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JUBBA ENVIRONMENTAL AND SOCIOECONOMIC STUDIES FIRST ANNUAL REPORT

JESS Report No. 4

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ABBREVIATIONS AND ACRONYMS

AHT	Agrar und Hydrotechnik, GMBH
AID	U.S. Agency for International Development
ARD	Associates in Rural Development, Inc.
BDP	Baardheere Dam Project
BOSTID	Board on Science and Technology for International Development
BuRec	U.S. Bureau for Reclamation
CIPL	Commodity Import Program
DOS	disk operating system
GSDR	Government of the Somali Democratic Republic
IBM	International Business Machines
JESS	Jubba Environmental and Socioeconomic Studies
JuDAS	Jubba Development Analytical Studies project
MJVD	Ministry of Jubba Valley Development
MMP	Sir M. MacDonald and Partners, Ltd.
NAS	National Academy of Sciences
PC	personal computer
RMR	Resource Management and Research
RUP	resource user/producer group
SEBS	socioeconomic baseline survey
USAID	U.S. Agency for International Development
VSC	Vehicle Service Center

PREFACE

The Jubba Environmental and Socioeconomic Studies (JESS) is part of a larger project, Jubba Development Analytical Studies (JuDAS), which is a cooperative effort between the U.S. Agency for International Development (AID) and the Ministry of Jubba Valley Development (MJVD) of the Government of the Somali Democratic Republic (GSDR). Associates in Rural Development, Inc. (ARD) of Burlington, Vermont, signed a contract (number AFR-0134-C-00-5047-00) with AID in September 1985 to provide technical assistance and project management for JESS. The following people have been involved in JESS during its first year.

Associates in Rural Development, Inc.

Field Staff

Dr. E. Drannon Buskirk, Jr.	team leader, natural resources planning
Dr. James Merryman	anthropology
Dr. Kathryn Craven	socioeconomics
Dr. Ian Deshmukh	ecology, vegetation and wildlife
Dr. Nancy Merryman	administrative coordinator, anthropology

Home-Office Staff

Mr. Richard Donovan	project manager, training
Dr. Gus Tillman	technical project manager, ecology and remote sensing
Dr. George Burrill	management
Mr. Richard Hart	budget and accounting systems
Mr. Ross Bryant	research assistant and procurement
Dr. James Thomson	institutional analysis
Dr. Abe Waldstein	anthropology
Ms. Karen Wiese	agricultural economics

Consultants

Dr. Peter Bloch	economics and resettlement
Mr. Tom Hart	remote sensing
Mr. Christopher Hemming	ecology and vegetation
Dr. William Jobin	water quality and public health
Mr. Tom Kelly	logistics and office start-up
Mr. Len Malczynski	research design and data base management
Mr. Earl Meredith	fisheries
Dr. James Ruff	hydrology and sedimentation

Dr. James Riddell	land tenure and anthropology
Dr. Curt Schneider	public health and epidemiology

Ministry of Jubba Valley Development

Mr. Aweys Haji Yusuf	project manager
Mr. Ali Warsame Aden	administration
Mr. Mohamed Hassan Aden	counterpart
Mr. Ahmed Nur Weyrah	counterpart
Mr. Omar Aliwan Farah	counterpart
Mr. Abdulkadir Haji I.	counterpart
Ms. Faduma Roble Mohd	assistant
Ms. Roda Mohd Abdulahi	secretary

JESS Office and Field Personnel

Mr. Abdulkadir A. Afrah	office manager
Ms. Mumina Aden Abdi	word processor
Mr. Mohamed Abdi Omar	office assistant
Mr. Ahmed Mohd Ali	field assistant
Mr. Mohamed Aden Keynan	enumerator
Mr. Idris Ali Keyrow	enumerator
Mr. Abdulkadir Sheik I.	enumerator
Mr. Ahmed Sharif Mohd	enumerator
Mr. Mohd Ali Mohd	enumerator
Mr. Ali Ahmed Mohd	enumerator
Mr. Aden Subane Abdille	enumerator
Mr. Abdulle Hussein Gure	driver
Mr. Mohd Hared Hassan	driver
Mr. Osman Ahmed Nur	driver

USAID/Somalia

Ms. Sally Patton	JuDAS project manager
Mr. Dan Vincent	mission engineer

I. EXECUTIVE SUMMARY

JESS is a three-year program of river-valley investigations being conducted prior to construction of the Baardheere Dam in the Jubba Valley of southern Somalia. JESS will provide MJVD with a variety of services, including training, socioeconomic and environmental assessments, development guidelines, procedures for mitigating adverse effects and enhancing beneficial impacts, and a plan for long-term monitoring of development activities in the valley.

The first year of JESS included all six months of Phase I and the initial six months of Phase II, which will last a total of two years. Phase I focused on tasks related to field start-up of the project and the design of JESS studies. The first six months of Phase II included the start of implementation of field studies in the Jubba Valley.

ARD has a five-person field team in Somalia working with MJVD. The JESS staff presently consists of 25 people, with additional persons to be hired for fieldwork, data processing and other tasks. ARD's home-office staff provide managerial, administrative, technical, financial and procurement services.

A. Phase I

The JESS team was mobilized quickly in Somalia and the United States. Five weeks after the contract was signed, ARD's field team leader and start-up team were in Somalia. Three weeks after their arrival, the team had imported and installed an operational computer system.

In Phase I, JESS staff made over a dozen visits to parts of the Jubba Valley, by land as well as flyovers in light aircraft. These trips served a variety of purposes--to familiarize the team with valley resources, establish contacts with valley people and inspect potential study sites.

JESS has expended considerable effort on local training activities, and a training and manpower assessment was conducted ARD's project manager. ARD field staff and consultants have conducted classroom sessions, seminars and on-the-job-training. JESS Somali staff have led training on survey research techniques and received English-language training.

ARD has procured and shipped massive amounts of equipment and supplies for JESS. Major items have included computers, camping equipment, boats and radios. Local procurement and fabrication (e.g., roof racks for vehicles) are utilized whenever possible.

The National Academy of Sciences (NAS) sponsored and JESS cooperated on one workshop and a work plan review meeting during the project's first year. The workshop, which was held in Somalia, involved a field trip to the Jubba Valley and meetings in Mogadishu for an orientation and discussions of issues relevant to JESS studies and Jubba Valley development. The review meeting involved a review of ARD's draft work plan for Phase II investigations.

Six weeks of design studies followed the NAS workshop in Somalia. ARD staff and consultants, in consultation with other interested parties, proposed studies for dealing with selected environmental and socioeconomic issues relevant to the Jubba Valley. These design studies were then incorporated into the Phase II work plan by ARD home-office staff, followed by review and editing of the work plan by the ARD field staff.

A JESS bibliography was submitted with the Phase II work plan, which was based on a literature review conducted jointly by ARD and JESS. The more than 1,000 citations were entered into a computerized bibliographic data base for future reference.

Following delays in fuel procurement and disbursements of local funds, JESS underwent a financial crisis at midyear. As a result, new financial arrangements were made so that JESS and the other AID-funded collaborator, the U.S. Bureau for Reclamation (BuRec), control their own local funds.

