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9. ABSTRACT

Reports findings of a trip made to the Republic of Djibouti by a three-man agricultural team to assess agricultural potential in that country. After gaining independence in June, 1977, Djibouti leaders immediately began exploring the possibilities of agricultural development along with other economic activities. Djibouti has virtually no agricultural tradition. It has few resources for economic development and the few it has do not fit well together. There is very little fresh water without a significant capital investment and the water is warmer than average, ranging from 102 to 120 degrees Fahrenheit. In places it has a high salt content. The soil *per se* is probably adequate to sustain a reasonable level of economic activity, but without water and improved human resources it is likely being used at its optimum level right now. It has been damaged by salinization to various degrees and this will continue to be a problem. Agricultural development cannot be considered in isolation. Such general purpose capabilities as total water management, taxation and public finance, and technical manpower, which currently do not exist, will be essential for agricultural development, and they cannot be assumed away in designing an A.I.D. strategy or project. No source appears likely for help in these areas other than A.I.D.

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REPORT

on

SURVEY OF DJIBOUTI'S AGRICULTURAL DEVELOPMENT

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October 4-18, 1977

PREFACE

After gaining independence status on June 27, 1977, the former French Territory of Afars and Issas became the Government of the Republic of Djibouti (GROD), and immediately began to charter courses of action for economic and social development. One of the first actions of President Hassan Gouled after independence was to authorize the creation of a model farm near the city of Djibouti to demonstrate the feasibility of agriculture in a country almost totally bereft of any prior development in that field. To facilitate further expansion in the critical agricultural field, the GROD asked the United States Government to provide needed technical, material and design assistance. Through normal diplomatic channels and subsequent meetings between officials at the highest levels of both Governments, an agricultural survey team was authorized to make an assessment of the GROD's agricultural potential. The efforts of a three-man team culminated in a report with discussions on water, soils, climate, people and politics, health and nutrition, institutions, economic considerations, assumptions and recommendations.

The team acknowledges that its efforts would have been without foundation were it not for the valuable assistance provided by the Africa Bureau, United States Agency for International Development, American Embassies in Paris and Djibouti, University of Bordeaux III, French Ministry of Cooperation and the Government of the Republic of Djibouti.

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SUMMARY AND CONCLUSIONS

Purpose

Purpose of this trip was to develop alternatives and recommendations for specific A.I.D. action in the newly-created Republic of Djibouti, based on a reconnaissance of the country's natural, human, and institutional resources.

This report will present a background and summary of the findings of the team which will be followed by recommendations. After that will come detailed findings and the itinerary of the trip along with an identification of the persons contacted.

Summary

Djibouti became independent after more than a century of French dominance, first as French Somali and later the French Territory of the Afars and Issas. Djibouti leaders immediately began exploring the possibilities of agricultural development along with other economic activities. They are interested in livestock, particularly in ways to harvest the yields of their flocks as an alternative to drouth and starvation for keeping numbers in balance with resources. Leaders are also interested in fish, particularly in preservation and marketing. However, the interest in agriculture by far outweighs that in the other two areas, and our orientation was to agricultural development.

Djibouti has virtually no agricultural tradition. Reports of a now-defunct vegetable production industry around the capital city involve Yemen farmers, not Djiboutians. Agriculture consists of some scattered date plantations and plots of vegetables and grains around wells or the rare year around springs. For all practical purposes, agriculture can be considered as starting from zero. The French have had no interest in crop production and have provided neither training facilities nor training to Djiboutians. They had about the same interest in livestock and fishing, but both are traditional, although livestock far outstrips fishing in importance.

The French were interested in Djibouti almost exclusively for its port, which served first as a base for communication between France and Indo-China. The port gained commercial significance, serving both as service station for other ships and as the ocean outlet for Ethiopia, a role that was enhanced by the construction of the railroad to Addis Ababa. France still maintains a significant naval operation from the port and bases some 4,000 land troops in the country. Either of these operations could be reduced substantially or withdrawn completely without anticipation.

The sole breach in the French disinterest in agriculture has been in water. Pierre Pouchan, a French hydrologist, University of Bordeaux, has made a long-time study of the underground water resource, and some 66 wells have been drilled on the basis of his studies. Somewhat more than half serve towns and other needs in the interior. However, the country achieves independence with only one well drilling rig (virtually worn out) and no native hydrologist, although a Djiboutian is reportedly studying the subject at the University of Bordeaux.

Djibouti's situation contains little that is encouraging. We were able to identify only two positive factors--its newness as an Arab nation and its strategic location. Even these are difficult to evaluate. It won't be "new" for very long, and a country of 250,000 may not command much attention from development donors. The locational resource is part geography and politics and part capital represented in the port facilities and in the railroad to Addis Ababa. The latter currently is not in full operation, and its value as capital has been largely depreciated.

The country is virtually without resources for economic development and the few it has do not fit well together. There is virtually no fresh water without a significant capital investment. And there are even problems with the water. It is warmer than average, ranging from 102 to some 120 degrees Fahrenheit, and in places it has a high salt content. In some cases the water temperature is high enough to constitute a resource for energy production, but there is little productive use to which it can be put. The soil per se is probably adequate to sustain a reasonable level of economic activity, but without water and improved human resources it is likely being used at its optimum level right now. Further, it has been damaged by salinization to various degrees, and salinization will continue as a problem.

No other resources of any consequence have been identified. Our task was to look at agricultural development, and it is to this topic the discussion pertains.

The indigenous human resource presents just as discouraging an aspect as does the natural resource. In the traditional rural sector no agricultural folk wisdom has evolved, although it undoubtedly has in animal husbandry. Among the so-called elite there has been virtually no investment in the human resource in any of the technical fields.

Little capital has been formed in the indigenous sector of the economy and the outlook is for more of the same. Take away that part of the GNP generated by Europeans, and it's difficult to recognize a significant debt-service capacity, the other side of the capital formation coin. The French are leaving little human and institutional capital, and much of the physical capital they provided has been used up.

Conclusions

If agricultural development could be considered in isolation, our task would be much simpler. Unfortunately, it cannot be. Such general purpose capabilities as total water management, taxation and public finance, and technical manpower, which currently do not exist, will be essential for agricultural development, and they cannot be assumed away in designing an A.I.D. strategy or project. No source appears likely for help in these areas other than A.I.D.

Currently, water seems to be the most serious primary or first order limiting factor. Since money and people are important in solving water problems, they too become limiting factors even if by derivation. A logical development strategy must figure to economize on the scarcest resource. Inefficient use of relatively abundant resources is not serious and may even be wise, as long as that resource is not being destroyed. To be specific, yield per cubic meter of water is a more important performance criterion than yield per acre of land (if the land is not being lost). However, the water management problem is far more inclusive. A water management capability will include such sophisticated elements as monitoring the re-charge of underground reservoirs and the establishment and enforcement of both rates of extraction and rights to water when it becomes necessary. It will also include such mundane elements as keeping pumps in operation, as well as such general elements as an efficient procurement mechanism for essential imported supplies and equipment, which currently are very costly.

