PD-AAX-242
649134

PN-54477

JUBA ENVIRONMENTAL AND SOCIOECONOMIC STUDIES SECOND ANNUAL REPORT

JESS Report No. 24

Prepared by:

Associates in Rural Development, Inc.
110 Main Street, Fourth Floor
P.O. Box 1397
Burlington, VT 05402
U.S.A.

Under AID contract number AFR-0134-C-00-5047-00.

Date: 15 December 1987

CONTENTS

Abbreviations and Acronyms i

Preface ii

I. Executive Summary 1

II. Introduction 4

III. Project Environment 5

A. Somalia 5
B. AID 6
C. MJVD 6
D. ARD 6
E. Summary 7

IV. Summary of Work Strategy 8

V. Principal Activities 10

A. Baseline Studies 10
1. SEBS 10
2. WBS 12
3. Market Study 13
4. TEBS 13
5. Summary 14
B. Remote Sensing 15
C. Water Quality 16
D. Public Health 18
E. Hydrology, Sedimentation and River Scour 19
F. Fisheries 19
G. Ornithology 20
H. Aerial Photo Interpretation 21
I. Botany 21
J. Land Tenure Studies 21
K. Limnology 22
L. Cultural Heritage 22
M. Forestry 23
N. Wildlife 24
O. Pre-Construction and Dam Operation 24
P. Mapping and Long-Term Monitoring 24
Q. Project Management and Administration 25
R. Data Collection and Management 27
S. Project Liaisons 29
T. Training 30
U. Evaluation 30
V. Reports 31
W. Workshops 31

VI. Future Work Strategy 32

A. Phase II 32
1. Consultants and ARD Staff 32
2. JESS Team 33
B. Phase III 34

Appendix -- JESS Reports

ABBREVIATIONS AND ACRONYMS

AHT	Agrar- und HydroTechnik, GMbH
AID	Agency for International Development, Washington, DC
ARD	Associates in Rural Development, Inc.
BDP	Baardheere Dam Project
BFP	British Forestry Project
BOSTID	Board on Science and Technology for International Development
BuREC	U.S. Bureau of Reclamation
CRDP	Central Rangelands Development Project
EC	electrical conductivity
ELC	Electroconsult
FAO	Food and Agriculture Organization of the United Nations
FSU	Field Support Unit
GSDR	Government of the Somali Democratic Republic
GTZ	German Agency for Technical Cooperation
JESS	Juba Environmental and Socioeconomic Studies*
JuDAS	Juba Development Analytical Studies*
LMHP	Livestock Marketing and Health Project
LTC	Land Tenure Center
MFMR	Ministry of Fish and Marine Resources
MJVD	Ministry of Juba Valley Development*
MoH	Ministry of Health
NAS	National Academy of Sciences
NRA	National Range Agency
NRC	National Refugee Commission
NTTCP	National Tsetse and Trypanosomiasis Control Program
NUS	National University of Somalia
PC	personal computer
PP	project paper
RFP	request for proposals
RHU	Rural Health Unit
SARSA	Human Settlements and Natural Resource Systems Analysis
SEBS	socioeconomic baseline studies
TDS	total dissolved solids
TEBS	terrestrial ecology baseline studies
TOEFL	Teaching of English as a Foreign Language
VSC	Vehicle Service Center
USAID	U.S. Agency for International Development
WBS	women's baseline studies
WHO	World Health Organization

---

*Juba is spelled with one "b" when referring to the name of the project or the related ministry. The Jubba spelling is used for all geographical references.

PREFACE

Juba Environmental and Socioeconomic Studies (JESS) is part of the Juba Development Analytical Studies (JuDAS) Project, which is being implemented in southern Somalia (see Figure 1) by the U.S. Agency for International Development (AID) and Ministry of Juba Valley Development (MJVD) of the Government of the Somali Democratic Republic (GSDR). Associates in Rural Development, Inc. (ARD), of Burlington, Vermont, is providing technical assistance and project management for JESS under an AID contract (number AFR-0134-C-00-5047-00). The JuDAS Project also includes a soils and land use classification project, that was implemented and completed by the U.S. Bureau of Reclamation (BuREC), and a long-term training component administered by AID. In addition, the Board on Science and Technology for International Development (BOSTID) of the National Academy of Sciences (NAS) provides advisory services to AID and MJVD under the JuDAS Project.

The JuDAS Project has two major purposes:

- to gather necessary information on soils/land use and socioeconomic and environmental factors to be incorporated into a master planning process for Jubba Valley development; and

- to provide MJVD with technical support and training.

To assist with Jubba Valley development, JESS is supplying the results of its socioeconomic and environmental studies to a master planning team in MJVD from the German Agency for Technical Cooperation (GTZ) and Agrar- und HydroTechnik, GMbH (AHT). JESS is also providing practical, informal training for its Somali counterparts and serving in an advisory capacity to AID and MJVD on long-term training.

This second annual report describes the progress of JESS between 1 October 1986 and 31 October 1987, in compliance with AID reporting regulations. This report does not satisfy the contract requirements for the JESS Phase II report (scheduled for release in April 1988), in which specific studies and their results will be presented in detail.

As of 31 October 1987, the JESS technical assistance team included:

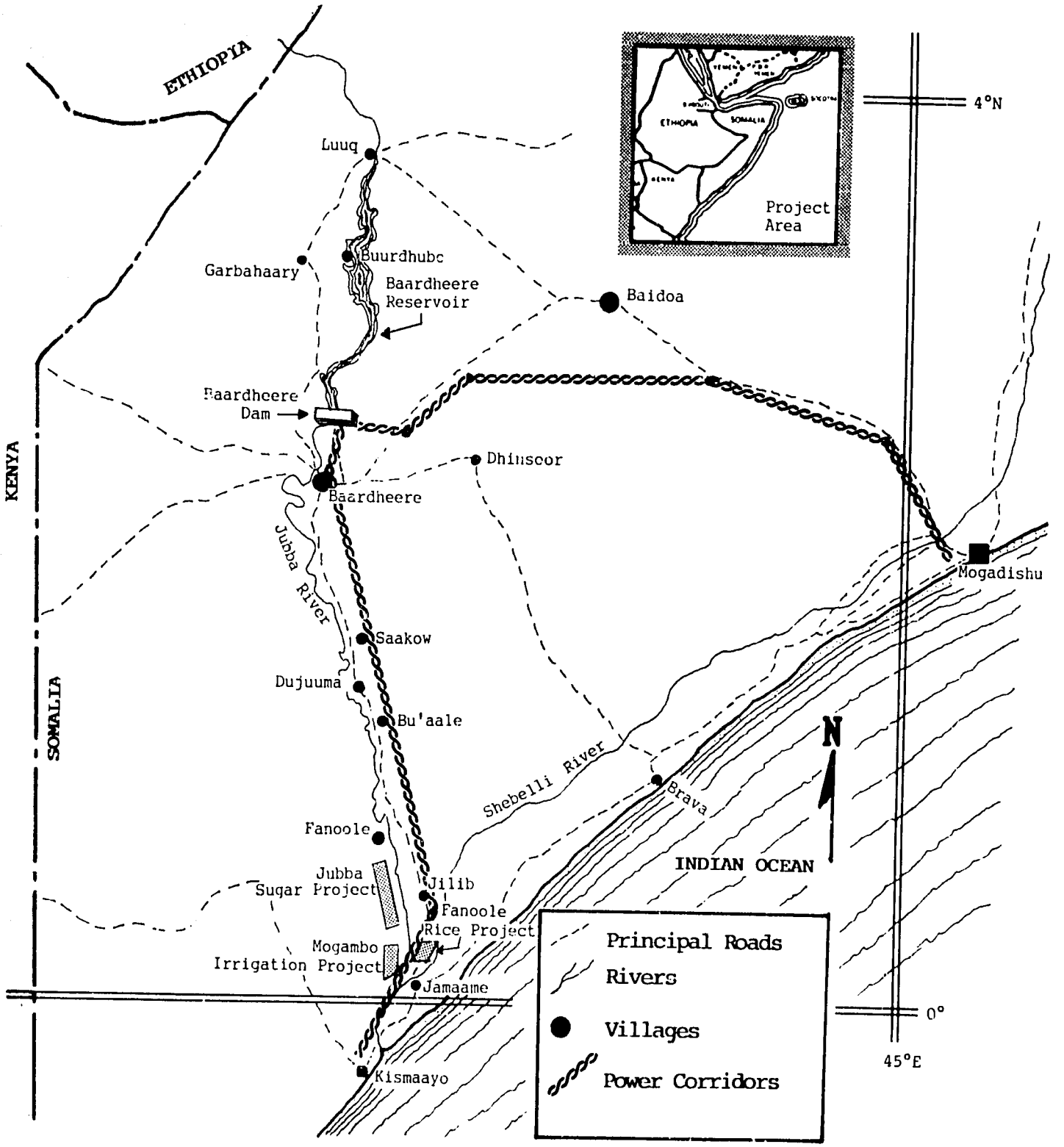
- Dr. Robert "Gus" Tillman, team leader;

- Dr. Kathryn Craven, socioeconomics;

- Dr. Ian Deshmukh, ecology, vegetation and wildlife;

- Dr. James Merryman, anthropology;
- Dr. Nancy Merryman, administrative coordinator and anthropology; and
- Ms. Marie Tillman, data center manager.