B. Initial Phase II Activities

The Phase II work plan is composed of interrelated environmental and socioeconomic baseline studies that will be directed by the JESS field team. These baseline studies will be supplemented and complemented by a series of special studies to be conducted by ARD home-office personnel and involving slightly more than 31 person-months of effort by technical consultants. The work plan is based on various inputs, including comments from NAS scientists, GSDR development priorities, technical design studies by ARD staff and international experts, and a literature review.

The principal focus of Phase II is field investigations. The initial studies have been or are being conducted on the topics of socioeconomics, vegetation, water quality, information management and archeology. Aerial censuses of wildlife and land use have also been done.

The initial water-quality fieldwork has involved setting up a program for water sampling and analysis; studying salinity and tidal influences; estimating fertilizer and biocide use in the valley; habitat inspections for snails, mosquitoes and disease

vectors; and public health issues. The water sampling and analysis program continues, with Somalis receiving training in all aspects of this work.

Following an extensive analysis of existing vegetation studies on Somalia, the JESS terrestrial vegetation surveys have begun. JESS staff and ARD's subcontractor, Resource Management and Research (RMR), established sites for future studies. They also collected plant specimens and made measurements at the sites, and queried residents about local uses of vegetation.

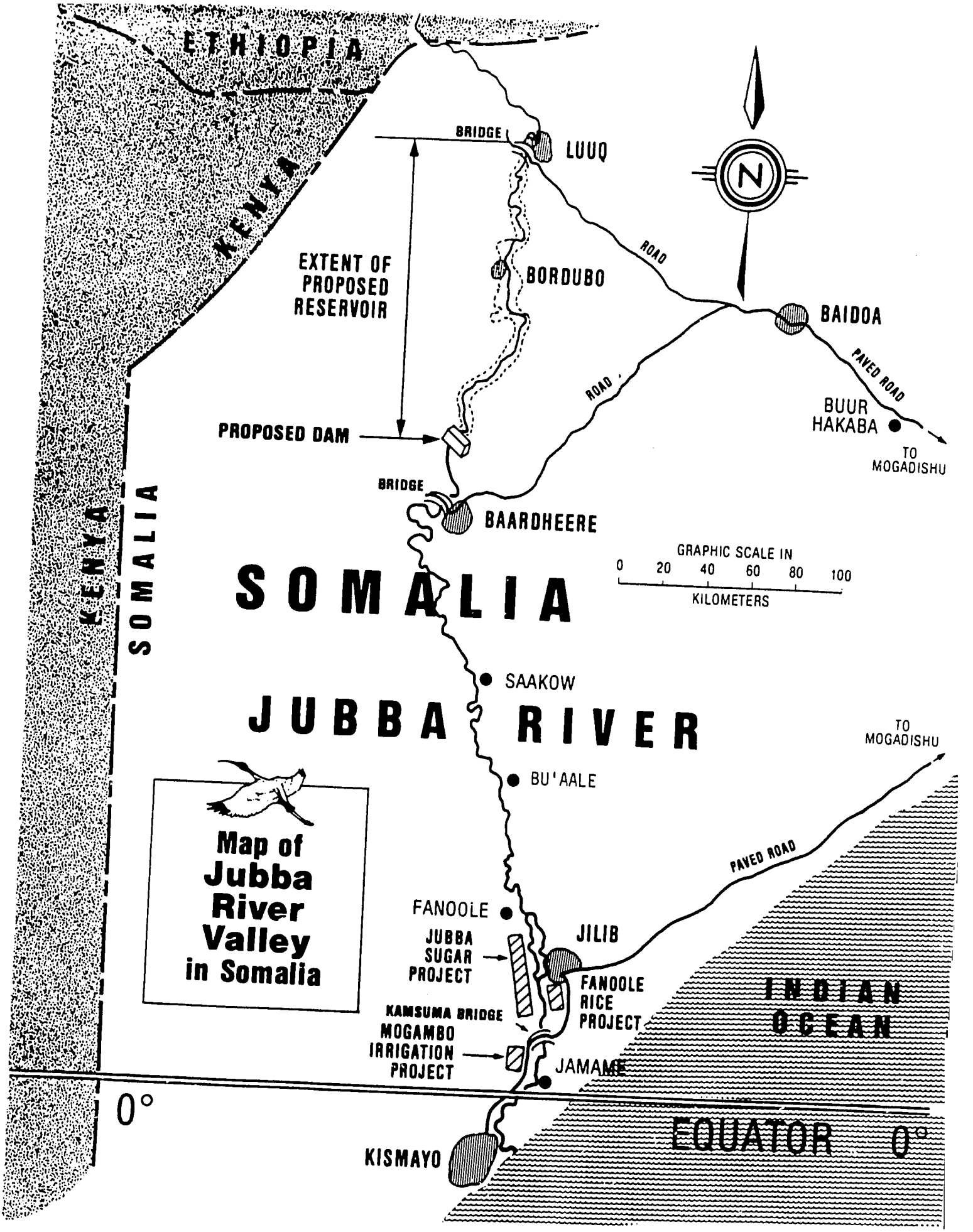
Concurrent with the start of Phase II data collection, an ARD consultant advised JESS on information management systems. An assessment was made of the amounts and types of information to be processed, as well as the facilities, computer programs and personnel for handling project information. These evaluations led to recommendations for establishing an information management system suited to JESS data collection and analysis needs.

C. Year-Two Activities

A principal focus of JESS activities during the next year will be collecting baseline data in the Jubba Valley. However, JESS will also continue to train Somali staff and gather information that contributes to the development of a long-term monitoring plan and environmental and socioeconomic guidelines for facilitating sound development in the valley. It is expected that sometime during the late spring or early summer of 1987, JESS will participate in another NAS workshop which will discuss long-term monitoring and designing development guidelines, among other topics.

During the coming year, JESS' major socioeconomic work will be the socioeconomic baseline survey (SEBS) of people who use valley resources. In preparation for this effort, a sondeo (frame survey), questionnaire development and pretesting, and enumerator training have been done during the initial months of Phase II. Another socioeconomic study to be conducted during year two will concern land tenure, and an interim report on this subject will be produced by JESS.

Environment-related interim reports will be produced on the health implications of dam design, preconstruction site concerns, sedimentation and scouring, archeology, fisheries, water quality and ornithology. In addition to these studies, continued baseline work will be conducted, including remote-sensing activities.


ETHIOPIA
KENYA
KENYA
SOMALIA
BRIDGE
LUUQ
N
EXTENT OF PROPOSED RESERVOIR
BORDUBO
ROAD
BAIDOA
PAVED ROAD
ROAD
BUUR HAKABA
TO MOGADISHU
PROPOSED DAM
BRIDGE
BAARDHEERE
GRAPHIC SCALE IN
0 20 40 60 80 100
KILOMETERS
SOMALIA
SAAKOW
JUBBA RIVER
TO MOGADISHU
BU'AALE
Map of Jubba River Valley in Somalia
PAVED ROAD
FANOOLE
JILIB
JUBBA SUGAR PROJECT
FANOOLE RICE PROJECT
INDIAN OCEAN
KAMSUMA BRIDGE
MOGAMBO IRRIGATION PROJECT
JAMAME
0°
EQUATOR 0°
KISMAYO

II. INTRODUCTION

The long-term goal of the JuDAS project is to compile data and perform assessments associated with planning optimal resource use in the Jubba Valley. The JuDAS project has two primary purposes:

- to gather necessary information on soils/land use and social and environmental factors for incorporation into a master plan for the valley; and
- to provide MJVD with technical support and training.

