

SOMALIA

NUGAL TECHNICAL MISSION

Water Supply Working Group

APPENDIX A

NUGAL WATER DIVISION

SOMALIA

TECHNICAL MISSION TO THE NUGAL REGION

Water Sector Institution Building

The New Regional Institutional Framework

A. BACKGROUND

Present Situation

1. The collapse of the Central Government authority has completely broken down the institutional framework of the Nugal Region. Virtually all rehabilitation activities are realised by channelling donors resources directly through international implementing agencies including international non-governmental organizations with a very limited participation of local and regional authorities. This system has worked adequately for the execution of some high priority rehabilitation action of limited importance usually implemented at the village level.

However, this approach has its limit since it contributes to give to the donor community and then implementing agencies a de facto monopoly of the rehabilitation and development actions at the regional level. In the Nugal Regional where the security situation is usually considered as better than in most of the other regions of Somalia and where some form of economic planning and programming can be initiated at least for some key sectors of the economy, the absence of involvement of the infant Regional Development Committee in the rehabilitation process is not advisable. It can lead rapidly to tension between local authorities and some foreign agencies, including international NGOs which will finally be detrimental to the welfare of the local population.

Addis Ababa Agreement

2. This situation is in contradiction with the decision of the Fourth Coordination Meeting for Humanitarian Assistance to Somalia held in Addis Ababa in November/December 1993. During this meeting, it was agreed that a regional administration, the Regional Development Committee (RDC) would be set up in all regions to confirm the importance of Somali ownership in the rehabilitation and reconstruction process of the country. In the present situation characterized by the absence of the central government, this solution is the only workable one. The donor community, during the Addis Ababa meeting, committed itself to fully support the new RDC and help him to participate in defining rehabilitation priorities of the region, funding of these rehabilitation actions and give him the means to supervise their implementation.

SACB Standing Committee Position

3. In its report "Institutional Strengthening of the Regional Level - Revisiting the Approach", of 19 May 1994, the Standing Committee of the Somalia Aid Coordinating Body - emphasised the need for strengthening regional administration capacity to plan and budget rehabilitation actions. Even if the degree of authority that a future central government will decide to vest in regional authorities, particularly in the allocation of local revenue and donors funds, still remain unclear, it is evident that the future institutional framework of Somalia will give a key role to the Regional Institutions for planning and implementing rehabilitation projects of their region. This willingness of local authorities to strengthen the political and administration structure of the North East Region (NER) has been on the agenda of the political congress organized by SSDF at Gardo. Naturally, this process will be set up progressively since most qualified officers of the former administration having a good knowledge of the economic problems of the Nugal Region were displaced during the civil war turmoil.

It is the mission's feeling that Somalia has now a unique chance to break with the former highly centralised administrative system of the past mainly built during the Russian assistance period.

4. It is in this context that the technical mission in charge of the water sector:
- reviewed the new regional institutional framework which is envisaged for the Nugal Region.
 - evaluate the investment and recurrent costs required for creating the nucleus of a small unit of the regional administration which will be in charge of the management of the water sector of the Nugal Region.

B. THE ENVISAGED NEW REGIONAL INSTITUTIONS

The Regional Development Committee

5. In accordance with the Declaration of the 4th Humanitarian Conference on Somalia held in Addis Ababa from 29 November to 1 December 1993, a Regional Development Committee (RDC) has been formed in the Nugal Region. The Regional Development Committee of the Nugal Region is said to be the first created in Somalia.

For the time being, the RDC of the Nugal Region is composed of the directors of the 6 technical departments. It will constitute the backbone of the regional administration. These departments are:

- Depart.: - Planning and Agriculture
 - Livestock and Ranch
 - Finance
 - Health
 - Education
 - Public Works

This last department will be technically important since it covers 7 sub-sectors:

- Public buildings rehabilitation and housing
- Water and Sanitation
- Highways
- Airports
- Sea Port (Eil)
- Energy
- Communication

The RDC is chaired by the Director of the Planning Department.

District Development Committees

6. To facilitate the coordination with local authorities, a similar organization is set up in the four districts of the region i.e. Garowe, Burtinle, Eil and Dongorayo. In each of these local districts, a District Commissioner has been appointed. He will be one of the representatives of the District at the Regional Council. All District Commissioners report directly to the Governor, Chairman of the Regional Committee.

The Regional Council.

7. The Nugal Regional Council will be the key policy making body of the region. The chairman of the Regional Council is the Governor of the Region. The main administrative apparatus of the Regional Council will be the RDC but in addition, the Regional Council will have direct authority on four purely regional departments i.e. not represented at the district level:
- The Regional Department of Planning
 - The Department of Public Property
 - The Regional Police Commissioner
 - The Internal Audit Department

8. These new departments have not yet been effectively installed. At present, the former police works on a voluntary basis with some limited assistance from UNOSOM. While some judges and their staff have already been nominated, in fact, at least in some villages visited by the mission, it seems that the traditional system of justice relying on local committees of elders continue to play a leading role at least to settle disputes related to water and livestock matters.

Operating Environment

9. The new regional government of Nugal will not be in a position to operate efficiently until the problem of the recuperation of public buildings, now occupied by displaced families, and the repair and re-equipment of the existing offices, some of them totally looted, are completed. This re-building of new administrative offices for the envisaged Regional Water Division of the RDC is a first priority. It is only when the new regional water administration will dispose effectively of adequate working facilities that the operations of planning the rehabilitation of the water sector at the regional level, preparing of feasibility studies and the controlling of the implementation of these projects can be envisaged. While the technical mission focus only on the water sector, it is likely that some of the issues raised on establishing a small nucleus of local administration will also be encountered in other departments.

C. HUMAN RESOURCES AVAILABLE

Former Water Management Organization

10. Two governmental organizations were playing a leading role model in the former administration. The former staff of these organizations which were implementing all surveys, studies on the management of the water sector in Somalia might possibly contribute to the strengthening of the Nugal Regional Institution in the Water Sector. The **Ministry of Water and Mineral Resources (MWMR)** was responsible for the collection and assessment of hydrological surveys and the implementation of proved water exploration project. The Ministry centralised in its services most of the information on water resources of the country including those of the Nugal Region.
11. **The National Water Committee (NWC)** chaired by the Minister for Water and Mineral Resources was the main policy decision making of the sector since it coordinates all water resource projects of the country. The committee included representation of local government and of ministries directly involved in the utilisation of water such as the Ministry of Rural Development, Livestock, Forestry and Ranch, and representatives of two autonomous bodies: the Water Development Agency (WDA) and the National Ranch Agency.