Figure 1. Area of the Baardheere Dam Project and the Jubba Valley Development



I. EXECUTIVE SUMMARY

This is the second annual report on JESS progress. It summarizes the project's activities and achievements from 1 October 1986 to 31 October 1987. The last section provides a brief summary of the work strategy for the third and final year of JESS.

The reporting period was marked by significant staffing changes at ARD, MJVD and AID. Likewise, the typical climatic pattern was broken by a temporary drought during the Deyr that ran into the Jilaal, which caused extensive crop and livestock losses. Gu' rains arrived late and heavy, which produced unseasonable flooding and exacerbated the usual problems with gaining access to the Jubba Valley to do fieldwork. Some consultants' investigations had to be delayed, but all were fully completed at a later time during the year.

JESS made significant accomplishments during its second year, meeting the schedule of deadlines nearly to the day. The terrestrial ecology and socioeconomic baseline studies were in the process of full implementation. Baseline studies specifically concerned with women's roles in the Jubba Valley were also initiated during this period, as the need for them evolved from the overall socioeconomic baseline studies. A full year of data on local and regional markets was collected.

Four major remote-sensing activities were completed--run-of-the-river stereo pairs, two aerial censuses of the floodplain and river-dependent zones, and aerial photographs of selected sites for vegetation mapping. A land-use map of the river-dependent zone was prepared on the basis of aerial photos.

During this period, JESS undertook a one-year water-quality sampling and analysis program with the National University of Somalia (NUS). Data from this study will provide much-needed insight into potential water-quality problems that may be associated with development of the Baardheere Dam. A series of public health studies was also initiated, including investigations into water supplies and disease vectors, and the groundwork was laid for development of an epidemiological and nutrition survey to be carried out during the project's third year.

A study on hydrology, sedimentation and river scour found that the expected amount of inflow to the reservoir was overly optimistic by 15 percent. At the same time, after the dam is completed, little problem is anticipated with downstream river scour.

Two fisheries consultancies produced a wealth of data on species of fish in the Jubba River and the river's capacity for fisheries. In addition, two Kenyan scientists conducted a brief limnological survey of the river. They noted low diversity in the populations of phytoplankton, zooplankton, benthic organisms and macrophytes. However, because of irregular flooding conditions, these results may not be representative.

An ornithological survey on Palearctic migratory species was completed. Of the 270 species recorded, 13 were first-time observations for the Jubba Valley.

A second botanical survey was made in the area of the future impoundment zone. In all, 119 plant specimens were collected, including an unknown sedge that may be new to science.

A field survey of the Jubba Valley was carried out to assess land tenure issues. The preliminary findings indicate there are few current problems, but changes could occur rapidly as a result of the accelerated development that may take place after dam construction.

A large consulting team traveled by camel caravan to execute a limited-sample cultural heritage survey of the eventual inundation zone. Some 699 sites were investigated, including camps, scatters, cairns and caves displaying unusual rock art.

Investigations of forest resources and related utilization activities in the Jubba Valley found that these resources are not being overexploited at present and are in fairly healthy condition. There is a noticeable lack of tall trees, which indicates a scarcity of sawtimber.

An aerial census provided valuable data on local populations of wildlife, specifically larger mammals and crocodiles. Further, informal sightings of other wildlife throughout the valley are recorded by all JESS staff when they are in the field.

Two interim reports were produced during the period that synthesize information about potential impacts of construction of the Baardheere Dam, and highlight issues concerning dam design and the need for well-planned, orderly development of the proposed project.

Summary investigations were done of the need to map JESS research results and a systematic approach to long-term environmental and socioeconomic monitoring of Jubba Valley development. Numerous recommendations and guidelines concerning these two topics will be addressed in the JESS Phase II and III reports.

In spite of persistent problems with inadequate communication systems, power and equipment failures, vehicle breakdowns, restrictive accounting procedures and other logistic matters, JESS administrative personnel managed to keep the project on schedule. The energetic, able Somali staff are greatly commended for their contributions to the JESS effort. Although JESS data collection and management have been plagued by computer-processing difficulties, data-center staff members have persevered, keeping up with the coding and entering of questionnaires brought in from the field. During the reporting period, an ARD consultant developed a customized data-entry program to meet the needs of JESS.

The project has maintained continuous liaisons with numerous organizations and personnel from other development entities, both within and outside Somalia. This collaboration, especially with the AHT/GTZ master planning team, has been mutually beneficial and has also aided the overall MJVD effort. JESS staff attended a project workshop in Coolfont, Virginia, at the invitation of NAS.

On-the-job training of JESS Somali staff is implicit in all of the project's everyday activities. Some JESS staff members have also been selected to receive continuing education at universities in the United States.

Finally, a midterm evaluation of the JuDAS project was conducted. JESS staff members actively helped meet the logistic and information needs of the evaluators. Later, JESS responded to the evaluation's findings--challenging some, but making adjustments in certain aspects of its operations to satisfy AID.

II. INTRODUCTION

This JESS report is the second of two annual reports on project progress. As such, it meets part of the reporting requirements defined in the contract agreement between AID and ARD. Thus, this report should be recognized as a document that is intended for a limited audience, serving basically as a means of communication between contractor (ARD) and clients (AID and MJVD).

Phase I of JESS began in September 1985 with the signing of the technical assistance contract and ended in April 1986. It saw the review of existing baseline information concerning the project area to define gaps in the data and resulted in a detailed work plan for investigations to be carried out during the second phase. Phase II began in May 1986 and will continue until March 1988. This 18-month period is being used to conduct macro- and micro-level studies of existing environmental and socioeconomic conditions in the study area. Phase III is the final phase of JESS and will run from April to September 1988. During this period, all of the environmental and socioeconomic data gathered during Phase II will be reviewed analytically to make decisions regarding the mitigation and/or avoidance of negative impacts associated with the Baardheere Dam Project (BDP) and Jubba Valley development as well as recommendations that will optimize the results of this development.

This second annual report summarizes the progress and achievements of JESS from 1 October 1986 to 31 October 1987--it does not include an extensive presentation of the results of field investigations. At the end of the Phase II studies in March 1988, ARD will prepare a major report that includes the results of all fieldwork. However, the Phase III analysis of data from the major baseline studies will have just begun, so the discussion of data analyses in the Phase II report will be limited. At the end of Phase III, ARD will prepare a final report that presents the results of extended data analyses, but in a condensed form for use by Jubba Valley development planners.

III. PROJECT ENVIRONMENT

A. Somalia

Somalia's pulse is measured by precipitation. When the seasonal rains are timely and adequate, its agro-pastoral economy moves toward elusive prosperity and national well-being. It is recognized that the East African climate is plagued by precipitational arrhythmia which cannot be predicted by meteorologists, pastoralists, farmers or development planners. Seasonal vagaries send major ripples of change through the social, economic and environmental systems of Somalia that are difficult to measure within the country and may well be imperceptible from without. The period covered by this report was clearly affected by unpredictable precipitation conditions, with disruptions to both the JESS work plan and schedule.

During the reporting period, the GSDR was obliged to make international note of the drought, followed by reports of unusually heavy flooding in river valleys. This apparent inconsistency does not demonstrate a lack of ability to gather regional information, but rather, how rapidly meteorological changes can occur on the Horn of Africa. For a project such as JESS, which is investigating socioeconomic and environmental parameters in remote pastoral and agrarian settings, meteorological inconsistencies are of considerable import, affecting both logistics and study results. Regional inconsistencies exacerbate disruptions of plans that were created in the expectation of relatively stable, predictable conditions.

In 1986, the Deyr (October and November) rains were weak or absent in much of Somalia and the Jubba Valley. Crop and livestock losses then became significant during the extremely dry Jilaal (December to March), beginning in 1987. If the Gu' (April to June) rains had been timely in late April, the effects of the drought might have been blunted for farmers and pastoralists alike, but they did not come until late May when they arrived in unwanted abundance. Heavy, persistent rainfall occurred in the Jubba River's Ethiopian catchment area, which caused damaging floods throughout the valley in June. Further, light to moderate rains fell in the Jubba Valley during the normally dry Xagaa (July to September), which may have blended with the start of the Deyr rains in October 1987.

In terms of Somali agriculture, the damage caused by drought and flood may have been offset on a national basis by Gu' and Xagaa rains that were above average, which stimulated bumper crops in many areas. However, when the JESS Phase II data are fully analyzed, they may reveal that these rains and subsequent harvests were not adequate to compensate for heavy flood losses. In terms of JESS, the unusual weather events made it necessary to

abort, abandon or postpone planned fieldwork, including both baseline and consultant studies. For instance, the fishery studies scheduled for May had to be modified because of the rising waters, which prevented much of the planned chemo-fishing. In addition, consultant visits on limnology and cultural heritage were postponed from June to August and September.

However, ARD adjusted well, and JESS came to the end of the reporting period nearly on schedule and with most of its planned activities completed. Intense periods of activity were the result of having to execute so many field activities in a few months, rather than being able to space the studies over an extended period. At one point, JESS had 13 vehicles and 41 people in the Jubba Valley. This logistic feat could only be achieved because the JESS Somali staff carried out their project roles with exceptional efficiency.

B. AID

Just as Somalia's environment presented JESS with variability, so did the USAID mission. The mission director, Mr. Louis Cohen, departed Somalia and was replaced by Ms. Lois Richards. The JuDAS project manager, Ms. Sally Patton, completed her assignment and departed for USAID/Cairo, shortly after the arrival of the new project manager, Mr. Weston Fisher. This permitted a period of overlap and effective liaison between the outgoing and incoming project managers. Because of Mr. Fisher's assignment to AID's Agriculture Division, JESS was shifted administratively from engineering to agriculture for project management. However, these mission changes did not adversely affect project progress,and all the transitions were very smooth.