There seems to be no way that agricultural development can be initiated in Djibouti without subsidy, and for a country with few financial resources, an uncertain tax mechanism, and lack of skills in public financial management, this issue has to be faced. (The budgeting of \$600,000 for the development of a 15-hectare agricultural development site dramatizes the financial management problem.) In the short to intermediate run, it can be expected that there will be external budget support assistance, but there is no basis for expecting it to provide much investment capital over any long run. Since it seems clear that the government will have to play a major role in agricultural development, the questions of where financial resources are found and the efficiency with which they are used become critical.

Neither the water problem nor the financial problem can be addressed without both (1) a stock of well-trained people and (2) an institutional framework that allows the people to be productive.

There are many indications that given all the above, Djibouti stands exposed to a situation in which donor activity can do more harm than good. The absence of a capability to plan, to understand what is feasible; i.e., complete dependence on foreigners exacerbates the danger. The more harm than good could flow from three types of eventualities. One is that donors will provide goods that either are not worth their cost to the country or

provide such a small return that a capital starved country cannot afford them. This could come from a desire of a donor country to export goods or from a beleaguered bureaucrat under pressure to move money or forced to operate beyond his area of competence. The impact on Djibouti would be the same.

The second problem, and Djibouti may be facing it, is that with only a few external resources conditions would be created that would result in new life styles dependent on the flow of external resources, and thus highly vulnerable to an interruption of that flow over which the country has little control. Djibouti is more vulnerable than most countries because its resources in their natural states will not sustain any more than the current level of activity, and perhaps not as much. Further, the resource combination is such that it is difficult to see how the growth process can sustain itself, once initiated, in some sort of autonomous fashion. Agricultural growth is going to be dependent on investment either in wells or dams that only government can be expected to make.

The upshot is that any significant agricultural development must depend on a relatively sophisticated institutional structure to guide, nurture, and finance it. That structure will take some time to develop, and Djibouti will have to have assistance to accomplish it. Sloppiness in design and implementation of development projects could result in serious consequence if the assistance or the process were interrupted. If an economy depends on wells, the pumps have to be kept working. They don't work naturally.

The third danger of harm exceeding good stems from the damage that could come to the fragile ecology from developmental activities. The team can only recognize the danger, not evaluate it. It is possible that the Djibouti ecology has stabilized at such a low productive state that further degradation is not likely.

RECOMMENDATIONS

Assumptions

Some clarification is necessary of the assumptions that are relevant to the recommendations.

1. We assume that for perhaps as long as a decade, the international community, mostly France, will provide budget support to the Djibouti government. We assume that this support will not provide for developmental activities and that it will not be accompanied with significant technical assistance in efficient budgeting and administration.
2. We assume that other donors will provide some financial assistance that will be determined on the basis of a project analysis, not a global or institutional analysis. Judging from observations of donors in some other

countries, we assume that at times there will be more money available that can be efficiently used in Djibouti and that there will be short run improvisations in project management to compensate for the lack of Djibouti institutional capability.

3. We assume that there will be projects and instances of interest in specific technical areas on the part of other donors.

4. We assume that no other donor will be specifically interested in the institutional and human resource development area on the comprehensive scale that our analysis indicates to us is needed.

5. We assume that the government will not be able to maintain adequate surveillance, let alone management, of the various donor activities. Donor activity will, in effect, be out of control, but still donor competition for the attention of the scarce Djibouti manpower will be substantial.

6. We assume there will be a severe shortage of resources of all kinds over which the government has discretion.

7. We assume that the needs for economic efficiency may well be in conflict with cultural traditions, but economic development is a rigorous task master and it demands efficiency. Program design must reflect the conflict and seek a resolution.

8. We assume political stability but recognize the need to maintain some protection against instability.

Recommendations

1. That A.I.D. develop a program for Djibouti that emphasizes helping Djibouti know and understand its natural resource situation and helping develop the human and institutional resources. The program should be guided by the following criteria.

a. We must face the Djiboutians with the facts of the difficult development task that the country faces and guard carefully against masking over the problem, either intentionally or inadvertently.

b. The program should attempt to keep recurrent financial requirements as nearly as feasible in line with Djibouti's capacity to produce financial resources (by economic activity) and to mobilize them (by taxation or other anticipated means).

c. It should aim to conserve capital to the maximum extent feasible.

d. It should look to non-financial forms of capital both in use and formation. For example, if boulders can be removed from land by use of the otherwise unemployed labor of those who will benefit, scarce financial resources can be saved, and capital will be formed.

e. It should aim to achieve net cumulation of benefits as opposed to relying on future (or continuing) investments to make past investments productive.

f. It should seek efficiency in the use of all resources, either internal or external, not just the inputs provided by A.I.D.

2. That A.I.D. assign one officer to Djibouti. At this time it is difficult to justify more than one, either as a function of the indicated program or of the availability of A.I.D. officers. On the other hand, it is important that one be assigned. The Embassy is not staffed to handle an A.I.D. effort.

3. That immediate steps be taken to procure a new well drilling rig for Djibouti, according to criteria recommended by experts available to AID/W. It is essential that appropriate spare parts accompany the rig and that liberal training in operation, maintenance, and repair be provided before the rig begins to operate. The need is urgent and A.I.D. should seek the most expeditious means to provide the rig.

4. That the Djibouti program be implemented in the Title XII style, given Title XII emphasis on knowledge, technology, human resource development, and institutional development, which is precisely what is most needed. The arrangement needs to be made immediately because of the great need for technical expertise in program development, and the advantages that would be gained from early involvement of the university. The program should depend heavily on TDY help, with no more than one person being in residence. Either the Consortium for International Development or one of its member universities is indicated as the logical collaborator. A team consisting of one A.I.D. officer and one contract person with TDY access to the resources of a major university operating over a decade would stand a relatively good chance of making an impact in Djibouti. If the two-man team cost \$200,000 to \$225,000 a year, and one assumed a million dollar annual budget, ample funds would be left for TDY, training of Djibouti personnel, and even some modest commodity procurement. One could expect some technical input, not simply administrative services, from the two-man team in residence. The Embassy plans four rooms for A.I.D. in its new facilities. If two were used for this team and one for the secretary, a room would be available for TDY personnel.

5. Three resource inventory and evaluation tasks need immediate attention, dealing with water, soil, and environment. The Title XII collaborator should be involved in this effort. We offer these considerations.

Full advantage needs to be taken of the work of Pierre Pouchan, University of Bordeaux hydrologist. His data and analysis on the water situation may be adequate for immediate needs. It would be useful in planning the inventory. Dealing as he does in geology, his information may also be useful to the

soils people. A.I.D. and/or the Title XII collaborator should procure his services on a consulting basis to help determine what we know and what needs to be done to develop further information.

In the soils area, a survey is needed, but the extent and nature is in question. The first task that we see needed is to evaluate the soils in the spots where there is currently some water available for irrigation. The second priority need is for surveys in those areas in which Djibouti is interested in drilling more wells, or in helping determine future well sites. Some study should be made of the Gobaad and Hanle Plains.

We recommend providing some soil testing laboratory equipment and supplies along with the survey, but do not know what is needed.

