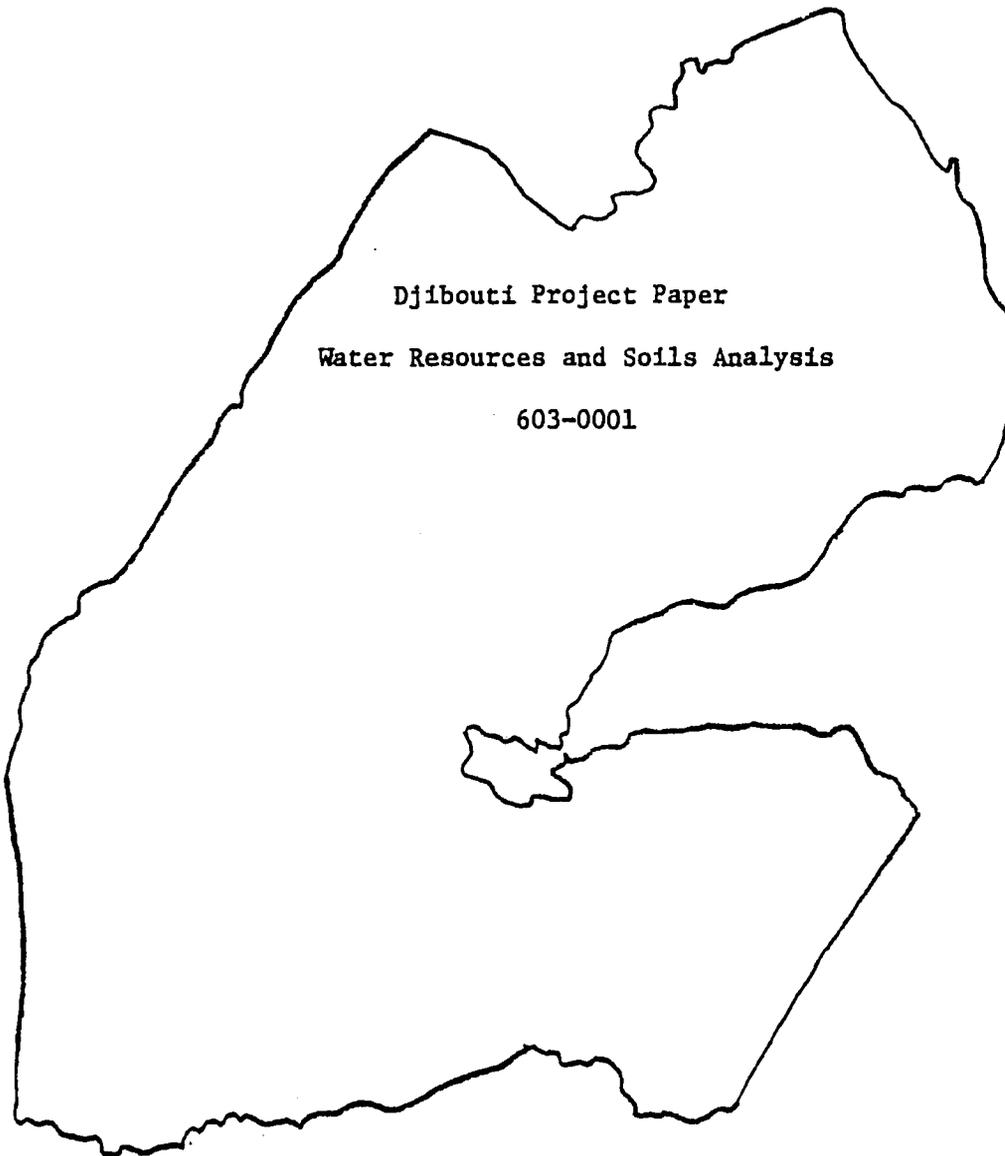


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AGENCY FOR INTERNATIONAL DEVELOPMENT PROJECT PAPER FACESHEET		1. TRANSACTION CODE A A = ADD C = CHANGE D = DELETE		PP 2. DOCUMENT CODE 3
3. COUNTRY/ENTITY Djibouti		4. DOCUMENT REVISION NUMBER Original		
5. PROJECT NUMBER (7 digits) [603-0061]	6. BUREAU/OFFICE A. SYMBOL AFR B. CODE [06]		7. PROJECT TITLE (Maximum 40 characters) [Water Resources and Soils Analysis]	
8. ESTIMATED FY OF PROJECT COMPLETION FY: [8 1]		9. ESTIMATED DATE OF OBLIGATION A. INITIAL FY [7 9] B. QUARTER: [2] C. FINAL FY [7 9] (Enter 1, 2, 3, or 4)		

10. ESTIMATED COSTS (\$000 OR EQUIVALENT \$) -						
A. FUNDING SOURCE	FIRST FY 79			LIFE OF PROJECT		
	B. FY	C. L.C.	D. TOTAL	E. FY	F. L.C.	G. TOTAL
AID APPROPRIATED TOTAL	432	55	497	432	55	497
(GRANT)	432	55	497	432	55	497
(LOAN)	-	-	-	-	-	-
OTHER: 1.						
U.S. 2.						
HOST COUNTRY	50	130	198	50	130	198
OTHER (ONORIS)						
TOTALS	491	204	695	491	204	695

11. PROPOSED BUDGET APPROPRIATED FUNDS (\$000)									
A. APPROPRIATION	B. PRIMARY PURPOSE CODE	PRIMARY TECH. CODE		E. 1ST FY: 79		H. 2ND FY		G. 3RD FY	
		C. GRANT	D. LOAN	F. GRANT	G. LOAN	I. GRANT	J. LOAN	L. GRANT	M. LOAN
(1)				497	-	-	-	-	-
(2)									
(3)									
(4)									
TOTALS				497	-	-	-	-	-

A. APPROPRIATION	N. 4TH FY		O. 5TH FY		LIFE OF PROJECT		12. IN-DEPTH EVALUATION, SCHEDULED: [01 8 1]
	Q. GRANT	P. LOAN	R. GRANT	S. LOAN	T. GRANT	U. LOAN	
(1)					497	-	
(2)							
(3)							
(4)							
TOTALS	-	-	-	-	497	-	

13. DATA CHANGE INDICATOR. WERE CHANGES MADE IN THE PID FACESHEET DATA, BLOCKS 12, 13, 14, OR 15 OR IN PRP FACESHEET DATA, BLOCK 12? IF YES, ATTACH CHANGED PID FACESHEET.

