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JESS INTERIM REPORT:
VEGETATION SURVEY OF
BAARDHEERE RESERVOIR ZONE

JESS Report No. 23

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CONTENTS

<u>Section</u>	<u>Page</u>
<u>Acronyms and Abbreviations</u>	i
<u>Preface</u>	ii
I. <u>Executive Summary</u>	1
II. <u>Introduction</u>	2
III. <u>Technical Discussion</u>	3
A. <u>Vegetation Survey Comments</u>	3
B. <u>Vegetation Site Description</u>	3
C. <u>Reservoir Margin</u>	7
D. <u>Vegetation Monitoring</u>	9
E. <u>Collections</u>	10
<u>Appendices</u>	
A -- <u>Scope of Work</u>	A-1
B -- <u>List of Plants Collected</u>	B-1

ACRONYMS AND ABBREVIATIONS

AID	U.S. Agency for International Development
ARD	Associates in Rural Development, Inc.
GSDR	Government of the Somali Democratic Republic
JESS	Juba Environmental and Socioeconomic Studies*
JuDAS	Juba Development Analytical Studies
masl	meters above sea level
MJVD	Ministry of Juba Valley Development
NRA	National Range Agency
NUS	National University of Somalia
RMR	Resource Management and Research, Ltd.

*The spelling of Juba with one "b" is used when dealing with the project name or the ministry created for the project. A double "b" spelling is used for any geographical application, such as Jubba River, Jubba Valley, etc.

PREFACE

The Juba Environmental and Socioeconomic Studies (JESS) are jointly funded by the Government of the Somali Democratic Republic (GSDR) and the U.S. Agency for International Development (AID). JESS is part of a larger project funded by AID and GSDR, the Juba Development Analytical Studies (JuDAS) Project. Technical assistance and JESS management are being provided to the Ministry of Juba Valley Development (MJVD) by Associates in Rural Development, Inc. (ARD), of Burlington, Vermont, under AID contract number AFR-0134-C-00-5047-00.

This second interim report on botanical investigation in the Jubba Valley is one of many such reports to be produced during Phase II of JESS, a two-year period of intensive field studies. The author of this report, Mr. Christopher F. Hemming of Resource Management and Research, Ltd. (RMR), was employed on a subcontract basis to assist the JESS ecologist, Dr. Ian Deshmukh, in conducting this work. (See Appendix A for Scope of Work).

The focus of this botanical investigation was on the area which will be inundated by the proposed Baardheere Dam, roughly between the villages of Luuq and Baardheere on the Jubba River. The consultancy period was between 24 June and 29 July 1987.

Mr. Hemming would like to acknowledge the assistance given him by MJVD, AID and ARD. Help rendered in the field by Abdulkadir Haji Ibrahim and Mohamed Hared of the JESS field team is also gratefully acknowledged. Finally, Mr. Hemming wishes to thank Dr. Deshmukh for his hospitality and collaboration.

I. EXECUTIVE SUMMARY

Field trips were made to 32 vegetation monitoring sites on the east and west banks of the Jubba River, from Luuq south to the Baardheere dam site (coinciding with the future reservoir zone). Specimens of 28 grasses and sedges, 23 dwarf shrubs, 30 forbs, 28 shrubs and 10 bushes and trees were collected and delivered to herbariums in Somalia, Kenya and the United Kingdom for subsequent identification.

While much vegetation in the lower parts of the reservoir zone will be irretrievably lost to flooding, dynamic vegetational changes will occur in the drawdown zone. Recommendations are made to maintain selected areas or plots in natural vegetation, even though most of the reservoir drawdown area will be used for temporal agriculture. MJVD should establish a monitoring unit to study the changes that will occur as the result of project development--especially in the drawdown zone and reservoir margin.

II. INTRODUCTION

This interim report is a second part of botany field studies in Phase II activities of JESS. The objectives of this consultancy were to:

- assist in a vegetation survey concentrated in and around the inundation area of the proposed Baardheere Dam;
- locate and describe representative vegetation sites to be flooded with emphasis on those sites of ecological, ethnobotanical and conservation interest;
- examine sites at the edge of the future reservoir and in the drawdown zone in order to assess future vegetational change in this zone;
- suggest possible schemes for monitoring vegetational change around the reservoir and in the drawdown zone; and
- take primary responsibility for plant identification in the field and at herbaria receiving plant specimens.