C. MJVD

Midway through the reporting period, MJVD assigned Mr. Yassin Nur Osman to the position of Director of Finance and Administration, where he became JESS project manager for MJVD. In March, Mr. Aweys Haji Yusef, Director of Planning, assumed technical direction for JESS and continued in that assignment until he became General Manager of the BDP in September. At that time, Mr. Abdirahman Islow Mahadalle became the new Director of Planning with management responsibilities for JESS. Mr. Abdi Ali Mo'alin, Permanent Secretary of MJVD, maintained his overall management role for MJVD studies throughout the reporting period.

D. ARD

ARD also added elements of project variability. Dr. E. Drannon Buskirk, Jr., resigned as JESS team leader in December,

but remained in that position until Dr. Tillman, ARD's home-office technical manager for JESS, arrived in Somalia during February to assume the role of team leader. Later in the reporting period, Mr. Paul Dulin replaced Mr. Richard Donovan as ARD's home-office project manager for JESS.

In August, Dr. N. Merryman's role shifted when she became a JESS anthropologist in addition to her work as administrative coordinator. Drs. Craven, Deshmukh and J. Merryman continued in their roles as the JESS socioeconomist, ecologist and anthropologist, respectively, throughout the reporting period. In July, ARD added Ms. Tillman to the JESS field team as data center manager.

E. Summary

The project environment during the reporting period was characterized by nearly constant, significant change. ARD very capably anticipated most of these changes, and modified work plans and schedules to meet varying project needs. For unanticipated events, ARD reacted swiftly to make the alterations and adjustments needed to keep the project's progress directed toward the timely completion of the studies. Considering the problems commonly encountered with projects in Somalia, even during periods of climatic and administrative stability, ARD, AID and MJVD can be commended for the progress of JESS during this year of change.

IV. SUMMARY OF WORK STRATEGY

The JESS project paper (PP) and request for proposals (RFP) provided a framework for a work strategy by dividing the contract period into three phases. Phase I was defined as a six-month preparatory period for establishing the long-term team members in Somalia, reviewing relevant literature and designing a work plan for field data collection. Phase II was planned as a two-year period for conducting field studies and collecting data. Phase III was intended as a final six-month period for analyzing data, designing monitoring programs and preparing reports for MJVD and AID. ARD acknowledged this framework for the JESS schedule when it signed the project contract. The reporting period discussed here covers one year of collecting field data during Phase II.

The JESS mandate to collect socioeconomic and environmental field data made it necessary for ARD to develop a work strategy based on seasonal access to the Jubba Valley. For the most part, the valley cannot be traversed during the wet seasons of Gu' and Deyr, although it is possible to reach the northern areas near Baardheere and southern regions surrounding Jilib throughout the year. Thus, a work plan was developed that concentrated on field activities for the baseline and special studies during the dry seasons of Jilaal and Xagaa. ARD tentatively scheduled socioeconomic and ecological baseline field trips during those periods, and arranged for consultant visits to coincide with dry seasons unless this was contraindicated by their subject of study.

The work strategy developed at the end of Phase I and presented in the JESS work plan separated the Phase II studies into two major baseline efforts concerned with socioeconomic investigations and environmental studies. The plan also elaborated on special studies that were to be conducted by JESS field team members or ARD consultants, according to a seasonal schedule and the availability of project vehicles.

At the beginning of this reporting period, the JESS environmental baseline studies, identified as the terrestrial ecology baseline studies (TEBS), were underway. Dr. Deshmukh, the JESS ecologist, had previously selected and marked 36 vegetation survey plots to be observed and measured early in each dry season to determine the effects of the preceding wet season. During the reporting period, Dr. Deshmukh planned to identify and mark additional study plots to cover all of the ecological zones in the Jubba Valley.

As of 1 October 1986, Drs. Craven and J. Merryman, the JESS socioeconomist and anthropologist, were in the final stages of defining the socioeconomic baseline studies (SEBS) after completing a sondeo (rapid reconnaissance) of the valley. Survey

questionnaires had been prepared in draft form and were being refined following a series of pretests. The start of actual SEBS data collection was planned for early 1987.

At this time, ARD was also anticipating the creation of special studies on local markets and women's issues for development planning as an integral part of JESS activities. This research was to be performed by the JESS long-term field team.

ARD consultants on water quality, public health, hydrology and remote sensing were scheduled for special studies during the Jilaal of the reporting period. Further, ARD consultants in ornithology and fishery science were to make visits that were planned to overlap the Jilaal and Gu' seasons. An ARD data management expert was scheduled to arrive during Gu'. For Xagaa, ARD had planned consultancies on botany, limnology, cultural heritage, land tenure and remote sensing, which would conclude the reporting period.

Finally, ARD had planned management reviews in November, December and July for the firm's president, home-office technical manager and home-office project manager, respectively.

Besides individual consultant reports, no other major reports were contractually required during the period from 1 October 1986 to 31 October 1987.

V. PRINCIPAL ACTIVITIES

A. Baseline Studies

1. SEBS

During the entire reporting period, the SEBS were under the direction of Drs. Craven and J. Merryman. Early in 1987, Dr. N. Merryman began assisting with the women's issues component of SEBS and in July, became the third codirector of SEBS fieldwork as a second team anthropologist. While ARD considers the women's issues study to be part of SEBS, especially in terms of logistics, it is of sufficient importance to merit separate discussion in this report (see Section V.B).

During SEBS pretests, Drs. Craven and J. Merryman decided to extend the pretesting to ensure that the final SEBS instrument would effectively measure the economic and social diversity of Jubba Valley residents. A lengthened pretest period would also allow more time for training JESS enumerators. SEBS went through three pretesting sessions and, as a result, field data collection was delayed until January 1987. At this time, a target sample of 1,000 Jubba Valley households was set by the JESS team. Of those 1,000, 500 would be rural sedentary households, 250 pastoral nomadic households and 250 urban families. The households were to be selected using a stratified random sampling technique that was devised based on results from a sondeo conducted in the valley in the previous reporting period. Optimistically, JESS planned to complete the survey by the end of this reporting period.

Initially, a SEBS field team consisted of a JESS team scientist and approximately 13 Somali assistants, including a field assistant, field technicians, enumerators, driver and cook in a two-vehicle caravan. Eventually, with the acquisition of BuREC vehicles from the JuDAS soil and land classification studies in April and the addition of the women's survey component, each field team grew to two JESS anthropologists and 17 Somali assistants in a three-vehicle caravan. Between January and November 1987, SEBS accounted for approximately 1,735 person-days in the Jubba Valley collecting field data. During that period, 946 SEBS questionnaires were completed, covering each region and district in the valley. The remaining households will be surveyed in November and December during the next reporting period. The completed women's survey questionnaires will be discussed in the following section on the women's baseline studies (WBS).

While each SEBS trip had unique characteristics due to weather, topography and population distribution, the team's

routine was well-defined and honed to razor-sharp efficiency. On arriving in an area, village lists were prepared and villages selected randomly for initial contact (often before camp was fully set up). The SEBS leader and selected assistants then visited the first village for preliminary discussions to determine the interest of participants and seek permission from village leaders to conduct research. After conferring with them, the SEBS team returned at a predetermined time to meet with a village assemblage. Notably, no village has denied the team permission to conduct interviews. In each district, four agricultural villages and usually two watering points for nomads were approached in the same fashion and dates for visits set.

At the agreed time, the SEBS team arrived in the village and started a village meeting to gather background information and randomly select household heads to be interviewed. While the SEBS leader continued the group meeting, JESS enumerators began individual interviews with the household heads selected for the sample. When the group and individual meetings were concluded, the SEBS team returned to camp to field-check all of the completed questionnaires and discuss the strategy for the next day. In most cases, the SEBS leader had gone on to contact other villages for subsequent visits. Generally, the SEBS team stayed in the field for approximately two weeks before returning to Mogadishu.

During this reporting period, team efficiency improved dramatically in terms of both the quantity and quality of work accomplished. Initially, 60 to 80 interviews were completed per trip, and many questionnaires had minor, but troublesome, errors that delayed data coding and entry. At present, 120 to 150 completed interviews are the normal output for each trip, with far fewer errors, but on the most recent SEBS trip, 246 interviews were completed in Jilib, Jamaame and Kismaayo during a 15-day period.

It must be remembered that this survey work is being carried out in a difficult and remote area of Somalia. Except when staying at the JESS field station in Baardheere, SEBS teams had to camp in open areas or compounds where even the essentials, such as water and food, were sometimes in short supply and of dubious quality. Access to villages and nomad sites was usually by rugged tracks over relatively great distance, making low-speed, four-wheel drive absolutely necessary. Travel was interrupted by numerous tire punctures and vehicle malfunctions, which had to be "bush"-repaired before continuing work. In contrast, the urban surveys proceeded with comparative ease because of the better roads and shorter distances to be traveled.

This demanding work extracted a heavy physical and mental toll on all the participants and an equally heavy cost on the vehicles. In the midterm evaluation of the JuDAS project, ARD

was chided for setting overly ambitious goals for SEBS, essentially planning to do too much with too little, and strong doubt was expressed that targets could be achieved. The SEBS record now speaks for itself.