The JESS team is assisting in Somalia's development by applying the results of its environmental and socioeconomic studies to development planning, impact assessment, ecosystem monitoring and staff training. Also under the JuDAS project, BuRec is preparing a soils and land-use classification, and NAS is conducting a peer review and providing advisory services to USAID/Somalia, JESS and MJVD.

To help fulfill JuDAS' goal and purposes, JESS has the following specific objectives:

- supply the GSDR with timely information to be used in formulating a socioeconomically and environmentally sound master plan for the Jubba Valley and guidelines for designing future projects;
- identify and evaluate interrelated socioeconomic and environmental effects that may be caused by development of the river valley, and further describe procedures and development activities to mitigate adverse effects and enhance beneficial impacts;
- provide the GSDR with a realistic plan for monitoring environmental, socioeconomic, land-use and agricultural parameters in the Jubba Valley, so that national development decisions can be based on sound, current data; and
- develop institutional strength within MJVD through classroom and on-the-job training.

To implement the JESS project, ARD has a five-person field team in Somalia, including a natural resources planner (the team leader), ecologist, socioeconomist, anthropologist and administrative coordinator. ARD has also enlisted the services of consultants and subcontractors for short-term technical assistance.

The objectives outlined above will be realized through three phases of JESS activities. Phase I was a six-month period of project planning and the start-up of field operations. It included the opening of an office in Mogadishu, hiring Somali project staff, Somali language training for two members of ARD's long-term advisory team, field reconnaissance in the Jubba Valley, a literature search, participation in the first NAS workshop in Mogadishu, design of Phase II studies, and a training and manpower assessment. Four specific ARD reports resulted from Phase I activities:

- BIBLIOGRAPHY FOR THE JESS PROJECT,
- PHASE I DESIGN STUDIES FOR JESS,
- JESS MANPOWER AND TRAINING ASSESSMENT, and
- PHASE I REVIEW AND PHASE II WORK PLAN FOR THE JESS PROJECT.

Phase II will last for a period of two years. The main emphasis in this phase will be on primary data collection in the Jubba Valley. JESS has designed these primary data collection activities so that the information gathered will serve as a baseline for future socioeconomic and environmental monitoring in the valley. This requires that JESS staff consider the form of future monitoring systems and types of data which will be needed.

Some preliminary analysis of field data will be made during Phase II to provide the MJVD and potential donors with timely information for project planning purposes. This preliminary analysis will be provided to MJVD in the form of interim reports. For example, the first three such interim reports are:

- JESS INTERIM REPORT ON PRECONSTRUCTION CONCERNS FOR PROPOSED BAARDHEERE DAM,
- JESS INTERIM REPORT ON HEALTH IMPACTS OF DESIGN ALTERNATIVES FOR PROPOSED BAARDHEERE DAM, and
- JESS INTERIM REPORT ON HEALTH CONSEQUENCES OF DESIGN CRITERIA FOR WATER SUPPLY AND SANITATION IN NEW AND RESETTLED COMMUNITIES.

These reports have been prepared in anticipation of upcoming dam design and technical advisory committee meetings.

Phase III consists of a six-month period when the final analysis of field data and all project products must be completed. Final outputs to be produced during this period will include:

- baseline maps of socioeconomic, environmental and land-use conditions in the Jubba Valley;
- an evaluation of impacts from construction of the Baardheere Dam and suggestions for ways to enhance positive and mitigate negative effects;
- a realistic plan for long-term monitoring;
- to the extent possible, MJVD staff will be trained to continue related assessment, monitoring and planning work in the future;
- resource management guidelines for future development; and
- a final version of the JESS bibliography.

JESS will be studying a broad range of topics. Based on experience with other river basins in Africa and other parts of the world, as well as the characteristics and priorities of development in the Jubba Valley, AID, MJVD, NAS and ARD have agreed that the following subjects should be considered by JESS:

Study Topics

livestock	demography
wildlife	family resource management
aquatic fauna	production systems
ornithology	social services
water quality	health
limnology	nutrition
disease vectors	land tenure
estuarine ecology	women's issues
reservoir ecology	archeology
reservoir sedimentation	resettlement
river scour	agricultural resettlement*
forestry	irrigation costs*
range management	irrigation history*
biocide use	labor*
biological conservation	markets
institutions	pastoralism
water and sanitation	dam design and operations
watershed management	ethnobotany

*Topic to be covered by JESS during Phase III, although other organizations may do initial research in this area in Phase II.

This annual report discusses the first year of JESS activities, from September 1985 to September 1986, and provides a concise plan for the second year of project activities. Section III reviews JESS' overall experiences with project administration and logistics/field support during its first year. Section IV covers the technical aspects of Phase I and Section V, the first six months of Phase II. Section VI discusses activities planned for the second year of JESS, with an emphasis on technical (rather than administrative) directions. An in-depth review of the overall focus and direction of JESS studies, including plans for all the technical studies, is provided in PHASE I REVIEW AND PHASE II WORK PLAN FOR THE JESS PROJECT (ARD, Burlington, Vermont, 31 July 1986). The appendix provides a detailed listing of scheduled field studies, interim reports and other milestones in JESS' second year for project management purposes.

III. ADMINISTRATION AND LOGISTICS

ARD's activities in relation to management and administration of JESS and its experiences thus far can best be discussed by describing four different elements:

- project start-up;
- the maintenance of contacts and communications with relevant parties in Mogadishu, other parts of Somalia, Africa and the United States;
- the types of personnel involved as well as their organization and training; and
- the facilities and logistic arrangements that either exist or have been developed to fulfill JESS objectives.

During the past year, JESS has addressed the unique working conditions in Somalia by having a plan from the outset for getting field activities underway and attempting to remain flexible in terms of its approaches to administration and manpower allocations. Though ARD's long-term team in Somalia has principal responsibility for day-to-day implementation (with support and cooperation from MJVD and USAID), ARD home-office staff have been active in JESS through support from the United States and short-term consultancies in Somalia.

A. Start-Up

A four-person start-up team for JESS was in Mogadishu approximately five weeks after the contract was signed. It included:

- ARD's field team leader,
- ARD's president,
- an office start-up specialist with two years of experience in Somalia, and
- ARD's home-office technical project manager.

The start-up team was able to establish an office with Somali staff and functional computer systems soon after their arrival. Various members of the ARD start-up team were also able to conduct a short field reconnaissance in the Jubba Valley, accompanied by representatives from USAID/Somalia and MJVD.

B. Personnel and Administration

The JESS and BuRec teams are attached to different administrative units of MJVD. The JESS field team coordinates its activities with the Department of Administration, which has been helpful in meeting the team's needs for office space and resolving other administrative problems.