As with a previous report (Interim Report on Vegetation Survey of the Jubba Valley, JESS Report No. 9, October 1986), this consultancy was to conduct a brief botanical inventory. The obvious focus was to collect and later identify plant specimens from the area to be inundated by the proposed reservoir resulting from construction of the Baardheere Dam. Since the organization and identification of plant specimens is a long process involving multiple herbaria in three countries (United Kingdom, Kenya and Somalia), this report cannot provide full descriptions of the botanical specimens collected, nor discuss, except in general terms, the significance of the collected material. The JESS Phase II report will provide more comprehensive coverage of the collections during both botanical consultancies by the author.

III. TECHNICAL DISCUSSION

A. Vegetation Survey Comments

A field trip to establish and examine new vegetation survey sites in the area upstream of the Baardheere Dam site was undertaken between 4 and 22 July 1987. The timing of this trip was providential in a botanical context, as the Jubba River experienced unusually heavy flooding during late May and early June. By the time of the survey, soil moisture was still sufficiently high to prolong plant flowering and fruits were still visible. On a negative side, roads were nearly impassable due to mud. The flood was the largest in the last seven to 10 years. Various informants differed in their estimate of the time period. It is sufficient to say, however, that it was an unusual flood.

A total of 32 sites were established and studied. These sites were situated on both the east and west banks of the Jubba River, being distributed from just north of Luuq to the dam site, some 30 kilometers north of Baardheere (see map). The east and west distribution of the sites was from the present floodplain to above the margin of the proposed reservoir. The proposed reservoir is in a rugged part of northern Somalia. The reservoir is accessible by road at three points: Luuq, Buurdhuubo and the dam site, but several tracks permit access at other points.

The 32 sites were studied using guidelines prepared during the first botanical consultancy (see pg. 7, Interim Report on Vegetation Survey of the Jubba Valley, JESS Report No. 9). The selected sites were located in the area to be perennially inundated, in the drawdown zone and at the proposed reservoir margin. Table 1 shows the distribution of the locations in relation to the reservoir. Sites in this study are numbered from 60 to 91.

B. Vegetation Site Description

The sites to be flooded fall into two broad classes. The first class is the river floodplain, which is largely enclosed by thorn fencing. Part of each enclosure is usually used for maize production and sometimes, if the enclosure is within reasonable access of population centers, onions and tomatoes are grown. Sorghum is also being grown as a flood recession crop in some enclosures. Since the river floodplain is not flooded each year, many farmers have begun to use small pumps to draw irrigation water from the river. These pumps are temporary and can be moved from one enclosure to another. A large portion of most enclosures is not cultivated but is used instead as a dry-season grazing reserve for the owner. Some areas which are normally

