

PN ABH-123

69963

**THE JUBA VALLEY DAM:
A SUMMARY REPORT ON
THE ENVIRONMENTAL AND
SOCIOECONOMIC ISSUES**

**BOARD ON SCIENCE AND TECHNOLOGY FOR
INTERNATIONAL DEVELOPMENT**

NATIONAL RESEARCH COUNCIL

**2101 CONSTITUTION AVENUE N.W.
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SEPTEMBER 1989

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This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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This report has been prepared by a panel of the Board on Science and Technology for International Development, Office of International Affairs, National Research Council. The activity was funded by the United States Agency for International Development under Contract No. AFR-0134-A-00-5033-00.

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TABLE OF CONTENTS

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS.....	5
A. Panel Concerns	5
B. General Comments on the JESS Scope of Work	6
C. Review of ARD Draft Executive Report	7
INTRODUCTION.....	9
ISSUES ARISING IN CONNECTION WITH RIVER BASIN DEVELOPMENT AND THEIR IMPLICATIONS FOR THE JUBA VALLEY.....	11
1. National and Regional Planning	11
2. Integration of the Region within National Development	11
3. Underestimation of River Basin Development Potential	11
4. Access to Land	12
5. Health Impacts	13
6. Institutional Arrangements for River Basin Development	13
7. Transfer of Authority	
8. Adequacy of Existing Contextual Analysis	14
GENERAL COMMENTS ON THE JESS SCOPE OF WORK.....	15
REVIEW OF ARD DRAFT EXECUTIVE REPORT.....	15
1. Macroeconomic Context	16
2. Institutional Context	18
3. Priorities	19
4. Pastoral/agropastoral Sector	19
5. Deshek Sector	19
6. Other	20
7. Panel Recommendations	21
LIST OF APPENDICES.....	24
ACRONYMS AND ABBREVIATIONS.....	25

SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

A. Panel Concerns

The Juba and Shebelle river basins are the heartland of future development, and more emphasis needs to be given to regional planning. There is **need for a strong, permanent, planning/policy unit within the government** to coordinate development of the valleys, and to maintain a rolling planning capability during implementation of the construction phase. Particularly important in this regard are the arrangements to be made for monitoring health, ecological, and economic effects, since the costs and benefits of these typically cut across traditional sectors. The negative health impacts caused by dam impoundments are disproportionately borne by the people living on the lake margins. These adverse health impacts are predictable and controllable. Though current infrastructure is weak, **adequate arrangements must be made to mitigate the inevitable consequences to the health of the population of the valley.**

The development potential of river basins, both reservoir and downstream, is always underestimated. The reservoir itself can be a major regional resource, in addition to the hydroelectricity, flood control and other direct benefits, and the panel urges that attention be given to this regional resource. Downstream, the panel stresses the **importance of continuing to simulate the annual flood regime** for a range of uses (especially traditional agriculture and livestock production), bearing in mind the need to control its dangers.

Using at least part of the electricity generated within the Valley itself, for rural electrification of villages, schools, clinics, and wherever possible small-scale irrigation pumps is likely to have a positive impact. The Panel views this **use of the generated power as important for raising the general level of development** along the Valley, in creating additional multiplier effects, and in reducing the costs of irrigation (as well as reducing the foreign exchange for importing petroleum products, and the cost of transporting them to the Valley, which would save even more than reducing electrothermal power generation for Mogadishu.)

There is **need for policy and legislation for land allocation.** The mix needs to be carefully assessed. The panel has serious concerns about the economic future of the traditional production sector of the valley and the people currently engaged in it, especially with reference to minority groups. The panel therefore urges the MJVD, and the future agencies and other ministries responsible for implementation of the Bardera Dam Project, as well as the donor and technical assistance agencies providing assistance to the projects, to give **especial attention to the development needs, and the equitable treatment of the traditional farmers and herders of the Juba Valley** as they are affected by the large-scale investment projects.

Experience to date with modern irrigation systems in Somalia has been confined largely to cash crops (such as bananas and sugarcane) and this experience has shown consistent failure to meet expectations. Irrigated food production, on the other hand, has been most successfully implemented by small-scale projects and by farmers in desheks or with low-lift pumps. These are the people with the knowledge of sustained food production in the valley, and to the extent that they are displaced by large projects, production is likely to drop, and food self-sufficiency will be delayed rather than increased.

The JESS Executive Report implies that government policies for rural populations are more favorable than they are. Yet the information presented describing the post-1969 agrarian transformation strategy involving nationalization of the banana

industry, initiation of large state farms, passage of the 1975 Land Law, state support of cooperative formation, and state monopoly in marketing of grains and sesame, shows these did not help the rural population of the Valley. Emerging from this investigation is a significant decline in the local population's ability to produce an agricultural surplus, and clearly government policies have had a negative impact on the village sectors since 1969. The Executive Report implicitly recognizes the limitations of large-scale irrigation projects. Development costs of large-scale irrigation are exorbitant, and equivalent money invested in varietal research, machinery services (either tractors or animal traction) and simple inputs for local farmers, traditional yields could be doubled or even tripled, producing much more grain than is presently produced under the project.

In the Panel's view, it will be crucial for policies to be elaborated to facilitate small-scale pump irrigation as an end in itself, and in preference to government or parastatal large projects.

The report shows how weak government institutional capabilities are, even by African standards, and without these most basic services as a foundation, little development can occur. Development activities are more likely to be effective to the degree that they accommodate and incorporate local institutions in implementation plans. The first priority should be given to government facilitation--as opposed to domination--of local initiative and production activities.

Incorporation of pastoralists within development plans is especially important in Somalia given the great importance to the national economy of the pastoral livestock sector, which elsewhere in Africa has been consistently ignored in connection with river basin development--with adverse effects.

Little useful information exists regarding upper basin-lower basin linkages in relation to planning activities in the Juba Valley. Similarly, considerable uncertainty remains regarding the seasonal and accumulative effects of water/soil interaction in relation to the economic viability of the projects. Further information is also required regarding rates of sedimentation in relation to the design of the Bardera Dam and its projected impact upon economics of hydropower generation.

B. General Comments on the JESS Scope of Work

Changes in the scope of work during the project constrained realizing the full benefit of the really quite exceptional field research on the part of ARD. The scope of work emphasized the mitigation of impacts of the dam, rather than on how the dam could be used for the integrated development of the Juba Valley, and particularly for the benefit of the local people in and around the Valley. Nonetheless, this should not have prevented an emphasis on the development potential rather than mitigation, because it was clear from the outset that realization of the potential benefits of the dam could only be achieved by integrating all the development possibilities.