1 = NO
 2 = YES

14. ORIGINATING OFFICE CLEARANCE		15. DATE DOCUMENT RECEIVED, IN AID OF OR FOR AID PROGRAMS, DATE OF DISTRIBUTION	
SIGNATURE <i>Karl Manler</i> Karl Manler	CONCURRENCE: <i>Louis A. Cohen</i> Louis A. Cohen		
TITLE AID Affairs Officer Djibouti	DIRECTOR REDSO/EA	DATE SIGNED	

B. Recommendations

Based on the approval by AID/W of the Project Identification Document (PID) and a source and origin waiver for a project vehicle, authorization of this project is recommended:

-FY 1979 Grant.	<u>\$497,000</u>
Total New AID Obligation	<u>\$497,000</u>

C. Summary Description of the Project

The Government of the Republic of Djibouti (GROD) has requested AID assistance in determining the long-term potential of agricultural development. By analyzing data on soils and water resources, GROD officials will be able to make rational economic decisions regarding Djibouti's future development in food production and water and soil conservation.

A paucity of accurate and detailed information for providing a sound data base is a primary justification for AID assistance to the GROD at this time. The nature and timing of AID assistance is predicated on the belief that agricultural potential exists in Djibouti and that U.S. technical assistance, even if modest, can have a significant impact if concentrated on the most basic resource needs, i.e., water and soils.

The project will institutionalize, through training in the Ministry of Agriculture and Rural Development (MOA), the capacity to undertake studies supportive of long-term agricultural sector development, that is, the capacity to do basic applied research which has immediate practical benefits to the Djiboutian farmer. The key assumption is that initial results will indicate the agricultural inputs (seeds, fertilizers, etc.) in which farmers should invest and the extent to which that investment is economically and socially justifiable.

Over the two-year life of the project, AID will provide resources totalling \$497,000, to finance the long-term services of a hydrogeologist who has had experience in soil sampling. This advisor will work with and train Djiboutian counterparts in exploring for aquifers, analyzing water samples, taking soil samples, directing soils analyses and interpreting the results to the farmers who work those soils. He will also assist in the establishment of a water and soils analyses laboratory which is being built and partially equipped by the GROD. Short-term consultant services in soils and water resources planning will also be provided to assist the long-term advisor in preparing soils and water inventories. Both long-term U.S. and short-term third country participant training will be offered to Djiboutian staff of the water/soils laboratory. This staff will make available applied research to the existing agricultural extension service, and

its agents, giving information of practical value and benefit to the farmers. In addition, supplementary equipment and supplies will be purchased for the laboratory, as well as a project vehicle and camping equipment to assure maximum mobility for the long and short-term technical advisors. Funds will also be provided for aircraft rental, communications, vehicle operation and maintenance, temporary lodging and miscellaneous operating expenses.

In support of this project, the GROD is prepared to finance the equivalent of \$198,000, to provide complete access to and use of a water and soils laboratory, including equipment and supplies, plus the services of the following Djiboutian laboratory personnel: one hydrologist, one water quality chemist, one or two soils scientists, one librarian, one lab assistant and nonprofessionals, as required. These technicians and facilities will backstop the 10-man agricultural extension service, which will bring soils and water samples to the laboratory and take the practical advice derived from laboratory findings to the farmers.

The estimated total cost of the project is \$695,000, of which AID will contribute \$497,000 and the GROD will contribute \$198,000. AID life-of-project financing will be provided in FY 1979.

This project will be the first of several projects in a modest, bilateral assistance program in Djibouti. The GROD is keenly interested in implementing this project as soon as possible to coincide with completion of the water and soils analysis laboratory in August 1979. The GROD official request for assistance is attached as Annex A.

D. The Project Paper (PP) Design Team

The team responsible for the preparation of this Project Paper included two soil scientists, a hydrologist, an irrigation engineer, an agricultural economist, a rural sociologist, and a design consultant. The team was thoroughly briefed by the AID Affairs Officer in Djibouti (AAO/Djibouti) and at meetings arranged with the U.S. Charge d'Affaires and various local agricultural experts and GROD officials. Site visits were undertaken in three of the four administrative regions (Cercles) of the country. The fourth region could not be visited due to limitations of time and transport. Members of the team were taken on a chartered air flight for an aerial over-view of the country at low altitude. Numerous discussions and interviews were held with Djiboutians at all levels of society, from nomadic herdsmen to government ministers.

As the work of the PP team progressed, two facts became clear. On the one hand, team investigation established that certain small areas of the country (quasi-oases) appeared to have the necessary soil and water requirements for successful agriculture. On the other hand, the amount of time available to the team and their need to make judgements based only on observation rather than through accepted laboratory procedures combined to make the determination of specific interventions difficult. The physical characteristics of the country and the financial and organizational difficulties to be expected in a newly independent nation suggested that agricultural sector development should be approached with caution to prevent AID and GROD commitment to unwieldy, expensive programs. This approach has been agreed to by the MOA. The lack of necessary data concerning the agricultural situation and the resulting lack of a coherent national policy with clear goals suggested that an intensive effort to promote agricultural extension would be premature, and, if poorly prepared, potentially detrimental to future agricultural development.