Many of the functions overseen by the Ministry of Water and Mineral Resources were carried out by autonomous agencies. In particular, the **Water Development Agency** provides useful technical assistance to rural and urban communities through 16 regional offices.

12. Some qualified staff of these former administration had a good knowledge of the water problem of the Nugal Region. From discussion with Somali counterparts who joined the technical mission, it appears that some of these technicians or administrators would most likely accept to join the Nugal Development Committee to strengthen the new water division.

D. THE RDC WATER DIVISION

Priority Objective of the Nugal Water Division

13. The present malfunctioning of most of the public well fixtures reduce the level of water supply in the whole region and now lead to an excessive concentration of livestock, mainly during the dry season, in areas which can provide adequate water. This contributes to a dramatic increase in the concentration of livestock in some areas, in particular the Nugal Valley during the dry season contributing therefore to accentuate the already apparent problem of overgrazing and in some cases of soil erosion. Since the most urgent problems are both the malfunctioning of the public water supply system and the control of water and land use, it is therefore proposed that a small unit, the "Water Division" should be formed under the Department of Public Works of the Regional Development Committee. This unit will be limited in size but staffed with qualified technicians. In the first three years of its operation, it will benefit the technical assistance of a consultant in the field of water management policy and in the day-to-day organization of its administrative and technical functions.

Scope of the Water Division Responsibility Staff

14. Since the short-fall in supply of water in the Nugal Region is largely due to the inadequate operating conditions of the public wells, the nucleus of the Water Division team will be:

- 1 water engineer
- 1 administrator

These two key executive staff will be assisted by a team of 4 technicians: 1 mechanic, 1 electrician, 1 welder and 1 plumber.

This team will operate in liaison with the water officers of the District Development Committee to inspect, maintain public wells in urban and rural areas, and recover users water charges. Routine maintenance and minor repair works of public pumps and generators will be done in the workshops of the Division. Some remunerated maintenance service might also be provided to communities or organizations which operate private wells. Most important works and repairs will be done through normal contracting procedure.

Technical Assistance Service

15. For a period of at least three years, the Water Division will receive the support of a qualified professional:
- to assist in the management of the water division
 - assist the UNDO-financed team of technical assistants which will be in charge of the preparation of the development phase of the region including the preparation of a Land Use and Water Management Master Plan study. The assistance of the Division will be necessary for all in matters related to data collection, field investigation, tariffs, legislation, etc.

E. BUDGET

Capital Cost

16. Since the offices of the former water agency of the Nugal Region have been totally looted but are now occupied by displaced families. The most urgent action will be to liberate and rehabilitate these facilities in order to allow the Water Division to start its operations.

An estimate of the total cost of the rehabilitation of the complex is presented in table annex 1. It amounts to US\$ 332,870 of which:

- \$ 130,000 for workshops rehabilitation
- \$ 35,600 for offices
- \$ 11,270 for office furniture/equipment purchases
- \$ 15,000 for radio equipment purchase
- \$ 125,000 for vehicles

It is assumed that all the office, transport and communication equipment will be provided through ODA or other donors funding.

17. For the rehabilitation works of the former water agency compound, some local cost such as local labour and building materials can be covered through on going UNOSOM proforma assistance such as food programmes but this possible contribution will remain limited. It has been tentatively estimated that this local contribution might represent about US\$14,600 i.e. about 9% of the total cost of the Compound Rehabilitation.

Running Costs and Recovery Policy

18. The total running expenses of the Division has been estimated to about US\$ 184,000 per year (table annexed) i.e. the equivalent of US\$ 15,300 per month. This estimates do not include the cost of the Technical Assistant Services which will be funded through a UNDA/UNDP technical assistance programme or other donors funding. These US\$ 15,300 per month running cost of the Water Division will be covered easily by a small tax on the sales of the water of the public wells. An estimate of the current water supply of the region based on the public wells sites visited by the mission can be evaluated 20 litre/sec minimum i.e. about 630,000m³/year equivalent to about 53,000m³/month. This is a minimum estimate since the water supply can be easily increased to 35 litre/sec through first phase of the proposed programme of rehabilitation of the existing "public-owned" water delivery system.
19. If the totality of the running expenses of the Water Division are covered by a tax on the sale of water of the public wells, the corresponding tax for the administration will represent the equivalent of $\frac{\$15,300/\text{month}}{53,000 \text{ m}^3/\text{month}} = 29 \text{ cents/m}^3$ in the first phase of the rehabilitation programme. Later on, when the most urgent repairs of the public wells are completed and production sold can be increased to 35 litres/sec i.e. the equivalent of 93,000 m³/month the tax for covering the Water Division operation will be limited to only 16 cents/m³ which represent very minor expenses compared with average price of water paid during the wet season 25,000ssh/m³ or the price actually paid during the dry season 125,000ssh/m³ in most villages of the region.

F. DISTRICTS ADMINISTRATION

Scope of Works

20. In addition to the creation of the Water Division of the Regional Administration, some investments are needed for installing a small team of technicians, in the three districts of Burtinle, Dangoroyo and Eil, who will supervise the operation of public wells system of the district and proceed to routine maintenance operations. This team will operate under the District Development Committee in coordination with the Regional Water Division.
21. The technical staff of well inspectors and routine maintenance will collect information on the operation of each well and proceed to small routine maintenance works. The budget for these local units will then be extremely limited at least during the first three years. Except for Eil which dispose of more abundant water resources, a team of one technician and one assistant should be sufficient.

	Burtinle	Dangoroyo	Eil
Staff			
- Technician	1	1	2
- Assistant	1	1	2
Equipment			
- Vehicle 4 x 4 WD	1	1	1
- Tools kit	1	1	1
- Small workshop/Office Room	1	1	2

Costs

22. The total capital cost and running cost of these 3 small offices has been estimated as follows:

Districts Water Administration Expenses (US\$)

	Burtinle	Dangoroyo	Eil	Total
A. <u>Equipment</u>				
Vehicles	25,000	25,000	25,000	75,000
Tools Kit	10,000	10,000	15,000	35,000
Workshops	15,000	15,000	20,000	50,000
Office	5,000	5,000	10,000	20,000
Radio	<u>2,000</u>	<u>2,000</u>	<u>2,000</u>	<u>6,000</u>
Total Equipment	57,000	57,000	72,000	186,000
B. <u>Annual Running Costs</u>				
<u>Staff</u>				
Technician	4,800	4,800	9,600	19,200
Assistant	3,600	3,600	7,200	14,400
<u>Maintenance Operations</u>				
Office operation cost	1,000	1,000	1,000	3,000
Vehicles	7,000	7,000	8,000	22,000
Consumable maintenance	<u>2,000</u>	<u>2,000</u>	<u>4,000</u>	<u>8,000</u>
Total running costs	10,000	10,000	13,000	33,000

23. The disbursement schedules assume that the priority should be the creation of the Regional Water Division and in a second phase the creation of the small District Unit. The schedule proposed is the following:

<u>Total Cost</u>	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>
US\$ 186,000	19,000	93,000	74,000
100%	10%	50%	40%

G. PROJECT OVERALL COST

24. The total investment cost for the reconstitution of the maintenance capacity of the public wells system plus the high priority works of rehabilitation of the existing wells is estimated at about US\$ 2.8 million for the three first years of operations of the Nugal Water Division. US\$ 2.8 million will be for rehabilitation works and reconstitution of the administrative capacity of the Water Division.