Evaluation of the potential effects on the socioeconomic impacts of the various institutional arrangements proposed for the implementation of dam construction, associated infrastructure and subsequent management, was also omitted. This restriction should have been unacceptable since it makes the ARD assessment and recommendations about different development and policy options virtually impossible, since institutional capabilities are a crucial variable.

Detailed macroeconomic analysis of the power generation, construction engineering, and irrigation options, were undertaken by other agencies. However, this

should not have led to the total omission from the Executive Report of any description of the various options, which seriously undermines its authority.

C. Review of ARD Draft Executive Report

The Panel believes that the ARD JESS Team has done an exceptional job in gathering high quality field data under very difficult conditions, and in analyzing and presenting that data in detailed reports. In many instances these reflect earlier Panel comments that have been incorporated into this draft. The Panel's concerns therefore relate not to what is included in the report but what is not included. The Report contains no synopsis of the macroeconomic situation within which the ARD projections of possible socioeconomic impact and mitigation can be viewed. The absence of any simple description of the basic economic choices before the Ministry--which are key variables affecting socioeconomic impact--weakens the presentation of ARD findings.

These economic issues include:

1. **Electricity generation.** There is no discussion of the fundamental choices of how much of the power generated is to be used for supplying electricity to Mogadishu as opposed to using it for development of the Valley. The Panel and ARD also recognized the potential economic and social benefits of using part of the electricity for Valley development, including electrifying smallholder irrigation.
2. **Smallholder versus large scheme.** The Executive Report clearly points out the weaknesses of the larger-scale parastatal irrigation projects as well as the strengths of local production strategies. It also presents an exceptionally strong case for recommending a development strategy whereby government attempts to build upon the strengths of its Juba Valley population and resources. By not underlining the major policy implications of the completed research, the Executive Report, however, fails to take advantage of this important opportunity to influence policy. The report gives the impression that JESS somehow disapproves of the burst of small-scale irrigation activity through the use of small pumps. Throughout most of Africa, small-scale pump irrigation is considered one of the few bright spots, and what is missing is a general discussion of policy issues here, to address the balance between different types of irrigated land use as they relate to valley living standards and multiplier effects.
3. **Controlled flooding and deshek production, and integration of livestock management into Valley development,** are each given attention, but these important aspects are left simply hanging in absence of any indication of the major economic choices. The Executive Report does not adequately summarize the negative impacts of the dam on local production systems. The Draft SEBS does not equivocate: "If provision is not made for an annual artificial flood from the dam for the indefinite future, or at least until appropriate irrigation technologies are equitably introduced and reliably in place, the majority of farmers will be negatively affected by alteration in the river's current flood regime." Moreover there appears to be a bias against seasonal (transhumant) pastoralists. Nowhere is there any attempt to quantify or at least generalize about the amount of grazing that will be eliminated by the flood reduction. The recommendations do not relate to seasonal land use. Yet seasonal grazing in the Valley is essential to livestock production from over 3 million camels, cattle, sheep and goats, and crop production from deshek and seasonal plots are the mainstay of Valley output.
4. **Institutional context.** As in the case of the macroeconomic context, there is no discussion of the importance of the institutional context in determining alternative strategies that might lead to different socioeconomic benefits and amelioration actions. Yet the very recommendations offered by JESS presuppose adequate, even exceptional,

institutional capability within the context of Third World conditions. In reality, there is little if any evidence for such capability in Somalia, but this is not reflected by JESS policy conclusions. The benefits from this complex, multifactoral project will accrue in proportion to the extent to which the different aspects can be implemented in a coordinated, concurrent, manner. The current institutional capabilities of the Government of Somalia to carry it out are limited. Depending on how these capabilities are organized and strengthened, there are different levels of expectation and therefore potential socioeconomic consequences, which must influence ARD's conclusions.

5. Pastoral/agropastoral sector. The report includes numerous descriptive points regarding the economic and ecological characteristics of pastoral and agropastoral life in the Juba Valley. However, coherent treatment of the fundamental survival needs and vulnerabilities of the Valley's pastoral/agropastoral population in relation to the environmental and socioeconomic changes likely to accompany dam construction, is lacking. Such omission is not acceptable, given the well-known experience from comparable river basin developments in Africa and the specific findings of JESS research itself.

6. Deshek sector. Deshek cultivation and agriculture along the river will be affected through river flow changes following dam construction and through associated land tenure changes. However, the relationship between these changes and the sustainability of the Valley's traditional economies--both pastoral and agropastoral--is not drawn. Virtually all of the discussion of land tenure change is treated with reference to small-, medium- or large-scale irrigation as distinct from riverine usage by pastoralists and agropastoralists for cultivation, pasturage, and watering. The report raises serious issues of equitability as well as those of economic viability of the different-sized landholdings, and of resource destruction. Reforms proposed to the Land Law, implicitly but strongly emphasize only permanent occupation as an adequate basis for blocking or strongly conditioning registration by "new" individuals, rather than take account of the strong seasonal dependence on these same resources by pastoralists and agropastoralists.

7. Refugee and Valley resident resettlement. While not undertaken by JESS itself, should nevertheless be considered in some integral fashion with the JESS effort, if nothing more than in relation to several key recommendations set forth in the concluding pages.

8. Conditions upstream from the reservoir. These conditions, including those in Ethiopia, are fundamental to some aspects of JESS' conclusions and recommendations and should at least be outlined for further policy consideration. The political sensitivities involved here should not preclude their mention as important issues involved in planning in Somalia (for example, upriver impacts on river flow and sediment load).

9. Riverine and reservoir fisheries. Development is suggested by JESS in the form of contractual relations and concessionary policies with foreign entrepreneurial interests. Much of the literature details the establishment of a strong dependency of the Third World country on the foreign capital involved--a dependency not effectively offset by a sustainable fisheries development program. The evidence for Somali institutional capability for effectively coping with such a development arrangement is lacking, suggesting the need for more care in the evaluation of such an approach.