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

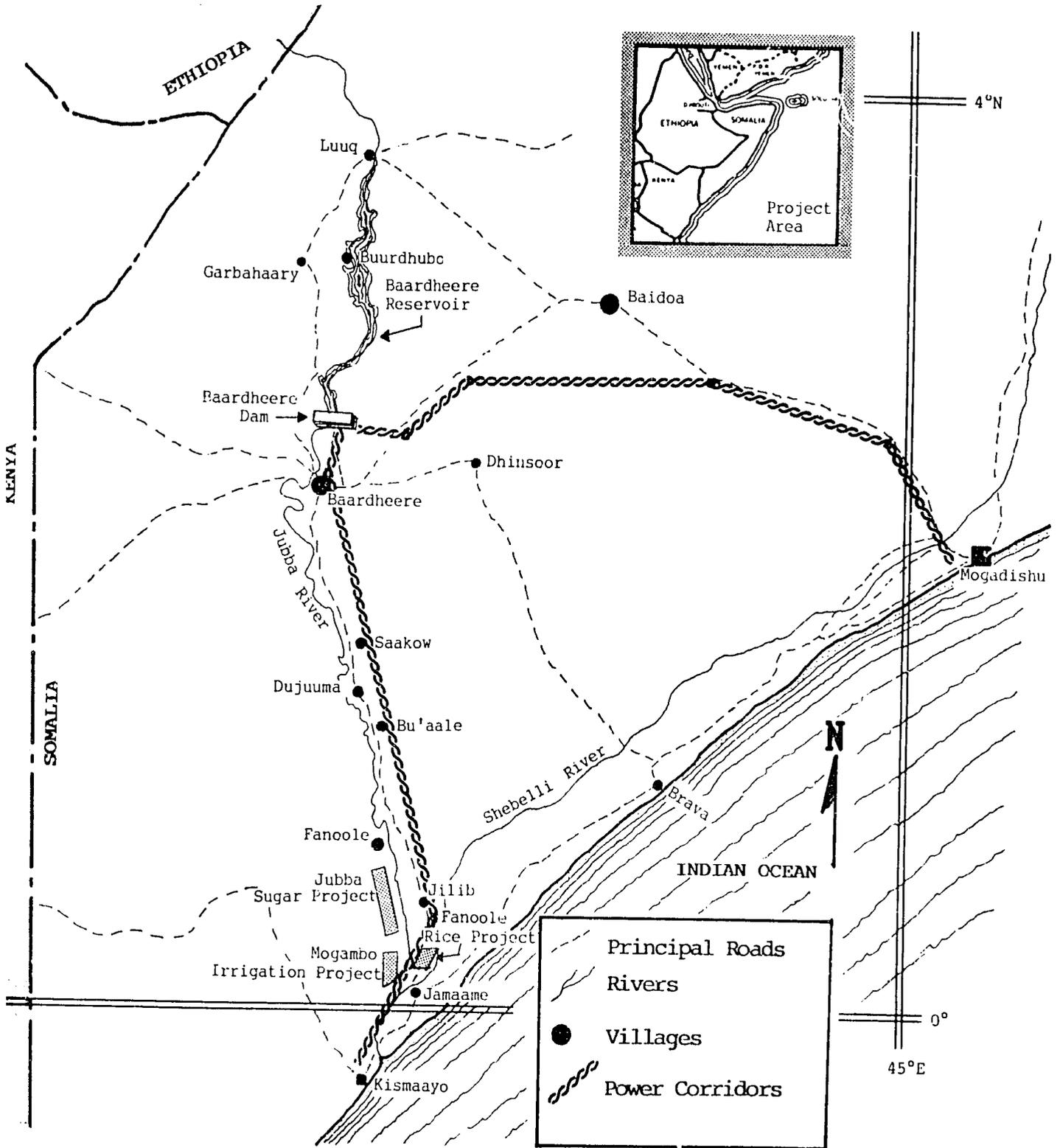


Table 1. Location of JESS Vegetation Sites 60 to 91

<u>Category</u>	
1	<u>Current Floodplain</u> - 10 sites (most to be permanently flooded) # 60, 62, 64, 66, 68, 70, 76, 77, 85, 89
2*	<u>Drawdown Zone</u> - 9 sites (partially or completely submerged) # 75, 78, 80, 82**, 83, 86, 87, 88, 90
3*	<u>Reservoir Edge</u> - 8 sites (145-155 meters above sea level [masl]) # 65, 67, 71, 72, 73, 81, 84, 91
4*	<u>Above Reservoir</u> - 5 sites (above 155 masl) # 61, 63**, 69**, 74, 79

*The soil/vegetation types sampled in categories 2, 3 and 4 are widespread and can be found in any adjacent zones.

**Denuded areas around refugee camps.

irrigated were under pasture following the recent flood. As long as grazing is available elsewhere, the grass in the enclosure remains largely unused. In one enclosure (site 70), no land was being cultivated.

Site 68 was prepared for irrigation some months ago but the flood destroyed the crops which had been almost ready for harvest. Reported losses were 35 tons of maize, fiveton of the river floodplain. The rest of the area to be inundated is covered with vegetation typical to areas which will remain above the reservoir.

The 32 sites studied in this consultancy were, of necessity, determined by accessibility. It is recommended that a boat-based survey be undertaken in the northern and southern portions of the reservoir where steep terrain limits vehicular access. The boat

survey, if undertaken, should concentrate on vegetational types not encountered in this survey, such tion of the river floodplain. The rest of the area to be inundated is covered with vegetation typical to areas which will remain above the reservoir.

The 32 sites studied in this consultancy were, of necessity, determined by accessibility. It is recommended that a boat-based survey be undertaken in the northern and southern portions of the reservoir where steep terrain limits vehicular access. The boat survey, if undertaken, should concentrate on vegetational types not encountered in this survey, such as woodlands other than *Acacia zanzibarica*, and forest relicts, if present.

It clearly will not be possible to preserve any such areas (e.g., riparian woodland or forest) in that they will be inundated. However, before they are lost to rising reservoir waters, they should be collected exhaustively in order to know what has been irretrievably lost. Since the Jubba Valley is relatively unstudied botanically, recent collections have included occasional new species and many new records for Somalia. It is likely that, if extensively collected, a similar or higher proportion of new Somali records or new species will be found in this interesting northern part of the Jubba River floodplain.