With the above in mind, the search began for a practical initiative that would build on the positive information collected by the team. During this process, the team learned that the

GROD had committed funds for the construction and the establishment of a water and soils laboratory for investigation of Djibouti's agricultural production potential. Discussions between team members and government officials indicated two conditions:

- (1) the equipment already ordered for the laboratory was inadequate for the preparation of the necessary water and soil inventories, and
- (2) while some local expertise existed, there was a need for professional technical assistance in support of the laboratory. GROD officials concurred in this assessment, but there were insufficient funds available for a significant expansion of their project. It was the judgement of the team that the laboratory effort was an appropriate response to the situation and worthy of support, as it would lay a necessary foundation of information for future activities in the agricultural sector and would permit a step-by-step practical extension of agricultural support services to existing farmers.

Each member of the PP team prepared a technical report, including analyses of sources of data on water and soils resources, observations and recommendations for AID assistance. The technical reports are available on file in REDSO/EA and AAO/Djibouti.

II. BACKGROUND AND DETAILED DESCRIPTION

A. Background

1. Project Setting

The former Territory of the Afars and Issas only recently became the Republic of Djibouti, gaining its independence from France in 1977. No AID relationship had previously existed with the Territory. Other than the distribution of P.L. 480 foods and other assistance to the refugee communities resulting from the war in the Ogaden, AID/Djibouti projects and activities are presently in the planning and development stages.

With an estimated population of 300,000, Djibouti is a small country in one of the world's driest inhabited areas. Rainfall averages about 200 mm per year. A large proportion of Djibouti's population is active in nomadic husbandry, herding primarily goats and sheep, with smaller numbers of cattle and camels. Djibouti's present center of economic activity and the primary reason for the original French colonization are found in the operation of the port located at the capital city. This port and the railroad connecting it to Ethiopia provide the population's major source of employment and income.

Ninety-seven per cent of Djibouti's food is imported, including all of its food grains. Traditionally, the majority of this food was imported by rail from neighbouring Ethiopia. However, the recent fighting in the Ogaden has severely disrupted rail service and resulted in increased food imports from Kenya and France. The additional expense involved in this importation has led to steep increases in food prices and shortages. The disruption of rail service has also created unemployment for a large segment of Djibouti's salaried labor force. The drop in income, rise in prices and influx of refugees have combined to create severe economic difficulties. Although occasional day-time rail service has resumed, the long-term prognosis remains unclear.

The lack of agricultural growth in the local economy may be attributed to insufficient expertise among the local nomadic inhabitants and a scarcity of known sources of suitable soil and water. Since the early 1940's, the French have undertaken agricultural schemes, but with limited success. Yemeni farmers had established gardens in recent years, but were generally unable to obtain sufficient income to continue farming. While adequate soil and water for agriculture are thought to exist in parts of Djibouti, there is no systematic, centralized collection of scientifically acceptable water and soil information currently available for agricultural planning and for dissemination to farmers through the agricultural extension service.

2. The Importance of Water Resources and Soils for Development.

a) Water Resources.

As is true of all nations, water is essential to the physical well-being of the people of Djibouti and to the future economic development of the nation. The highest priority for water use is for domestic consumption. The rapid increase in recent years of Djibouti's population (average annual growth rate, including refugees, is estimated at close to 5%) has severely increased national requirements for water in an area that is one of the world's most arid and where water has traditionally been at a premium. Beyond domestic purposes, water will also be needed in the event of increased agricultural and/or industrial development which will bring even greater strains to bear upon existing and presently foreseeable water supplies. Proper planning will be required for the efficient use of water in the future. A clear understanding, in so far as this is possible, of total water resources, both surface and ground water, will be essential to this planning.

Present information regarding Djibouti's water resources is insufficient to determine acceptable initiatives for AID's consideration in the area of large-scale increased agricultural production. Prior to the proposal of water-related projects, it is essential that a full water resources inventory be undertaken in Djibouti under the direction of technically competent individuals and supported with the necessary equipment and laboratory facilities. Such an inventory would also provide significant benefits to the GROD in its concern with the problems associated with population growth and industrial development.

b) Soils.

It is not feasible, at this time, to state definitely the relationship of Djibouti's soils to the potential for national agricultural development. As Djibouti lacks a tradition of farm cultivation, this relationship cannot be determined by past experience. For the present, the influence of soils on future production can only be estimated. However, it can be said, based on the analysis of the limited data available and following discussions with local experts and officials, that it appears that arable soils exist in sufficient quantity in various regions of Djibouti to justify professional interest and certainly to justify laboratory and extension facilities to inventory those soils which are being worked in order to identify what treatment they require to yield optimum, sustainable crops.

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Both the immediate and the eventual development of arable land could be of significant economic and social benefit to Djibouti. The present diet of many Djiboutians, particularly in rural areas, is comprised in large part of milk, boiled sorghum and some meat from one or more of various livestock sources: goats, sheep, cattle, and/or camels. This diet does provide sufficient nutrients, assuming a sufficient quantity is consumed. Observation of the current situation and investigation of the literature suggests that, whereas nutritional deficiencies do exist as might be expected in a low-income developing nation, the general nutritional status of the population is not alarming. However, as the estimated population growth rate is in excess of 4% annually, it is doubtful that (a) the herds of livestock can also increase sufficiently in the coming years to meet future needs, and/or (b) Djibouti's ecology can support such an increase without danger of over-grazing. This is particularly a problem for the rapidly growing urban center of Djibouti city. If the serious gap persists between food requirements and food supplies (as represented by livestock), a gap presently overcome by French subsidies, then an alternative source of protein/vitamins/minerals will be required. This alternative source could include grains, vegetables, and fruits grown locally for local consumption. Further, Djibouti presently imports an estimated 97% of its food requirements. These importations from areas as distant as France and Kenya represent a major expense to the country, requiring the use of a large proportion of Djibouti's limited (and externally supplied) financial resources and thus denying their use for other vitally important development projects. Thus, it is concluded that the investigation of Djibouti's soil resources and their potential use for cultivation is a concern warranting the attention and support of the Government of Djibouti and AID.

c) Basis for Intervention.