We have no recommendation for specific action in the environmental field--only that our program not ignore it.

6. Given the urgent needs for efficient use of resources and the nature of the culture, we recommend that both economic and social expertise be made available by the university.

7. We recommend that every activity take all feasible steps to build Djibouti capacity. For example, the soil survey should supply some equipment and involve the native agronomist. Solving the water drilling rig problem should immediately address the need for a maintenance and repair capability, plus the need for an efficient procurement mechanism. Stated in another way, we recommend that human resource and institutional development constitute the central thrust of the A.I.D. program, but that in every case the activities should be oriented to real problems, strictly resisting any temptation to build institutions in the abstract.

3. We cannot be precise at this time on recommendations for initiating the agricultural development program. Currently, the French, with two line officers in high Ministry of Agriculture positions dominate this activity. We do recommend a strategical position; i.e., that activities be designed to achieve agricultural development in a gradual steady fashion. The alternative is to attempt quantum jumps which would necessitate large capital investments in boulder clearing, land leveling, ditch construction, and wells, and with little experience, technology and knowledge on which to base decisions. The gradual steady course would involve taking advantage of "surplus" water at current wells or wells drilled to serve other needs, and natural springs over the next three to five years. During this time, technicians could be trained, farmers could be recruited and trained, essential experimentation both in agronomy and in farm development could be done, program experience on the part of the public officials could be gained, and we would have many insights as well as questions which we cannot foresee today. The capital costs would be relatively modest, and the inevitable errors would be small in consequence. Finally, at any time it were justified, the alternative strategy could be adopted.

The alternative is to establish big projects. Preliminary data indicate that good water and good soil can both be found in the Gobaad and Hanle Plains, and that is a temptation to move in immediately. With no farmers, no public servants experienced, no technical training or training facilities, and no indigenous technology, the large project seems too great a risk. In Djibouti, it will not take a very big project to be too large.

It is difficult for us to visualize the course of agricultural development when the process starts at zero, but if 100 acres were under crops on 20 going-concern farms in five years, it would probably be a notable achievement. That could be done at four or five sites, and experimental work could be handled at another four or five sites.

This presumes that the current site at Petit Bara would be developed at a rate to be determined by the success in bringing costs under control. It is not counted as a going-concern farm.

FINDINGS

Water

Water is the critical element in any of Djibouti's development alternatives. We did no detailed study of precipitation, but in consultation with Pierre Pouchan, hydrologist from the University of Bordeaux, we understand that average rainfall ranges from about ten inches a year down. Timing of the rainfall is so variable that it cannot be predicted. Shortly after completion of the field visit, five inches fell on the capital and parts of the interior, creating near disaster conditions. There has been no experience with surface water impoundment. The evidence is mixed regarding the ability of the soil to contain surface impoundments. The earth's crust is leaky in many spots, but there is also evidence that clay settling out of runoff water will seal the soil.

Currently, aquifers about 100 meters deep are the important source of water and are likely to be for the next several years. Fortunately, considerable information on ground water has been collected, all by Pouchan who has been studying the country's water situation for some 15 years and has determined the location of the wells drilled until now. This report depends completely on his studies in its discussion of water. He also provided geologic input for the soil analysis and general information on areas we did not see.

Our tentative conclusion is that the total supply of ground water, replenished from rain, is adequate for a substantially higher level of economic activity, including agricultural development. The evidence follows.

Djibouti has an unusual geology. It is formed largely by volcanic action over long periods of time, and has undergone uplifting in some areas and

collapse and settling in others. There has been significant geologic erosion and transfer of soil and its parent material in many areas. Two important characteristics have resulted. One is that there is a large area of soil along the coast north of Obock that is formed by an uplift of coral from the sea. Some of this is covered with volcanic outwash. The other characteristic is that some of the watersheds have no drainage to the sea. Some are below sea level. Water escapes by percolation and evaporation, and evaporation of this type is associated with salinization.

Pouchan called our attention to 12 underground reservoirs or aquifers. These are marked by numbers on the map, and notes on each one appear below.

#1. Gobaad Plain, from Dikhil to Lake Abbe. A reservoir of good water lies under the upper third of the plain. There are natural springs at Kikhil. This aquifer is formed by faults in the basalt, a sinking of the earth's crust between the faults, and a filling of the depression by alluvium (soil and rock washed in by floods). Pouchan calls this a collapsed fault and says it makes the best aquifer. Alluvium here is some 100 meters deep, and good quality water is found at about 40. The watershed for this aquifer lies partly in a "high" rainfall area of Ethiopia, and replenishment is believed good.

This watershed drains into Lake Abbe. From the west the Awash Wadi in Ethiopia drains into the same lake. This is one of the closed systems, and the lake water is a brine with a high sulfur content. The word "Abbe" is said to mean putrid. Salt is normally associated with a closed system, and the extent to which soil is affected is not known, although the water in this aquifer is considered good. An international soil survey shows there is also some of Djibouti's best soil in this area.

#2. Hanle Plain aquifer is fed from an area of about 200 mm. of rainfall per year. We did not see this area, but it has been described as one with agricultural potential, both by Pouchan and by the FAO-UNESCO Soil Map of the World. The surface topography resembles a closed system, much like the Grand Bara (#5) which has a large area of "sterile clay." The aquifer is located in the upper third of the plain. Alluvium is 70 meters deep, and there are reports of water at 6 to 10 meters.

#3. Geo-thermal wells are in several locations to the west and south of Lake Assal, none of which we saw. Two wells were drilled near the Lake to a depth of about 1,150 meters. One well was dry. Water temperature in the other was reported at 200 degrees Celsius. Pressure at 1027 meters was 78 kg/cm². Heat content of steam was measured at 80 to 125 kilocalories/kg, but there are some judgments that it may be much higher, up to 250 kilocalories/kg. Estimates are that it could produce 1-2 megawatts of electricity.

#4. We have no specific information on this aquifer. It is located on an alluvial plain.

#5. Grand Bara. Chief characteristic of its surface is that there are 60 to 100 square kilometers of what the French agricultural technicians call "sterile clay." Judging from the surface, this may be a closed system. The surrounding topography drains into it. However, there may be underground drainage to the Gaggade Plain to the northwest which includes site #4.

There is believed to be abundant water under this plain. The aquifer seems to be composed of young and leaky basalt, although the surface resembles alluvium. One part of the aquifer has more cracks in the basalt than the other and is believed to have a higher yield capacity. Wells have been drilled in each part, one to provide water to the town of Ali Sabieh. Water produced so far is good, but it is feared that there may be salt in the pool. There is considerable uncertainty with respect to the reservoir.

#6. Petit Bara. No water had been discovered there at the time of the team visit. Two holes about 100 meters deep, and the third well was being drilled during our visit. Following team visit, second unsuccessful well shaft was cleared and redrilled. Water was found at 100 meters. It was not saline and first indications are that it may produce enough water for modest agricultural preparations already underway at Petit Bara. Professor Pouchan advised that the successful well be dug an additional 10 meters in order to profit from main water table. It was expected that there is water in a collapsed fault aquifer. The drainage area is not large, and replenishment is relatively modest. Drilling continues to provide water to the proposed 15-hectare agricultural development site. Problems in finding water exemplify the limits of knowledge regarding ground water. As Pouchan states it, "We simply don't have enough holes" to have definitive information. The drilling equipment is inferior and limits the information they can gain even from two drillings.