MJVD should encourage botanical collection in the inundation zone, primarily in collaboration with the National Herbarium of the National Range Agency (NRA) and with the botany faculty of the National University of Somalia (NUS). It is also recommended that MJVD establish its own ecological monitoring unit as soon as possible to participate in the suggested botanical surveys. The MJVD staff would need some in-service training, which would be easily done if they were accompanied by National Herbarium staff on their first few field trips. If this should prove impossible, it might be necessary for a short-term consultant to train MJVD

staff in collecting dry plant specimens and to record pertinent data.

The size of an ecological monitoring unit in MJVD will clearly depend upon the available financial resources for monitoring, but at a minimum, the unit should include one graduate agronomist or botanist, one field assistant, a driver and a suitable four-wheel-drive vehicle. It is likely that some of the area deserving of study can only be reached by boat. JESS currently has two boats which can be placed at the disposal of MJVD for a variety of reservoir surveys, including botanical collections. However, due to the large number of crocodiles in the upper Jubba River, it is also highly recommended that MJVD use extreme caution in selecting a very capable boat pilot for any river expedition.

Floodplain dwellers recalled many cases of people and goats being taken by crocodiles. It is interesting that in this survey, no frames of branches and sticks were seen in the river which would protect people while collecting water or watering livestock. Such protective devices were frequently observed south of Baardheere during last year's botanical survey. This may be due to destruction by recent flooding.

At the moment, the Jubba River has steep banks along most of its length in the reservoir zone. These banks are too steep for crocodiles and the risk of attack is greatest when people or stock climb down the bank to the river's edge. After the dam is completed, most, if not all, of the reservoir margin will have gently sloping banks which will allow free movement on the banks. River floodplain dwellers reported that after the flood this year, crocodiles came out of the main river channel onto the banks, but went back into the river when the flood receded. It can be anticipated that crocodiles will be a more serious pest after the reservoir is full. Control measures for crocodile skin exports could be a useful source of revenue, especially for foreign exchange.

C. Reservoir Margin

Examination of sites along the edge of the future reservoir and within the likely drawdown zone did not provide any distinct evidence of the vegetational change that will occur after the reservoir is in place. However, if one extrapolates from the evidence found in the present floodplain, there is a suggestion that deposition of rich alluvium (clay and silty sand) will cause soil enrichment. This, coupled with higher soil moisture, will lead to dramatic vegetation change on the reservoir perimeter.

Since the drawdown zone will be greatest in the central part of the reservoir, it is impossible to determine how much alluvium

will be deposited in this zone, beyond saying that it will be the finer materials. It is likely that the drawdown zone soils will gradually improve as fine silts are deposited during maximum reservoir levels.

It is clear that the natural vegetation in the lowest levels of the drawdown zone (ca. 128 masl) will be killed by prolonged submergence, while those areas between 135 and 140 masl will be inundated for shorter periods of time and will benefit from alluvial deposition. Species composition will shift toward more flood-tolerant grasses, such as *Sporobolus helvolus* and *Echinochloa haploclada*, away from the presently common annual dryland species. Any such change will be for the better as these perennial grasses will remain in an attractive grazing condition for a much longer period of time.

After the dam has been constructed, and if closure takes place during a wet season as anticipated, the water level should rise quickly. In addition, most of the present river floodplain will be submerged for much of the first year of filling and permanently so thereafter. The floodplain, as expected, was the most useful and productive ecological zone encountered during this survey. Most of this land is enclosed by thorn fencing and is used for crop production and dry-season grazing reserves.

The permanent submergence of the river floodplain will displace the present users, which are more numerous than anticipated. These displaced people will presumably try to establish claims at the reservoir margin and in the drawdown zone. Initially, based on their floodplain experience, they will only have a vague idea of the land's potential as well as the best way to manage this area for crop and forage production.

As has been mentioned, the potential of these areas will, to a large extent, be dependent upon the amount of alluvium deposited. The soils encountered in the drawdown zone and at the reservoir perimeter varied from sandy to silty clay loams. This is quite a small variation and it seems likely that the slope and the presence or absence of large numbers of stones will be a deciding factor in determining the ultimate potential of these zones without added alluvium. Table 2 summarizes the slope in addition to rockiness for 17 sites (Categories 2 and 3 in Table 1).