As of 1 September 1986, the JESS staff in Somalia is made up of 25 persons. In the United States, 15 ARD staff provide administrative, technical and procurement services. Four ARD home-office staff members have been to Somalia to assist with the technical and management aspects of field implementation of JFSS. A total of 10 ARD consultants have contributed to the design studies, Phase II work plan and initial field investigations. The JESS team is comprised of five long-term ARD employees, four Somali counterparts, and 16 Somali office and field personnel. The team also involves numerous other persons who provide assistance on a temporary basis in support functions. However, skilled personnel continue to be in short supply for the office and field. Somali staff have been assigned either by the MJVD (as members of the Somali civil service) or hired under project-specific arrangements.

JESS uses funds provided through the Commodity Import Program (CIPL) for local expenditures. In 1986, this process was extremely sluggish, as all funds could only be obtained from a single account, which required many different steps, including approvals from various MJVD offices. The team did not receive major amounts of funds allocated to JESS until late August. Fieldwork was delayed because of money and fuel shortages. A funding crisis occurred from June to August, which was followed by a change in financial arrangements. The funding recipients--JESS, BuRec and MJVD--now have separate bank accounts.

C. Contacts and Communications

During the first year, JESS and ARD had discussions with approximately 100 organizations and hundreds of individuals around the world. These contacts ranged from private consultants to international agencies. The JESS office manager, a former member of Somali diplomatic missions, has performed considerable liaison services.

Communications between the United States and Somalia posed major difficulties in terms of project coordination and equipment procurement. However, these problems were anticipated and significant schedule adjustments have not been required. The principal means of communication between ARD's home office and JESS are telex messages, the diplomatic pouch, courier service

and postal systems. Telephone service has proven to be of limited value for both local and overseas purposes.

D. Facilities and Logistical Support

Logistical difficulties are a principal challenge for most projects in Somalia. The absence of facilities and services in the Jubba Valley and shortages of essential supplies (e.g., fuel) are major constraints. Although JESS has experienced many problems, the situation appears to be improving.

JESS has ample office space at MJVD, including six offices for staff members, a computer room and a resource center. Project equipment and supplies are stored mainly at the residences of ARD staff members. A continuing problem with the MJVD facilities is access after-hours because MJVD is located in the presidential compound where security is rigorous.

The procurement and shipping of camping, fisheries, computer and other equipment needed for the fieldwork have been major responsibilities for ARD's home-office staff. JESS currently has sufficient camping equipment for about 25 persons. When field teams are in the vicinity of major towns, field stations may be available, as JESS has such stations at Baardheere and Jilib. ARD has also procured and shipped radios and boats for aquatic investigations and river transportation.

The project has made a major investment of time and materials in data management. JESS already has one IBM personal computer (PC), two IBM PC/AT computers, three Hewlett-Packard Portable Plus computers, and associated peripheral devices and software in Somalia. The computers have suffered recurring breakdowns because of equipment failures and inadequate electric power supplies. This equipment will be used to meet JESS needs for information processing in its field and office functions, and will serve the GSDR when the project is over. Other aspects of data base management are discussed in Section V.D of this report.

JESS has had five CJ8 Jeeps from the outset. Because of a crowded schedule and the jeeps' limited carrying capacity, it is expected that more vehicles may be needed for fieldwork, especially the socioeconomic studies. Arrangements have been made to regain use of a CJ8 Jeep that was on loan to the MJVD project manager and obtain a JESS Blazer assigned to the BuRec team. Other vehicles will become available when BuRec completes its work in March 1987.

Arrangements for fuel storage and disbursement are developing satisfactorily, although many problems were encountered in previous months. JESS now has storage capacity

for approximately 9,000 liters of fuel, but additional storage capacity is needed at the field stations.

In a large project, tracking systems are necessary for equipment, supplies, schedules and personnel. Toward this end, the JESS team has developed the following procedures:

- consultant checklist--this covers the entire span of a consultancy in Somalia, from AID's travel approval through notification of ARD regarding completion of the consultancy, and includes such items as inquiries about predeparture preparations, arrangements for accommodation, preparations for fieldwork, the scope of work, liaisons, briefings, report reviews, seminar schedules and other matters;

- field trip checklist--this has general uses in field operations, particularly for vehicle-related issues, and includes advance arrangements for fuel disbursement, vehicle maintenance, accommodations, credentials, permits, equipment and supplies needed for rural travel, and a schedule for timely arrangements and preparations;

- camping equipment checklist--most JESS work is done in rural areas and villages, and field teams often consist of seven to 15 persons, so camping is the most cost-effective way to accommodate such large groups--all types of camping equipment are included on this list (e.g., tents, tables, stoves, cots, lighting systems) as well as records of loans from central stockpiles or other sources;

- field supplies checklist--adequate food, water and other supplies are essential for successful field operations--in addition to the various categories and quantities of supplies, this list covers time-related activities (e.g., water boiling) and involves coordination among several persons (including the field operations leader, cook, counterpart and logistics assistant), and individual teams maintain their own checklists for research materials and equipment, making copies for administrative coordination;

- fuel--diesel fuel is the most important commodity for field operations, and fuel supplies are monitored in different ways--storage containers are labeled, records kept of all disbursements, tank and drum levels measured periodically, and a procedure has been developed for recording fuel exchanges in the field between BuRec and JESS;

- vehicles--JESS jeep travel is monitored in logbooks that record destination, mileage (in kilometers), date, purpose of the trip and driver, vehicle assignments for field trips are noted, maintenance records are kept for individual vehicles by the Vehicle Service Center (VSC), and an inventory of spare parts is also maintained by VSC;

- equipment inventory--the JESS team has set up a computerized equipment inventory system, which features the name of the item, classification number assigned by ARD, letter code for type of equipment (e.g., K for camping, C for computer), letter or numerical code to specify the item's location, date the item was disbursed or transferred, and notes about its condition--the inventory file is being transferred to dBase III (a data base management software package) for increased flexibility in file sorting and aggregation; and

- schedule--the JESS team has set up a system for schedule control of staff activities--manual and computerized schedules are maintained by the project's secretary in a procedure that records both the date when an event or task is to be accomplished as well as antecedent activities necessary to achieve the end result (a daily computer printout indicates the activities of the entire team).

Through the diligence and support of MJVD staff, the project was assigned radio frequencies only four months after the initial request was made to the Ministry of Telecommunications, a relatively rapid process in comparison to the norm in Somalia. JESS has coordinated its radio procurement and plans for operations with BuRec and Agrar und HydroTechnik (AHT).

IV. PHASE I

Technical accomplishments during Phase I of JESS included staff training, Jubba Valley reconnaissance, a literature search, participation in the NAS workshops, design studies, the Phase II work plan, an aerial census and photography plan, and responding to special requests.

A. Training

With regard to institutional development, MJVD considers training of prime importance. To help identify training needs, ARD performed a manpower and training assessment (see JESS MANPOWER AND TRAINING ASSESSMENT, ARD, Burlington, Vermont, 31 July 1986). JESS staff have engaged in various kinds of training, which will continue for the duration of the project:

- on-the-job training is the type of training given the greatest emphasis by JESS--Somali field staff have already been introduced to field techniques in the areas of water quality, disease vectors, archeology, fishery science and socioeconomic survey research;

- classroom training--ARD's long-term staff have conducted sessions on development planning and socioeconomic and environmental baseline study methods, and a Somali field assistant developed and taught a series of classes on survey research concepts and enumeration techniques;

- seminars--ARD consultants have conducted seminars on various topics, including land tenure, water quality and data management;

- office and field training--both Somali and expatriate staff have received training on such topics as word processing, computers, first aid and vehicle maintenance; and

- language training--JESS is now organizing English-language training for MJVD personnel and has budgeted funds for this purpose, and two ARD field staff have taken six weeks of intensive Somali-language training during the project's initial start-up.