#7. This is the aquifer from which Djibouti gets its water and about which most is known. Wells are 40 to 50 meters deep. The aquifer is in a young, cracked, hard basalt over the top of an old impervious basalt and may contain some alluvium. It is fed by several wadis flowing out of the mountains. The aquifer extends into Somali.

Pumping for the city of Djibouti amounts to about 20,000 cubic meters a day. It is calculated that pumping could be increased to 27,000 without depleting the supply; i.e., from annual replenishment. Surface runoff into the sea has been estimated from six to nine million cubic meters per year, an amount roughly equal to current consumption. It may be feasible to impound this water either for direct use or for recharging the underground reservoir. This is the only area for which any kind of water balance study has been made.

There is faint taste of salt in Djibouti water.

#8. This aquifer is fed from the mountain range that lies to the north and west of Tadjoura, and replenishment is good. While it may have some salt pollution from the Gulf, it is considered a high quality aquifer, good enough that they are considering marketing natural mineral water from it. Water is 40 to 110 meters deep, and depth of alluvium is not known.

#9. This is a huge reservoir under a coral coastal plain uplifted from the sea and covered in places with alluvium of volcanic origin. Salt is a problem, however, at least in part of the aquifer.

#10. This is a good quality aquifer in alluvium which is up to 600 meters deep. Water is about 100 meters deep. It is fed by water from the mountains to the west.

#11. This aquifer contains high quality water and is replenished by a large watershed that extends some 80 kilometers up the Djibouti-Ethiopian border and thus has a good replenishment rate. The surface drainage out of this watershed is also high, and there are reportedly some good damsites in the basin. There is water here at 40 meters, but total depth is not known. We did not see this area.

#12. There is water here, but it is quite deep. One well at Dorra was drilled to 300 meters in depth. The bottom is caved in, and some water is being pumped from about 150 meters. The capacity is not known, but in the dry season, there is sometimes inadequate water for a small vegetable plot the district chief is experimenting with. No significant aquifer is identified.

Because of the rapid population growth of the capital the last several years, there is some worry that Djibouti will have a water supply problem in the future. This has led to the development of LOTUX (Long Pipe) a project which would bring water from the Gobaad and Hanle Plains reservoirs to the city of Djibouti. A \$70 million dollar project has been proposed that also includes some irrigated agriculture along the pipeline.

While the total water supply potential seems adequate to sustain agricultural development and other economic activity, some important problems must be solved.

1. More information about the water supply is needed, particularly with respect to the annual yield capacity of the major aquifers and to water quality, especially in those reservoir in which the danger of salt is recognized. The Pouchan data would yield considerable information, but he claims that adequate information will require more test borings. The team's judgment is that the water supply potential is adequate to support some agriculture and thus it justifies further attention. Water

expertise is needed to help determine both study needs and exploitation needs.

2. Temperature of the well water ranges from 39 to 50 degrees Celsius (104 - 122 F.), and we do not know how to evaluate this phenomenon in either its direct effects or its implications.

3. Major limiting factors are presented by the lack of trained manpower and the lack of an institutional framework to deal with the water problem. One problem, for example, is the exceptionally high cost of equipment and supplies associated with water, all of which are imported, chiefly due to weakness in the importing institution.

Soils

Little is known about Djibouti soils. Some non-technical briefing material listed the soil as sand. In one of our interviews it was indicated that there had been so little weathering that the parent material has not been broken down to form a soil base adequate for agriculture. Our observations did not square with either of these bits of evidence.

Our judgment is that the soil base is adequate to support a significant agriculture. We base that judgment on the fact that volcanic soils are usually relatively fertile and that soils under arid conditions have not been extensively leached. In addition, the soil is of a color normally associated with relatively good productivity. Basalt is sometimes associated with relatively good soils, and the parent material is essentially basalt. Finally, our observations were that the parent material has been weathered and that there is a high clay content. In fact, in some areas a major problem may be associated with a high clay content.

While we saw snow-white surface in only one area, and that from the air, our hypothesis is that salinization has occurred on a major scale and is the explanation of the so-called "sterile clays." We inspected only one of these areas on the ground, that of the Grand Bara, but we saw much more from the air. The "sterile clay" areas are almost always found on the plains formed by alluvium which filled in the collapsed faults associated with the aquifers. Our hypothesis is that these sterile areas were formed in the low spots of the closed surface drainage systems, that the heavier material had settled out before the water reached these spots, that the clays settled out in these spots, that the clays sealed off the surface so that there was almost no percolation, and that the ensuing evaporation has allowed enough salt to accumulate to prevent plant growth but still not enough to produce the pure salt cover. Admittedly, this is layman reasoning, but it does seem to fit observations made from the surface. We did not see areas in which the entire plain was "sterile clay." Much of the surface is covered with basalt rocks and boulders, but these "sterile clay" areas were clean, as if the boulders had been covered by the sedimentation.

At any rate, a study by soils experts is needed, and our judgments are that there is enough good soil to justify such a study. We saw a wide variety of crops growing at several well sites, but given the size of

the plots, and the lack of information on technology used, the evidence of the care and attention they had received, we could draw little conclusion from them.

We recognize these problems or possibilities of problems.

1. One is the lack of knowledge and understanding of the soils. We do have from Pouchan some fairly good geologic maps. While some soil survey is justified at present, the extent of the survey must be determined in consultation with experts.

2. Of special concern is the danger of salinization, as a function of both water and soil quality.

3. Djibouti has only the beginnings of an institutional structure to deal with this problem, but virtually all the expertise is embodied in one person with a B.S. in agriculture, and he has virtually no equipment and no library or literature facilities.