Although SEBS questionnaires were checked in the field for accuracy at the end of each day, primary quality control was exercised at the JESS data center. There, questionnaires were reviewed once again for accuracy by JESS enumerators as they prepared code sheets from the data recorded on the questionnaire forms. The code sheets from the enumerators were then checked one more time, usually by Ms. Tillman, but frequently by Drs. Craven or J. Merryman. The data entry program--developed by an ARD data management consultant, Mr. Leonard Malczynski--includes quality control features to ensure that the codes entered are within a logical range and in the proper format before they will be accepted by the computer. It should be noted that not just a sample number of code sheets were checked for accuracy, but <u>every</u> sheet was checked by a member of the JESS professional staff. After being entered in the data base, all of the data sets were screened a final time by Dr. Craven or Ms. Tillman to check for data-entry errors. With this system of checks, the SEBS data base can be considered to be relatively error-free.

2. <u>WBS</u>

At the beginning of the reporting period, WBS was merely a concept and undefined task to be performed during Phase II. Once the SEBS materials had been refined and finalized, the JESS team began to formulate definitive strategies for WBS. Initially, Drs. Craven and N. Merryman held a series of working meetings with Dr. J. Merryman and Mr. Ahmed Mohamed Ali to outline the objectives and methodologies for this survey. In between separate home leaves and other JESS duties, Drs. Craven and N. Merryman exchanged responsibilities for preparing WBS materials, using several sets of feedback to refine the survey instrument, which was ready for field-testing during Xagaa. At that point, only minor refinements were found to be necessary, and code books were prepared.

Logistically, it seemed reasonable to attach WBS personnel to the SEBS field teams and work in the same areas simultaneously. This option made even more sense when Dr. N. Merryman became a permanent addition to the SEBS field team, with primary responsibility for supervising WBS field data collection and secondary responsibility for SEBS. The estimates of person-days spent in the Jubba Valley on WBS were included in the SEBS figure.

The WBS techniques used are similar to those of the successful SEBS model. While Dr. J. Merryman held a village

session with male village or nomad leaders, Dr. N. Merryman would hold a group meeting with the women. Meanwhile, specially trained JESS female enumerators conducted individual interviews with village women, often household heads.

In spite of a late start in June 1987, the WBS team successfully completed 207 interviews, with samples from nearly every district in the Jubba Valley. By December, WBS will have samples from every district, including nomadic and urban populations. JESS has not begun data entry nor attempted more than a rudimentary analysis of the WBS data during this reporting period. However, data entry will begin before the end of 1987 on the personal computer (PC) at MJVD, using dBase III Plus software, which was also used for the SEBS data. The data entry programs for this study have already been prepared.

3. Market Study

Under the direction of Dr. Craven, JESS has nearly finished collecting one full year of market data in Jubba Valley towns and villages. This important survey began in December 1986 and will continue until the end of Phase II. In this study, surveyors make biweekly visits to markets in four selected urban centers to determine the availability of selected commodities (including cereal grains, vegetables, fish, livestock, wood and fodder) and record prices. Market surveyors were established at Kismaayo, Jilib, Baardheere and Buurdhubo for most of the reporting period. JESS believes this is the first long-term marketing study conducted in the Jubba Valley.

Data from this survey have been entered in the JESS data base, and Dr. Craven has begun preliminary analyses on the more important items. AHT extracted information on livestock while preparing its Phase I report. Since the market surveyors live in the towns selected for this study, it is not realistic to estimate the number of person-days in the field that have been devoted to this activity.

4. TEBS

Dr. Deshmukh, JESS ecologist, is directing the TEBS fieldwork, assisted by three Somali counterparts plus a driver and cook in a two-vehicle caravan. The focus of this survey is on seasonal vegetation changes caused by climatic factors, river regimes and human activities. The TEBS team identified and marked a series of vegetation survey plots, covering all of the Jubba Valley's ecological zones. These plots are to be visited, observed and measured biologically at the beginning and end of each dry season, if access can be gained.

At each site, plants are identified, measured and recorded, the condition of woody species evaluated, and an assessment of site conditions recorded. At selected sites, measured areas of herbaceous vegetation are cut, dried and weighed for a standing-crop determination. Representative plant specimens are often collected and prepared for identification and preservation. Multiple collections have been made for botanical collections in Somalia, Kenya and the United Kingdom. Dr. Deshmukh receives taxonomic assistance from the East African Herbarium in Kenya and Royal Botanic Garden at Kew in the United Kingdom. Mr. Christopher Hemming, an ARD botanical consultant, assisted Dr. Deshmukh in analyzing vegetation in the future impoundment area.

Dr. Deshmukh and the TEBS team also made several measurements regarding the use of woody vegetation, especially poles and posts for house construction. In addition, local informants have been queried to determine the vernacular names of plants and local uses for vegetation.

At the close of the last reporting period (September 1986), the TEBS team had established 36 vegetation sites. Currently, TEBS has 82 sites throughout the Jubba Valley, both in and outside the floodplain from the Indian Ocean to Luuq. Many of these sites were visited three to four times during the reporting period. The TEBS team logged approximately 550 person-days of fieldwork in the Jubba Valley during this reporting period.

Dr. Deshmukh has completed a majority of TEBS, with only two field visits planned for the remainder of Phase II. Recently, he began preparations for computerized data analysis using the IBM PC AT at the Merrymans' residence.

5. Summary

In spite of numerous difficulties, ARD is proud of the progress made on the JESS baseline studies during the reporting period. The team has worked around expected constraints with vehicle allocation and maintenance and coped successfully with the unexpected problems of particularly aberrant weather patterns. In addition to the baseline studies, long-term team members are obliged to spend considerable time with consultants, resolving both logistic and intellectual matters. Of necessity, a higher priority for vehicle and equipment allocation has often been given for consultant visits over the baseline survey work, especially when either was in short supply. This has placed an additional burden on the survey teams.

The addition of BuREC's Blazer and truck fleet to JESS helped overcome a major logistic obstacle for the field studies by permitting multiple teams to operate in the field simultaneously, but the primary factor behind the success of the

baseline survey work is the dedication, enthusiasm and perseverance of the long-term JESS professionals involved in the fieldwork on the baseline studies. An adequate vehicle fleet merely allowed this team to meet their high personal goals and levels of commitment, and fully apply their skills, without the undue imposition of artificial constraints.

B. Remote Sensing

Resource Management and Research (RMR) is ARD's principal subcontractor, with responsibility for remote-sensing products for JESS. During this reporting period, RMR conducted four major remote-sensing activities for JESS. In January 1987, RMR conducted an aerial census of the Jubba Valley, with 10 percent coverage of the floodplain. Data from this census were computerized by RMR and turned over to JESS for entry into the project's data base.

In February 1987, RMR took stereo aerial photographs at approximately 1:10,000 scale of a four-kilometer strip centered on the Jubba River. Two sets of these stereo pairs were delivered to JESS in March and April. These photographs were then interpreted by an RMR consultant, Mr. Eric Trump, in April and May. The photographs were particularly useful for Phase I of the resettlement study conducted by Halcrow Fox Ltd. and were also used by AHT consultants for land-use determinations.

In late March and early April, RMR conducted another census of the Jubba Valley similar to the one conducted for early Jilaal in January, except that a three percent river-dependent census was added. The preliminary results of this census were delivered to JESS in September. In July, RMR flew a third aerial census using the same format as the March census.

RMR attempted to take 500 individual photographs of designated areas at preselected scales for vegetation mapping for inclusion in the TEBS study component. However, due to a camera malfunction, fewer than 100 photographs were delivered. The remainder will be taken during the next reporting period. While conducting the 1:10,000-scale photography flights, RMR also took 1:5,000-scale photographs of selected towns in the valley.

In May, ARD requested a proposal from a consultant, Mr. Thomas Hart, for a study of the Ethiopian portions of the Jubba River's upper catchment area. This proposal was accepted by ARD and will produce an upper catchment model of river hydraulics, based on elevation, slope, soil types, land use and rainfall information taken from various remote-sensing products and long-term meteorological data. As a final product, these surficial factors in the Ethiopian catchment will be correlated to river hydrographs at Luuq. Preliminary topographic data have already

been entered into a geographic information system based on ERDAS software.

In June, three members of the JESS field team participated in a five-hour overflight of the Jubba Valley during a high flood. Numerous photographs of flood conditions in the valley were taken to document the extent of flooding and provide an overview of dhesheeg surface areas. This flight gave the team valuable insights into the present role of dhesheegs in Jubba Valley agriculture.

C. Water Quality

Recognizing the paucity of water-quality data for the Jubba River and their importance for planning agricultural development in the valley, ARD included a major consultancy in the JESS Phase II work plan to address this lack of information. Much of this work was performed by Dr. William Jobin of Blue Nile Associates and was successfully completed during this reporting period. During the project's first year, Dr. Jobin helped JESS come to an agreement with the NUS Faculty of Chemistry for their assistance in conducting a one-year program of water-quality sampling and analysis of the Jubba River. This program was designed by Dr. Jobin with the concurrence of ARD project management.

Essentially, this research program consisted of taking water samples monthly at five widely spaced sites from Luuq to the estuary and more frequent sampling during peak flow periods. Existing water-quality records indicated that the Jubba River experiences high salinity peaks during the initial flood surge at the onset of each wet season, so it was considered desirable to increase the frequency of testing during these periods. However, since these surges cannot be predicted by date, weekly samples were taken during the months when river floods were most likely until the salinity began to increase. Then, samples were taken daily until the salinity began to decrease. During the reporting period, approximately 70 samples were taken for a total of 120 over the life of the project.