Table 2. Soils of Drawdown Zone Sites

Stony Sites

Sloping - # 67, 71, 75, 84, 91
Level - # 88

Non-Stony Sites

Sloping - # 65, 73*
Level - # 72*, 78, 80, 81, 82, 83, 86, 87, 90

*gypseous soil

Table 2 shows that a large majority (nine out of 11) of the non-stony sites are basically level. In such areas where the slope is extremely gentle, a small drop in reservoir water level will expose a wide expanse of land which, particularly if improved by alluvium, will present new opportunities for crop or forage production. Site 72 is a puffed-up gypseous soil, and its potential may be less than other sites unless it is covered by quite a deep amount of alluvium.

The development potential of the sloping sites is more problematic in that areas close together will be covered with water for considerably different periods of time.

The stony sites are clearly less suitable for crop or forage production. It is interesting to note that five out of six of the stony sites are sloping. Such sloping stony sites are likely to have low potential for crops. There is only one fairly level stony site (site 88) and it is impossible to estimate the future potential of this site. It will, to a large extent, depend on whether or not it is gradually covered with sediments.

D. Vegetation Monitoring

The construction of the Baardheere Dam will be the most expensive development project ever undertaken in the Jubba Valley, if not in all of Somalia, and it will clearly have extensive ecological effects.

As noted previously, it is recommended that MJVD establish a small monitoring unit to study the changes that will occur as a result of reservoir operation (drawdown zone and reservoir margin). It is certain that the lake edge will be settled as soon as the reservoir is full. It is recommended that a number

of these lake edge dwellers be selected and that they be required to leave a small strip (ca. 10 meters) extending from 20 meters above the reservoir edge to the bottom of the drawdown zone. This strip should be not be cultivated, and natural vegetation should be allowed to develop. These sites should be selected as soon as possible after the reservoir reaches its maximum normal operating level. The monitoring unit should record plant species and also measure the rate of deposition of sediments. Steel bars fixed in concrete at these monitoring sites would aid in measuring sediment deposition as well as establishing permanent markers for each study site.

In order to ensure success of the monitoring unit, MJVD must assure proper liaison with the dam operations team so that monitoring times can be determined in advance. MJVD should also establish working relationships with the NRA and the botany faculty at NUS.

E. Collections

During this consultancy, 119 plant specimens were collected at the 32 study sites. Most of the sites (22) were in dry habitats surrounding the present floodplain. In most of the floodplain, *Acacia zanzibarica*, open woodland with a layer of grasses and herbs were found. This year, owing to the flood, it was possible to collect both grasses and herbs in flower and fruiting condition. In years when there is no flooding, it is probable that the ground vegetation will be almost absent. In one place on the floodplain (site 76), moderately dense monospecific communities were found on two sides of a levee, *Tamarix aphylla* near the river and *Salvadora persica* a few meters further from the river. The finding of such sites emphasizes the need for further collections in areas not covered by this survey.

The collected plants were comprised of:

- 28 grasses and sedges;
- 23 dwarf shrubs;
- 30 forbs;
- 28 shrubs; and
- 10 bushes and trees.

On this survey, the species diversity was found to be much greater on the dry slopes than on the floodplain. Most of the species recorded on the study sites were identified to generic level and many to specific level. The specimens collected mostly

represent those that could not be identified in the field to specific level. Owing to the recent flood and rains, a high proportion of specimens was collected in flower and fruit while the dry, windy weather provided ideal drying conditions. The specimens were divided into four sets for the following institutions:

- Herbarium of the National Museums of Kenya;
- Herbarium of the Royal Botanical Garden at Kew;
- National Herbarium of the National Range Agency; and
- Herbarium of the National University of Somalia.

The sets for Kew and Kenya will be delivered by the consultant after leaving Somalia. Four sets of herbarium labels will also be prepared. Summary descriptions of the sites to be attached to the specimens, in addition to the labels, have already been prepared.

Mr. J. B. Gillett of the Royal Botanical Garden at Kew and Ms. Christine Kabuye of the National Museums of Kenya have kindly agreed to continue identifying specimens for JESS. It is a pleasure to note the speed with which names have been supplied in the past year and the consultant, on behalf of JESS, would like to express his grateful appreciation.