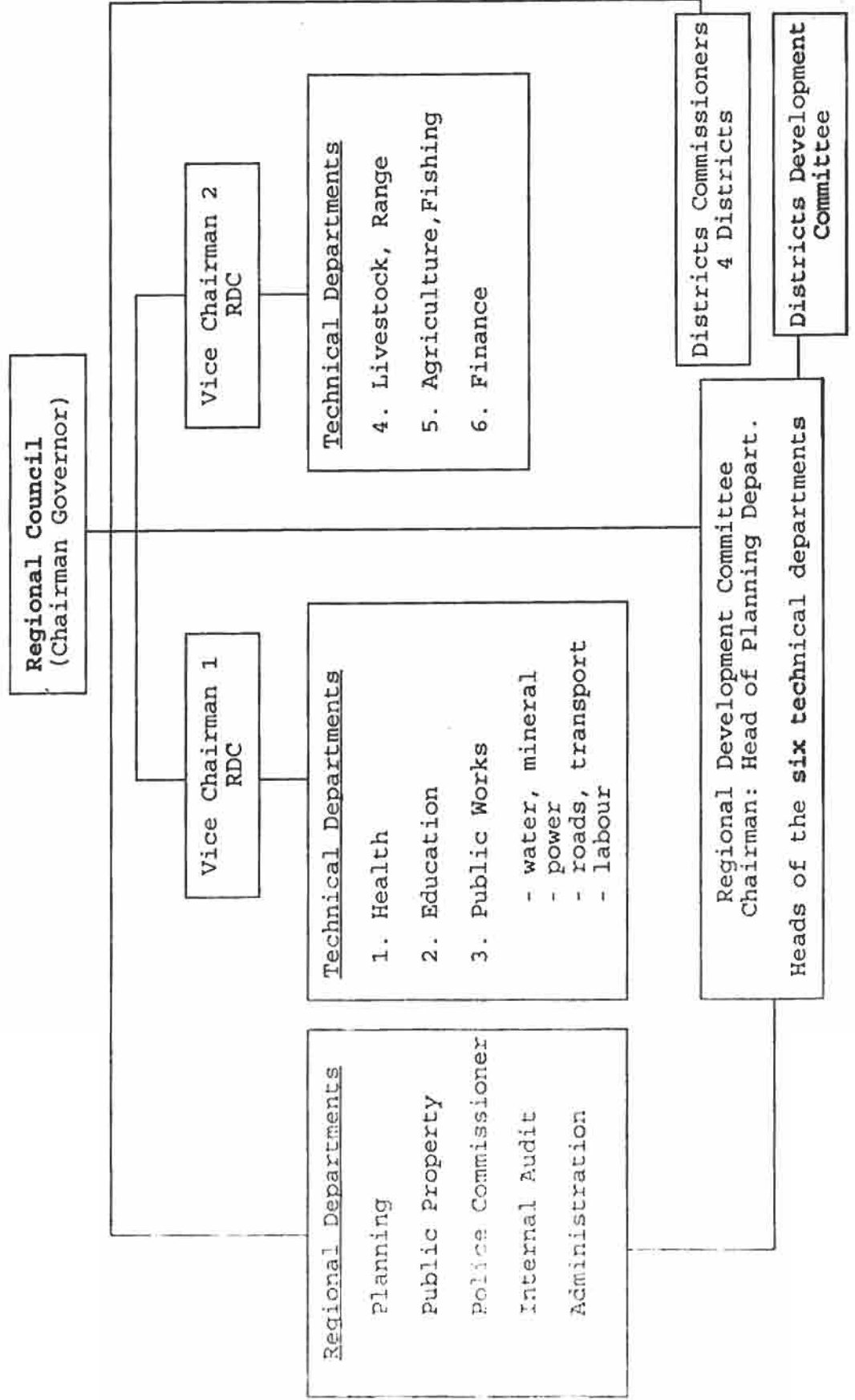
In addition, about US\$ 1.1 million will be necessary for providing technical assistance to the Nugal Water Division for starting its operation, implementing the rehabilitation programme and initiating and supervising the studies needed for the management of the sector.

Total Investment Costs (Regional Water Division and Districts Administration) (US\$ 000)

Expenses	Total Cost	Disbursement		
		Year 1	Year 2	Year 3
1. Creation - Regional Water Division	333	333		
2. Equipment - District Units	186	19	93	74
Total - Creation Administration	519	352	93	74
3. Rehabilitation Works	2,321	528	493	1,300
Total Investment (1+2+3)	2,840	880	586	1,374
4. Technical Assistance - Studies	1,050	180	485	385
TOTAL COST (1 + 2 + 3 + 4)	3,890	1,060	1,071	1,759

NUGAL

Structure of the Regional Administration



TECHNICAL MISSION TO NUGAL REGION
(June 21-23, 1994)

Regional Development Committee
Department of Public Works
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Water Division Budget

SUMMARY

A. <u>Capital Cost</u>		Total Cost (US \$)
I. <u>Water Agency Compound Rehabilitation</u>		
1.1.	Offices Rehabilitation	6,600
1.2.	Water Supply/ Sanitation	29,000
1.3.	Workshops Rehabilitation	
	Building	25,000
	Equipment	105,000
	Sub-total Rehab. buildings	<u>165,600</u>
1.4.	Relocation 4 displaced families	16,000
	Sub -Total Building	<u>181,600</u>
II. <u>Office Furniture and Equipment Purchase</u>		
2.1.	Furniture	3,770
2.2.	Office Equipment	6,800
2.3.	Programmes Misc Purchases	700
	Sub-total Office Equipment	<u>11,270</u>
III. <u>Transport/Communication</u>		
3.1.	Radio Equipment	15,000
3.2.	Vehicles	125,000
	Sub-total Transport/Communication	140,000
	TOTAL CAPITAL COST (I, II, III)	<u>332,870</u>