During the sampling, field measurements were made of water temperature, pH, electrical conductivity (EC), turbidity and river flow. Attempts to measure dissolved oxygen were unsuccessful because the water's high turbidity prevented accurate measurements. Samples were taken to the NUS' Faculty of Chemistry laboratories and analyzed for numerous chemical parameters, including EC, chlorides, total dissolved solids (TDS), suspended solids and ionic balances. These analyses were completed during the reporting period, and the data are now being analyzed and summarized by Dr. Jobin for a final report on water quality.

In the United States, Dr. Jobin prepared computerized river and reservoir models for water quality using the preliminary water-quality data. These models will be refined and run with the complete set of data, and the results will appear in Dr. Jobin's final report on water quality. The present report on JESS progress and accomplishments during the second year is not a an appropriate place to discuss the preliminary findings on water quality, but partial summaries of the results have already been published in JESS interim reports (see the Appendix, which provides a list of all project reports).

In retrospect, ARD is obliged to make note of an element of luck in conducting these studies. Water-quality field teams were on-site with Dr. Jobin when the Jubba River was at its minimum flow stage into the estuary during a high-tide event. In fact, the river ceased to flow at Kamsuma Bridge, upstream of the estuary, and tide levels forced saline water to its maximum upstream point, completely inundating the domestic water intakes for Kismaayo. Further, water-quality field teams were at Baardheere during two separate floods in the same season and took daily measurements that caught the beginning of the saline peak on both occasions. Given this upstream opportunity, water-quality teams were subsequently dispatched to measure the surge at downstream locations, which will thus permit relatively precise time-lag calculations. It should also be mentioned that the success of this effort depended on the water-quality teams being adequately trained, equipped and able to take optimal advantage of good fortune.

During this reporting period, approximately 520 person-days were spent in the Jubba Valley with JESS and Faculty of Chemistry personnel on the water-quality studies. However, this figure is an approximation as Dr. Jobin also utilized this field time for a study of public health issues. For reporting purposes, Dr. Jobin's field time was split equally between his work on water quality and public health, while staff from the Faculty of Chemistry were assigned full-time to the water-quality study, as were JESS assistants, cooks and drivers.

In a memorandum to the JESS team leader, Dr. Jobin was effusive in his praise of the work done by the Faculty of Chemistry during this reporting period. JESS has the longest record of water-quality sampling at multiple sites on the Jubba River. Combined with the longer term records maintained by Jubba Sugar Estates at Mareerey, the project's contribution to a water-quality data base for the Jubba River constitutes an invaluable resource for agricultural development planning in the valley.

D. Public Health

Dr. Jobin of Blue Nile Associates was also ARD's principal consultant on public health issues associated with JESS. During this reporting period, he visited Somalia three times--December 1986, and April and September 1987. During each assignment, Dr. Jobin split his time between water-quality studies and public health issues. In November, ARD released Dr. Jobin's report on the health implications of various dam design options, which discussed sizes of bottom outlets, turbine alternatives and future reservoir operations (see the Appendix).

In December, Dr. Jobin focused on community water supplies and disease vectors associated with water-related development projects, including hydropower and irrigation. During this fieldwork, he conducted assessment surveys on vector habitats and the presence of disease vectors. Dr. Jobin also inspected and evaluated community water supply systems throughout the Jubba Valley. At the request of the AID project manager, Ms. Patton, he prepared a proposal for an epidemiological and nutritional survey of the valley, which was subsequently adopted in modified form for a contract amendment between ARD and AID. The results of this consultancy were made public in a JESS report released by ARD in January 1987.

In April, Dr. Jobin conducted vector surveys during fieldwork for the water-quality studies. In addition, he made initial contacts with potential cooperating parties for the epidemiological surveys at the World Health Organization (WHO), Ministry of Health (MOH) and Rural Health Unit of the National Refugee Commission (NRC). This work formed the basis of an epidemiological component in the contract amendment negotiations between ARD and AID.

In September, Dr. Jobin returned to Somalia for two weeks to finalize plans for the epidemiological and nutritional survey that had subsequently been included in the contract amendment. These surveys will be conducted during the next reporting period.

The number of person-days devoted to public health issues were estimated, knowing that Dr. Jobin did not work with field counterparts on public health, and drivers, cooks and assistants from the Faculty of Chemistry were included in the figure for the water-quality studies. Thus, only 45 person-days were approximated for field studies on public health issues during the current reporting period, which is approximately half of Dr. Jobin's fieldwork for the project's second year.

E. Hydrology, Sedimentation and River Scour

An ARD hydrology consultant, Dr. Donald Alford, came to Somalia in January 1987 for a two-month consultancy on hydrology, sedimentation and river scour. During this time, he carefully reviewed and evaluated hydrology data prepared by Electroconsult (ELC), AHT, dam-design engineers and the MJVD master-planning technical assistance group. Dr. Alford made two visits to northern and southern sections of the Jubba River to evaluate the potential for sedimentation and river scour.

In his hydrology review, Dr. Alford calculated that the estimates of potential reservoir inflow were overly optimistic by as much as 15 percent. This observation necessitated an extensive review of his report by JESS and MJVD before it was released by ARD. Based on Dr. Alford's draft report, AHT chose to review their hydrology data and came to a preliminary conclusion that partially substantiates his observations about the earlier inflow estimates. Until these results are firmer and presented by AHT to MJVD, this annual report is not an appropriate place for further discussion of this issue.

With regard to sedimentation, Dr. Alford was unable to develop definite conclusions owing to a lack of baseline data. However, he did urge systematic, long-duration, sediment sampling using an integrated sediment sampler. ARD carefully considered working this recommendation into its work plan, but ultimately decided to forego sediment studies because of time constraints and current security precautions near the most suitable sampling sites. The most likely sites would have been the bridges at Baardheere and Luuq, where security measures are quite intense. It was anticipated that having an expatriate team carry winches and a device resembling a bomb onto those bridges was unlikely to be accomplished without considerable difficulty. JESS did investigate other options with Somali research agencies, but without success. The lack of a systematic, integrated, sediment-sampling regime is still a serious pre-construction flaw in BDP planning, and it is hoped that sediment sampling will be undertaken by BDP as soon as possible.

Dr. Alford made rudimentary field observations concerning the potential for river scour and calculations of river-flow energy. On the basis of these observations and calculations, he did not consider the potential for river scour to be an important consideration after the dam is completed.

F. Fisheries

ARD selected Mr. Earl Meredith as the JESS fishery consultant. At the end of the project's first year, he was halfway through the first of two consultancies of two months

each. Mr. Meredith's first consultancy ended in November 1986 and the second in May 1987. For both, he was ably assisted by Mr. Ahmed Abdulaahi Yassin, a fishery scientist with the Ministry of Fish and Marine Resources (MFMR) and JESS staff counterparts. Mr. Yassin conducted further fisheries studies for JESS when Mr. Meredith was out of Somalia.

During his first consultancy, Mr. Meredith completed a frame survey, conducted fishing-gear assessments and began fish biology sampling. In his report on this work, Mr. Meredith estimated that the Jubba River could sustain an annual harvest of 1,600 to 1,800 metric tons of freshwater fish, valued at approximately US$1,000,000. His analyses indicated that the Jubba River's fishery resource is under-exploited.

For his second consultancy during April and May, Mr. Meredith continued the fish biology sampling, but was severely hampered by rising river flows, such that the planned chemo-fishing had to be restricted. He did make comparative assessments of fishing in the Shebelli and Jubba rivers. In total, approximately 120 person-days were spent in the Jubba Valley on fisheries research.

Acting on a recommendation from the midterm evaluation, ARD sent Mr. Meredith to Kenya to observe and evaluate fisheries created in the Tana River impoundments. Mr. Meredith also visited the Food and Agriculture Organization (FAO) of the United Nations in Rome to discuss Jubba River fisheries with Mr. Robin Welcomme, an internationally recognized expert on African inland fisheries.

G. Ornithology

In March, an ARD ornithology consultant, Dr. David Pearson, came to Somalia to conduct a survey of birds in the Jubba Valley, concentrating on Palearctic migratory species. He spent three weeks on this survey with three JESS staff members for a total of approximately 60 field days. They recorded 270 species between Bu'aale and Kismaayo. No rare or endangered species were encountered, although Dr. Pearson did add 13 first-time observations for the Jubba Valley. He does not consider the valley to be a major flyway for Palearctic species. In October, ARD published Dr. Pearson's report on this consultancy. Based on a recommendation from this survey, ARD plans to have him return to the Jubba Valley in November 1987 to conduct a follow-up survey during a wet season.

H. Aerial Photo Interpretation

Mr. Eric Trump, an RMR air-photo interpretation expert, came to Somalia to interpret the 1:10,000-scale photographs that RMR had taken earlier for JESS. He spent six weeks interpreting the 1,800 stereo photos using a classification system that was modified from AHT's land-use maps of the Jubba Valley. Dr. Deshmukh assisted with development of the classification system and photo interpretation. Mr. Trump's report on this work was released by ARD in June 1987. Later, he produced a land-use vegetation map at 1:60,000 scale based on 1960 aerial photography of the Jubba Valley. This map will be used to compare vegetation and land-use changes in the valley between 1960, 1983 and 1987.

I. Botany

Mr. Christopher Hemming, an ARD botanical consultant, made his second Phase II contribution to JESS in June 1987. For this consultancy, he and Dr. Deshmukh conducted a botanical reconnaissance of the proposed impoundment area. During this survey, the team collected 119 plant specimens for multiple collections at cooperating organizations in Somalia, Kenya and the United Kingdom. One specimen may be a species of sedge that is new to science. The 114 person-days spent in the field on this survey are incorporated in the overall estimates for the TEBS team.