The GROD Ministry of Agriculture and Rural Development (MOA) is responsible for all agricultural matters. The Ministry employs an average of 400 people during the course of the year, of whom approximately 100 hold professional positions at varying levels. Within the Ministry, there are three "Services": Agriculture and Forestry, Rural Engineering, and Livestock and Fisheries (see attached organization plan, Annex B). The determination of the quality of soils and water and the provision and promotion of their use for cultivation are primarily the concerns of the first two Services. Approximately 50% of the Ministry's employees work under the Rural Engineering Service, which is particularly concerned with the provision of water supplies.

Although recognizing the needs presented above, it would be premature for AID and GROD to initiate financing for large-scale cultivation programs at this time. Much more specific data on soils and water resources must be accumulated before such efforts should be undertaken. The collection of this data will require considerably more time than is available to short-term teams. Furthermore, adequate laboratory facilities are not currently available in Djibouti.

The MOA has begun the construction of a variety of offices and a laboratory. The primary purpose of the laboratory will be to support the investigation of water resources, soils research and land classification. The effectiveness of water and soils research, however, will be greatly enhanced and the results of that research will be of greater benefit to future activities, particularly in terms of agricultural production.

Specifically, additional inputs, particularly in terms of additional equipment and technical assistance, will greatly increase the benefits to be derived from the work of the laboratory.

Construction of the laboratory is expected to begin in late 1978, with completion expected by mid-1979. Within the MOA, the laboratory will be administered by a special and newly-created Laboratory Section of the Rural Engineering Service, under the general administrative overview of the Technical Advisor to the Minister (French) and, ultimately, the Minister. In order to coordinate activities with agricultural planning, the laboratory will cooperate closely with the Studies Section of the MOA Agriculture and Forestry Service. It will also, for practical purposes, be linked with the MOA Agricultural Extension Service.

B. Detailed Description

1. Sector Goal and Project Purpose

The purpose of the project is to institutionalize within the MOA Rural Engineering Service the capacity to (a) analyse ground and surface water quantity and quality, as well as to compile, catalogue and disseminate hydrological information, and (b) classify soils, prepare soils maps and provide evaluation concerning the proper utilization of soils. In practical terms, farmers can be advised on soil treatments to obtain optimum sustainable yields. Achievement of this project purpose should impact on the sector goal of developing an information base for use by the GROD in (a) national agricultural planning, and (b) its dissemination to farmers through the agricultural extension service.

Assumption for achieving the sector goal are that (a) data of sufficient importance and scientific validity can be accumulated, and (b) the GROD has (or can obtain) the necessary technical expertise to evaluate and make use of the data and to communicate its practical application to farmers.

By the end of the project, the laboratory staff of the Rural Engineering Service will have begun work on a considerable portion of a national water resource inventory, with at least preliminary specific recommendations on the potential for water and soil use for crop production in the more favorable areas of Djibouti, e.g. Plain de Goubet. The laboratory will also have undertaken a soils inventory and developed a land classifications system in those areas.

2. Project Outputs

The following outputs provide a direct linkage to and are necessary for the accomplishment of the project purpose:

- (a) a water and soils analysis laboratory fully equipped and in full operation;
- (b) a data collection system established and available for the use of other GROD, private and donor institutions;
- (c) systemization of existing water data and information;
- (d) documentation of soils and land classification; and

- (e) GROD personnel trained and staffing the water and soils analysis laboratory.

Based on the above, the magnitude or quantifiable indicators of the outputs by the end of the project include:

- (a) a 150m² laboratory/office complex equipped with supplies and instrumentation provided by both the GROD and AID;
- (b) a technical library established and stocked with relevant texts, manuals and journal subscriptions (in French) in the fields of soils science, hydrology, water resource planning and development and management of land;
- (c) reports (approximately 3) prepared on water resources surveys using stream gauging, well-logging and meteorological methods;
- (d) selected small-scale water and soil studies (approximately 3) undertaken in areas which have the most agro-potential based on soils samples;
- (e) on-the-job training completed for a hydrologist in stream gauging, well-logging interpretation and data management, for a librarian in cataloguing and data management, and for lab assistants in soils sampling and testing; and
- (f) a hydrologist and water quality chemist trained to continue work on the water resources inventory.

3. Project Inputs.

AID inputs will be provided over the two-year life of the project. They will consist of the following:

- (a) Technical Services: the long-term services of a hydrogeologist will be provided for two years. The primary duties of this advisor will be to develop and maintain the water and soils analysis laboratory, train local technicians, operate the laboratory and analyse samples for water and soil surveys. A position description is attached as Annex C. Required prior experience for this position includes soil sampling. Although his technical training rests in exploring for aquifers, the advisor will also take soil samples, direct soils analyses and interpret the results which will be available to the agricultural extension service and other GROD and donor organizations. Short-term consultant services will also

be provided for a total of five person-months. Specialists in water resources planning and soil science will periodically assist in the laboratory, train Djiboutian lab staff in soil sampling and generally direct the soils inventory and land classification effort between visits.

(b) Participant Training: Funds will be provided for the training in the U.S. of a Djiboutian in hydrology. Upon his/her return, he/she will join the staff of the laboratory in continuing research for the water resources inventory. One Djiboutian will also receive short-term, specialized training (up to two months) in water chemistry and quality. Suitable training programs may be available in West Africa.

(c) Commodities: Equipment will be provided to supplement the work of the laboratory in regard to water inventories, soils classifications and field investigations, including necessary sounding equipment, conductivity meters, Ph-meters, a colorimeter, a nitrogen analyzer and balances. An illustrative equipment list is attached (Annex D). To provide mobility on field trips throughout the rugged country a project vehicle will be procured. The vehicle must have four-wheel drive, be capable of carrying 4-6 persons and field gear and have a self-rescue capability (front-end winch, sand tracks, etc.). A Toyota Land Cruiser is recommended. Camping equipment will also be purchased to permit lengthy field trips by the advisor, short-term consultants and Djiboutian technicians on the laboratory staff. A procurement source and origin waiver for the project vehicle is attached as Annex E.