APPENDIX A

Scope of Work

Mr. Christopher F. Hemming - Proposed Consultant

1. The contractor will conduct a four week consultancy in Somalia beginning on or about 7 July 1987 for Associates in Rural Development, Inc. (ARD) as a part of the Jubba Environmental and Socioeconomic Studies (JESS).
2. The general focus of this consultancy is to assist the JESS ecologist in a vegetation survey concentrating in and around the inundation area of the proposed Baardheere Dam.
3. Prior to departure for Somalia, the consultant will receive a written or telephone briefing by the ARD project manager, ARD technical manager or the JESS ecologist.
4. Upon arrival in Somalia, the consultant will hold briefing meetings with the USAID project manager or designate, JESS team leader or designate and JESS ecologist to discuss the consultant's scope of work. At these meetings, a means for progress reporting during this consultancy will be defined.
5. In the Jubba Valley, the consultant will assist the JESS ecologist in locating and describing representative vegetation sites to be flooded by the proposed Baardheere Dam, with emphasis on those of ecological, ethnobotanical and conservation interest.
6. The consultant will examine sites at the edge of the future reservoir and in the drawdown zone with a view to predicting possible development of vegetation when the reservoir becomes operational.
7. The consultant will suggest a scheme for long-term monitoring of vegetation changes around the reservoir and in the drawdown zone.
8. During this consultancy, the consultant will take primary responsibility for plant identification in the field and at the Somali and foreign herbaria which receive material from JESS. A set of all collected plant specimens will be left with the Somali National Herbarium.
9. A draft typewritten or word processed report for this consultancy will be delivered to the JESS team leader at least one full day before departure from Somalia. This report will be written in a format defined by the JESS ecologist. This report will constitute a basis for a final briefing with the USAID project manager, JESS team leader, the JESS ecologist and personnel from the Ministry of Jubba Valley Development (MJVD). A schedule for revisions to the

final report will, of course, be dependent upon final plant identifications. This schedule should be defined by the consultant and the JESS ecologist.

10. At the discretion of the JESS team leader, the consultant may be required to present a one hour training seminar at the MJVD on a topic related to this consultancy.

APPENDIX B

List of Plants Collected

Received 25 September 1967 from J.F. Hemming, 25 Medina Road, Holloway,
London N7 7JU. H 1523/87 Southern Somalia near the River Juba July 67

Plants collected by J.F. Hemming and Ian Deshmukh. Juba Environmental &
Socioeconomic Studies.

JESS 1967. List compiled by CFH from two lists from J.E. Gillett and one from
C. Kabuye. (Gramineae and Cyperaceae)

266	<i>Echinochloa colona</i> (L.) Link	Gramineae
267	<i>Paspalum desertorum</i> (A. Rich.) Stapf	Gramineae
268	<i>Chloris virgata</i> Sw.	Gramineae
269	<i>Eriocloa fatmensis</i> (Hochst. & Steud.) W.D. Clayton	Gramineae
270	<i>Barleria quadrispina</i> Lindau	Acanthaceae
271	<i>Pavonia arabica</i> Boiss.	Malvaceae
272	<i>Barleria proxima</i> Lindau	Acanthaceae
273	<i>Solanum jubae</i> Bitter	Solanaceae
274	<i>Commiphora</i> sp. Section <i>Campestres</i> (More required)	Burseraceae
275	<i>Heliotropium aegyptiacum</i> Lehm.	Boraginaceae
276	<i>Amaranthus sparganiocephalus</i> Thell.	Amaranthaceae
277	Sterile annual.	
278	<i>Farsetia robecchiana</i> Engl. (New record for S. Somalia)	? Compositae
279	<i>Cyperus</i> sp. nov.	Cyperaceae
280	<i>Gossypium benadirensis</i> Mattei (More required)	Malvaceae
281	<i>Celosia polystachia</i> (Forsk.) C.C. Townsend	Amaranthaceae
282	<i>Ziziphus mauritiana</i> Lam.	Rhamnaceae
283	<i>Barleria</i> sp.? nov. aff. <i>proxima</i> Lindau (= Gilbert 2134)	Acanthaceae
284	<i>Cleome brachycarpa</i> Vahl	Capparidaceae
285	<i>Zaleya pentandra</i> (L.) Jeffrey	Aizoaceae
286	<i>Jatropha rivae</i> Pax	Euphorbiaceae
287	<i>Boerhavia</i> sp. aff. <i>B. repens</i> L.	Nyctaginaceae
288	<i>Heliotropium zeylanicum</i> (Burm. f.) Lam.	Boraginaceae
289	<i>Eragrostis cilianensis</i> (All.) F.T. Hubb.	Gramineae
290	<i>Boerhavia elegans</i> Choisy	Nyctaginaceae
291	<i>Abutilon anglosomaliae</i> Cuf.	Malvaceae
292	<i>Sesbania</i> sp. (Material with flowers required)	Papilionoideae
293	<i>Solanum coagulans</i> Forsk.	Solanaceae
294	<i>Acrachne racemosa</i> (Roem. & Schult.) Ohwi	Gramineae
295	<i>Dactyloctenium aegyptium</i> (L.) Willd.	Gramineae
296	<i>Setaria verticillata</i> (L.) P. Beauv.	Gramineae
297	<i>Celosia polystachya</i> (Forsk.) C.C. Townsend	Amaranthaceae
298	<i>Convolvulus capituliferus</i> Franch. var. <i>foliaceus</i> Verdc.	Convolvulaceae
299	<i>Tribulus terrestris</i> forma <i>vergens</i> ad <i>T. cistoides</i> L.	Zygophyllaceae
300	<i>Gynandropsis gynandra</i> (L.) Briq.	Capparidaceae
301	<i>Heliotropium zeylanicum</i> (Burm. f.) Lam.	Boraginaceae
302	<i>Cassia racemosa</i> Vatke	Caesalpinioideae
303	<i>Eragrostis ciliaris</i> (L.) R. Br.	Gramineae
304	<i>Indigofera</i> sp. aff. <i>I. spinosa</i> Forsk.	Papilionoideae
305	<i>Leucas nubica</i> Benth. (1st Somali material at Kew)	Labiatae
306	<i>Cyperus grandibulbosus</i> C.B. Cl.	Cyperaceae
307	<i>Cyperus grandibulbosus</i> C.B. Cl.	Cyperaceae
308	<i>Dinebra retroflexa</i> (Vahl) Panzer var. <i>condensata</i> S.M. Phillips	Gramineae
309	Specimen lost	
310	<i>Amaranthus graecizans</i> L. ssp. <i>graecizans</i>	Amaranthaceae
311	<i>Digera muricata</i> (L.) Mart. ssp. <i>trinervis</i> C.C. Townsend	Amaranthaceae
312	<i>Justicia</i> sp. aff. <i>odora</i> Vahl (= Gilbert 4011 etc)	Acanthaceae
313	<i>Solanum jubae</i> Bitter	Solanaceae