J. Land Tenure Studies

During July and August, Dr. James Riddell of the University of Wisconsin's Land Tenure Center (LTC) made three field trips to the Jubba Valley to study land tenure issues. He was assisted by JESS counterparts and a colleague from the NUS economics department, Mr. Mohamed Said Samatar. Dr. Riddell interviewed 90 landowners between Baardheere and Kismaayo, and approximately 200 person-days in the field were required for this survey.

Dr. Riddell's preliminary findings were that land tenure issues do not constitute a serious problem in the Jubba Valley at present, but this situation could change rapidly with accelerated development. His findings do not concur with earlier studies conducted before World War II, thus indicating recent changes in social structures. In addition, Dr. Riddell's research revealed evidence of increasing land speculation, particularly in the middle Jubba Valley.

K. Limnology

In August, ARD sent Drs. Steve Njuguna and Francis Muthuri to Somalia to conduct a limnological survey of the Jubba River. This study was planned for June, but had to be postponed due to severe flooding in the valley. River levels were still high in August, which affected both aquatic populations and sampling strategies.

The limnologists were assisted by JESS counterpart staff and, in part, by Mr. Ahmed Abdulaahi Yassin from MFMR. As the JESS boat was unavailable, Drs. Njuguna and Muthuri were restricted in their ability to collect aquatic samples. However, samples were taken from the estuary, a dhesheeg, the middle Jubba River near Baardheere, Buurdhubo, Luuq and a tributary in the reservoir zone. A plan to take samples from Jilib to Baardheere had to be aborted when roads became impassable because of unexpected Xagaa rains in the middle Jubba Valley. A total of 78 person-days were spent in the valley on two limnology trips.

The report on this survey noted low diversity in the populations of phytoplankton, zooplankton, benthic organisms and macrophytes, which may be a result of two unusual river conditions that preceded the fieldwork. In early June, the Jubba River experienced unusually heavy floods that may have scoured many benthic organisms and macrophytes. In addition, the water-quality data showed relatively high levels of arsenic in the river water for May and June, which may have had deleterious effects on the plankton populations. Since this survey was the first limnological study of the Jubba River, there were no previous records to use for comparison, and follow-up studies are not planned by JESS.

L. Cultural Heritage

In late August, ARD sent an advance party from the cultural heritage survey team to Somalia to begin preparations for an extensive reconnaissance trip to the proposed inundation area. Mr. Tom Gresham, one of the team's codirectors, and his wife, Ms. Gisela Gresham, spent a week on intense preparatory activities in Somalia prior to the arrival of the other team members. Besides accumulating field supplies and equipment in Mogadishu, they went to Buurdhubo, Garba Haarey and Baardheere to locate base camps and rent six camels and drivers for the expedition.

The other codirector, Dr. Steven Brandt, and Ms. Nanny Carder, Mr. Rob Benson, Mr. Jim Ellison and Mr. Curtis Marean arrived on 30 August to complete the pre-trip activities. The team, assisted by JESS enumerators, drivers and cooks, embarked for Baardheere three days later to begin fieldwork. The plan for this reconnaissance consisted of establishing a base camp at

Buurdhubo for fieldwork in the reservoir's central area. Two other teams left Baardheere, one on each side of the Jubba River, to conduct a walking reconnaissance of the reservoir gorge area between the dam site and Buurdhubo. Each team consisted of two expatriates, two JESS assistants, three camels, two camel drivers, a cook, two camp assistants and one police officer for protection.

After 20 days, the teams met at Buurdhubo and returned to Mogadishu to rest and replenish their supplies. Four days later, they returned to Buurdhubo and headed north with the camel teams toward Luuq while the central team continued to work around Buurdhubo. Two volunteers, Ms. Sandy Whitney and Ms. Wendy Rogers, joined the cultural heritage team at this time. The teams met at Luuq 19 days later and then returned to Mogadishu several kilograms lighter, but none the worse for wear.

During the 435 person-days spent in the field, the team investigated 699 sites, mostly archeological scatters of middle and late stone-age artifacts. Other sites included cairns, burial areas and caves that contained unusual rock art. At a debriefing for AID, the team described the expedition, discussed its preliminary findings and exhibited selected samples of artifacts. Dr. Brandt and Mr. Gresham noted that this was the first archeological reconnaissance carried out in the Jubba Valley and perhaps the first archeological survey sponsored by AID. Since the 699 sites represent only a sample of sites in the area, the team strongly recommended further archeological surveys, including excavation of the most promising sites, before flooding occurs.

M. Forestry

In September, an ARD forestry consultant, Dr. Timothy Synnott, arrived in Somalia to conduct a one-month survey of forest resources and management practices in the Jubba Valley. After discussing his proposed activities with Dr. Deshmukh, the British Forestry Project (BFP) and AHT master planning team, Dr. Synnott went to the Jubba Valley with his wife, a JESS assistant, cook and driver. This team started at Luuq and traversed the length of the Jubba Valley to Kismaayo, evaluating forest resources and examining various uses of forest products by valley residents. Dr. Synnott visited National Range Agency (NRA) nurseries in each district and talked with district forestry officers. Approximately 80 person-days were spent in the Jubba Valley on the forestry survey.

At his debriefings for MJVD and USAID and in his draft report, Dr. Synnott indicated that he felt the forest resource in the Jubba Valley is not overexploited at present and is in a healthy condition, except in areas with high human population

densities, such as refugee camps and large agricultural projects. He was encouraged by increasing agro-forestry activities and the capabilities of Somali technical forestry personnel. Dr. Synnott did note a serious diminution of tall forest (basically riverine forest) and, hence, a lack of sawtimber for construction and carpentry. During his fieldwork, he visited forest preserves in the Jubba Valley and noted a need for immediate protection if they are to remain a viable option for forest conservation areas.

N. Wildlife

During the project's second year, JESS continued to collect anecdotal information on Jubba Valley wildlife from the SEBS and TEBS surveys and consultant reports. The RMR aerial surveys also provided valuable data on larger mammals and crocodiles. JESS is waiting for the final report on the University College of London survey conducted during July and August 1986.

O. Pre-Construction and Dam Operation

In its second year, JESS produced two reports on pre-construction and operation concerns regarding the Baardheere Dam. Report No. 5, JESS INTERIM REPORT ON HEALTH IMPACTS OF DESIGN ALTERNATIVES FOR PROPOSED BAARDHEERE DAM, by Dr. William Jobin, was widely discussed by MJVD, AID and AHT following its release by ARD in November 1986. A different reporting strategy was employed in JESS Report No. 16, JESS WORKING PAPER: PRE-CONSTRUCTION CONCERNS WITH THE BAARDHEERE DAM, by Dr. R. E. Tillman. This report was circulated in draft form for intense discussions with MJVD, AID, AHT and the World Bank before it was finalized for publication. Acting on a recommendation from AID, ARD delayed publication until suitable photographs and slides could be assembled and printed to demonstrate points made in the text.

P. Mapping and Long-Term Monitoring

In July, Mr. Dulin, ARD's natural resources specialist and home-office project manager for JESS, carried out summary investigations into the need for and possible configurations of mapping the results of JESS research. Because the development projects that are being planned affect a large geographic area in southern Somalia, a major portion of JESS research results should be presented in map form to facilitate rapid, visual assessment of current socioeconomic and environmental conditions, locations of actual or potential conflicts and/or impacts, and areas of specific development concern.

Mr. Dulin reviewed the quality and scales of existing base maps in Somalia and visited the principal ministries involved in producing maps. This research found that there is currently no entity in Somalia with sufficient staff and logistic support to produce high-quality, camera-ready maps of selected JESS results. As is fully discussed in the interim report on this consultancy, a decision was made to prepare draft maps in Somalia and send them to ARD's home office for editing and publication. A tentative list of suggested map themes was prepared along with suggested scales for each theme. Final decisions regarding the selection of themes and scales will be made before the maps are prepared for inclusion in the final Phase III report.

In light of the importance of long-term environmental and socioeconomic monitoring to detect and analyze the impact of the pending dam project and subsequent valley development, it will be necessary to establish a monitoring capability in Somalia as an integral part of the GSDR's development plans. In an effort to initiate the conceptualization of a long-term monitoring system, Mr. Dulin also reviewed the capabilities and experience of various Somali ministries regarding environmental and socioeconomic monitoring. With few exceptions, it was found that the term "monitoring" was used only in the context of project management (i.e., to control the quality and quantity of work performed).

The justification for such a monitoring system is discussed in a JESS interim report, which also presents a tentative list of monitoring themes that cover the pertinent aspects of development concerns, and makes a strong argument for the creation and adequate funding of a monitoring and evaluation unit to be established within MJVD. Final decisions concerning the recommendations on long-term environmental and socioeconomic monitoring will be included in the final Phase III report.