INTRODUCTION

In mid-1985 the Somali Mission of the U.S. Agency for International Development (USAID) agreed to provide assistance to the Government of the Democratic Republic of Somalia to undertake environmental and socioeconomic studies on the impact of the proposed Bardera* Dam which the government planned to build on the Juba River in southern Somalia. USAID requested interested contractors to prepare proposals to carry out these studies over a three-year period. At the same time, USAID requested the U.S. National Research Council (USNRC) to advise them, the Somali Ministry of Juba Valley Development (MJVD), and the eventual contractors, Associates in Rural Development (ARD), regarding the studies by organizing a series of workshops at which ARD, USAID, and MJVD officials would discuss with an NRC panel of experts the methodologies being employed and progress being made by the contractor, and the emerging issues.

USAID negotiated a contract with ARD, of Burlington, Vermont, in late 1985 to undertake the studies in the field. The AID contract with the USNRC, implemented by the Board on Science and Technology for International Development (BOSTID), began in September 1985 for a three-year period, during which five workshop activities were planned. However, because of budgetary restrictions, AID was only able to provide funds for the first four activities, planned to take place prior to June 30, 1988. Additional funds for the final workshop were not provided to complete the originally agreed-upon fifth and final activity, the review of the ARD findings and final report.

This report thus provides a summary of the overall reflections on the information gained during the period of the activities, including the 4 workshops and the ARD draft final report. Reports of the four workshop activities under the contract, undertaken during the period September 1985 to June 1988, are provided in the Appendices. These included:

1. a workshop in cooperation with the Somali Academy of Sciences and Arts/National Research Council (SOMAC/SNRC) and the MJVD in Mogadishu, in January 1986
2. a workshop with Associates in Rural Development (ARD) in Burlington, Vermont, in April 1986
3. a workshop to review the experience on river basin development in association with the Tana and Athi rivers in northeastern Kenya, held in the field and in Nairobi, Kenya, in October 1986, and
4. a workshop on African river basin experience of relevance to the Juba Valley project, in Berkeley Springs, West Virginia, in May 1987.

*The spelling is also commonly "Baardheere," which is the more widely accepted official form, as is "Jubba" for Juba and "Mogadishu" for Mogadishu; throughout this report we have used the older standard English transliterations, except where the name is quoted from a contributed paper or speech.

In addition, the BOSTID program arranged for the following activities at AID/Washington and USAID/Somalia's request:

1. A mid-term review of the U.S. Bureau of Reclamation (BuRec, Reston, Virginia) preliminary survey of Somali soils and their suitability for irrigation, a parallel activity to the environmental and socioeconomic study, also funded by USAID. This review was undertaken by Dr. Peter Ahn (International Board for Soil Research and Management, Nairobi, Kenya) at BOSTID's invitation.
2. A paper on the legal aspects of land and water use in the Juba Valley, undertaken on BOSTID's behalf by Prof. B.H. Selassie (Howard and Georgetown Universities).
3. A review of the final BuRec report in late 1987 by Prof. Jack Keller (Utah State University), Dr. Wim Sombroek (International Soil Reference and Information Centre, the Netherlands), Dr. Otto Baumer (U.S. Soil Conservation Service), and Dr. Peter Ahn.

BOSTID proposed to USAID a final workshop to review the outcome of the ARD studies, and a master plan for Juba Valley development being drafted by Agrar- und Hydrotechnik (AHT, Essen, Federal German Republic) with support by the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ, Eschborn, Federal German Republic). These studies were expected to be available in draft in July/August 1988. BOSTID accordingly received an extension of its contract through April 30, 1989 in order to complete the planned activities to the extent feasible without the final workshop, no additional AID funds being provided. The ARD executive summary report was received in May and June, 1989, and subsequently reviewed individually by NRC Panelists. This summary of the BOSTID panel's concerns emerged from these activities, covering the four workshops and related activities, including the points raised in the reviews. The Appendices are available (in limited quantities) on request to BOSTID.

- ISSUES ARISING IN CONNECTION WITH RIVER BASIN DEVELOPMENT EXPERIENCES IN AFRICA AND THEIR IMPLICATIONS FOR THE JUBA VALLEY

When the panel was first established in late 1985, panelists were skeptical regarding the net benefits to the country and the inhabitants of the Juba Valley that would result from construction of the Bardera Dam. After all, they had been documenting failures with dams and river basin development projects around Africa for many years. Nevertheless, because the intention to construct the dam is official Somali government policy, the panel focussed upon assisting the ARD contractors in gathering information, and providing advice to assist the MJVD and the Somali government in achieving the widest range of objectives possible in Juba Valley development for the benefit of the entire population of Somalia.

Based on their experience with river-basin development in Africa and elsewhere, the panel member's major concerns were the following:

1. National and Regional Planning and Their Relationship

The Juba and Shebelle river basins are the heartland of future development, and more emphasis needs to be given to regional planning. The draft plan for the development of the Juba Valley was submitted by AHT to the Somali government in December 1988. There is need for a strong planning unit within the government to coordinate development of the valleys. The hope is that the AHT masterplan team and MJVD will give consideration to this need, to the requisite training, and to the preparation of a rolling planning capability during implementation of the construction phase.

2. Integration of the Region within National Development

Once the dam is built, donor funds will tend to become more scarce than they will be during the construction phase, and provision of resources necessary for development can be expected to be delayed. A portion of the electricity generating capacity should go to the Juba Valley in order to support a broad range of small, productive activities involving large numbers of people, from which economic benefits to the valley and the nation as a whole can be anticipated through the multiplier effect. If the infrastructure is not built before completion of the dam, there is the danger that it may be delayed, or may not be funded at all. For example, the transmission lines should be built to Jilib and Mogadishu simultaneously. If there is any doubt that both sets of transmission lines will be built, they should go to Jilib first, and perhaps if necessary continued from Jilib to Mogadishu, because if they serve Mogadishu first, they may never reach Jilib.

3. Underestimation of River Basin Development Potential

The development potential of river basins, both reservoir and downstream, is always underestimated. The reservoir itself can be a major regional resource, in addition to the hydroelectricity, flood control and other direct benefits, and the panel urges that attention be given to this regional resource. Downstream, the panel believes in the importance of continuing to simulate the annual flood regime for a range of uses (especially traditional agriculture and livestock production), bearing in mind the need to control its dangers.