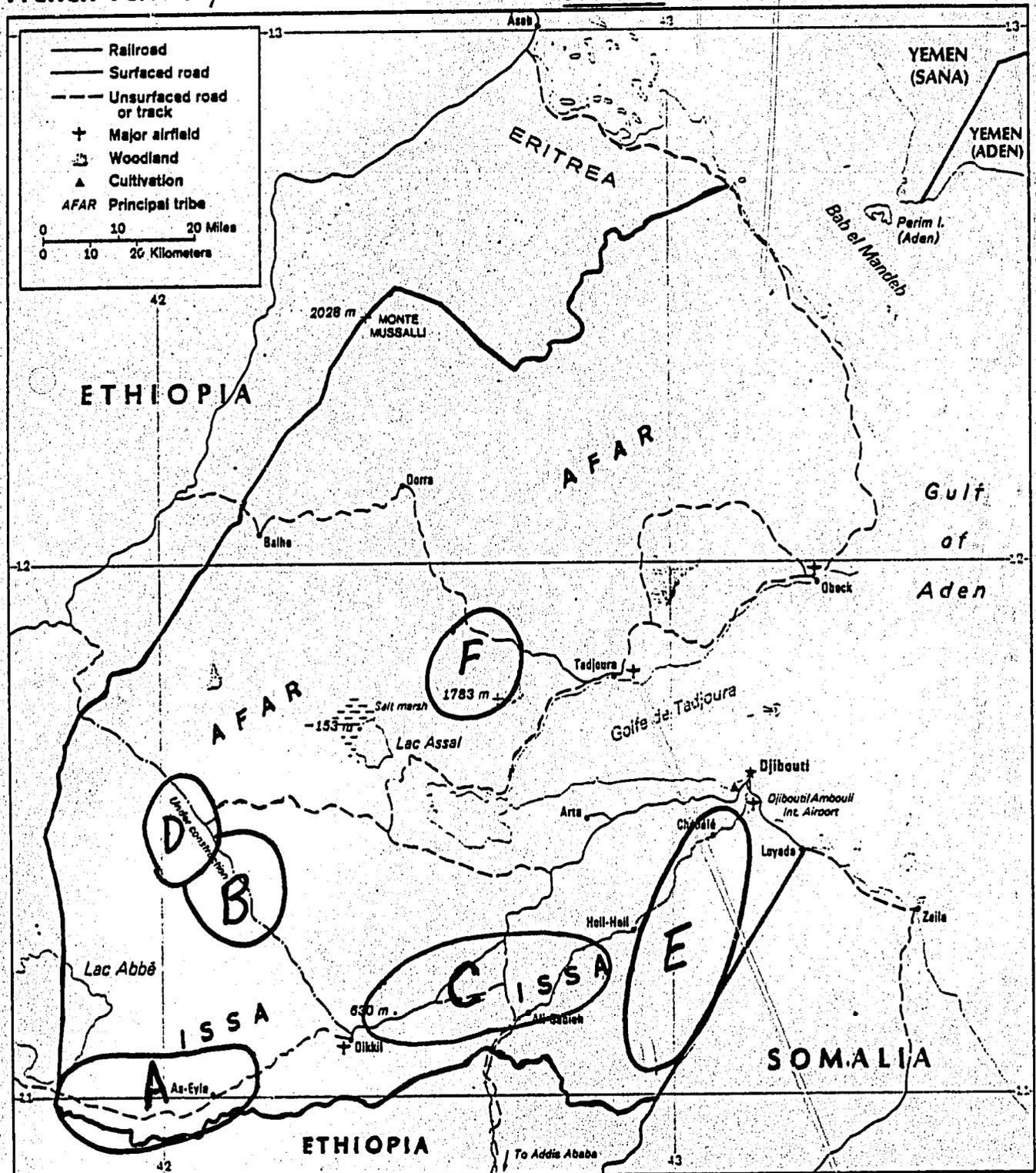
The FAO-UNESCO Soil Map of the World, published in 1973, yields the following data as interpreted by Tejpal Gill, DSB/AGR. Areas shown on the soils map as A and B contain substantial areas which Gill interprets as follows: "Under good management these may be the best soils of Djibouti. Fertility is generally good. Drainage may be needed. Soil suited to irrigation, rice, cane, and many other crops. Underground water is probably available." The aquifer map shows underground water.

Areas C and D he interprets as follows: "Salinity is serious problem. Leaching of the soil is essential. Salt tolerant plants needed with irrigation."

A large area of soil somewhat inland from the aquifer identified as 7, and marked E on soils map, Gill characterizes in this way: "Plant nutrients are generally sufficient, except for some minor elements. Nitrogen is generally needed. Excess soluble salt is a problem. Irrigation would require good drainage." Area F has the same general characteristics.

The FAO-UNESCO Map indicates that the soils are clays and silts. This map was developed on the basis of reconnaissance surveys and is not to be regarded as definitive.

SOILS OF THE French Territory of the Afars and Issas DJIBOUTI



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This is a harsh country. In addition to the ancient volcanic activity, the faults and sinking of huge areas of land, the country is still subject to earthquakes and floods that cannot be anticipated. On the other hand, the sun and the wind are constant. Data on evaporation was not available, but the sun shines on most days, and in the month of July the mean high temperature is above 100 degrees Fahrenheit in the capital. It is claimed that the climate is humid, but we saw no data on this. The wind was mentioned often as a problem. In several of the areas, the growing of wind-breaks was of as much interest as the growing of crops. The wind and sun may also constitute energy resources, but there has been no experience with them in Djibouti, and we were not able to evaluate them.

People and Politics

The population of the Republic of Djibouti (GROD) is also unknown. Most estimates place it at about 250,000; more than half is in the capital city. Whatever the facts may be, the population is growing rapidly. A mimeograph supplied to the team (Identified as "Paris MARCHES TROPICAUX ET MEDITERRANEENS in French, 17 May 74, pp. 1310, 123-34) reported the 1967 population as 125,000, made up of 48,000 Afars, 40,000 Issas, 18,000 "miscellaneous non-Issa Somali tribesmen", 8,000 Arabs (mostly from Yemen), and 10,000 Europeans. A promotional publication (about 1972) encouraging foreign investment in Djibouti gives the same total population but a little different composition.

If the population today is 250,000, that would be doubling of the reported 125,000, a decade earlier, or an annual increase of about 7 percent.

Population varies widely within the year. In December, the climate is relatively pleasant in the cities, and pastures are relatively good in the country, and the population is at its highest. In the July to September period, both herdsmen and urban dwellers may be out of the country. The herdsmen follow the pasture without much regard for national boundaries, and there seems to be an easy flow of kinsmen across the boundary whether following herds or not.

The Afar-Issa relationship is not clear. The Afars are part of a larger Afar group living in Ethiopia, and the Issas are related to the Somalis. The French source, cited above, indicates that the two groups live peacefully in the country, that the most common conflict, dispute over land, is more likely to be within the groups than between them. On the other hand, there are reports that there is constant tension between the groups. As Djibouti gained independence, both groups are represented in the government. At the time of our visit a group of Afars, in a move to free their companions, killed a pilot of Djibouti Airlines in Tadjoura, and the mother of the Minister of Justice.

Even if the Afars and Issas can get along inside Djibouti if left to their own devices, problems exist which we are not able to evaluate. Given the Somali-Ethiopian struggle elsewhere and the port and railroad, it does not seem likely that the Djibouti relatives are going to be left to their own devices. In addition to the official refugees of the Ethiopian wars, there are many immigrants. The presence of these immigrants, the kinships that cross national boundaries, and the easy physical movement of the people from country to country present a complex situation, difficult to evaluate. Also difficult to evaluate is the government's likely reaction to it.

Health and Nutrition

Dr. Tom Edwards of the Communicable Disease Center, in Djibouti as part of the A.I.D. disaster-refugee team, reported to us that the problem of malnutrition is likely not serious. Although most of his observations were made in the camps of refugees from the Ogaden sector of Ethiopia, he had some observations of other segments of the population. Most serious are problems in a camp of refugees from the Eritrean sector of Ethiopia, which is in the capital city and which has been in existence much longer than the other two camps. He did find that the most serious health problem is tuberculosis, in spite of the sunny and dry but humid climate. He will work with the Ministry of Health to conduct a nutrition survey, and his experience in the flood disaster area will also give more insights into the health and nutrition situation.