Water Division Budget (Continued)

			<u>US \$ per year</u>
<u>B.</u>	<u>Operating Costs</u>		
I.	<u>Salaries</u>		
	1.1. Management/Administration	26,400	
	1.2. Technical Staff	28,800	
	1.3. Drivers	16,800	
	<u>Sub-total Salaries</u>		<u>72,000</u>
II.	<u>Office Expenses</u>		
	2.1. Stationery (\$500/month x 12)	6,000	
	2.2. Office Maintenance	2,400	
	<u>Sub-total Office Expenses</u>		<u>8,400</u>
III.	<u>Transport Operating Expenses</u>		
	3.1. Vehicles Operating Expenses	65,300	
	3.2. Travels - Local Journeys	5,800	
	- Others	2,000	
	<u>Sub-total transport/travel costs</u>		<u>73,100</u>
IV.	<u>Workshops Consumable</u>	30,240	<u>30,240</u>
	<u>TOTAL OPERATING EXPENSES (I+ II+ III+ IV)</u>		<u>183,740</u>

**RECAPITULATION
(US \$)**

A.	INVESTMENT (1st Year)	332,870
B.	OFFICE/ WORKSHOPS RUNNING EXPENSES	<u>183,740</u> per year

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NUGAL REGIONAL DEVELOPMENT COMMITTEE

DEPARTMENT OF PUBLIC WORKS

Budget of the Water Division

A. Capital Costs (US \$)I. Compound Rehabilitation1.1. Refurbishing Existing Offices

Office of Engineer	1,200
Office of Administrator	1,200
Office of Technical Assistant	1,000
Radio/Storage	600
Stores	600
Toilets	2,000
Total	<u>6,600</u>

1.2. Water Supply
(for offices and workshops)

Well	3,500
Pump/Generator	18,000
Tanks (6m3)	4,000
Pipes	3,500
Total	<u>29,000</u>

1.3. Workshops Rehabilitation

Rehabilit buildings	25,000
Generator 60 kva	20,000
Mechanical machines + tools	40,000
Electrical tools + instruments	25,000
Plumbing, welding, small formula	20,000
Total	<u>130,000</u>

1.4. Relocation of 4 displaced families

4 x 400 per relocation	16,000
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<u>Total Compound Rehabilitation</u>	<u>181,600</u>
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A. Capital Costs (Continued)II. Office Furniture and Equipment Purchases

	US\$/Unit	Total (Minimum)
2.1. <u>Furniture</u>		
<u>Administration</u>		
3 desks	80	240
4 tables	50	200
2 secretarial desks	40	80
12 clerical desks	15	180
2 shelves	35	70
3 filing cabinets	180	540
2 cabinets	220	440
1 safe	500	<u>500</u>
	Sub-Total	2,250
<u>Stores</u>		
Shelves 10 m	55	500
2 Tables	50	<u>100</u>
	Sub-Total	600
<u>Workshop</u>		
2 tables	50	100
3 cabinets	150	450
2 shelves	35	70
Lockers		<u>300</u>
	Sub-Total	920
	Total Furniture	<u>3,770</u>
2.2. <u>Office Equipment</u>		
1 Computer, monitor	2,500	2,500
1 Printer	1,500	1,500
1 UPS	700	700
2 Typewriters	300	600
1 Photocopier	1,500	<u>1,500</u>
	Total Equipment	<u>6,800</u>
2.3. <u>Computer Programs</u>		
1 Word Processor	250	250
1 Spreadsheet	200	200
1 Database	250	<u>250</u>
	Total Computer programs	<u>700</u>
	Total Furniture and Equipment Purchase	<u>US\$ 11,270</u>

* Minimum prices based on Dubai Imports

A. Capital Costs (Continued)III. Transport/Communication3.1. Radio Equipment

	US \$/unit	Total (US \$)
5 VHF Portable	1,000	5,000
1 Office radio	10,000	10,000
Total Radio Equipment		15,000

3.2. Vehicles

2 Range Rover type 4 x 4 wd (including spare parts)	50,000
1 Truck 5/6 tons	30,000
1 crane truck 5 tons	45,000
Total Purchase of Vehicles	125,000

Total Transport/Communication **US\$ 140,000**

TOTAL CAPITAL COSTS

Compound Rehabilitation	181,600
Office Furniture/Equipment	11,270
Transport/Communication	140,000

TOTAL

US\$ 332,870

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NUGAL REGIONAL DEVELOPMENT COMMITTEE

DEPARTMENT OF PUBLIC WORKS

Budget of the Water Division

RUNNING COSTS

1 - SALARIES

	<u>No. of Staff</u>	<u>\$/Month</u>	<u>\$/Year</u>
1.1. <u>Management</u>			
Water Engineer	1	600	7,200
Administrator/Accountant	1	500	6,000
Secretary	1	400	4,800
Support Staff	1	200	2,400
Guards - day	2	200	4,800
- night	2	200	4,800
<u>Sub-total</u>	<u>8</u>	<u>2,500</u>	<u>30,000</u>
1.2. <u>Technical Staff</u>			
Mechanic	1	500	6,000
Electrician	1	500	6,000
Plumber	1	400	4,800
Welder	1	300	3,600
Assistant Mechanic	1	300	3,600
Assistant Electrician	1	300	3,600
<u>Sub-total</u>	<u>7</u>	<u>2,400</u>	<u>28,800</u>
1.3. <u>Drivers</u>	4	1,400	16,800
TOTAL			<u>72,000</u>

**Total salaries - US\$ 72,000 per year
(US\$ 600 per month)**

Note: Unit cost based on salary scale proposed in "concept paper" of the donor mission to Nugal Region (24-26 February 1994)

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NUGAL REGIONAL DEVELOPMENT COMMITTEE

DEPARTMENT OF PUBLIC WORKS

Budget of the Water Division

RUNNING COSTS

II -OFFICE EXPENSES

US\$ per year

2.1.	Stationery		
	Engineer	150 / month	
	Administrator/Secretary	200 / month	
	Workshops	100 / month	
	Stores	50 / month	
	Total	500 / month	6,000
2.2.	Maintenance		
	Cleaning products	200 / month	<u>2,400</u>
	Total		<u>8,400</u>

SOMALIA

NUGAL REGIONAL DEVELOPMENT COMMITTEE

DEPARTMENT OF PUBLIC WORKS

Budget of the Water Division

RUNNING COSTS

III - TRANSPORT OPERATING EXPENSES3.1 VehiclesFuel costa) Milage (in Kilometres)