Q. Project Management and Administration

During the reporting period, ARD employed a management structure similar to that used during the first year of JESS activities. Overall supervisory responsibility remained with ARD's president, Dr. George Burrill, who conducted one management review in Somalia during the project's second year, as planned in ARD's best-and-final proposal. Day-to-day project management and monitoring of ARD home-office operations were the responsibility of ARD's project manager, Mr. Donovan, until July 1987 when Mr. Dulin took over this position. Mr. Richard Hart, ARD's business manager, handled financial negotiations and the design and implementation of fiscal accounting procedures with AID. Dr. Tillman served as the home-office technical project manager for JESS until he replaced Dr. Buskirk as team leader in February 1987. After these changes, Mr. Dulin and Dr. Tillman shared

responsibilities for all the technical aspects of JESS. However, the responsibility for directing and implementing project activities in the field rests with the JESS team leader, who is assisted by an administrative coordinator, Dr. N. Merryman, and counterpart staff.

The expatriate team continued to rely heavily on a highly efficient Somali staff consisting of MJVD and JESS employees. Mr. Sheik Mumin Sheik Mohamed is the JESS office manager, managing the office personnel and serving as liaison with MJVD senior staff. Mr. Aweys Sheik Mohamed, who was initially office assistant, was promoted to assistant office manager, taking on duties of preparing check vouchers, photocopying and preparing the payroll, in addition to assisting Mr. Mumin with daily office operations. Mr. Said Husein Hersi is the JESS logistics manager with broad duties ranging from fuel delivery and storage to vehicle logistics to collecting camping gear for consultant trips. Mr. Abdi Jama Samatar, the JESS accountant, serves as liaison between the team leader and Ministry of Finance. Mr. Abdi Jama also took on full responsibility for timely fuel procurement and has been very effective in this task. Ms. Rooda Mohamed Abdulaahi, is listed as the JESS secretary, but performs numerous other duties. She prepares check vouchers and payroll forms, enters data for SEBS and WBS, and prepares monthly cash disbursement journals to record expenditures of DDD funds.

Considering that JESS employs approximately 49 Somali staff members and manages a fleet of 15 vehicles, the Somali staff is essential for project operation and deserves considerable credit for the successes realized during this reporting period. In the absence of the team leader and administrative coordinator, project activities went on as planned because of the skill and enthusiasm of JESS office staff.

In addition to conducting field research, JESS scientists took on extra administrative responsibilities. Dr. Craven became JESS data manager, handling logistics and machinery at the data center as well as the data sets. In June, Ms. Tillman was hired by ARD as manager of the JESS data center to relieve some of this heavy burden on Dr. Craven. In this role, she assumed responsibility for the center's daily activities and handled quality control for the final entry of SEBS data into the computer. Dr. Deshmukh assumed responsibility for vehicle maintenance and use schedules, working directly with the Vehicle Service Center (VSC) of the Field Support Unit (FSU). Dr. J. Merryman served as field coordinator for personnel and equipment, assuring that each field team, including consultants, had the assistance and equipment needed to complete their fieldwork. Because of the Somali office staff's high efficiency, Dr. N. Merryman was able to delegate some of her administrative coordinating tasks and became the second JESS anthropologist.

R. Data Collection and Management

During this reporting period, JESS activities in the Jubba Valley involved an estimated 3,863 person-days in the field for baseline and special studies (see the table below). The average figure of 322 person-days per month is misleading because field activity was concentrated during the eight months of relatively dry conditions, during which time the monthly average was 483 person-days.

Person-Days in the Field by Study

Study	Person-Days	Percentage of Total
SEBS	1,735	44.9
TEBS	550	14.2
water quality	520	13.4
cultural heritage	435	11.3
land tenure	200	5.2
fisheries	120	3.1
forestry	80	2.1
limnology	78	2.0
ornithology	60	1.5
public health	45	1.2
hydrology	40	1.0
Totals	3,863	99.9

These estimates do not include the time of market surveyors, who reside in the towns they are studying, or the aerial census work and photography done by RMR. It should also be noted that a major epidemiology survey will be conducted by JESS in late 1987 and early 1988 that will substantially increase the number of person-days spent in the field on public health components of JESS.

As the intent of Phase II is the collection of field data, ARD believes that the number of person-days spent in the Jubba Valley reflects a strong commitment to the intended objectives of JESS. The project's efforts during this reporting period were clearly concentrated on collecting field data. Teams led by JESS scientists and ARD consultants have been in the field constantly, with over 40 persons in the field at a single time on two occasions in August and September. Data collection for the baseline studies has been highly structured and coded for rapid computer entry. The data for water quality, fisheries and land tenure were also highly structured for computer analysis.

Data for the baseline studies are currently being entered on JESS computers, while the water quality, fisheries and land tenure data are stored at U.S. sites for analysis by ARD consultants. Early in 1987, JESS established a data center that was separate from the project's offices at MJVD. Since the ministry is part of the presidential compound, security is rigorous and JESS staff often had difficulty gaining access to the office after business hours. Further, it became clear that JESS data entry would require longer working hours than were possible at the ministry. The data center, a refurbished house, became a focal point for SEBS and market-survey activities. Three computers were installed, and most of the JESS equipment was moved to the center for storage.

JESS has five personal computers with one back-up machine. Most data entry is done at the JESS data center where two AT-type personal computers are operated on double shifts during the workweek. In addition, JESS has three Hewlett-Packard portable lap-top computers, of which one is usually down or in the United States for repairs.

Throughout the reporting period, JESS data management was plagued with problems. Because of severe power fluctuations and extended outages, the computers cannot be operated directly off commercial power supplies. Instead, they must rely on a complex arrangement of transformers, heavy-duty batteries, battery chargers, inverters and power filters. This line of power is only as good as its weakest link, which can and does change on a daily basis. Since none of these items, except batteries, are readily available in Somalia, it has taken considerable effort on the part of JESS and ARD to keep the computers operating. Recently, the electric power at the data center has been too low to fully charge the batteries between shifts and overnight. As a result, it has been necessary to operate a diesel generator for six to eight hours a day to adequately charge the batteries for computer operation. At times, one data-entry shift has been unable to work because the batteries have not taken a full charge. Similarly, when a computer fails, determining which part of the system malfunctioned requires considerable troubleshooting. Since none of the JESS staff have sufficient training and experience in electricity or electronics, their knowledge of computer system operation and repair is self-taught.

ARD's data management consultant, Mr. Malczynski, was very helpful in setting up and repairing computer equipment during his consultancy in May, but his primary function was to prepare software programs for simplified data entry and analysis. Because of nearly constant equipment malfunctions, JESS feels a considerable measure of success in being able to keep at least two machines operational on a daily basis. As a result, data entry has progressed at a satisfactory pace and was on schedule at the end of this reporting period.

S. Project Liaisons

In addition to daily contact with the project managers at AID and MJVD, JESS maintains close relationships with other projects working in the Jubba Valley. This includes systematic exchanges of reports, meetings and sharing data sets. The following discussion is not intended to include all JESS liaisons during the second year, but rather, is offered as an illustrative description of its relationships to other projects.

JESS has its most frequent exchanges with the AHT master planning team. This liaison consists of scheduled meetings between teams as well as individuals working together on shared data sets. Each ARD consultant meets with the AHT team leader to discuss the proposed scope of work and, if relevant, meetings are scheduled between the consultant and AHT team members. Consultant draft reports are given to AHT as well as JESS monthly reports and team trip reports. However, during the reporting period, no AHT draft reports were received by JESS except for one on forestry. AHT did provide JESS with scopes of work for AHT consultants.

JESS worked closely with Halcrow Fox during Phase I of its resettlement study, assisting with logistic arrangements and making all project reports, maps and aerial photographs available to Halcrow Fox. The latter reciprocated logistically by making camping equipment and a crucial fuel supply in Luuq available to JESS. Similarly, JESS provided assistance and information to Price Waterhouse during its Phase I institutional study of MJVD.

JESS and the two LTC study teams exchanged information on a constant basis through meetings and the sharing of reports. Ms. Catherine Bestemen's research in the middle Jubba Valley has been helpful and should prove even more valuable as she gets further into her work.

JESS and the Human Settlements and Natural Resource Systems Analysis (SARSA) team that is studying rural/urban linkages in the lower Jubba Valley hold frequent meetings to discuss research strategies and avoid duplicating research efforts. These teams plan to exchange certain data sets and field observations, and SARSA receives JESS monthly and trip reports.

To a lesser extent, JESS maintains contacts with the Central Rangelands Development Project (CRDP) and BFP at the NRA. The project also works with the Livestock Marketing and Health Project (LMHP), National Tsetse and Trypanosomiasis Control Program (NTTCP) and World Concern in Jilib.

T. Training

Besides providing on-the-job training, ARD does not have contractual training obligations and only participated minimally in this project component before Mr. Fisher became the JuDAS project manager. At Mr. Fisher's request, JESS has taken a more active role in planning and assisting with the implementation of short- and long-term training. While Mr. Fisher has overall responsibility for this project component, JESS has been pleased to assist AID and MJVD when possible. The JESS team leader is a member of the training committee established by AID and MJVD, along with Mr. Fisher and MJVD's Permanent Secretary and Director of Planning.

To assist candidates who have been nominated for training abroad, JESS began English language classes at MJVD, which are designed to prepare candidates for the TOEFL (Teaching of English as a Foreign Language) exam. JESS team members take individual responsibility for ensuring that candidates make the necessary arrangements for TOEFL exams.

Finally, JESS holds seminars that are conducted by ARD consultants for training and debriefing purposes. However, owing to rigorous field schedules, attendance at these seminars is inconsistent.

U. Evaluation

In April, JESS participated in a midterm evaluation of JuDAS. The evaluation team was critical of the project's ambitious work schedules, especially for SEBS. At that point, the evaluators assumed it would be impossible, or at least improbable, that 1,000 households could be sampled by SEBS before the end of 1987. As a result, the ARD home-office project manager and JESS team leader set a cutoff date for SEBS data collection of 15 December. With 946 household interviews completed by 31 October, this turned out to be an unnecessary precaution.

