peer reviewed by scientists or engineers from the appropriate discipline. The membership of AAAS and its affiliated societies represent a unique resource for the peer review.
2. There is a need to increase the visibility among the general scientific and engineering community of the developed countries of the equipment problem. One means of achieving this would be to disseminate information on the problem widely throughout the AAAS and affiliated societies network.
3. Experts in developing countries may determine a need for guidance on laboratory management. The general membership of AAAS and affiliates should be made available to provide such on-site advice at

experience of previous ones. Local arrangements for the courses could be coordinated by regional organization such as:

- o Federation of Asian Scientific Academies and Societies
  - o Interciencia Association
  - o Association of African Universities
  - o Pan-African Union of Science and Technology
  - o African Academy of Sciences
4. Training course could be offered to graduate students from developing countries who are studying at institutions in developed countries. In addition to the fact that less travel money is needed for such a project, this has the unique benefit of training young scientists who represent the future scientific sector of their respective countries. The linkage established between the student and his industrialized country colleagues also provides a solid foundation for future communication as the student advances in the science establishment of his home country.

Initially, it is proposed that such a course be offered at ISA to developing country students in the Research Triangle Park (RTP) area, near the ISA training facility. The RTP involves three institutions: Duke University, the University of North Carolina, and Wake Forest University, all of which have science and engineering students from developing countries.

5. Meetings should be convened at which experts from scientific and engineering societies, scientific research institutes, governmental organizations charged with science and technology policy, donor agencies and suppliers could discuss the equipment issue. These fora would aim to determine policies appropriate for regions or for individual countries by providing for open dialogue between equipment users, scientists and engineers, suppliers, and policy and decision makers. Regional organizations such as FASAS, IA, PUST, AAU or AAS would convene and organize the meetings; AAAS and its affiliates would stand ready to facilitate the process and offer any expertise required by the developing country convenor.

Participants in the 1988 Annual Meeting of the  
CONTINUING COMMITTEE ON THE ROLE OF SCIENTIFIC AND ENGINEERING  
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