(d) Other Costs: Funds will be provided for aircraft rental for aerial reconnaissance and transportation to relatively inaccessible regions of the country, communications (including the mailing of soil samples to international research centers and U.S. experimental stations), vehicle operation and maintenance, temporary lodging and subscriptions to professional journals and periodicals for the technical library, housing and furnishings for the American technician.

Government of Djibouti

The GROD is prepared to provide the following inputs in support of the project:

(a) Technical Services: The full-time services of a hydrologist, a librarian and at least two laboratory assistants will be provided to work with the U.S. advisor. Candidates will be made available for long- and short-term training in hydrology and water chemistry. In addition, the GROD will provide the services of a typist, accountant, driver and office cleaner.

- (b). Construction : The GROD will construct a water and soils analysis laboratory/office complex, including 150m² of floor space, chemistry benches with access to distilled and tap water and a stable electrical power source, four sinks and a wall bench with cabinets for the storage of glassware and supplies. Other facilities will include three offices, a sample preparation room, a supply and storage room and an instrument room. The building complex is schedule for completion in late 1979.
- (c) Commodities : Basic equipment for the new laboratory.
- (d) Other Costs : Utilities and maintenance of the laboratory and offices will be financed by the GROD. In addition, temporary laboratory and office facilities will be furnished by the MOA, if the MOA-financed building is not completed prior to the arrival of the long-term USAID Advisor.

III. PROJECT ANALYSES

A. Technical Analysis

There are a number of reasons for the low state of agriculture in Djibouti, including: (1) extreme aridity, (2) high summer temperatures, (3) shortage of readily available water, (4) an inadequate transportation system, (5) uncertain demand for farm products, (6) scarcity of skilled farmers, and (7) unwillingness of nomads to undertake farming. These factors make the prospect of food self-sufficiency extremely doubtful. Yet the GROD is very interested in reducing the country's dependency on imports through support to economically-viable agricultural programs. However, preparation of a national agricultural development plan is hindered by the lack of adequate soil and water resource inventories. This deficiency results in expression of opinions about agricultural development which range from deep-seated pessimism to moderate optimism. In no case are opinions or reports based on reliable, documented information.

Profitable agriculture may be - and this project should help to provide an indication - both physically and economically possible in Djibouti. Nine areas were examined by the PP team through visitation, study of written information or both. It appears that upwards of 50,000 hectares of land are reasonably level, have native vegetation growing and may have some possible supplies, albeit limited, of ground water. Water clearly will be the limiting factor in all locations. Even rough estimates of water quantities are difficult to project, but very preliminary estimates indicate that there might be enough ground water to irrigate between 100 and 2,000 hectares.

There appears to be some potential for conserving water with dams and ground water recharge through spreading water from the waddis during runoff. Thus, basin agriculture may be possible. This would increase the potential cultiva area.

With respect to its soils, Djibouti has no adequate soil resources inventory. This is needed to plan proper agricultural development. Also, crop production in the immediate future will only be possible where irrigation water, pumped from deep wells, will be available. Soils and water quality are extremely variable. The high cost of irrigation agriculture infrastructure requires careful selection of sites in order to make optimum use of scarce water resources.

The Government of Djibouti does not have the capacity to carry out a critical evaluation of the potential of the soils and water resources for crop production. In the past, some surveys have been

undertaken by French technicians on a short assignment basis. Only two Government officers have training in soil science, but little experience. One hydrologist has been trained in Romania, and one hydrologist is now in training in France and will return within a year.

Djibouti has recognized the need to develop the agricultural sector. Present-day agricultural activities consist of small garden plots (approximately 1,000 sq. meters) that surround existing wells. It is reported that a total of only 20 to 40 irrigated hectares is under cultivation. Most of this is in citrus and vegetables. However, water resource surveys and previous experience indicate that the agricultural area could be markedly increased, provided crops, water and soils are well managed.

Irrigation agriculture is not the only activity which lacks basic information for planning. The large majority of the population in the country is nomadic and lives from the products of herds of goats and sheep. Many areas around wells have been over-grazed, and hunger, not thirst, has devastated a considerable number of communities in the past. Land and water evaluation and mapping at appropriate scale could assist in determining the carrying capacity of the soil, the selection of sites and the spacing of drilled and hand-dug wells, and thereby maintain a balance between amount of range and sizes of herds.

There are three major objectives which the water and soils analysis laboratory will serve:

- (1) Immediate needs of existing garden areas where management, irrigation techniques, reclamation procedures, crops, and drainage will be adapted to soil conditions and water quality;
- (2) Medium scale (1:50,000) surveys of major plains and valleys, in order to plan further development of irrigation areas; and
- (3) A large-scale survey (1:200,000) of the country, which would provide basic information on uplands and stratify soil environments according to their potential for grazing, carrying capacity, etc.

The three objectives are listed in sequence, adapted to local circumstances and development needs.

The field work undertaken during the project will focus on the collection of ground and surface water samples and soil samples from waddis, well-sites, present spring sites and potential "run-off"

agricultural sites. Samples will be analyzed in the laboratory. Soils samples which cannot be analyzed in the lab will be mailed to international research centers or U.S. agricultural stations (at Cornell University and the University of Hawaii, for example) for interpretation. In-depth field studies will be published as a result of the accumulation of data on particular areas. The area focus of these studies will be at sites selected by the GROD and other donor agencies. For example, German aid agencies are considering some assistance to the Plain de Goubet area, and water and soils analyses will be used in determining the extent of such assistance. In addition, the technical reports of the hydrologist, irrigation engineer and soils scientists on the PP team recommend specific locations for study.

B. Social Analysis

The principal beneficiaries of the project are the portion of the population which makes its living off the land. The data base generated through the project and the complementary and follow-on extension activities will provide the scope for a more rational, efficient use of soil and water by both farmers and herders. Regular communication between laboratory staff and other MOA personnel, especially agricultural extension agents, should enable farmers to benefit by providing them with information to make decisions on using their scarce soil and water resources more scientifically. Identification and use of water resources may also significantly decrease the time and energy expended by both herders and their animals in the search for good grazing and water.