Even once the contractors are selected to build the dam, provided the design includes bottom outlets, there is still flexibility with respect to control of the flood level, through the height and capacity of the bottom outlets and the number of turbines installed or brought into operation. The need is to provide bottom outlets to the dam of sufficient capacity to release sufficient water (up to 1200 m³/sec) to simulate the annual flood after dam closure. It will be necessary to experiment with different flood levels, and look at the aggregate advantages and disadvantages of eliminating or simulating the flood so that all the implications can be understood. Benefits from flood simulation will include provision of water and nutrients for traditional downstream deshek (recessional) agriculture, which currently makes an important contribution to national agricultural output; dry season grazing for livestock, both in the traditional areas downstream of the dam site, and in new drawdown areas at the reservoir margin that will be created, in which recessional crops can also be grown; and health benefits by drying up areas where vectors could proliferate under continual moisture conditions. These must be weighed against possibly greater capital cost, and subsequent reductions in electricity-generation capacity associated with the water released through the bottom outlets for flood simulation.

4. Access to Land

There will be a flood of applications for land in the valley. This makes implementation of plans difficult, if the land has been allocated before the plan. Spontaneous settlement will occur, government officials will apply, as well as private individuals, and joint ventures will be organized to open up available land. There is therefore need for policy and legislation for land allocation. The mix needs to be carefully assessed.

The panel has serious concerns about the economic future of the traditional production sector of the valley and the people currently engaged in it, especially with reference to minority groups. The panel was delighted to have the reassurance by the Minister of MJVD regarding the government's intention to provide land compensation for people relocated as a result of compulsory acquisition of land for larger-scale irrigation projects, and the intention to provide them, and settler families, with 2.5-5 ha farms. Their multiplier effect in contributing to future economic development can be very high, but they are often swamped by large-scale operations. The MJVD reassurance notwithstanding, the panel feels strongly that past experience from other development schemes in Africa, as well as earlier projects in Somalia, indicates that there are strong economic forces which prevail over the best intentions of the government, and poor people inevitably lose access to their traditional resources without adequate (or, frequently, any) compensation. The panel therefore urges the MJVD, and the future agencies and other ministries responsible for implementation of the Bardera Dam Project, as well as the donor and technical assistance agencies providing assistance to the projects, give especial attention to the development needs, and the equitable treatment of the traditional farmers and herders of the Juba Valley as they are affected by the large-scale investment projects.

This attention to equity considerations is important for several reasons:

- o It is both legally required and morally necessary.
- o It is likely to be given detailed scrutiny, under present conditions of widespread international skepticism about large dam projects, by concerned groups and individuals. Unfavorable reports are likely to have an increasing influence on future international investments in the valley's economic activities.

o It is likely to increase the overall effectiveness of the valley development. The dam is intended to promote greater self-sufficiency in food production. Experience to date with modern irrigation systems in Somalia has been confined largely to cash crops (such as bananas and sugarcane) and this experience has shown consistent failure to meet expectations. Irrigated food production, on the other hand, has been most successfully implemented by small-scale projects and by farmers in desheks or with low-lift pumps. These are the people with the knowledge of sustained food production in the valley. To the extent that they are displaced by large projects, production is likely to drop, and food self-sufficiency will be delayed rather than increased.

o Incorporation of pastoralists within development plans is especially important in Somalia given the great importance to the national economy of the pastoral livestock sector, which elsewhere in Africa has been consistently ignored in connection with river basin development--with adverse effects.

o Integration of refugees into the local population can thereby be enhanced. The panel understands that Somali government policy is that if refugees want to stay in the Valley, they will be integrated. If this happens, and they have the requisite skills, this integration may serve to decrease projected labor constraints that may cause development delays.

5. Health impacts

Related to questions of land access and equity, water-use management and simulated flooding, are important health considerations. It is clear from experience elsewhere in Africa that the negative health impacts caused by dam impoundments are disproportionately borne by the people living on the lake margins, while the economic benefits created by the dam only slowly if ever percolate through to these same people. These adverse health impacts are predictable and, at least to some extent, controllable. They include spread to endemic proportions of schistosomiasis, malaria, and other mosquito-borne diseases--such as filariasis and Rift Valley Fever. To combat the spread of these diseases involves, on the one hand, provision of rural health facilities for monitoring, reporting and treatment, and, on the other hand, management of the dam operations and related crop and livestock production in such a way as to reduce health risks to the extent possible. The latter actions will include seasonal drying out of irrigation canals and lake margins to kill vectors and their habitat, and choosing crop rotations that do not require year-round flooding of land. The management of these control measures has important economic aspects requiring ultimately institutional arrangements for trading off economic costs and benefits against the socio-political costs and benefits of mitigating adverse health impacts.

6. Institutional Arrangements for River Basin Development

The importance of a strong, permanent, planning/policy unit under the arrangements proposed in the Price, Waterhouse study recommendations has been repeatedly stressed throughout these and earlier discussions. Particularly important in this regard are the arrangements to be made for monitoring health, ecological, and economic effects, since the costs and benefits of these typically cut across traditional sectors. Monitoring arrangements should ideally be in place by the time the ARD contract expires, so that there can be continuity in using that valuable information and experience. However experience from other river basins cannot yet suggest an effective model, and this topic needs attention by the development community.

7. Transfer of Authority

International experience has shown that organizations such as the Tennessee Valley Authority and similar parastatals in other countries are most effective in early developmental activities such as construction and fund-raising, and the question of their handing over responsibility to line ministries and local organizations for the development activities is an important issue which should be given attention early in the planning process, not left, as it usually has been, to resolution by default.

8. Adequacy of Existing Contextual Analysis in Relation to Proposed Activities

Relatively little useful information exists regarding upper basin-lower basin linkages in relation to planning activities in the Juba Valley. Similarly, while relationships between river regime and the areal extent of proposed irrigation projects has been satisfactorily addressed, considerable uncertainty remains regarding the seasonal and accumulative effects of water/soil interaction in relation to the economic viability of the projects. Further information is also required regarding rates of sedimentation in relation to the design of the Bardera Dam and its projected impact upon economics of hydropower generation.

These are the principal issues that the Panel feels need attention over the next 5-20 years as the construction and development phases of the Bardera Dam are implemented.

GENERAL COMMENTS ON THE JESS SCOPE OF WORK

It is unfortunate that the AID scope of work, while initially in the Request for Proposal being all-inclusive (to the point that the project appeared impossible to complete) subsequently was changed, and these changes constrained realizing the full benefit of the really quite exceptional field research on the part of ARD.