Project staff have also explored short courses in other countries on ecological monitoring, remote sensing, development planning and watershed management. Although ARD is not responsible for

training outside Somalia, project staff and suitable training courses are being identified for recommendation to AID.

B. Jubba Valley Reconnaissance

During Phase I, JESS staff made ground trips to the Jubba Valley for purposes of environmental and socioeconomic reconnaissance. Most of these trips were to the middle and lower Jubba regions and included the following activities:

- establishment of contacts and liaisons with local officials,
- tests of field equipment and vehicles,
- familiarization with the characteristics of habitats and populations,
- trials and evaluation of aerial photographs and maps, and
- inspection of potential study sites.

In addition to these overland trips, JESS personnel, consultants and NAS panel members were able to view the area from chartered light aircraft.

C. Literature Search

ARD and JESS have contacted approximately 100 organizations around the world for information about JESS-related topics. This literature search is essential to the design of efficient, relevant studies and evaluation of results. The more than 1,000 citations identified thus far are presented in a separate ARD report, BIBLIOGRAPHY FOR THE JESS PROJECT (ARD, Burlington, Vermont, 31 July 1986). The literature review will continue for the duration of JESS.

A joint literature search was conducted by both ARD and JESS personnel. The JESS team mainly reviewed Somalia-related documents, while ARD home-office staff conducted a general review, gathering information from other river-basin projects elsewhere in the world and also focusing on methodological issues relating to certain technologies or concepts pertinent to JESS (e.g., rapid rural appraisals, remote sensing). ARD home-office staff have entered the information collected using a bibliographic computer program, titled Nutshell, which was transferred to Somalia in May 1986. The JESS team is now planning to transfer the Somalia-based literature list onto a dBase III computer file for easier retrieval and use. This

program can serve as the basis for a computerized reference system for MJVD.

D. NAS Workshops

The main vehicle for NAS interaction is a series of workshops and/or technical review meetings. The first workshop was held in Somalia at the end of January 1986. A two-day, technical review meeting was held in Burlington, Vermont, in April, which focused specifically on ARD's draft work plan for Phase II. The Somalia workshop was a cooperative effort between MJVD and NAS, and had two parts--a field trip to the Jubba Valley and meetings in Mogadishu. JESS played a central role in the logistical arrangements for the field trip and also participated in the meetings. ARD field staff and the NAS panel engaged in several small-group and one-on-one discussions about development issues, assessment approaches and comparative studies of man-made lakes in Africa.

From left, ARD's field ecologist and socioeconomist with AID's regional environmental officer during NAS field trip to the Jubba Valley.

At the first workshop, the NAS panel focused on the following issues surrounding Jubba Valley development and the JESS studies:

- the inclusion of small- and medium-scale development approaches, in addition to large-scale irrigation projects, which are currently in favor for valley development;

- trade-offs involved in the allocation of hydropower from the Baardheere Dam project between settlements in the Jubba Valley and Mogadishu;

- development opportunities and limitations associated with reservoir drawdown (i.e., use of the draw-down zone) and controlled floods;

- resettlement of people dislocated by projects;

- consideration of livestock and pastoralism in agricultural projects for the valley; and

- local and national institutional factors involved in development.

NAS and MJVD participants during joint workshop in Mogadishu.

The purpose of a second meeting with an NAS panel was review and discussion of the draft work plan for Phase II. This panel consisted of a roster of individuals who were largely new to the JuDAS project. Comments from NAS for this meeting were the subject of a short paper (18 pages) prepared by the academy's

Board on Science and Technology for International Development (BOSTID), titled "Review of Jubba Valley Environmental and Socioeconomic Studies Implementation Work Plan" (7-8 April 1986). In general, the panel felt the draft work plan could be improved by:

- a presentation of unifying analytical frameworks or themes in the studies;
- a discussion of methodological approaches, especially for studies of the seasonal or transhumant populations in the basin; and
- an exploration of alternatives to options that are currently perceived for development of the Jubba Valley, especially studies of adaptive technologies and the multiplier effects of smallholders.

These scientists further recommended comparative studies of Shabeelle development schemes as a basis for possible prediction of development patterns in the Jubba Valley. The panel also called for explicit integration of JESS studies into the planning process as well as data management to provide accessible and useful information to government officials and planners. ARD has incorporated these suggestions in its PHASE I REVIEW AND PHASE II WORK PLAN FOR THE JESS PROJECT (ARD, Burlington, Vermont, 31 July 1986). It is important to note that integration of the studies into the planning process occurred during Phase II in the form of interim reports and such integration is a principal focus of Phase III. However, in terms of comparative studies with Shabeelle development schemes, ARD will use past investigations or coordinate JESS studies with current work being done with funding from AID and the World Bank. JESS will not conduct any primary data collection in the Shabeelle area, as this is beyond its scope and limited resources.

E. Design Studies

Following the NAS workshop in Somalia, six weeks were devoted to designing studies proposed in the Phase II work plan. This work was done by the JESS field team, three visiting ARD home-office staff and five international experts on aspects of river-basin development, in consultation with MJVD personnel. Advice and opinions were also received from NAS scientists, Somali National University professors and representatives from numerous organizations in Somalia. This effort included interviews, lengthy discussions, brainstorming sessions, flights over the Jubba Valley and ground visits to the area.

The studies were designed using lists of issues taken from ARD's scope of work, the first NAS workshop, experiences of ARD

staff and consultants, and literature on other river-basin assessments, planning efforts and developments elsewhere in Africa and around the world. JESS has also included issues that were suggested by MJVD, based on GSDR development priorities for the Jubba Valley. Through interviews, in-country research and team meetings, ARD identified activities being conducted by other organizations in the Jubba Valley. Based on that information, ARD reduced the very long list of issues that had been originally drawn up. ARD staff and consultants next drafted preliminary study designs to address the remaining issues. The reports of the five consultants have been compiled and are presented in PHASE I DESIGN STUDIES FOR JESS (ARD, Burlington, Vermont, 31 July 1986). In addition to defining scope and methodology, the design studies included manpower requirements and scheduling suggestions. On completion of these preliminary designs for the Phase II studies, they were transferred to ARD's home office and incorporated into a draft work plan for Phase II.

F. Phase II Work Plan

The Phase II work plan derives directly from the design studies. The draft work plan was prepared by ARD home-office staff and revised by the ARD field team prior to final editing by the home office. It is based on reviews and comments of the draft document by MJVD, NAS, USAID/Somalia, ARD and its subcontractors.

The work plan covers two years of environmental and socioeconomic investigations and analyses in Somalia, and is keyed to numerous factors, including development perspectives (GSDR priorities), present and anticipated logistic and climatic constraints, manpower allocations, budgetary restrictions and product timeliness (e.g., the master plan and decisions about dam design and construction contracts).