Water is an important factor in human health. Edwards estimates that up to 70 percent of disease other than tuberculosis is caused by polluted water.

Institutions

As a new country, Djibouti's most serious problem is its almost complete lack of an institutional base. The importance of institutions lies in the fact that institutions are the instruments by which a country manages its affairs. Not only are its institutions not in place, it has few building blocks in the form of trained people with which to build institutions.

Education

Of all the resources, the human resource is the most important, since it manages the others, so we look first at education. The document, MARCHES TROPICAUX ET MEDITERRANEENS, presents the following data for 1972-73.

There were 8,021 students at all levels, only 6,727 from the territory itself. Of these, 6,230 were in public schools and 1,791 were in private, mostly Catholic, schools. There is no information on Djiboutians studying in other countries.

Schools listed included 30 public primary schools (171 classes); five private elementary schools; 24 junior high school classes, and 12 senior high school classes (number of schools not reported); two private junior high

schools, a normal school, a technical school at the junior high school level with 528 students; a private secretarial school; six home economics "sections;" and "several specialized schools."

We did gather some school and population numbers in interviews with five district chiefs, which are presented below.

District	Population		School Data
	Rural	Urban	
Dikhil	40,000	10,000	600 students were reported in 12 primary classes. 80 students were reported in three secondary classes.
Ali Sabieh	19,000	10,000	425 students, 1 school, 11 classes 225 students, 1 school, 6 classes 180 students, 1 school, 6 classes 164 students, 3 schools, total of 6 classes 65 students in one high school class
Tadjoura	45,000	8,000	No data available on school enrollment. There were about 35 classes in the district. Number of schools not reported.
Obock	13,500	1,300	1 school in the city has 6 classes, 5 rural schools have one class each, no high school (perhaps 3 students will get through high school a year somewhere).
Dorra	N.A.	500	Normally have 3 classes and about 90 students. This year only 2. All students are children of nomads. Town residents send their children to the capital or a larger city.

These data suggest that underschooling of the rural areas is drastic, that many schools offer three or fewer grades (not six), and that at only two places outside the capital is high school training available and that very limited.

On the matter of faculty training, evidence is just as skimpy. The principal at Ali Sabieh had some training at a normal school in France, but we were told by a newly arrived teacher from France that no Djiboutian was teaching in the capital city schools. The teachers were reportedly from Tunisia, Somali, and France. French is emphasized in the schools, making it difficult to explain the presence of the Somalis. In various of the districts, classes had been reduced this year because of the lack of a teacher. We did not hear of lack of funds as an explanation. We visited the Ali Sabieh plant. It is impressive; first year high school facilities have just been built, and textbooks seemed adequate.

Ministry of Agriculture

The Ministry of Agriculture consists of three units -- Rural Water Corps (Genie Rural), Animal Husbandry Service (Service Elevage), and the Agricultural and Forestry Service (Service Agricole et Forêt). The Ministry is responsible for all water, including supply to Djibouti and also has some responsibility for the refugee problem.

The Rural Water Corps employs some 350 persons. It is headed by a French technician (not trained at University level) who is also second in command to the Minister. He has a Djibouti deputy and two well-drilling crew chiefs, although one rig is permanently out of commission. Both are Djiboutians who have received only on-the-job training. The staff includes carpenters, electricians, plumbers, and other craftsmen.

The number of staff in the livestock service was reported as 80 to 100. It has been headed by a Djiboutian only since September who has received only on-the-job training. There are a dozen or so animal nurses (infirmier veterinaire) also trained on the job, and one French veterinary doctor.

Agricultural and Forestry Service has about 55 persons. The director is a French agronomo with some graduate training, but not an M.S. Since independence, a Djibouti-born Somali with a B.S. in Agriculture from the American University at Beirut has been contracted. The next highest trained people are two "chief gardeners," both working at the 1½ hectare station in the suburbs of the capital city. There are four "moniteurs" who have been in service for several years and eight new ones who have just been hired. The rest are made up of drivers, mechanics, and laborers. A young French agronomist is assigned to the Service in lieu of military service.

The Agricultural Service does not have a genuine agricultural tradition. For years one of its important functions has been to provide ornamental

plants to home owners. The principal agricultural station at Amboulliet is almost entirely devoted to ornamentals, and two of the high status employees are gardeners.

We visited several of the MinAg stations but we saw nothing impressive. Irrigated planting around wells gave the impression of being planted almost at random. On the production (not experiment) station at Randa in the mountains, with water and good weather the year around, the land was simply not being used, and we were told that the station operates at a deficit. The Ministry has a date production program, some 40 hectares in 15 plantations. No production figures were available. We saw one date plantation in the coastal plain outside Tadjoura, about five years old and just starting to produce. It required irrigation for three years before the roots were able to take moisture from the soil (supplied by capillary action from a high water table). The water was said to be salty (although the plantation was not far from a well we were shown that was thought to have export quality water.) Although shade appeared to be no problem, there was no experience with intercropping between the rows of dates.

The normal MinAg budget for 1977 amounted to 140 million francs (about \$840,000 at 175 francs per dollar). Of this five went to the office of the Minister, 40 was for livestock, 41 for agriculture and forestry, and 50 was for water. There was a reallocation of funds from FIDES (International Social and Economic Development Fund) of about 105 million. In addition, France pays the salaries of the French personnel.

The two people in the Ministry of Agriculture who have agricultural training cannot speak to each other. The English-speaking Somali does not speak French, and the French technician does not speak either English or Somali. This presented the image to us that the differences between the two were deeper than language. The English-speaking Somali indicated to us that he had citizenship rights in Djibouti and that there was clear possibility that he would spend his career in the Ministry. Obviously he is a candidate to replace the French technician as head of the Agricultural Service, an event that could occur rather soon.

The employment of this agronomist and the eight Djibouti technicians appear to us to be tangible evidence of the seriousness with which the new government is addressing agricultural development. The government has also created a special fund of 100 million Djibouti francs (\$600,000 @ 175 Df/\$) to develop a 15-hectare agricultural development site on the Petit Bara. Only one of the new technicians has training beyond the sixth year, and his was in masonry in the trade school. They were picked on the basis of an examination in the French language, and their selection may have been more a function how well they knew French than of their aptitude in agriculture. The Somali agronomist designed and presented a pre-service training course for them (against the opposition of the French technicians, he told us).

The indigenous capacity in the Ministry of Agriculture is virtually no more than the single B.S. level agronomist with some experience in the Somali experiment station. Virtually all other training has been limited to that acquired on the job. Equipment-wise, the situation is about the same. Only one old well drilling rig is in operation, and it is not expected to last more than another year. There is no laboratory equipment or library facilities, and field equipment is scarce and nearly worn out.

Under the pressure of the new government, the French technicians have developed some development plans, which are explained later under donor interests.

Other Institutions

We made no adequate study of the other institutions, but not much was needed to get some important insights. When the prime minister was asked about his new country's aspirations and plans, he responded that, of course it was too early to have plans. Then he added that it could not really have aspirations until it found out what was possible, and for this the country has to rely on outsiders. Thus, there is no planning capacity, and we did not meet or hear about a trained economist.