The scope of work emphasized the mitigation of impacts of the dam, rather than on how the dam could be used for the integrated development of the Juba Valley, and particularly for the benefit of the local people in and around the Valley. This may have resulted from the difficulties in reaching agreement with the MJVD in the initial negotiations, which caused the deletion of an AID/Washington inserted provision for the JESS to include assessing the "no-dam" (or multiple small barrage as opposed to single large dam) option, that was totally rejected by MJVD. As a result, the point was accepted by AID that the political decision to build the Bardera dam had been taken, and was irrevocable, and hence led to a concern for mitigation, as opposed to alternatives for Valley development. Nonetheless, this should not have prevented an emphasis on the development potential rather than mitigation, because it was clear from the outset (for example see the summary conclusions of the Al-Aruba workshop-Appendix B) that realization of the potential benefits of the dam could only be achieved by integrating all the development possibilities.

Subsequently, in internal management decisions taken in Mogadishu between ARD and USAID, due perhaps to a concern for conserving funds, because it was a touchy topic with the MJVD, and because it was the topic of a parallel assessment (by Price, Waterhouse) ARD was evidently instructed to leave out of its assessment of the socioeconomic impacts any evaluation of the potential effects on those impacts, and alternative measures that could be arranged, as a result of the various institutional arrangements proposed for the implementation of dam construction and associated infrastructure and subsequent management of these various aspects. This restriction should have been unacceptable since it makes the ARD assessment of, and recommendations about, different development and policy options virtually impossible, since institutional capabilities are a crucial variable.

With respect to the detailed macroeconomic analysis of the power generation, construction engineering, and irrigation options, it was accepted from the outset by USAID and ARD that these would be undertaken by other agencies (including AHT, the World Bank, and Sir Malcolm McDonald and Partners). However, this should not have led to the total omission from the Executive Report of any description of the various options, which seriously undermines its authority.

REVIEW OF ARD DRAFT EXECUTIVE REPORT

One purpose of the NRC review process is to be supportive of the ARD research effort. In addition to helping the ARD team over the years to the extent possible (which was limited given the time constraints on volunteer committee members and the financial constraints which precluded the final review meeting), one responsibility of the NRC Committee is to ensure, to the extent possible, that the final Executive Summary, Recommendations and Report to the Government of Somalia and to AID reflect as accurately as possible the results of the research and the priorities revealed by that research. This additional responsibility is required by the nature of the

political arena in which development oriented research is carried out (among a large number of organizations and agencies with different agendas) and the danger that research results will be "softened" by political considerations. The NRC committee has a responsibility to help the ARD colleagues resist such "softening".

One of the strengths of the USAID-funded University of Michigan studies of Gambia River Basin development was that they did not hesitate to emphasize conclusions that they knew would be unpopular with the countries in which the research was carried out. Hence though they knew that Gambian officials from the President down were committed to the Balingho Dam, Michigan presented strong evidence that it was not a viable option, evidence that influenced donors to favor a bridge across the Gambia at the proposed site rather than a dam. Though ARD's scope of work is more restricted, and construction of the dam was assumed from the outset, nonetheless the opportunity is there to influence government and donor policies as they relate to the Juba River Valley below the dam and the area between the dam and the Ethiopian border. Donors and the Government of Somalia should not, however, have to read between the lines to fathom JESS's conclusions or discern the more important recommendations.

The Panel believes that the ARD JESS Team has done an exceptional job in gathering high quality field data under very difficult conditions, and in analyzing and presenting that data in detailed reports. That achievement alone requires doing justice to the research in ARD's written and verbal summary reports and recommendations. The Draft Executive Report represents a fine job of pulling together many of the research results, and in presenting a large number of important recommendations. In many instances these reflect earlier Panel comments that have been incorporated into this draft. The Panel's concerns therefore relate not to what is included in the report but what is not included. Since many of the agencies concerned with development in the Juba region will rely heavily on the Executive Report, the omission of discussion of fundamental issues and questions surrounding the dam's construction and associated Valley changes is not justifiable, whatever the political sensitivities may be. The working assumption that the dam will be built, and JESS's consequently more limited objective of conducting research towards recommendations for mitigation of effects of construction, should not obfuscate identifying the most basic effects the dam will impose on the Valley. In this regard, the report is weakened by its avoidance of these basic issues. Panel concerns about these omissions, which were transmitted to ARD separately in June 1989, are summarized as follows:

1. Macroeconomic context

The Report contains no synopsis of the macroeconomic situation within which the ARD projections of possible socioeconomic impact and mitigation can be viewed. ARD was not expected to provide this as a major component of the socioeconomic study under its terms of reference, as this analysis was to be undertaken by AHT and the Ministry of Economic Planning in the preparation of the Master Plan for the development of the Juba Valley. However the absence of any simple description of the basic economic choices before the Ministry--which are key variables affecting socioeconomic impact--weakens the presentation of ARD findings. These include:

a) **Electricity Generation.** There is no discussion of the fundamental choices of how much of the power generated is to be used for supplying electricity to Mogadishu as opposed to using it for development of the Valley. Early arguments proposed that most of the power should go to the capital, to substitute for imported oil-generated electricity. However, the Panel and ARD also recognized the potential economic and social benefits of using part of the electricity for Valley development, including electrifying smallholder irrigation. (In other African schemes, electrification can

reduce energy costs of irrigation by 50 percent.) Moreover, it was also argued that since the returns from power generation alone would be insufficient to repay the investment, it becomes important to use impounded water to generate additional revenues and benefits through irrigation, particularly the substitution of imported food by increasing local production, a priority repeatedly stressed by Minister of Juba Valley Development Habib.

b) **Smallholder versus Large Scheme.** Again, there is no presentation of the basic issues. The Executive Report clearly points out the weaknesses of the larger-scale parastatal irrigation projects as well as the strengths of local production strategies (including small-scale irrigation, deshek and levee cultivation, the trend toward agropastoralism, trading in crop residues for stock, etc.) It also points out the constraints on local initiative and development posed by the 1975 Agricultural Land Law, and associated with large government-sponsored irrigation projects. Combined with weak government institutional capabilities, this data presents an exceptionally strong case for recommending a development strategy whereby government attempts to build upon the strengths of its Juba Valley population and resources, and to reduce constraints by taking approaches that are within government institutional capabilities (and that are included among the recommendations; for example, allowing a controlled downriver flood and amending the 1975 Land Act). By not underlining the major policy implications of the completed research, the Executive Report, however, fails to take advantage of this important opportunity to influence policy.