Systematic knowledge of productive soils and water supplies will be especially important to rural people in the event of drought and/or other disasters, such as locusts. It will also be important as the GROD increases its attempts to intervene in the ongoing traditional subsistence systems. A systematic knowledge of reliable soil and water resources is imperative to avoid serious negative effects in the mid- and long-term.

There are two issues related to the success of the project in social terms which must be monitored. One is the departure of trained Djiboutians from their positions once they have been trained. The provision of well-equipped laboratory facilities, high-level technical assistance and participant training opportunities is expected to improve the professional opportunities available in Djibouti for nationals interested in soil and water-related sciences and will thus serve as an incentive to their continued presence in Djibouti.

The second issue is the degree to which project linkages between MOA personnel, such as extension agents, and related institutions, such as the proposed Commission for Planning (see Section III.E.),

can be firmly established. This will guarantee a continued flow of information vertically - down to the farmer and herder and up to the level of national planning - as well as horizontally to other GROD ministries. The short timeframe of the project must be recognized, and linkages must be established quickly so that the goal of the project can be achieved in the mid- and long-term. A facilitating factor which merits emphasis in this regard is the relatively small-scale nature of the environment in which the project will be implemented. Djibouti is a very small country, and the MOA and other ministries are comparably small. In such an environment, frequent interaction among interested parties is the norm, not the exception.

Additional information on the cultural mores of the Afars and Issas, the principal tribal groups in Djibouti, is included in the report of the rural sociologist member of the PP team.

C. Cost-Effectiveness Analysis

The "product" of this project will be information on soils and water which is necessary in the design of subsequent farmer and nomad-oriented projects. This information is a precondition to such projects. In this case, economic analysis focuses on the cost-effectiveness of alternative means to produce soil and water information. Cost-benefit and internal rate of return approaches are unsuitable as no direct, discrete, quantifiable flow of benefits will be forthcoming.

The alternative to an indigenous soil testing capability is dependence upon expatriate technical assistance in every instance. Such a dependence will mean Djibouti will either have to use foreign exchange to hire skills or secure donor assistance whenever soils studies are required. This is clearly a less effective and more costly approach than using comparatively low-cost indigenous soils analysts in a national laboratory.

In the case of water resources inventories, the alternative are to (1) continue existing practices of drilling in likely sites in an ad hoc manner, and to exploit the resulting new wells with little regard to the effect upon aquifers, and/or (2) depend upon expatriate assistance along the lines discussed above for soils analysis. Focussing drilling efforts in specific areas on the basis of accumulated and analyzed water data should allow for an increase in the number of successful drillings. Prevention of over-pumping, estimations of the costs of water and allocation of scarce water resources among various claimants will be less expensive in social and financial costs than has been the case in recent history.

The project costs, including the GROD contribution are clear. The flow of benefits to the beneficiaries is much less clear and depends upon many assumptions and variables. Additional other donor projects will have to be implemented before the economic benefits of this project can impact directly on the poor majority. No projects however, can do this effectively without adequate knowledge of water and soils.

D. FINANCIAL ANALYSIS AND PLAN

1. Project Funding Summary

As shown below, the estimated total cost of the project is \$695,000. It is proposed that AID will provide \$497,000. The GROD will contribute the equivalent of \$198,000 over the two-year period of the project.

TABLE I: PROJECT FUNDING SUMMARY

<u>SOURCE</u>	<u>FOREIGN EXCHANGE</u>	<u>LOCAL CURRENCY</u>	<u>TOTAL</u>
AID	\$432,000	\$ 65,000	\$497,000
GROD	59,000	139,000	198,000
TOTAL:	<u>\$491,000</u>	<u>\$204,000</u>	<u>\$695,000</u>

2. Summary Cost and Financial Plan

The project costs and financial plan are summarized in the table below. All of the foreign exchange requirements are to be met by AID. Of the AID contribution, 95% represents dollar costs, and the equivalent of 5% represents local costs. The latter consists mainly of administrative support costs.

TABLE 2: SUMMARY COST ESTIMATES AND FINANCIAL PLAN

(\$000)

SOURCES	AID		GROD		TOTAL		TOTAL
	FX	LC	FX	LC	FX	LC	
USP							
Technical Services	250	-	-	84	250	84	334
Participant Training	14	-	-	-	14	-	14
Commodities	96	-	12	-	96	12	108
Construction	-	-	37	27	37	27	64
Other costs	-	55	-	6	-	61	61
Inflation (10%)	36	5	5	11	41	16	57
Contingency (10%)	36	5	5	11	41	16	57
T O T A L	432	65	59	139	491	204	695

TABLE 3: AID OBLIGATION BY COMPONENT

(U.S. \$)			
<u>Component</u>		<u>Amount</u>	<u>TOTALS</u>
<u>Technical Services</u>			<u>250,000</u>
<u>Long Term</u>			
Hydrogeologist (24 pm)		200,000	
<u>Short Term</u>			
Soils Scientist (3)		30,000	
Water Resources Planner (2)		20,000	
<u>Participant Training</u>			<u>13,500</u>
<u>U.S.</u>			
Hydrology (6)		8,500	
<u>Short Term</u>			
Water Chemistry (2 pm)		5,000	
<u>Commodities</u>			<u>96,000</u>
Equipment for water and soils analysis laboratory		80,000	
Vehicles (1)		15,000	
Camping equipment		1,000	
<u>Other Costs</u>			<u>55,500</u>
Aircraft rental		2,000	
Communications, incl. external analyses of soils samples		3,000	
Vehicle operation & Maintenance		5,000	
Temporary lodging		6,000	
Subscriptions for technical Library		3,000	
Housing & Furnishings		36,500	
	SUB TOTAL	415,000	415,000
<u>Inflation (10%)</u>		41,000	41,000
<u>Contingency (10%)</u>		41,000	41,000
	GRAND TOTAL	\$497,000	\$497,000

4. Cost Analysis

The cost of the long-term technician's services are estimated at \$100,000 per man-year, including base salary and benefits, allowance for transportation of effects, round trip transportation, etc. This assumes a contract with some firm or institution.