Vehicle 1: 50 km/day, 17 l/100 km
1,500 km/month
18,000 km/year

Vehicle 2: 200 km/day, 35 l/100 km
6000 km/month
72,000 km/year

Truck: 200 km/day, 40 l/100 km
6000 km/month
72,000 km/year

Crane-truck: 100 km/day, 40 l/100 km
3000 km/month

US\$ per yearb) Cost of Fuel

Fuel cost: US\$ 0.5/ l

Vehicle 1: $18,000 \times \frac{17}{100} \times 0.5 =$ 1,530

Vehicle 2: $72,000 \times \frac{35}{100} \times 0.5 =$ 12,600

Vehicle 3: $72,000 \times \frac{40}{100} \times 0.5 =$ 14,400

Vehicle 4: $36,000 \times \frac{40}{100} \times 0.5 =$ 7,200

Total 4 vehicles **35,730**

III - TRANSPORT OPERATING EXPENSES (Continued)US\$ per year

c)	<u>Oil/Grease</u>	
	Estimated 10% of fuel	3,570
d)	<u>Parts and Repairs</u>	
	Vehicle (12% purchase cost)	6,000
	Trucks 1 (20% purchase cost)	6,000
	Trucks 2 (20% purchase cost)	9,000
	<u>Total parts/repairs</u>	<u>21,000</u>
e)	<u>Other Costs</u>	
	Insurance/registration	5,000

Summary vehicle operating costs

Fuel	35,720/year
Lubricants	3,570/year
Parts/repairs	21,000/year
Others	<u>5,000/year</u>

Total vehicle operation costs **65,290/year****3.2. Travel Expenses**

a)	<u>Local Missions</u>	
	Engineer (US\$20/day x 60)	1,200
	Technicians	
	mechanic, plumber (US\$15/day x 180)	2,800
	welder, electrician (US\$ 15/day x 120)	1,800
	Total	5,800

b)	<u>Missions Abroad</u>	
	2 air travel/year	2,000
	<u>Total Travel Missions</u>	<u>7,800</u>

TOTAL TRANSPORT AND TRAVEL

Vehicles Operating Costs	US\$ 65,300
Travel	US\$ 7,800
Total	<u>US\$ 73,100</u>

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NUGAL REGIONAL DEVELOPMENT COMMITTEE

DEPARTMENT OF PUBLIC WORKS

Budget of the Water Division

RUNNING COSTS

IV - WORKSHOPS CONSUMABLEUS\$ per year4.1. Spare parts

Mechanical	US\$ 1,800/month	14,400
Electrical	US\$ 500/month	6,000
Welding	US\$ 300/month	3,600
	Sub-Total	24,000

4.2. Fuel Workshop

5 lit/hour x 82 x 26 = 1040 lit/month		
1040 l x US\$ 0.5/litre =	US\$ 520/month	6,240

Total Workshop Consumable **US\$30,240**

TOTAL RUNNING COSTS (I + II + III + IV) US\$ 183,740 PER YEAR

SOMALIA

UNEP TECHNICAL MISSION

Water Supply Working Group

APPENDIX B

PROJECT DEFINITION AND COST

SOMALIA

NUGAL TECHNICAL MISSION

Water Supply Working Group

THE WATER RESOURCES PROJECT

A. Project Objectives

1. According to the terms of reference of the Technical Mission, the water consultants team should prepare a cost-viable programme of rehabilitation of existing ground and surface water sources. The programme should, as far as possible, consist of small scale and quick impact rehabilitation projects which will:

- ✓ - be built on local initiatives /
- maximise Somali participation in design and management
- improve the delivery of clean and safe water.

2. Since the livestock production is by far the primary activity of the Nugal Region, the mission investigations emphasized on the water requirements of the traditional grazing areas. In these areas, it appears that the main sources of water are now those provided by the private sector which consist mainly of shallow wells and barkedes (usually small concrete-covered reservoirs) collecting the rain water during the two annual rainy seasons. This private supply is obviously insufficient since it operates only during the rainy season. During the dry season, i.e. at least 6 months per year, the herds have to be sent in grazing areas, mainly the Nugal valley where the water resources are usually more abundant. This result, in many cases, in an excessive concentration of livestock which contribute to increase the risk of over grazing and soil depletion in some areas. Local population are aware of this problem and request now a more adequate distribution of water points. In addition, this dramatic increase of water demand for the few available wells contribute to a considerable increase of the price of water usually 5 to 6 times the price during the wet season. (25,000 to 30,000 ssh per 200 litres drum as opposed to 5000 ssh during the wet season)
3. The present shortage of water supply in the Nugal Region is to a large extent due to the lack of maintenance of public wells after the collapse of the former administration. One of the first priorities of the project will then be to staff and equip a small water division under the Director of Public Works. The Water Division will be responsible to control the execution of the rehabilitation works and then to provide, in association with the local communities adequate level of routine and periodic maintenance.

This assistance to the Water Division of the Department of Public Works should be considered as the first priority component of the project.

B. Project Planning

4. Given the present lack of project management capability in the sector, the proposed project has been designed to be implemented in 3 phases. The programme proposed corresponds to a 3 years revolving programme. (It will be revised at the end of each year and an additional year of budget will be added)

Phase 1

5. During this first phase of implementation which is expected to cover a period of about one year, only high priority rehabilitation actions will be undertaken. Among those actions the most urgent one is to provide a minimum of technical, financial and administrative capability to the newly created Water Division under the authority of the Director of Public Works.
6. During this period, the execution of simple and evident repair works of the public wells which do not require sophisticated technical investigations will also be undertaken in order:
- i) to improve the geographical distribution of water, in particular, during the dry season and reduce the excessive concentration of livestock in some grazing areas of the Nugal valley.
 - ii) to provide security of supply in major towns during the dry season and drought periods.
7. During this first years, the Water Division will start to collect data and start the engineering studies needed for the second phase year 2 of the project.

During this first phase, the Water Division will also identify suitable NGOs or local contractors to execute high priority but the simple ground water or surface water projects which do not require complementary hydrological surveys.

8. A highly qualified water engineer technical assistant will be provided as soon as possible for a period of three years to the Water Division of the Department of Public Works. During the first year of his mission, this expert will assist the Chief Water Engineer, head of the Water Division to set up the day-to-day administrative and operational framework of the Division. This technical assistant will liaise with the technical assistant team of the Department of Planning of the RDC in order to provide the team with all the necessary input for the preparation of a Water Sector Policy Paper for the Nugal Region.

Phase 2 (Year 2)

9. During this second phase, the programme of rehabilitation of rural water points will continue as well as the improvement of works of the major town water distribution system.

On the basis of the information already collected during the first year of the project, some preliminary proposals can be made concerning the location and technical characteristics of construction of new deep bores. Detailed engineering and economic and financial evaluation of these projects will be completed.