Other parts of the institutional fabric are as threadbare as the ones examined above. The only land tenure rules are those of the tribal groups. As cropping is established on any significant scale and crops are fenced, the problem of establishing rights to land and the product of the land will present conflicts that the traditional rules have not had to resolve. Indeed the issue was foreshadowed in the selection of the 15-hectare agricultural development site. Establishing rights to water when there is not enough for both flocks and crops will also be a problem, as will be rights to underground water and policies on rate of pumping or harvesting. No institution is in place to resolve these predictable conflicts.

The current tax of most consequence is a flat levy on all imported goods. Not only do imported goods constitute a precarious tax base, but there has been some subsidy from France.

Another institutional problem results in what seems to be inordinately high prices for machinery, equipment, and supplies. A 100-meter well with pump, a storage tank made largely of local material, and a kilometer of pipe reportedly costs \$200,000. That price seems high to us.

There are other institutional problems, such as the lack of an experiment station, the virtual lack of an extension service, and the lack of any agricultural and technical training facilities. It is reported that three food importers control the fruit and vegetable market. It has been alleged that this concentration of power is one factor explaining the absence of any indigenous agriculture, that some Yemeni vegetable producers were forced out of business by the group. The market has some

peculiarities. Female entrepreneurs are said to battle in the central market for tomatoes at \$4 a pound in order to resell them in the township markets.

This discussion aims to illustrate the inadequacy of the institutional base and not to form a definitive analysis of the institutional situation.

The Government's Plans

The net result of this inadequacy is the almost total dependence on outsiders for technical expertise in such important matters as managing the most critical resource, for figuring out what is possible, and for planning projects. These inadequacies show up in the rudimentary planning decisions that have been made. Now in implementation is a 100 million franc (\$600,000) project to develop a 15-hectare agriculture development site. So far it is reported that \$150,000 has been spent on drilling (before finally striking water) and \$240,000 has been spent on building a water storage tank from basalt boulders cleared off the site and for land leveling. There are no fences and no buildings. If these costs are "reasonable", it seems clear that the country's agricultural potential is not great.

We were presented plans by the head of the Agricultural Service, a Frenchman whose salary is paid by the French Ministry of Cooperation, for five other projects at a cost of 256 million francs (\$1,540,000). The largest was for a training center for agricultural professionals, adults, and youth, for 187 million francs, about \$1,118,000. Second largest was for the development of a 20-hectare irrigation district for 42 million francs, about \$250,000. (In this plan a 70-meter well with no equipment is budgeted at nine million francs, about \$54,000). The third item is to build four dwellings and buy two vehicles in order to decentralize the agricultural agents (moniteurs). Houses are budgeted at 4,183,000 francs (about \$25,000 each) and the vehicles at two million (about \$12,000 each), for a total of \$125,000. The other two items are "equipment for the agricultural sector," 5,760,000 francs and "creation of school gardens," for 1,455,000 francs.

We do not know the status of the plans, whether, for example, the government leaves planning up to the directors. We do not know if these plans have been cleared through the French Ministry of Cooperation and if so whether the Ministry would provide any financial support. This set of plans was not mentioned in our visit with the Ministry of Cooperation mission.

Status of the plans aside, we were impressed that the plans were limited to hardware and were silent with respect to technical assistance and indigenous staff development. We asked about acreage planted goals and timetables, but none has been set.

Other Donor Interest

We know almost nothing definitive about other donor interest. We do know there is some, and Djibouti officials told us they had made requests to several donors. GROD's interest in A.I.D. stems from the great store of agricultural competence in the United States, plus the Agency's experience in dealing with problems of poor countries.

France could be expected to be the big factor in an assistance program. It is expected to help out with budget support as well as development. Apparently, it aims to place its capital assistance through the Fund for Economic Development (FED), which has already sent one mission to Djibouti. A report should be available before the end of the year.

France has a mission in the country from its Ministry of Cooperation, which deals with former territories. The mission director told us they did not have particular plans. They have offered one well drilling rig through FED, which will take more than a year and which they expect to be the only operating rig by the time it is in operation. This indicates their evaluation of present equipment. They have not thought about training, maintenance, and spare parts. They are planning to assign a married couple to work in agriculture. The husband agronomist will work in the Agriculture Service, and the wife will work at "helping administrators of all levels to understand agriculture." They expect one Volunteer for Progress to work as a garden specialist. France will also provide some temporary help in evaluating the LOTUX project, a \$70 million proposal for bringing water from the Gobaad and Hanle Plains to the capital and providing irrigation water for some areas along the way. Mention was made of developing 500 hectares, "maybe for refugees," but the site was not specified.

The director acknowledged Djibouti's interest in fisheries, and indicated they would leave that to FAO. We do not know what FAO's interest is. Upon our mention of soil testing facilities, he indicated there would be no conflict if A.I.D. wanted to provide it. Djibouti has requested one from France. Interest in "educational" activities was referred to, but there was nothing definite.

We heard while in Djibouti that the UNDP was sending a team in to review the water situation in November. Upon return we learn that a World Bank economist and an administrator of the UNDP African program were planning a trip. It is our judgment that a visit to the country will not produce much information on the water supply unless the team is knowledgeable of the hydrology work that has been done. We found geologic maps available in the Ministry of Agriculture but identified no person or other source of information.

The European Economic Community's Fund for Economic Development (FED) will have some interest, even if only as an alternative means of France's

providing support. It promised a well drilling rig and has fielded one team to help Djibouti figure out what is possible, or as the Prime Minister told us, "to help us plan to plan." The team was organized by a firm that specializes in economics, policy, and the social science. One agriculturist was on the team.

Since Djibouti has joined the United Nations organization, it seems reasonable to expect that the FAO will respond in some fashion to the country's interest in fisheries.

We heard several references to the fact that New Zealand was interested in helping evaluate and perhaps exploit the geo-thermal resource. This is probably more an interest in sharing its experience with the technology than it is in providing capital assistance.

We do know that Djibouti has joined the Arab League, but we have no information as to interest the oil producing countries may have in development assistance.

The United Nations Refugee Program is active in Djibouti and is discussing the possibility of establishing farms for refugees.

Economics

Several economic factors are cause for concern. Even under the best of circumstances (reasonable development cost, efficient agriculture, and good markets), it is not simple to make an irrigation scheme affordable. With no agricultural tradition and no facilities to compensate the lack, the GROD would have to jump almost immediately to a modern, efficient agriculture to justify the capital costs of irrigation. There may be possibilities for rainfed agriculture, but the Team was not able to identify them. Despite the current high food prices, the long run supply and demand picture has many uncertainties. Traditionally, the relatively rich Ogaden area of Ethiopia, linked to the capital city by a railroad, has supplied the basic food grains to Djibouti. The Djibouti-Addis Ababa railway was closed down by rebel action on June 1, 1977, in the first act of the renewed war over the Ogaden. The general consensus of all local and foreign observers is that the railway will not be brought back into regular commercial service for several years to come, if ever. In the meantime, a country like Sudan may eventually have food surpluses for the Djibouti market; however, the Sudan is gravely hampered over the short term by inadequate internal transportation facilities to bring its grain to the Red Sea port. On the demand side, there is no assurance that the European component of the population will hold at its current level. Observers expect that the 4,000 or so French troops could be withdrawn almost without notice. Whatever the result of GROD-France relations over the next few years, the primary goals of agricultural development in Djibouti must be to satisfy the needs of the Djiboutians, to replace the

heavy load of imports in basic commodities, and to increase opportunities for economic activities.