\$6,000 has been included in the budget for temporary lodging in case the housing is not available upon the technician's arrival in D'boon. Short-term consultant services have been budgeted at \$10,000 per man-month, including salary, per diem and round trip transportation.

Participant training costs have been estimated at \$8,500 for 6 months of academic training in the U.S., and \$2,500 per month for short-term technical training in Africa. Estimates are based on the following budgets:

(a) TRAINING IN U.S. - 6 MONTHS:

\$ 600	OIT costs.
612	Miscellaneous (books, typing, etc.)
-238	U.S. travel
2,050	Maintenance and per diem
<u>3,000</u>	Tuition
6,500	
<u>2,000</u>	Round-trip international air fare
<u>\$8,500</u>	Total

(b) Short-term Technical - Africa - Per month:

\$ 400	Tuition
1,050	Per diem (\$35.00 per day)
<u>50</u>	Miscellaneous (books, etc.)
\$ 1,500	
<u>1,000</u>	Round-trip international air fare
<u>\$ 2,500</u>	Total

The \$80,000 estimate for equipment for the water and soils analysis laboratory was included in the technical reports of the hydrologist and soils science members of the FP team. The illustrated equipment list is found in Annex D.

5. Project Expenditures

The table below indicates estimated annual expenditures for AID and GROD.

TABLE 4: ESTIMATED ANNUAL EXPENDITURES AND PROJECT COSTS

(U.S.\$000)

	1979	1980	1981	TOTAL
<u>AID</u>				
Technical Services	34	106	110	250
Participant Training	-	12	2	14
Commodities	26	60	10	96
Other Costs	26	18	11	55
SUB TOTAL	86	196	135	417
Inflation (10%)	8	19	13	40
Contingency (10%)	8	19	13	40
TOTAL	102	234	161	497
<u>GROD</u>				
Technical Services	21	42	21	84
Commodities	12	-	-	12
Construction	64	-	-	64
Other costs	2	2	2	6
SUB TOTAL	101	44	23	168
Inflation (10%)	9	4	2	15
Contingency (10%)	9	4	2	15
TOTAL	119	52	27	198
COMBINED TOTAL	221	286	188	694

It is assumed that the long-term U.S. advisor will arrive no later than August 1979. The Djiboutian candidate for U.S. long-term training should be scheduled to begin the academic year in September 1980.

E. Administrative Feasibility

The Djiboutian hydrologist in the MOA Rural Engineering Service and the French technical advisor in the MOA are somewhat concerned about the existing, fragmented and random approach to soils analyses and water resources development. To correct this situation, a Commission for Planning will be established within the coming months. The Commission will include ministerial representation and will have its own planning staff. Sub-commissions will be established for water, power and renewable energies. This mechanism will provide for liaison and guidance to water-using agencies, such as the MOA Rural Engineering Service. Also under this proposed organization plan, the French-supported Center for Geological Studies and Development will be integrated into the planning structure, while maintaining its primary contacts with the University of Bordeaux and other European research institutions. This arrangement will strengthen the capability of the water and soils analysis laboratory to relate academic hydrological studies to applied water and soils investigations. The outlook, then, is hopeful that the outputs of the project will be beneficial to the GROD's overall agricultural planning efforts.

F. Environmental Concerns

An initial Environmental Examination is attached as Annex F. The following statement discussing the environmental impacts of water development is taken from the report of the hydrologist member of the PP team.

At present, the level of water use in Djibouti has had practically no impact on what might be considered its natural hydrological regimes. Even the intensive development of the city of Djibouti has not had any visible impact. Of course, one might look at a place like Randa, with its intensive small-scale agriculture in a narrow canyon, and say that the microclimate has been affected. This is probably true, but is extremely minor.

The key is the extent to which the existing regime is modified. If local areas along channels are over-pumped, some of the scant vegetation will die. However, in most areas, the amount of arable land is so limited that the amount of water pumped for agricultural purposes will have little or no effect on the local environment. Continuously increasing pumpage in the urban areas will no doubt tend to raise the salt water level; but at the same time, as the salt water concentration rises, the well becomes less useful and pumpage is slowed. Gradually,

the salt water level drops back to near its former elevation.

In general, the small-scale agricultural developments that are under discussion should have little impact on the water tables. However, large-scale diversions of water, such as that proposed to move water from near Dikhil to Djibouti, may have localized effects on vegetation, result in minor subsidence, and possibly drop the water level below the bottom of some dug wells.

Until large-scale developments are affected, the impact of agricultural and municipal development will have little more than minimal impact on local and regional environments.

IV. IMPLEMENTATION ARRANGEMENTS

A. Administrative Arrangements

1. AID

Upon approval of this Project Paper, a Project Agreement will be negotiated with the GROD Ministry of Foreign Affairs. Upon signature, a subobligating PIOT/T will be issued by REDSO/EA authorizing AID/W to contract for the long-term technical services. Possible contractors include water resources engineering firms or, under a PASA, the U.S. Soil Conservation Service or the U.S. Geological Service. If necessary, a second subobligating PIO/T will be issued for the short-term consultant services in water resources planning and soils science. Once the U.S. hydrogeologist is identified, he/she can finalize the required equipment lists for the water and soils analyses laboratory and camping equipment. A subobligating PIO/C(s) will be issued by REDSO/EA for this procurement. Project monitoring and administrative support for the project will be provided by the AAO/Djibouti. REDSO/EA services will be provided as required, throughout the 30-month project period.

2. GROD

The Ministry of Agriculture will be the GROD implementing agency. The U.S. hydrogeologist and short-term consultants will work under the general direction of the Director of the MOA Rural Engineering Service. The MOA will be responsible for identifying Djiboutian candidates for long- and short-term training and for providing the services of other trained water and soils technicians and laboratory assistants. The GROD will also provide suitable housing in the city of Djibouti for the technician and his/her family. In the event that the MOA-provided laboratory is not completed prior to the arrival of the technician, suitable office space will be provided by the MOA.