It is not clear from the report what ARD thinks of the burst of small-scale irrigation activity through the use of small pumps, which (page 9) are noted to have increased from some 260 in 1984 to over 900 in 1988, with more than 7000 ha. being irrigated (page 53). Add 4000 hectares of levee cultivation and 7000 ha of deshek and more land is cultivated under small scale irrigation than under government projects (17,000 ha as mentioned on page 5). JESS apparently has no recommendations about the balance between these types. The general sense (penultimate paragraph on page 53-20 percent irrigation efficiency, "top-ender" risks of reducing water availability for downstream government projects, and the phrase on the need to curb upstream offtake), indeed, is to give the reader the impression that the JESS somehow disapprove of such irrigation. Throughout most of Africa, small-scale pump irrigation is considered one of the few bright spots. However, clearly the proliferation of small-pumps poses special problems of two sorts in the Juba context:

- o the ownership of many pumpsets by outsiders at the expense of Valley residents where (i) their land is registered in an outsider's name, and (ii) the benefits of small-scale irrigation do not accrue to the local people; and
- o the top end offtake that presents problems for downstream users, which clearly requires some allocational planning.

What is missing is a general discussion of policy issues here, especially since no recommendations deal with small-scale irrigation as such (on pp. 109-110), while the recommendation on page 115 on water legislation sounds rather punitive against small-holders. The problem will be intensified if the World Bank proposal to resettle reservoir relocatees along the middle valley with small pumps is implemented. Hence the need for JESS to address the balance between different types of irrigated land use as they relate to valley living standards and multiplier effects.

c) **Controlled Flooding** and deshek production, and integration of livestock management into Valley development, are each given attention, but these important aspects are left simply hanging in absence of any indication of the major economic choices.

This does not mean that ARD should have been required to arrive at specific recommendations over these choices; in the final analysis, these are political choices for the Somali government to make in the context of the Master Plan on the basis of detailed economic analysis. However without a description of these basic issues, the reader cannot perceive the options clearly, and how the environmental and socioeconomic implications ARD identifies will be affected.

2. Institutional Context.

As in the case of the macroeconomic context, there is no discussion of the importance of the institutional context in determining alternative strategies that might lead to different socioeconomic benefits and amelioration actions. (There are a few exceptions: for instance, minor notation of the limitations of the Ministry of Agriculture). Yet the very recommendations offered by JESS, and much of the effort to explain already existing problems in the Valley, presuppose adequate, even exceptional, institutional capability within the context of Third World conditions. In reality, there is little if any evidence for such capability in Somalia, but this is not reflected by JESS policy conclusions. The benefits from this complex, multifactoral project will accrue in proportion to the extent to which the different aspects can be implemented in a coordinated, concurrent, manner. The current institutional capabilities of the Government of Somalia to carry it out are limited. Depending on how these capabilities are organized and strengthened, there are different levels of expectation and therefore potential socioeconomic consequences, which must influence ARD's conclusions.

Some of the dimensions of proposed action where institutional capability is fundamental include: delivery of services and management; monitoring of socioeconomic and environmental conditions; multi-level planning with regard to agricultural development, settlement, health measures and livestock management and marketing; and, interministerial coordination.

Institutional assessments and comments are necessary not just because they have direct relevance to government abilities to implement recommendations, but also because they have direct relevance to the development approach taken by the government. The same can be said about unfavorable government policies toward rural and human resources development (for example, educational expenditures falling from 10 percent to 2 percent of budget between 1975 and 1986 with severe negative effects in the Juba Valley.)

3. Priorities.

The timidity of the Executive Report is especially shown in the unwillingness to prioritize recommendations. While JESS was not asked to carry out a benefit-cost analysis, at the very least recommendations should be assigned broad categories of importance where the report does reach firm conclusions. The length of the report, and the recital of the issues, leads to the potential for treating all of them equally. In starting off with "safe" recommendations and scattering the more important ones throughout the text, Section V does a disservice to the research results. To provide an example, the first three recommendations deal in sequence with Baroko Meadows and Shoonto Forest, Shebelle wetlands, and a unique species of sedge. The Shebelle wetlands recommendation is orders of magnitude more important than the other two. Yet as presented, the outside reader interested in the "bottom line" to whom the recommendations section is slanted will not realize that. The same is true of other recommendations. Furthermore, recommendations deal not just with mitigation (as in the title to Section V) but also with development issues. The individual

recommendations are excellent, but they are not prioritized according to their importance, nor are their policy implications drawn out, especially in regard to alternative development strategies for the Juba Valley.

4. Pastoral/agropastoral Sector.

The report includes numerous descriptive points regarding the economic and ecological characteristics of pastoral and agropastoral life in the Juba Valley. These characteristics are, to some extent, discussed within the conceptual framework of risk aversion strategies. This constitutes a vast improvement over the earlier Executive Report draft which largely ignored the indigenous pastoral/agropastoral population of the Valley. Despite the inclusion of some detail along these lines, however, coherent treatment of the fundamental survival needs and vulnerabilities of the Valley's pastoral/agropastoral population in relation to the environmental and socioeconomic changes likely to accompany dam construction, are still lacking. Although the report does, in fact, make statements regarding possible changes in rangeland vegetation and land use pressures, the need for "corridors" of access to the river by stock herders, and overgrazing as a likely mounting problem in the Valley, these hardly constitute an adequate treatment of the implications of dam construction and associated development for pastoral/agropastoral elements. Specification (including quantitative estimates) of the types and degree of dependence of these peoples on the riverine zone is largely ignored except for brief and inconsistent mention. Such omission is not acceptable, given the well-known experience from comparable river basin developments in Africa and the specific findings of JESS research itself. This is not only a problem of interpretation and presentation of JESS data, but also one of the research design itself. Even if the tentative hypothesis was formulated by JESS early on in the course of its work, that effective "mitigation" of the dam's effects on pastoral/agropastoral economy was not possible, and/or that such mitigation was not a significant concern of the GSDR, identification of the specific dimensions of the problem in systematic fashion should have been essential to the JESS task.