The work plan includes the following types of studies:

- baseline studies of environmental and socioeconomic conditions in the Jubba Valley;
- impact assessments of selected development projects--interventions such as the Baardheere Dam Project (BDP) and irrigation schemes in the lower Jubba region;
- special studies relevant to long-term Jubba Valley development (e.g., pastoralism and health considerations in dam design).

All the studies aim to enhance the positive effects of development and mitigate adverse impacts associated with

construction of the Baardheere Dam and other related projects in the Jubba Valley. The work plan includes considerations for facilitating JESS studies, such as the use of remote-sensing technologies and data management systems. It also provides a schedule for the proposed activities and indicates the level of effort planned for the various investigations.

G. Special Requests

JESS staff have responded to two ad hoc requests from the World Bank and MJVD for preliminary information for project planning purposes. These organizations asked for brief assessments of the number of refugees in the inundation zone for the BDP and terms of reference for resettlement studies. With regard to the first request, the JESS team prepared a population estimate based up interviews, reports and secondary information sources, and delivered it to both MJVD and World Bank. In the future, JESS social scientists will collect primary data in the inundation zone during the full-time fieldwork and update this information. In response to the second request, ARD's home-office technical manager and JESS field staff assisted in developing and reviewing the terms of reference for developing a resettlement plan for the inundation zone. MJVD and World Bank will be contracting a separate team of specialists to conduct these studies.

V. PHASE II

Phase II field operations have followed from the series of initial explorations by JESS scientists (e.g., sondeo) and investigations by ARD consultants during Phase I. The types of major activities conducted during the first months of Phase II have included:

- development of a resource center at MJVD,
- SEBS development,
- the design and start of implementation of aerial census and photography work,
- water-quality investigations,
- data management,
- and terrestrial vegetation studies.

A. Resource Center

A modest resource center has been established by JESS at MJVD's offices. Project documents, maps and aerial photographs are being organized in a room with cabinets, a table, chairs, map tubes and display boards for aerial photographs. An information classification system has been developed for the center, which consists of an initial 30 categories of topics representing the studies in the work plan, general subjects (e.g., development planning and dams), and supporting documents, such as catalogs and dictionaries.

The document collection and other references are being included in the computerized JESS bibliography. This program is capable of sorting entries by categories or key words, and over a thousand references are currently listed in the bibliographic computer file. The JESS team will use a compilation of this file as a catalog for the resource center.

B. SEBS Development

SEBS is the main data collection instrument for JESS socioeconomic information. A major effort has been expended on identifying the variables for this survey and developing the information system for handling SEBS data. SEBS is the second of three socioeconomic data collection stages, which include:

- sondeo,
- baseline survey, and
- time-series studies.

Beginning in mid-March 1986, JESS social scientists conducted a sondeo--a technique for rapid reconnaissance of human groups. The sondeo was designed to provide a general preliminary overview of social and economic patterns in the Jubba Valley. This early stage of field investigations has yielded qualitative indicators relevant to the development of baseline questionnaires. In the sondeo, village-level meetings were held in all major ecological zones (as defined by the JESS ecologist) to establish distinctive features of the populations, including demography, livestock and land-use patterns, water-use patterns, health, land tenure, interactions between inter-riverine resource user/producer groups (RUPs), emigration, history of settlements or resource uses, pastoral activities, and adaptive strategies for environmental, social and economic conditions. This information will be used to develop a set of hypotheses to be tested using the quantitative data collected during Phase II. Thus, the sondeo has been crucial to the development of a sampling plan for the socioeconomic investigations.

The baseline survey will generate a large data base for the Jubba Valley, from Luuq to Kismaayo. The sample population will be several hundred heads of households, selected using a stratified random cluster sample design. Initial stratification will be done on the population in the proposed reservoir area (Baardheere to Luuq), including people who may be targeted for resettlement. The population located downstream from the dam site (Baardheere to Kismaayo) will be further stratified by resource-user ecological zones. In each zone, village clusters will be randomly selected within subdistrict (beel) units. Approximately 15 household heads will be randomly selected for interviews in each village sampled. This sampling design has been tested with 845 households in the Bay Region of Somalia and is outlined in detail in SOCIOECONOMIC BASELINE STUDY OF THE BAY REGION (University of Wyoming, Laramie, Wyoming, 1984).

In conjunction with the standardized household questionnaire, a meeting will be held in each village represented in the sampling frame. These village meetings will be structured as open-ended discussions of village-wide concerns, such as access to water, grazing rights, land tenure, community organization of work and adjudication of disputes. In addition, a general history of each village will be outlined as well as a listing of contemporary social services offered by the village. Key informant interviews on specialized topics will augment the quantitative data collected in the survey with qualitative information.

Following completion of the general baseline survey, five to 10 villages, which are representative of the valley's primary resource-user zones, will be selected for time-series studies. Each will be visited several times in conjunction with seasonal production cycles to gain a deeper understanding of each major production system.

Somali pastoralists using the Jubba River to water animals.

C. Aerial Census and Photography

A plan has been developed for an aerial census and aerial photography in the Jubba Valley that is based on the needs for remote sensing perceived by ARD scientists, seasons, analysis of studies conducted in the valley, gaps in previous work, budgetary considerations and other factors. The plan includes the following features:

- four aerial censuses of livestock, large wildlife, crops, houses, enclosures, riverine fauna and other items;

- census coverage of five percent in the riverine zone and three percent at a distance of approximately 30 kilometers on either side of that zone--further stratification will be based on vegetation and land-use units and other factors;

- aircraft flight lines perpendicular to the direction of river flow and centered on the river;

- aerial photography in different formats at various locations (e.g., towns, non-refugee settlements in the proposed Baardheere reservoir area, and estuary)--JESS has stereoscopic aerial photographs for the valley (1:30,000 scale) taken in 1983-1984, and similar photographs taken in 1960 are available to compare and assess landscape changes.

Census counts will be keyed to designated vegetation and land-use units in the riverine area, and to small rectangular plots in areas away from the river. This information will be integrated with various environmental and socioeconomic JESS studies.

D. Water Quality

The quality, quantity and location of water supplies and sanitation facilities are major concerns in current activities and future development in the Jubba Valley. JESS scientists will address major water-quality issues and conduct water-quality surveys of the Jubba River. These findings will be used in other studies, such as those on aquatic ecology and fisheries, and will serve as part of the environmental baseline studies.

Initial water-quality studies have already begun. The objectives of this work include:

- development of a program to collect and analyze water-quality data;

- initial measurements and analyses of water bodies;

- studies of salinity and tidal influences on the Jubba River;

- studies of fertilizer and biocide use;

- inspections of malaria and schistosomiasis vectors; and

- public health issues.

Based on four field visits to the Jubba Valley and discussions with university faculty and health officials, a number of preliminary observations can be made. Tentative results from the water-quality survey show that the Jubba River was relatively low in conductivity and chlorides during June 1986. Nutrient levels were also low, with nitrates around 10 milligrams per liter. The river-flow rate at Kamsuma Bridge was

between 200 and 300 cubic meters per second, but varied greatly during the three days of the survey. Even at high tide, there was no appreciable salt intrusion near the estuary. Secchi disk readings, which provide a relative measure of water clarity, were very low for the entire river from Luuq to Kismaayo because of high turbidity. The present plan is to combine the water-quality information and data on habitats in a model that will forecast the extent of malaria and schistosomiasis to be expected following construction of the proposed Baardheere Dam.