314	<i>Sporobolus helvolicus</i> (Trin.) Th. Dur. & Schinz	Gramineae
315	Sterile (Specimen not kept by Kew)	? Sapotaceae
316	<i>Echinochloa colona</i> (L.) Link	Gramineae
317	<i>Indigofera</i> Section <i>alternifoliolae</i> sp. nov. ?	Papilionoideae
318	<i>Reseda ellenbeckii</i> Perkins	Resedaceae
319	<i>Combretum hereroense</i> Schinz ssp. <i>volkensii</i> (Engl.) Wickens	Combretaceae
320	<i>Hibiscus somalensis</i> Franch.	Malvaceae
321	<i>Barleria argentea</i> Balf. f.	Acanthaceae
322	<i>Grewia</i> sp.	Tiliaceae
323	<i>Barleria quadrispina</i> Lindau	Acanthaceae
324	<i>Aristida mutabilis</i> Trin. & Rupr.	Gramineae
325	<i>Digera muricata</i> (L.) Mart. ssp. <i>trinervis</i> C.C. Townsend	Amaranthaceae
326	<i>Conchorus olitorius</i> L.	Tiliaceae
327	<i>Eriochloa fatmensis</i> (Hochst. & Steud.) W.D. Clayton	Gramineae
328	<i>Paspalidium desertorum</i> (A. Rich.) Stapf	Gramineae
329	<i>Eragrostis aethiopica</i> Chiov.	Gramineae
330	Sterile	? Acanthaceae
331	<i>Tetrapogon tenellus</i> (Roxb.) Chiov.	Gramineae
332	<i>Tetrapogon banchrififormis</i> (A. Rich.) W.D. Clayton	Gramineae
333	<i>Tetrachaete eilonuroides</i> Chiov.	Gramineae
334	<i>Justicia</i> sp. aff. <i>odora</i> Vahl (= Gilbert 4011 etc)	Acanthaceae
335	<i>Cadaba glandulosa</i> Forsk.	Capparidaceae
336	<i>Sporobolus</i> sp. (= Beckett 562)	Gramineae
337	<i>Maerua sessiliflora</i> Gilg	Capparidaceae
338	<i>Terminalia parvula</i> Pampan.	Combretaceae
339	<i>Solanum jubae</i> Bitter	Solanaceae
340	Sterile probably <i>Maerua</i> (See note below)	Capparidaceae
341	<i>Satanocrater</i> sp. (Sterile)	Acanthaceae
342	<i>Nothosaerva brachiata</i> (L.) Wight	Amaranthaceae
343	<i>Cissus aphylla</i> Chiov. (Probably)	Vitaceae
344	<i>Rhynchosia minima</i> (L.) DC. var. <i>minima</i>	Papilionoideae
345	<i>Senra incana</i> Cav.	Malvaceae
346	<i>Ecbolium violaceum</i> (Vahl) Hillcoat & J.I. Wood	Acanthaceae
347	<i>Euphorbia</i> sp.	Euphorbiaceae
348	<i>Solanum jubae</i> Bitter	Solanaceae
349	<i>Farsetia robecchiana</i> Engl.	Cruciferae
350	<i>Barleria</i> sp. aff. <i>mucronifolia</i> Lindau (= Gillett 4436)	Acanthaceae
351	Sterile (Specimen not kept by Kew)	? Capparidaceae
352	<i>Abutilon anglosomaliae</i> Cuf.	Malvaceae
353	?	Euphorbiaceae
354	<i>Maerua subcordata</i> (Gilg) De Wolf	Capparidaceae
355	<i>Leucas urticifolia</i> (Vahl) R. Br.	Labiatae
356	<i>Sporobolus fimbriatus</i> (Trin.) Nees	Gramineae
357	<i>Brachiaria ramosa</i> (L.) Stapf	Gramineae
358	<i>Asparagus somalensis</i> Chiov.? (From near type locality)	Liliaceae
359	<i>Ecbolium violaceum</i> (Vahl) Hillcoat & J.I. Wood	Acanthaceae
360	<i>Neuracanthus polyacanthus</i> (Lindau) C.B. Clarke	Acanthaceae
361	<i>Duospermum eremophilum</i> (Milne-Redhead) Brummitt	Acanthaceae
362	<i>Euphorbia arabica</i> Boiss. forma vel sp. aff.	Euphorbiaceae
363	<i>Terminalia parvula</i> Pampan.	Combretaceae
364	Sterile (Specimen not kept by Kew)	? Capparidaceae
365	<i>Indigofera spinosa</i> Forsk. variant with 5-foliate leaves	Papilionoideae
366	<i>Acacia ogadensis</i> Chiov.	Mimosoideae
367	<i>Cadaba glandulosa</i> Forsk.	Capparidaceae
368	<i>Commiphora unilobata</i> Gillett & Vollesen	Burseraceae