5. Deshek Sector.

The discussion of deshek cultivation and changes in agriculture along the river, in particular through river flow changes following dam construction and through associated land tenure changes, is also a considerable improvement over the earlier report draft. Again, however, the relationship between these changes, on the one hand, and the sustainability of the Valley's traditional economies--both pastoral and agropastoral, on the other, is not drawn. Virtually all of the discussion of land tenure change, notably the increasing number of share-cropping relationships, increasing emphasis on irrigation, and land speculation along the river, is treated with reference to small-, medium- or large-scale irrigation as distinct from riverine usage by pastoralists and agropastoralists for cultivation, pasturage, and watering. Indeed, the report raises serious issues of equitability as well as those of economic viability of the different-sized landholdings, and of resource destruction (for example, through de facto clearing versus forest management practices as required by the 1975 Land Law). But these concerns as formulated are not extended to the Valley's inhabitants who generally lack the resources to purchase diesel pumps, to enter effectively into share-cropping relationships with urban-based entrepreneurs, or to form cooperatives. By way of underscoring this point, note the unintentional bias against pastoral/agropastoral economic interests which is implicit in JESS' recommendations for alteration of the 1975 Land Law. Reforms such as requiring proof of "unoccupied" status of land requested by prospective registrants, or of "fair compensation" paid the same individuals, implicitly but strongly emphasize only permanent occupation as an adequate basis for blocking or strongly conditioning registration by "new" individuals, rather than take account of the strong seasonal dependence on these same resources by

pastoralists and agropastoralists. Furthermore, JESS has proposed reforms that permit registration of multiple plots, in itself a constructive suggestion on ecological/economic grounds, except that insofar as it is applied to prospective registrants who are basically involved in land speculation (a phenomenon repeatedly noted in the report), the modification of the Land Law only compounds the problem for economically more vulnerable elements of the Valley's population.

6. Other.

A number of other problems and issues are either omitted or overly minimized in the present report, as they were in the original draft. Some of these were raised by panel members in earlier communications:

a) The matter of possible refugee and Valley resident resettlement, while not undertaken by JESS itself, should nevertheless be considered in some integral fashion with the JESS effort, if nothing more than in relation to several key recommendations set forth in the concluding pages. (Resettlement is not even included as a topic in the bibliography, Vol. 4.)

b) Conditions upstream from the reservoir, including in Ethiopia, are fundamental to some aspects of JESS' conclusions and recommendations and should at least be outlined for further policy consideration. The political sensitivities involved here should not preclude their mention as important issues involved in planning in Somalia (for example, upriver impacts on river flow and sediment load).

c) Riverine, and in particular, reservoir fisheries development, is suggested by JESS in the form of contractual relations and concessionary policies with foreign entrepreneurial interests. It is suggested that export/import concessions and short term exploitative rights for foreign fishing interests should be offered by the Somali government in return for introduction of technology, training and general "know-how" and financial return in the form of export taxes. It should be pointed out that there exists a wealth of information regarding the difficulties of following this approach to fisheries development which focuses primarily on short-term profitability and exploitation of fisheries resources fundamentally dependent on the attraction (and dominance) of foreign capital. Much of the literature details the establishment of a strong dependency of the Third World country on the foreign capital involved--a dependency not effectively offset by a sustainable fisheries development program. Issues such as the ongoing costs for basic infrastructure creation, maintenance of equipment and purchase of spare parts for machinery, building and/or maintenance of facilities for cold storage and processing; access to market outlets; and depletion of fish stocks because of heavy initial exploitation and insufficiently understood fish populations, should produce caution in a context such as Somalia. Again, the evidence for Somali institutional capability for effectively coping with such a development arrangement is lacking, suggesting the need for more care in the evaluation of such an approach.

One of the few study weaknesses is the inconsistency between SEBS data on multiple crop ownership and the general perception that families try to gain access to all three plot types (page 48). That inconsistency reminds us of the weaknesses of surveys, the need to combine results with Besteman type research, and the need to resolve inconsistencies.

7. Panel Recommendations.

In light of the issues raised, or not sufficiently underscored, in the ARD Executive Report, the Panel wishes to give particular emphasis to a number of points already noted in previous sections.

Government policies for rural populations.

The Executive Report implies that government policies for rural populations are more favorable than they are. For example, on page 62, there is the statement "From the beginning, government has focused on welfare of rural populations in its allocations of scarce financial resources, especially in regard to agricultural development". Yet the information presented in Chapter III of the draft SEBS report describes the post-1969 agrarian transformation strategy involving nationalization of the banana industry, initiation of large state farms, passage of the 1975 Land Law, state support of cooperative formation, and state monopoly in marketing of grains and sesame. These did not help the rural population of the Valley.

The banana industry continues to have a negative impact on local food production due to removal of prime riverine land from the village sector (VI-12). Initiation of three state farms removed 17,000 ha of the better lands from small-scale village farmers, without any compensation--certainly a highly negative impact--while canals, bunds and similar control measures caused a different channelling of sheet flow and flood waters, which adversely affected an unknown number of villages outside the project area. A review of the feasibility studies shows "almost no consideration was given to the social and economic impact the projects would have on local farmers" (III-24). Seven negative impacts, including increases in bilharzia and reduced village income are listed on III-25. Village income is reduced because the primary source of income now is the low wage given on the projects; labor is paid 34 shillings per day from Jubba Sugar, while a living wage is calculated to be between 150 and 200 shillings per day (VII-30).

With regard to the 1975 Land Law, the above 17,000 ha were taken without compensations after its passage, and after passage speculation and registration of land by outsiders ballooned ("Today, 'developers' from Muqdisho are claiming thousands of ha more" III-51). Perhaps that was an unexpected outcome; perhaps not. Similar land laws in Mauritania are now agreed by most experts to allow a land grab, by Bidan (White Moor) individual entrepreneurs with capital, of Senegal river basin irrigable land controlled by black (Toucouleur) villagers, which the construction of the Manantali Dam has made the most valuable arable land in the country. The recent outbreak of ethnic violence in Mauritania and Senegal, in which many people have been killed, and Mauritians and Senegalese in Senegal and Mauritania respectively "repatriated" from the other country by an emergency airlift, has been directly attributed to the impact of land appropriation as a result of the dam construction (West Africa, 29 May-4 June, 1989, p. 868).

As for cooperatives, while their intention was to develop "the traditional smallholder sector" (with collective farms to be the end result of a three-stage cooperative succession), "The Co-Operative Movement now appears to be in a state of collapse" (SEBS VI-11) in part because of poor institutional ability on the part of the state to serve it. Moreover, SEBS III-43 notes that "the level of educational and health facilities enjoyed in the lower Jubba Valley in the 1950s and 1960s dropped sharply in the 1970s," with the Executive Report noting that government has decreased expenditure for education from 10 percent in 1975 to 2 percent in 1986--with severe negative effects in the Juba Valley (pp. 36-37). In sum, "The most remarkable and disconcerting fact to emerge from this investigation into the history of the lower Jubba Valley is significant decline in the local population's ability to produce an agricultural

surplus" (III-46). So clearly government policies have had a negative impact on the village sectors since 1969.