10. During this second year, preliminary studies on urban development and water requirement of the population of the main towns of the region will be undertaken.
11. The technical assistant in regional water management will liaise with the technical assistant teams of other sectors (planning, livestock, agriculture) for creating an adequate engineering data base using satellite imagery, aerial photography, maps and reports available on the water situation of the Nugal Region. This information combined with complementary specific surveys on population settlements, importance of the livestock population and its seasonal movement, identification of areas facing major soil erosion problems, etc. These studies and surveys should lead to the drafting of a preliminary land-use and water resources master-plan.

Phase 3 (Year 3)

12. During this third year of the planning period, the analysis concerning the preparation of the water master plan of the Nugal Region will be completed and the construction of new deep wells will be undertaken at adequate location. During this third year, the modernization of the water distribution system of the major cities of the region mainly Garowe, Eil, Burtinle and Dangoroyo might start, in line with the recommendations of the town water master plan.

C. Cost Estimates - Nugal Water Division

13. Detailed estimates of the project cost are presented in table annex 1. The total cost of the project for the three first years is estimated at US\$3.6 million of which:

9% or	US\$ 333,000 will be for the rehabilitation of the former water agency compound
2.9% or	US\$ 1,050,000 will be for studies and technical assistance to the Water Division.
61% or	US\$ 2,178,000 will be for the execution of rehabilitation and modernization works on the water supply system of the region.

The budget allocated for these rehabilitation works has been estimated as follows:

	US\$
<u>Immediate Rehabilitation of:</u>	
- Ground water supply fixtures	513,000
- Surface water works	<u>115,000</u>
Phase I (year 1/2)	628,000
<u>Rehabilitation of 10 new sites</u>	
- Phase II (year 2)	550,000
<u>Rehabilitation of the water supply system of towns</u>	
- Phase III (year 3)	1,000,000

(This cost estimate represents only the expenses of year 3, i.e. the beginning of the urban water programme which will be spread over a period of several years)

14. The envisaged schedule of disbursement for the rehabilitation works and the Regional Water Division creation but excluding investment at the District level, is summarized as follows:

Project Cost - Recapitulative Table
(US\$ 000)

	Disbursement			
	Total Cost	Year 1	Year 2	Year 3
<u>A. Creation Water Division</u>	333	333	-	-
<u>B. Technical Assistance Water Division</u>				
- Senior Water Engineer (3 years)	540	180	180	180
- Study 10 sites 7 men x months	105	105	-	-
- Study water master plan	180	-	90	90
- Tariff study	45	-	20	25
- Study town water system	<u>180</u>	<u>-</u>	<u>90</u>	<u>90</u>
Total	1,050	285	380	385
<u>C. Rehabilitation Works</u>				
- Ground water projects	513	384	129	-
- Surface water projects	115	44	71	-
- Rehabilitation 10 sites	550	-	250	300
- Cities distribution system	<u>1,000</u>	<u>-</u>	<u>-</u>	<u>1,000</u>
Total	2,178	428	450	1,300
TOTAL (A + B + C)	3,561	1,046	830	1,685

D. Districts Administration (as indicated in Appendix A paragraph 20 to 23)Scope of Works

15. In addition to the creation of the Water Division of the Regional Administration, some investments are needed for installing a small team of technicians, in the three districts of Burtinle, Dangoroyo and Eil, who will supervise the operation of public wells system of the district and proceed to routine maintenance operations. This team will operate under the District Development Committee in coordination with the Regional Water Division.
16. The technical staff of well inspectors and routine maintenance will collect information on the operation of each well and proceed to small routine maintenance works. The budget for these local units will then be extremely limited at least during the first three years; Except for Eil which dispose of more abundant water resources, a team of one technician and one assistant should be sufficient.

	Burtinle	Dangoroyo	Eil
<u>Staff</u>			
- Technician	1	1	2
- Assistant	1	1	2
<u>Equipment</u>			
- Vehicle 4 x 4 WD	1	1	1
- Tools kit	1	1	1
- Small workshop/Office Room	1	1	2

Costs

17. The total capital cost and running cost of these 3 small offices has been estimated as follows:

**Districts Water Administration Expenses
(US\$)**

	Burtinle	Dangoroyo	Eil	Total
A. <u>Equipment</u>				
Vehicles	25,000	25,000	25,000	75,000
Tools Kit	10,000	10,000	15,000	35,000
Workshops	15,000	15,000	20,000	50,000
Office	5,000	5,000	10,000	20,000
Radio	<u>2,000</u>	<u>2,000</u>	<u>2,000</u>	<u>6,000</u>
Total Equipment	57,000	57,000	72,000	186,000
B. <u>Annual Running Costs</u>				
<u>Staff</u>				
Technician	4,800	4,800	9,600	19,200
Assistant	3,600	3,600	7,200	14,400
<u>Maintenance Operations</u>				
Office operation cost	1,000	1,000	1,000	3,000
Vehicles	7,000	7,000	8,000	22,000
Consumable maintenance	<u>2,000</u>	<u>2,000</u>	<u>4,000</u>	<u>8,000</u>
Total running costs	10,000	10,000	13,000	33,000

18. The disbursement schedules assume that the priority should be the creation of the Regional Water Division and in a second phase the creation of the small District Unit. The schedule proposed is the following:

<u>Total Cost</u>	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>
US\$ 186,000	19,000	93,000	74,000
100%	10%	50%	40%

E. Overall Cost

19. The total investment cost for the reconstitution of the maintenance capacity of the public wells system plus the high priority works of rehabilitation of the existing wells is estimated at about US\$ 2.8 million for the three first years of operations of the Nugal Water Division. US\$ 2.8 million will be for rehabilitation works and reconstitution of the administrative capacity of the Water Division.

In addition, about US\$ 1.1 million will be necessary for providing technical assistance to the Nugal Water Division for starting its operation, implementing the rehabilitation programme and initiating and supervising the studies needed for the management of the sector.