The evaluation team was also critical of "rolling" project planning. This criticism was ignored entirely as it was not relevant in the Somali context. ARD was convinced that an inflexible implementation plan would not be appropriate in the constantly changing project environment found in Somalia. Since all of the studies identified in the JESS work plan for this reporting period were completed successfully, despite weather-induced alterations, the ARD strategy has been shown to be sound.

Other minor points from the midterm evaluation were considered, and if judged to be feasible, ARD made the necessary

adjustments. At a meeting with AID, the mission agreed that ARD had addressed the relevant points contained in the evaluation.

V. Reports

During this reporting period, ARD produced 16 consultant reports or working papers for the project (see the Appendix). In addition, JESS prepared 12 monthly reports that were sent to numerous interested parties as well as AID and MJVD.

W. Workshops

Drs. Tillman, Craven and Deshmukh attended the NAS workshop at Coolfont, West Virginia, in May 1987. Also, at MJVD's request, Dr. Tillman participated in the BDP Technical Committee Meeting held in June 1987.

VI. FUTURE WORK STRATEGY

A. Phase II

JESS has five months remaining for Phase II data collection, which will end in March 1988. ARD plans to send four consultants to Somalia during this period for epidemiological surveys, data management, pastoralism studies and an evaluation of local institutions. ARD's president, Dr. Burrill, and home-office project manager, Mr. Dulin, will also come to Somalia to provide management and technical inputs for JESS. In addition, ARD will send a long-term consultant on computer operation and maintenance to Somalia for four to six months, beginning in January 1988. All of the JESS baseline studies will be completed before February 1988, and all relevant baseline data will have been entered into the computerized data base before the end of Phase II.

1. Consultants and ARD Staff

In December 1987, Dr. Ralph Klumpp, an ARD epidemiology consultant, will coordinate and supervise an epidemiology, nutrition and vector survey in the lower Jubba Valley, centering on the Jamaame and Jilib districts. He will direct personnel from WHO, MOH and the Refugee Health Unit during this two-month consultancy.

In January 1988, ARD will send a computer hardware consultant to troubleshoot the project's problematic computer operations. This consultancy will last approximately three weeks. During this consultancy, a second, longer term consultant will arrive who has training in computer statistical software and experience in computer maintenance.

In early January, Dr. Jorg Janzen, an ARD pastoralism consultant, will go to Somalia for a two-month study of pastoral movements in the Jubba Valley. He will be assisted by Dr. J. Merryman.

Early in 1988, Dr. Burrill, ARD's president, will conduct a final project management review in Somalia. He will also provide guidance on preparing the Phase II report.

Before the end of Phase II, ARD will send its home-office project manager, Mr. Dulin, to Somalia to continue his work in mapping and monitoring. He will direct map production for the Phase II report and also help guide report preparation.

2. JESS Team

Dr. Craven will focus on completing SEBS data entry and continuing with data analysis. She will proceed with the analysis of SEBS data and begin analyzing the data collected by the JESS market survey. Dr. Craven will work closely with the computer and information specialists during their consultancies.

Dr. Deshmukh has two more field activities planned for the remainder of Phase II. In December, he plans to travel down the Jubba River from Buurdhubo to Baardheere by boat. He will be accompanied and assisted by Mr. Ahmed Abdulaahi Yassin of MFMR. Of course, execution of this plan depends on the amount of river flow and successful operation of the JESS boat and motor, which have been housed at Luuq since June 1987.

Dr. Deshmukh would also like to visit selected vegetation plots in the Jubba Valley once more before the end of Phase II. At this point, such a visit has been designated as optional and depends on many other variables, such as weather, fuel and vehicle availability, and DDD funding.

Dr. Deshmukh will continue with the computer entry and analysis of TEBS data. In addition, he will complete his report on forest conservation in the Jubba Valley.

Dr. J. Merryman is expected to complete SEBS field data collection by 15 December 1987 and will assist Dr. Craven in implementing quality-control measures for data entry when he is not in the field. Dr. J. Merryman will also be the primary contact for Dr. Janzen during his consultancy and will accompany him for some of the pastoral studies fieldwork.

Dr. N. Merryman will also complete her work on SEBS and WBS field data collection by 15 December 1987. She will begin to direct the computer entry of WBS data and design analysis strategies. She will also work closely with ARD's data management consultants.

Prior to the end of Phase II, each JESS scientist will be responsible for drafting sections on the baseline studies for the Phase II report.

Dr. Tillman will continue to perform the regular administrative and logistic duties of team leader, and begin to draft the sections of the Phase II report that deal with consultant studies. He will take the lead role in preparing the Phase II draft report, including making writing assignments and handling editorial responsibilities.

Ms. Tillman will continue to manage activities at the JESS data center, including the supervision of data entry and quality

control. ARD tentatively plans to discontinue her position in February 1988 as all data will have been entered and the new computer consultant can assume maintenance responsibility for hardware at the center.

B. Phase III

Phase III is designed to be an intense period of data analysis and report writing, and the team will work at these tasks from March to August 1988. A first draft of the final Phase III report will be available for comments by early August. ARD plans to repatriate the JESS team members by 15 August, and the team leader will leave Somalia two to three weeks after the departure of the last team member. The team will then reconvene at a site in the United States to evaluate comments on the final report and make revisions.

While specific consultancies have yet to be arranged for Phase III, there are plans to have consultant time available in Somalia and/or the United States for special studies or report writing and review. ARD home-office staff members will also visit Somalia during Phase III to assist with preparing the final report and designing long-term monitoring strategies for MJVD.

The team leader, Dr. Tillman, will start to work with the AID project manager, Mr. Fisher, to begin turning over project equipment to MJVD either late in Phase II or early in Phase III. This turnover will occur when specific items are no longer needed for project studies. Items that are initially planned for turnover will be high-frequency radios and part of the vehicle fleet.

A more refined strategy for Phase III activities will be defined during the management visits of Dr. Burrill and Mr. Dulin near the end of Phase II.

APPENDIX

JESS Reports

1. PHASE I REVIEW AND PHASE II WORK PLAN FOR THE JESS PROJECT; 31 July 1986.

2. BIBLIOGRAPHY OF THE JUBBA VALLEY IN SOMALIA FOR THE JESS PROJECT; 31 July 1986.

3. JESS MANPOWER AND TRAINING ASSESSMENT; Richard Z. Donovan; 31 July 1986.

4. JUBBA ENVIRONMENTAL AND SOCIOECONOMIC STUDIES FIRST ANNUAL REPORT; 3 November 1986.

5. JESS INTERIM REPORT ON HEALTH IMPACTS OF DESIGN ALTERNATIVES FOR PROPOSED BAARDHEERE DAM; William R. Jobin; 11 November 1986.

6. JESS INTERIM REPORT ON HEALTH CONSEQUENCES OF DESIGN CRITERIA FOR WATER SUPPLY AND SANITATION IN NEW AND RESETTLED COMMUNITIES; William R. Jobin; 12 November 1986.

7. JESS CONSULTANCY REPORT ON WATER QUALITY AND PUBLIC HEALTH ENGINEERING; William R. Jobin; 20 November 1986.

8. JESS INTERIM REPORT ON CULTURAL HERITAGE SITES IN PROPOSED BAARDHEERE RESERVOIR AREA; Steven A. Brandt; 20 November 1986.

9. INTERIM REPORT ON VEGETATION SURVEY OF THE JUBBA VALLEY; Christopher F. Hemming; October 1986.

10. JESS PHASE I DESIGN STUDIES; William R. Jobin, Peter A. Bloch, James C. Riddell, Curt R. Schneider and James F. Ruff; July 1986.

11. JESS SECOND CONSULTANCY REPORT ON WATER QUALITY AND PUBLIC HEALTH ENGINEERING; William R. Jobin; January 1987.

12. JESS FISHERIES CONSULTANCY I REPORT; Earl K. Meredith; June 1987.

13. JESS INTERIM REPORT ON AERIAL PHOTOGRAPHY INTERPRETATION; Eric Trump; June 1987.

14. JESS PRELIMINARY REPORT ON AERIAL SURVEY OF THE JUBBA RIVER; R. Murray Watson; June 1987.

15. JESS THIRD CONSULTANCY REPORT ON WATER QUALITY AND PUBLIC HEALTH ENGINEERING; William R. Jobin; July 1987.

16. JESS WORKING PAPER: PRE-CONSTRUCTION CONCERNS WITH THE BARDHEERE DAM; R. E. Tillman; November 1987.

17. JESS REPORT ON FORESTS IN THE MIDDLE JUBBA VALLEY (provisional title); Ian Deshmukh; forthcoming.

18. JESS INTERIM REPORT: MAPPING JESS RESEARCH RESULTS; Paul Dulin; 14 October 1987.

19. JESS INTERIM REPORT: SURVEY OF PALEARCTIC MIGRANT BIRDS IN SOMALIA'S MIDDLE AND LOWER JUBBA VALLEY; David Pearson; 23 October 1987.

20. JESS INTERIM REPORT: LONG-TERM ENVIRONMENTAL AND SOCIOECONOMIC MONITORING; Paul Dulin; 26 October 1987.

21. JESS REPORT ON WATER BALANCE AND SEDIMENT TRANSPORT IN THE JUBA RIVER WATERSHED; Donald Alford; 31 August 1987.