FISHING

A commercial fishing industry does not exist in Djibouti, but fishing provides a livelihood for many inhabitants resident along the coast. For example, in the Obock District, we were informed that people engaged in fishing limit their catch to what the market will consume on a daily basis. This limitation is due to the lack of refrigeration and storage facilities.

SOLAR ENERGY

There are likely to be models of solar energy that suit the Africa environment. The job is to arrange the type that suits Djibouti. The need for refrigeration is particularly great in countries like Djibouti with a lot of sunshine. Perishable foodstuffs, such as fish and surplus vegetables and meat products, can frequently be stored and used only under hygienically inadequate conditions. Often short throughout the year, food supplies are further reduced. Seemingly, Obock could be used as a test site for a solar energy experiment. Experts on solar energy say there are three distinct advantages for using solar energy in countries like Djibouti: most of the plants can be produced in developing countries; the plants are suitable for decentralized operation in small communities, and maintenance is low and requires no specialist personnel.

ABATTOIR

During consultation with the Commandant of the Djibouti District, the poor condition of the capital's only abattoir was discussed. It is reported to be unfit for storage of meat products for any sustained period without running the risk of spoilage which the GROD cannot afford. This problem should be investigated with the intent of rendering the abattoir to safe and sanitary conditions.

PERSONS CONTACTED

AMERICAN EMBASSY, PARIS

Howard Helman, USAID Representative
Jacquie Jullier, Secretary

UNIVERSITY OF BORDEAUX III, Bordeaux, France

Professor Pierre Pouchan, Hydrologist
Professor Michel Clin, Geologist

SEDES, Paris, France

Gerald Hayere, Consultant

MINISTRY OF OVERSEAS TERRITORIES

M. Sebeyran, Director

MINISTRY OF COOPERATION, Djibouti

M. Derribiere
M. Strombons

AMERICAN EMBASSY, Djibouti, Republic of Djibouti

Walter Clarke, Charge d'Affaires
Clyde Jones, Administrative Officer
Ms. Constance Jones, Secretary
David Harper, Political Officer
Thomas Edwards, M.D., Bureau of Disease Prevention
Robert Clary, OFDA
Hailu Johannes, Controller

GOVERNMENT OF THE REPUBLIC OF DJIBOUTI

Office of the President

Hassan Gouled Aptidon, President
Ahmed Abdullah Kamil, Foreign Minister
Ismael Guedi, Director, Presidential Office
M. Chaker, Chief of Protocol
M. Chauvet, Diplomatic Advisor

Office of the Prime Minister

Ahmed Dini Ahmed, Prime Minister

Ministry of Agriculture

Idris Farah-Abanah, Minister

Jackie Humberto, Director of Rural Water Development (Genie Rural)
and second in command to the Minister

Christian Astric, Director, Agriculture Service

Omer Said, Agronomist, Agriculture Service

DISTRICTS

Djibouti

Idris Doudoub, Commandant

Ali Sabieh

Salah Omer, Commandant

Said Ismael, Principal, Elementary School

Dikhil

Osman Roble, Commandant

Obock

Ougoure Hassan, Commandant

Tadjoura

Ibrahim Issak, Commandant

Dorra

Abdul Kader, Administrator

Geologic Office

Roberto Ferry, Director

CHRONOLOGY OF THE SURVEY

The trip started in Paris on October 4, with Broadnax arriving from Nairobi. He immediately flew on to Bordeaux and interviews with Pierre Pouchan and Michel Clin. McDermott joined him October 5. Two more interviews were held, one with Gerald Hayere of SEDES (Society for the Study of Social and Economic Development), a consulting firm employed by the European Development Fund (FED) to study the economic potential of Djibouti, and the other with Jean Sebeyran of the Ministry of Overseas Territories. This Ministry was responsible for Djibouti before independence. The responsibility has passed to the Ministry of Cooperation, but we were unable to make an appointment with that Ministry before leaving Paris. On October 7, Shuftans arrived in Paris and the team set out for Djibouti.

October 8: Flight was met by Walter Clarke, Chargé d'Affaires, and M. Chakar, Chief of Protocol. We met with Jackie Humberto and Christian Astric. Humberto is French and head of Genie Rural. He also serves as chief of the Minister's Office, a position that is second in command to the Minister. Astric, also French, is chief of the Agricultural and Forestry Service. Humberto and Astric were our official contacts with the GROD.

We also met Bob Clary, A.I.D. disaster relief office, and Tom Edwards, a physician from the Communicable Disease Center stationed in Salt Lake City.

October 9: We took a field trip to the Petit Bara (6 on aquifer map) and Grand Bara (5 on same map) and to the 1.5 hectare station at Amboullet at the edge of Djibouti. We also met with Prime Minister Ahmed Dini.

October 10: On field trip to Dikhil and Ali Sabieh, each a district seat of government, we visited the two district headquarters, refugee camps in the two cities, a school in Ali Sabieh, and the well from which that city gets its water, and had lunch with the district chief in Dikhil.

October 11: We flew to Tadjoura, travelled overland to Randa, where we saw some small plots irrigated by year around springs. Back at Tadjour we visited a small, new date plantation and a well of exceptional water quality, and had lunch with the district chief.

October 12: We visited Ismael Guedi, Director of the Office of the President; Roberto Ferry, a Frenchman, Director of the Geologic Office, and M. Derriehere and M. Strombons of the Mission of the French Ministry of Cooperation. The Minister of Education did not appear for an appointment.

October 13: We flew to Obock, visited a well at Oulma where a small plot was being irrigated, and visited with the District Chief, Ougoure Hassan. Then we flew on to Dorra, had lunch with the District Chief, Abdul Kader, and returned to Djibouti after flying north to Monte Mussal and back over Lake Assal and around the Gulf.

October 14: A Friday for us, this was Sunday in Djibouti. Shuftans returned to the States.

October 15: Our only scheduled activity was an interview with the Minister of Agriculture, Idris Farah Abaneh, who was formerly Minister of the Interior.

October 16: We visited the President, Hassan Gouled Aptidon; the Foreign Minister, Ahmed Abdullah Kamil, and Christian Astric and Omer Said of the Ministry of Agriculture. Said is a Somali with a B.S. degree in agriculture from American University in Beirut, contracted since independence.

October 17: We had a luncheon with the Ministers of Agriculture and Foreign Affairs, a detailed interview with Pierre Pouchan making notes on the water situation, and an interview with Walter Clarke.

October 18: McDermott left for the States.

October 19: Broadnax left for Nairobi.

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