Total Investment Costs
(Regional Water Division and Districts Administration)
(US\$ 000)

Expenses	Total Cost	Disbursement		
		Year 1	Year 2	Year 3
1. Creation - Regional Water Division	333	333		
2. Equipment - District Units	<u>186</u>	<u>19</u>	<u>93</u>	<u>74</u>
Total - Creation Administration	519	352	93	74
3. Rehabilitation Works	2,321	528	493	1,300
Total Investment (1+2+3)	2,840	880	586	1,374
4. Technical Assistance - Studies	1,050	180	485	385
TOTAL COST (1 + 2 + 3 + 4)	3,890	1,060	1,071	1,759

SOMALIA

NUGAL TECHNICAL MISSION

Water Supply Working Group

 REGIONAL PROJECT COST AND DISBURSEMENT SCHEDULE
 (000 US\$)

EXPENSES	TOTAL COST	YEAR 1	YEAR 2	YEAR 3
<u>A. Creation Water Division</u>	333	333	-	-
<u>B. Technical Assistance Water Division - Studies</u>				
- Senior Water Engineer (3 years)	540	180	180	180
- Study 10 sites (7 man x months)	105	-	105	-
- Study water master plan	180	-	90	90
- Tariff Study	45	-	20	25
- Study town water system	<u>180</u>	-	<u>90</u>	<u>90</u>
Sub - total	1,050	180	485	385
<u>C. Rehabilitation works</u>				
- Ground water projects	656	484	172	-
- Surface water projects	115	44	71	-
- Rehabilitation 10 sites	550	-	250	300
- Cities distribution system	<u>1,000</u>	-	-	<u>1,000</u>
Sub - total	2,321	528	493	<u>1,300</u>
<u>TOTAL (A + B + C)</u>	<u>3,704</u>	<u>1,041</u>	<u>978</u>	<u>1,685</u>

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NUGAL TECHNICAL MISSION

Water Supply Working Group

REGIONAL PROJECT COST AND DISBURSEMENT SCHEDULE (US \$)
Preliminary Estimates

NATURE OF EXPENDITURE	TOTAL COST	YEAR 1	YEAR 2	YEAR 3	COMMENTS
PHASE I					
I. <u>Water Division Creation</u>					
Offices, workshops rehabilitation,	182,000	182,000			First Priority Operation set up a small water division to coordinate rehabilitation actions in the public water supply system.
Office furniture, equipment, Vehicles	11,000	11,000			
Radio, telecom.	125,000	125,000			
	<u>15,000</u>	<u>15,000</u>			
Total I	333,000	333,000			
II. <u>Technical Assistance Study</u>					
3 years senior water engineer (US\$ 15,000 per month)	540,000	180,000	180,000	180,000	First priority T/A programme

NATURE OF EXPENDITURE	TOTAL COST	YEAR 1	YEAR 2	YEAR 3	COMMENTS
PHASE I (Continued)					
III. Rehabilitation Works (I)					
3.1. Ground Water Projects					
1. Deep Well drilling					
- Garowe (150 m)	220,000	130,000	90,000		Works which do not need special studies and surveys
- Burtinle (300 m)	134,000	134,000			
- Dangorayo (300 m)	<u>77,000</u>	<u>30,000</u>	<u>47,000</u>		
	431,000	294,000	137,000		
2. Repairs existing boreholes					
- Garowe	30,000	30,000			Immediate repair works
- Burtinle	40,000	40,000			
- Dangorayo	30,000	30,000			
- Sunijif	25,000	25,000	25,000		
- Awarculus	25,000				
- Kalogawsomadaw	10,000	10,000			
- Gode Jiran	<u>10,000</u>	<u>135,000</u>	<u>10,000</u>		
	170,000		35,000		
3. Infiltration Gallery					
- Xamur	15,000	15,000			Need some additional field survey

NATURE OF EXPENDITURE	TOTAL COST	YEAR 1	YEAR 2	YEAR 3	COMMENTS
PHASE 1 (Continued)					
4. <u>Miscell. Repairs</u>	15,000	15,000			
- Eil /basin, power generator, pipes		25,000			
- Eil/Boday cleaning well, pumping system, cover	40,000	40,000			Immediate repair work
Sub-Total {3.1. (1+2+3+4)}	656,000	484,000	172,000		

NATURE OF EXPENDITURE	TOTAL COST	YEAR I	YEAR 2	YEAR 3	COMMENTS
<u>3.2. Surface Water Project</u>					
<u>5. Deepening existing Wharo's</u>					
- Usgure	10,000		10,000		Easy deepening works
- Hesbele	10,000	10,000			
- Awerculus	10,000	10,000	10,000 20,000		
<u>6. Construction new Wharo's</u>					
- Kalabeyer	17,000		17,000		Some field survey need for optimal creation of the Wharo's
- Budinbuto	17,000	17,000			
- Recbenti	17,000	17,000	17,000		
- Querxis	17,000	17,000	17,000		
- Others	17,000	34,000	51,000		
	85,000				
Sub-Total {3.2 (5+6)}	115,000	44,000	71,000		
Total III (3.1. + 3.2.)	771,000	528,000	243,000		
TOTAL PHASE I (I + II + III)	1,644,000	1,041,000	423,000	180,000	

NATURE OF EXPENDITURE	TOTAL COST	YEAR 1	YEAR 2	YEAR 3	COMMENTS
PHASE II					
IV. <u>Deep Wells</u>					
4.1. <u>Studies of 10 sites</u>					
- Magacley, Usgure					
- Kalabeyer, Xamur (well)					
- Bedinbuto, Reebenti					
- Querxis, Wargarduud					Studies should start year 1
Sub - total	105,000		105,000		
4.2. <u>Works Execution</u>					
- New wells drilling (5 sites)	400,000		200,000	200,000	Execution of works spread during year 2 and 3
- Rehabilitation (5 sites)	<u>150,000</u>		<u>50,000</u>	<u>100,000</u>	
Sub - total	550,000		250,000	300,000	
Sub-Total {IV (4.1 + 4.2)}	655,000		355,000	300,000	

NATURE OF EXPENDITURE	TOTAL COST	YEAR I	YEAR 2	YEAR 3	COMMENTS
PHASE II (continued)					
<u>V. Preparation Nugal Region Land Use/Water Master Plan</u>					
Contribution Water Division 12 men x months at US\$15,000/month	180,000		90,000	90,000	Important Works. should be coordinated with land use survey at North East Region level.
<u>VI. Tariff Study</u>					
3 men x months at US\$ 15,000/month	45,000		20,000	25,000	To be undertaken in association with T/A team of the department of planning
<u>VII. Study of Towns Water Supply</u>					
Garowe, Burtinle, Dangorayo, Eil 12 men x months at US\$ 15,000/month	180,000		90,000	90,000	T/A Study
Sub-Total (V + VI + VII)	405,000		200,000	205,000	
TOTAL PHASE II (IV to VII)	1,060,000		555,000	505,000	

NATURE OF EXPENDITURE	TOTAL COST	YEAR 1	YEAR 2	YEAR 3	COMMENTS
PHASE III VIII. Modernization Towns Water Supply (Garowe, Burtinle, Dangorayo) Eil Water Supply Modernization	 500,000 500,000			500,000 500,000	Beginning of implementation of the modernization of the main towns water distribution network
TOTAL PHASE III	1,000,000			1,000,000	
GRAND TOTAL (PHASE I + II + III)	3,704,000	1,041,000	978,000	1,685,000	