During the June studies, the river and projects' irrigation canals were uninhabited by snails or mosquitoes, perhaps due to the high turbidity and high velocity of incoming water. No schistosomiasis-bearing snails were found in any of the irrigation canals, night-storage ponds or drains. In standing water bodies, such as roadside pools, Bulinus abyssinicus (a species associated with schistosomiasis in humans) and Bulinus forskalii were found. The latter species of snail transmits schistosomes to cattle. Irrigated areas in the lower Jubba region underwent much flooding and received heavy rainfall in May and June, so mosquito habitats were abundant in ground depressions. Breeding sites and mosquitoes were also prevalent below the proposed dam site at Baardheere, but not at the mid-reservoir location near the refugee camps at Bordubo, nor above the proposed reservoir near Luuq. These vector-habitat conditions were seasonal and will change during dry periods.

A wide variety of biocides are currently used by agricultural projects in the valley. They include chlorinated hydrocarbons, organophosphorus compounds and other potentially dangerous chemicals. The overall amounts used last year were low, but could become significant with agricultural expansion. The widest variety of biocides in use were found at the Mogambo Irrigation and Jubba Sugar projects. Fewer and smaller amounts of biocides were used by Somalfruit to grow bananas, at the Fanoole Project for rice and by Somaltex for cotton. Herbicides and urea fertilizer were used extensively by all projects except Somaltex.

A 20-kilometer topographical transect was taken from the river near Bordubo out to the western edge of the proposed reservoir (elevation of 150 meters above sea level). These sightings indicate that the existing 10-meter contour maps from Technital are fairly accurate, but obscure undulations in the terrain. Soil and vegetation conditions along the reservoir's edge appear unfavorable for intensive agriculture, based on simple visual observations along the single transect between Bordubo and Garbo Haarrey. However, the land in draw-down areas may be suitable for grazing animals.

Future water-quality studies will involve continued water-quality monitoring, a groundwater assessment, health

ramifications of dam design, costs and institutional arrangements for water supplies, simulation of water quality in the proposed reservoir and effects on estuarine conditions.

The Jubba River, roughly midway between Jilib and Baardheere.

E. Information Management

From the beginning, ARD has recognized the need for well-planned, organized data systems. A specialist on information management has already completed an initial consultancy on this topic. His scope of work included:

- a determination of the types and amounts of information to be processsed;
- and evaluation of existing computer facilities, programs and personnel for handling information;
- recommendations for the JESS data management system; and
- training in requisite areas.

This consultant held extensive discussions with MJVD and ARD field personnel regarding data instruments and analyses of various types, paying particular attention to the socioeconomic

questionnaires and ecological data forms. In addition, assumptions were made about data inputs from various short-term consultants. Based on this information and analyses, the number of keystrokes per week for data were estimated (e.g., 3,700 keystrokes per week for a data-entry station). Observations were also made concerning the number of reports, memoranda and other types of outputs being prepared by JESS. Staff members' familiarity with specific computer programs and data processing skills were assessed. This information, together with the above estimate, formed the basis for determining the information management facilities, programs and personnel needed for JESS. Accordingly, the consultant recommended the following changes:

- acquiring additional computers for data-entry stations--IBM-compatible equipment has been recommended so that components will be interchangeable with existing equipment;

- setting up data-entry stations in a single large room, which must have its access restricted to people who have business there and should also be available to staff during periods outside normal MJVD working hours at the presidential palace;

- hiring computer operators for data entry--it is estimated that three persons will be needed--part-time data entry by MJVD secretaries is not feasible because of the amount of data to be entered and quality control;

- hiring a data management specialist, preferably a Somali, who must have formal training in computer science and practical experience in computer applications, particularly with MS DOS computers and programs, such as MicroSoft Word, Lotus 1-2-3, dBase III and Statpac;

- reorganizing both JESS' computer files onto existing hard disks and supplies at computer facilities to increase operational efficiency; and

- continued training of staff in computer operations.

This consultant was also involved in other activities. He assisted the socioeconomic staff in identifying variables for various socioeconomic outputs and developed a list of file structures for use with dBase III concerning the socioeconomic baseline questionnaire. Tentative plans call for his participation in analyses scheduled for late Phase II and Phase III.

F. Terrestrial Vegetation Studies

The JESS ecologist, a consultant and Somali staff members have performed various studies of terrestrial vegetation in the Jubba Valley. These studies have included:

- establishing sites for future vegetation studies;
- collecting plant specimens and taking measurements at various sites;
- assessing uses of vegetation by valley residents; and
- evaluating the adequacy of vegetation maps.

In four weeks of initial vegetation field studies, JESS scientists selected 36 study sites. Many are now or recently were under the direct influence of the river's regime. Sites included areas in a variety habitats--former floodplain, dhesheek, levee, seasonal wadi, relatively undisturbed riverine forest and non-riverine areas (for comparative purposes). Data gathered at each site included the number of vegetative species, size structure of woody vegetation, condition of herbaceous and woody plants, and assessment of conditions at the site.

JESS vehicle crossing muddy area on road between Jilib and Baardheere during field reconnaissance.

Although the season was unsuitable for many flowering species, 225 plant specimens were collected for future identification and donation to herbaria in Somalia, Kenya and Britain. A small JESS collection will be kept at the National University of Somalia's Faculty of Agriculture. At some sites, residents were interviewed about local uses of vegetation, flood history and grazing patterns. This information will be augmented by ethnobotanical data collected during the SEBS studies.

G Interim Reports

At the time this annual report was being prepared, ARD was in the midst of finalizing three interim reports--JESS INTERIM REPORT ON HEALTH IMPACTS OF DESIGN ALTERNATIVES FOR PROPOSED BAARDHEERE DAM and JESS INTERIM REPORT ON HEALTH CONSEQUENCES OF DESIGN CRITERIA FOR WATER SUPPLY AND SANITATION IN NEW AND RESETTLED COMMUNITIES, both by Dr. William R. Jobin, and JESS INTERIM REPORT ON PRECONSTRUCTION CONCERNS FOR PROPOSED BAARDHEERE DAM, Dr. R. E. Tillman. These reports are being delivered to MJVD and USAID/Somalia for purposes of the dam-design and construction-planning activities that will take place in November and December 1986. For example, the report on preconstruction concerns has been prepared in the hope that a number of specific measures for addressing public health, reservoir-clearing and other related concerns will be included in the terms of reference for contractors participating in various aspects of dam construction. JESS will continue to provide similar interim reports on various topics throughout Phases II and III.

VI. ACTIVITIES FOR YEAR TWO

A challenging array of studies is scheduled for the next year of JESS, which falls completely within Phase II of the project. During the period from October 1986 to September 1987, primary (baseline) data collection and preliminary analysis will proceed on almost all of the topics being studied by JESS. JESS will also continue to train Somali staff and gather information that contributes to the development of a long-term monitoring plan and environmental and socioeconomic guidelines for projects in the Jubba Valley.