Institutional arrangements

While the Executive Report, as noted above, avoids any analysis of government institutional capabilities, analysis in the draft SEBS report shows how weak these are, even by African standards. A review of the transportation and communications, health, education and agriculture and livestock extension services "presents a rather dismal picture. Communications are still rudimentary, as are roads. Few inhabitants receive much government aid in the education, health agricultural, or livestock sectors. The mandate for action is fairly clear--without these most basic services as a foundation, little development can occur." (X-13) On the other hand, the draft SEBS report is encouraging about the local institutions (guddi, agiaarta, nabadoon in villages or xafaads and beels) which it finds "are the most effective local institutions for mobilizing support and participation in efforts of community interest." (X-3) "Valley residents have adapted most effectively to changes in the administrative structure implemented in their communities because the new structure was built on traditional institutions." (X-6) It notes the overall pattern of democratic process and local autonomy, and is encouraging about the dynamics of local village and pastoral production systems, and on small-scale pump irrigation development. Hence the conclusion "Development activities are more likely to be effective to the degree that they accommodate and incorporate local institutions in implementation plans. (X-6 et seq.)

It seems obvious that the first priority should be given to government facilitation--as opposed to domination--of local initiative and production activities.

Local production systems

The Executive Report does not adequately summarize the negative impacts of the dam on local production systems. The Draft SEBS does not equivocate: "If provision is not made for an annual artificial flood from the dam for the indefinite future, or at least until appropriate irrigation technologies are equitably introduced and reliably in place, the majority of farmers will be negatively affected by alteration in the river's current flood regime." Moreover there appears to be a bias against seasonal (transhumant) pastoralists. Nowhere is there any attempt to quantify or at least generalize about the amount of grazing that will be eliminated by the flood reduction. The recommendations do not relate to seasonal land use. Yet seasonal grazing in the Valley is essential to livestock production from over 3 million camels, cattle, sheep and goats, and crop production from deshek and seasonal plots are the mainstay of Valley output.

Small-scale irrigation over large-scale government projects

The Executive Report implicitly recognizes the limitations of large-scale irrigation projects: "It is recommended that government not attempt to implement any large-scale irrigation projects in Jubba Valley until existing projects are improved and expanded to the most feasible limits in view of water management constraints." (p. 109) The Draft SEBS report points out that development costs of large-scale irrigation are exorbitant (estimated to be over US\$14,000 per hectare) and that "even half this money invested in varietal research, machinery services (either tractors or animal traction) and simple inputs for local farmers, traditional yields could be doubled or even tripled, producing much more grain than is presently produced under the project." (VI-16,17) In the Panel's view, it will be crucial for policies to be elaborated to facilitate small-scale pump

irrigation as an end in itself, and in preference to government or parastatal large projects.

Electrification of the Valley

Finally, as noted above, there is no recommendation concerning the likely positive impact of using at least part of the electricity generated within the Valley itself, for rural electrification of villages, schools, clinics, and wherever possible small-scale irrigation pumps. The Panel views this use of the generated power as important for raising the general level of development along the Valley, in creating additional multiplier effects, and in reducing the costs of irrigation (as well as reducing the foreign exchange for importing petroleum products, and the cost of transporting them to the Valley, which would save even more than reducing electrothermal power generation for Mogadishu.)

With these recommendations for additional emphasis, and provisos in the preceding section, the Panel commends the ARD team for their extraordinary efforts and fully supports the conclusions and recommendations in the Draft Executive Report.

APPENDICES TO THE SUMMARY REPORT

REPORT OF A JOINT WORKSHOP ON ENVIRONMENTAL AND SOCIOECONOMIC ASPECTS

Al-Aruba Hotel, Mogadishu, Somalia
January 30-February 4, 1986..... B-1

REVIEW OF JUBA VALLEY ENVIRONMENTAL AND SOCIOECONOMIC STUDIES IMPLEMENTATION WORKPLAN: REPORT TO THE JUBA VALLEY ADVISORY PANEL

Burlington, Vermont
April 7-8, 1986..... C-1

REPORT OF A WORKSHOP ON TANA AND ATHI RIVER BASINS OF KENYA: LESSONS FOR THE JUBA VALLEY

Nairobi, Kenya
October 4-5, 1986..... D-1

WORKSHOP ON RIVER BASIN DEVELOPMENT EXPERIENCES IN AFRICA AND THEIR IMPLICATIONS FOR THE JUBA VALLEY

Berkeley Springs, West Virginia
May 7-10, 1987..... E-1

ACRONYMS AND ABBREVIATIONS

AHT	Agrar- und Hydrotechnik (Essen, Federal Republic of Germany)
AID	United States Agency for International Development (Washington, D.C.)
ARD	Associates in Rural Development
BDP	Bardera Dam Project (of Somali Ministry of Juba Valley Development)
BOSTID	Board on Science and Technology for International Development (of the U.S. National Research Council)
BuRec	United States Bureau of Reclamation
ELC	Electroconsult (Italy)
GSDR	Government of Somali Democratic Republic
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit (Eschborn, Federal Republic of Germany)
ILO	International Labor Organization (of the United Nations)
IPAL	Integrated Project in Arid Lands (Unesco/United Nations Environment Programme)
IRR	Internal rate of return
JESS	Juba Environmental and Socioeconomic Study
MJVD	Ministry of Juba Valley Development (Somalia)
REDSO	Regional Economic Development Services (Nairobi)
RMR	Resource Management and Research
RUPs	resource user-producer groups
SIDAM	Somali Institute for Development Administration and Management
SNRC	Somali National Research Council
SOMAC	Somali Academy of Sciences and Arts
TARDA	Tana and Athi Rivers Development Authority
TAMS	Tibitt, Adams, McCartney and Stratton
UNICEF	United Nations Children's Fund
UNEP	United Nations Environment Programme
UNESCO	United Nations Education, Scientific, and Cultural Organization
USAID	Somalia Mission, United States Agency for International Development (Mogadishu, Somalia)
USNRC	United States National Research Council