B. Implementation Plan

<u>CY</u>	<u>Month</u>	<u>Action</u>	<u>Responsibility</u>
79	January	- PP approved	AAO/D; REDSO/EA
	January	- Signature of Project Agreement	AAO/D; REDSO/EA; AID/W
	January	- PIO/T issued; Contracting process begins	AID/W; REDSO/EA
	February	- Vehicles, equipment ordered	AAO/D; REDSO/EA
	February	- Country clearances obtained	AAO/D; GROD
	June	- Housing for technician obtained	GROD
	July	- Contract technician arrives	AID/W; Contractor
	August	- Lab completed; staff on site	GROD
	August	- Equipment arrives; installation begins	GROD; Contractor
	September	- Contractor work plan finalized and approved	contractor; AAO/D; GROD
	September	- Lab begins operation	Contractor; GROD
	September	- Field work begins	Contractor; GROD
	November	- Library functioning	GROD
80	January	- Progress report	Contractor
	March	- Small-scale, in-depth field studies begin	Contractor; GROD
	July	- Mid-term evaluation	GROD; AAO/D; REDSO/EA
	July	- Progress report	Contractor
	September	- Djiboutian departs for long-term training	GROD; AAO/D; AID/W
81	January	- Special Evaluation	Contractor; USAID; GROD; AID/W; REDSO/EA
	April	- Survey, tests, OJT completed	Contractor
	May/June	- Maps completed; reports drafted	Contractor
	June	- Djiboutian returns from Int. training	
	June	- Final progress report	Contractor
	June	- Data, maps, final reports finished with copies submitted to AID and GROD.	Contractor; AAO/D; GROD
	June	- Technician departs	Contractor, AAO/D; GROD

C. Evaluation Arrangements

A formative evaluation is scheduled for July 1980, approximately one year after the arrival of the U.S. hydrogeologist. The purpose of this evaluation will be to (a) provide an indication of progress achieved towards the project outputs, (b) determine any need for project redirection and (c) establish the timing and frame of reference for a "special evaluation," which should follow six months later. A "special evaluation" (January 1981) will be made 6-8 months prior to completion of the project to determine if there is sufficient justification for AID consideration of a follow-on effort. As has been previously mentioned, it is not anticipated that a complete water resources inventory and soils classification will be accomplished within the 30-month period of the project. If, in the judgement of the "special evaluation" team, continued assistance is warranted, a rationale will be presented in the evaluation report for AID consideration (and inclusion in a follow-on PID). Members of the evaluation team should include a hydrogeologist, a water resources planner and a soils scientist, as well as the REDSO/EA Evaluation Officer. Given the in-depth analyses which will be conducted during the "special evaluation," the summative evaluation, scheduled for July 1981 prior to the departure of the U.S. hydrogeologist, can be undertaken by REDSO/EA and AAO/D, in collaboration with the GROD.

ANNEXES

- A. GROD Official Request for Assistance
- B. MDA Organization Plan
- C. Position Description for the U.S. Hydrogeologist
- D. Illustrative Equipment List
- E. Procurement Source and Origin Waiver for Project Vehicle
- F. Initial Environmental Examination

Djibouti,

Mr. Karl L. Mahler,
AID Affairs Officer,
Djibouti,
Republic of Djibouti

Dear Mr. Mahler,

The purpose of this letter is to request the assistance of the United States Government in establishing a capability within the Rural Engineering Service of the Ministry of Agriculture and Rural Development, to carry out analyses of water and soils samples. These samples will be collected from different regions of the country for analysis in order to help us determine which areas of the country have potential for agricultural development and which, consequently, should receive the attention and support of the Djibouti Government.

To establish such a capability within the Ministry, will require the services of an expert in hydrogeology. We anticipate that his functions will include the establishment and operation of a water and soils laboratory, and the training of Djiboutian technicians in sample collection and analysis. We would also appreciate assistance in equipping the laboratory and in-training of one of our Ministry technicians in hydrology.

To support such a program we propose to make available the services of a hydrologist and several assistant technicians plus the necessary physical facilities. These will include a laboratory, offices, supply room and sample room, as well as certain basic materials and equipment. The value of these contributions will be approximately DF 35,000,000.

Your assistance in this matter would be greatly appreciated.

Yours Sincerely,

Ministry of Foreign Affairs,
and Cooperation,
Djibouti,
Republic of Djibouti.

Moumin Bahdon
Minister of Foreign Affairs,
and Cooperation,
Djibouti

Side Agreement to Project Grant Agreement between
the Republic of Djibouti

and

The United States of America

for the Water Resources and Soils Analysis Project

DATED: _____

The United States of America, acting through the Agency for International Development and the Republic of Djibouti hereby agree that the following provisions are a part of the Project Grant Agreement between the United States of America and the Republic of Djibouti for the Water Resources and Soils Analysis Project:

1. Taxation : To the extent that any Contractor, including any consulting firm, any personnel of such Contractor financed under the Grant, and any property or transaction relating to such contracts, are not exempt from identifiable taxes, tariffs, duties or other levies imposed under laws in effect in the territory of the Republic of Djibouti, the Republic of Djibouti will, as and to the extent provided in and pursuant to Project Implementation Letters, pay or reimburse the same with funds other than those provided under the Grant. It is agreed that, inter alia, this provision exempts long and short term advisors financed under the grant, from any taxes, tariffs, duties or other levies ordinarily imposed on income and on the importation of personal effects (including automobiles) and professional equipment, under laws in effect in the territory of the Republic of Djibouti.

2. Language of Agreement: In the event of ambiguity or conflict between the English and French versions of this Agreement, the English version will control; however, the French version shall be considered.

IN WITNESS WHEREOF, The Republic of Djibouti and the United States of America, each acting through its duly authorized representation, have caused this Agreement to be signed in their names and delivered as of the day and year first above written.

REPUBLIC OF DJIBOUTI

BY: _____

TITLE: _____

UNITED STATES OF AMERICA

BY: _____

TITLE: _____