During the next year, it is expected that approximately 17 interim reports will be produced on the following subjects:

- health implications of dam design,
- pre-dam construction concerns,
- water quality and disease vectors,
- hydrology, river scour and sedimentation,
- limnology,
- fisheries resources,
- ornithology,
- archeology,
- aerial censuses,
- land tenure,
- forestry, and
- botany/vegetation.

Detailed descriptions of these studies are featured in the ARD report titled PHASE I REVIEW AND PHASE II WORK PLAN (Burlington, Vermont, 31 July 1986). A revised schedule of the reports planned for year two are shown in the table on the following page, and the appendix provides a detailed schedule for field studies, reports and other activities (e.g., training, the NAS workshop, staff vacations).

Throughout Phase II, JESS investigations will be coordinated with studies being conducted by other organizations. This includes JESS cooperation with the hydrology work of Sir M. MacDonald and Partners, Ltd. (MMP) for the Ministry of

JESS Year-Two Interim Report Schedule

REPORT TOPIC	OCT 1986	NOV 1986	DEC 1986	JAN 1987	FEB 1987	MAR 1987	APR 1987	MAY 1987	JUN 1987	JUL 1987	AUG 1987	SEPT 1987
Health implications of dam design		x										
Pre-dam construction concerns			x									
Water quality and disease vectors					x				x			
Hydrology, river scour and sedimentation						x						
Limnology										x		
Fisheries resources				x						x		
Ornithology									x			
Archaeology		x									x	
Aerial censuses			x		x			x				
Land tenure											x	
Forestry												x
Botany/ vegetation								x				
Health consequences of water/sanitation design		x										

Agriculture; AHT dhesheek study for MJVD; and independently funded botanical research being done by University College of London. In some cases, developments may render planned JESS studies unnecessary before they can even be accomplished. Any changes of this nature will be recorded both in the annual work plans prepared by JESS and through official correspondence between USAID and ARD after discussions with MJVD.

View to the north when standing at the Baardheere Dam site.

In October 1986, NAS completed a study tour of Tana River development and ecological monitoring in Kenya. An NAS review of the interim findings and methodological procedures of JESS investigations is expected to take place in the spring of 1987. This review, which will take the form of another workshop, is also expected to include discussions of two important JESS objectives--establishment of a long-term environmental and socioeconomic monitoring system, and guidelines for development activities in the Jubba Valley.

Other project activities scheduled for year two of JESS include periodic visits by ARD home-office staff for management, technical and project reviews, and training coordination.

APPENDIX

JESS Work Plan for Year Two

October 1986

Studies:

Archeology #1
Fisheries #1
Socioeconomic Baseline Survey
Aerial Census
Vegetation
Water-Quality Sampling and Analyses

Reports:

Archeology #1
Water-Quality Trip Report #1
Water-Quality and Public Health Interim Report #1
Dam Preconstruction Issues
Dam Health Implications
First Annual Report
Monthly Report
Quarterly Financial Report

Other:

R and R -- Drannon Buskirk, 30 October to 9 November
Terms of Reference -- Hydrology, Aerial Census #2 and Water Quality
Approval -- Water Quality
Annual Plan
Data Management System Setup
Financial System Setup (computer)
Study Tour of the National Academy of Sciences (Kenya)

November 1986

Studies:

Socioeconomic Baseline Survey
Fisheries #1
Water-Quality Sampling and Analyses
Disease Vectors and Health

Reports:

Aerial Census #1
Monthly Report

Other:

R and R -- Drannon Buskirk, 30 October to 9 November
Approval -- Annual Plan, Hydrology and RMR
Contract -- RMR, Part B
Technical and Management Reviews

December 1986

Studies:

Socioeconomic Baseline Survey
Vegetation
Aerial Census #2
Water-Quality Sampling and Analyses

Reports:

Monthly Report
Quarterly Budget, 1987

Other:

R and R -- Jim and Nancy Merryman, 18 December to 15 January
Drannon Buskirk, 22 December to 4 January
Terms of Reference -- River Scour, Sedimentation and Hydrology
Approval -- River Scour, Sedimentation and Hydrology
Uganda Wildlife Conference -- Ian Deshmukh, 5 to 15 December

January 1987

Studies

Socioeconomic Baseline Survey
Vegetation
Water-Quality Sampling and Analyses
River Scour, Sedimentation and Hydrology

Reports:

Fisheries #1
Aerial Census #2
Monthly Report
Six-Month Progress Report
Quarterly Financial Report, 1986

Other:

Terms of Reference -- Ornithology #1 and Disease Vectors

February 1987

Studies:

Socioeconomic Baseline Survey
River Scour, Sedimentation and Hydrology

Reports:

Water-Quality and Public Health Interim Report #2
Monthly Report

Other:

Terms of Reference -- Fish #2, Aerial Census #3
Approval -- Disease Vectors and Ornithology #1

March 1987

Studies:

Water-Quality Sampling and Analyses
Socioeconomic Baseline Survey
Vegetation
Groundwater (one month)
Disease Vectors
Ornithology #1 (three weeks)

Reports:

River Scour, Sedimentation and Hydrology
Quarterly Budget
Monthly Report

Other:

Terms of Reference -- Limnology
Approval -- Botany, Fisheries #2 and RMR
Contract -- RMR, Part C
Preparation for Reviews

April 1987

Studies:

Socioeconomic Baseline Survey
Water-Quality Sampling and Analyses
Botany
Fish #2 (six weeks)

Ornithology #1
Vegetation
Aerial Census #3

Reports:

Ornithology #1
Monthly Report
Quarterly Financial Report

Other:

R and R -- Drannon Buskirk, 9 to 19 April
Terms of Reference -- Land Tenure
Approval -- Limnology and Land Tenure
Management Review
AID Interim Project Review
NAS Workshop

May 1987

Studies:

Socioeconomic Baseline Survey
Water-Quality Sampling and Analyses
Fish #2
Limnology
Land Tenure

Reports:

Aerial Census #3
Disease Vectors
Botany
Monthly Report

Other:

Leave -- Ian Deshmukh and Kathryn Craven, 1 to 30 May
Terms of Reference -- Archeology #2, Nutrition and Forestry

June 1987

Studies:

Socioeconomic Baseline Survey
Water-Quality Sampling and Analyses
Land Tenure
Limnology

Reports:

Ornithology #1
Quarterly Budget
Monthly Report

Other:

Leave -- Jim and Nancy Merryman 10 June to 9 July
Terms of Reference -- Pastoralism and Ornithology #2
Approval -- Archeology #2, Nutrition and Forestry

July 1987

Studies:

Socioeconomic Baseline Survey
Water-Quality Sampling and Analysis
Archeology #2 (two months)
Forestry
Vegetation

Reports:

Fisheries #2
Botany
Limnology
Monthly Report
Quarterly Financial Report
Six-Month Progress Report

Other:

Leave -- Drannon Buskirk, 10 July to 9 August
Approval -- Ornithology #2 and Pastoralism

August 1987

Studies:

Water-Quality Sampling and Analyses
Archeology #2
Nutrition
Forestry
Pastoralism (two months)
Ornithology #2 (three weeks)

Reports:

Land Tenure
Forestry
Monthly Report

September 1987

Studies:

Water-Quality Sampling and Analyses
Pastoralism

Reports:

Archeology #2
Quarterly Budget
Monthly Report
Annual Report

Other:

Technical Review