369	<i>Seriscoomopsis pallida</i> (S. Moore) Schinz	Amaranthaceae
370	<i>Indigofera coerulea</i> Roxb. var. <i>occidentalis</i> Gillett & Ali	Papilionoideae
371	No specimen	
372	No specimen	
373	<i>Caesalpinia erianthera</i> Chiov. var. <i>pubescens</i> Brenan	Caesalpinioideae
374	<i>Boscia tomentella</i> Chiov.	Capparidaceae
375	<i>Barleria orbicularis</i> T. Anders.	Acanthaceae
376	<i>Pavonia arabica</i> Boiss.	Malvaceae
377	<i>Justicia flava</i> (Vahl) Vahl forma	Acanthaceae
378	<i>Enneapogon schimperianus</i> (A. Rich.) Renv.	Gramineae
379	<i>Euphorbia</i> sp.	Euphorbiaceae
380	<i>Enneapogon schimperianus</i> (A. Rich.) Renv.	Gramineae
381	<i>Balanites</i> sp.	Balanitaceae
382	<i>Indigofera spinosa</i> Forsk.	Papilionoideae
383	<i>Elepharis</i> sp.	Acanthaceae
384	Sterile possibly <i>Seddera microphylla</i> Engl. nom. nud.	? Convolvulaceae
385	<i>Euphorbia</i> sp.	Euphorbiaceae
386	<i>Terminalia</i> ? <i>brevipes</i> Pampan. (Sterile)	Combretaceae
387	<i>Edithcolea grandis</i> N.E. Br. (Syn. <i>E. sordida</i> N.E. Br.)	Asclepiadaceae

Notes *Ecbolium violaceum* (nos. 346 & 359) is to be transferred to *Megalochlamys* but this combination has not yet been published.

340 though sterile has very remarkable leaves and more fertile material desirable

384 Fertile material of this odd plant, which it has not been possible to match at Kew, is much desired.

Duplicate sets of this collection are at held by the E.A. Herbarium, Nairobi, Kenya and the National Herbarium, The National Range Agency, Mogadishu, Somalia.