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NUGAL TECHNICAL MISSION
Water Supply Working Group

Districts Water Administration Expenses
(US\$)

	Burtinle	Dangoroyo	Eil	Total
A. <u>Equipment</u>				
Vehicles	25,000	25,000	25,000	75,000
Tools Kit	10,000	10,000	15,000	35,000
Workshops	15,000	15,000	20,000	50,000
Office	5,000	5,000	10,000	20,000
Radio	<u>2,000</u>	<u>2,000</u>	<u>2,000</u>	<u>6,000</u>
Total Equipment	57,000	57,000	72,000	186,000
B. <u>Annual Running Costs</u>				
<u>Staff</u>				
Technician	4,800	4,800	9,600	19,200
Assistant	3,600	3,600	7,200	14,400
<u>Maintenance Operations</u>				
Office operation cost	1,000	1,000	1,000	3,000
Vehicles	7,000	7,000	8,000	22,000
Consumable maintenance	<u>2,000</u>	<u>2,000</u>	<u>4,000</u>	<u>8,000</u>
Total running costs	10,000	10,000	13,000	33,000

Investment Disbursement Schedule

<u>Total Cost</u>	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>
US\$ 186,000	19,000	93,000	74,000
100%	10%	50%	40%

SOMALIA

NUGAL TECHNICAL MISSION

Water Supply Working Group

Total Investment Costs
For The Regional and Districts Administrations
(US\$ 000)

Expenses	Total Cost	Disbursement		
		Year 1	Year 2	Year 3
1. Creation - Regional Water Division	333	333		
2. Equipment - District Units	<u>186</u>	<u>19</u>	<u>93</u>	<u>74</u>
Total - Creation Administration	519	352	93	74
3. Rehabilitation Works	2,321	528	493	1,300
Total Investment (1+2+3)	2,840	880	586	1,374
4. Technical Assistance - Studies	1,050	180	485	385
TOTAL COST (1 + 2 + 3 + 4)	3,890	1,060	1,071	1,759

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Water Supply Working Group

APPENDIX C

JOB QUALIFICATIONS

- **Staff of the Water Division**
- **Technical Assistant**

SOMALIA
NUGAL TECHNICAL MISSION
Water Supply Working Group

REGIONAL DEVELOPMENT COMMITTEE

WATER DIVISION

INDICATIVE JOB DESCRIPTION

Senior Water Management Engineer (Head of the Water Division)

A. Qualifications

1. The Water Management Engineer should be a qualified professional civil engineer with 10-15 years experience in management of water, of which at least 5 years have been with a public water authority. He should have suitable experience in managing the affairs of a parastatal organization providing a service at a regional level. Experience in the management of water projects in Somalia, and in working with international financing agencies would be appreciated. Fluency in written and spoken English and the ability to communicate ideas easily is required.

B. Duties

The Water Management Engineer, as Head of the Water Division, will report to the Director of Public Works for all matters concerning the water sector. He will assist and advise him on all aspects of the management of the water sector including but not limited to:

- a) reviewing the duties and responsibilities of the Water Division staff, and recommending and where agreed, implementing management systems and procedures and preparing training schemes.
- b) reviewing with the assistance of the Water Management Advisor, the organizational structure of the Water Division including statutes, role and composition as well as linkages with other local and regional authorities.
- c) formulate and institutional, operational and investment measures in view to strengthen the reliability and efficiency of the Division.

- d) evaluate and select the most appropriate hardware/software option for the various accounting, billing operations, and the recovery of water users fees.
- e) define the most appropriate procedures for forecasting capital requirements, investment plans, and cash of the Water Division and to strengthen its financial analysis capabilities. Review all proposals and studies related to the Water Sector of the Nugal Region.
- f) define the financial management information needs of the Division and its reporting requirements. Define performance indicators for monitoring the financial performance of the Division.
- g) analyse annual financial requirements of the Division including tariff adjustments to meet stipulated performance parameters.
- h) establish an inventory of all existing records, maps and other data on the water supply of the region. Initiate additional surveys and investigations for preparing updated inventories for the water supply system of the Nugal Region.
- i) identifying for each district the type and amount of work required for adequate maintenance. Translating such works into specific tasks in terms of routine/periodic maintenance. Define a plan of action to implement routine and periodic maintenance of public wells and water supply systems.
- j) develop maintenance cost and budgets.
- k) establish performance standards and work procedure for the Division staff and contractors' works, including the use of labour intensive methods wherever technically and economically feasible.
- l) directing and controlling the deployment of equipment and vehicle fleet to areas of operations. Control the use of these equipment.
- m) instruct maintenance personnel in proper work execution and how the required standards of maintenance can be achieved.
- n) with the Regional Water Manager advisor (Technical Assistance Programme) initiate the collection of basic information needed for the preparation of a long-term land use/water supply development plan of the Nugal Region. Coordinate this action with neighbouring region of North Eastern Somalia.
- o) reviewing and updating, with external assistance if needed the existing legislation on water supply and water quality controls.

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NUGAL TECHNICAL MISSION
Water Supply Working Group

REGIONAL DEVELOPMENT COMMITTEE

WATER DIVISION

INDICATIVE JOB DESCRIPTION

Administrator/Accountant

A. Qualifications

The Administrator should be a qualified professional accountant with 5-10 years of experience of which at least 5 years have been with a public water authority. He should have suitable experience in managing the accounts of a parastatal organization providing a service to a population of the size of the Nugal Region. Fluency in written and spoken English and the ability to communicate ideas easily are also required.

B. Duties

The Administrator on administrative and financial matters will report to the Chief Engineer, Head of the Water Division, and to the Director of the Public Works of the Nugal Region. He will advise and assist these executives in all aspects of the implementation of accounting and financial control procedures to be applied in the division and their coordination with the other divisions of the Department of Public Works.

Accounting

- a) proceed to periodic surveying of the Water Division assets and inventories, making necessary write-downs and write-offs of the existing assets register. Evaluate the actual monetary value of assets of the Division to be used for financial statements.

- b) define, eventually with external assistance, adequate accounting practices. In particular, define appropriate procedures and account classifications to be used in financial accounting system and financial statement preparation. Implement new system including necessary training of administrative staff of the Water Division.
- c) define adequate procedures of inventory management and control for both the administrative and workshop supplies.
- d) recommend and implement adequate procurement procedures for rapid purchase approval.
- e) recommend and implement procedures to ensure accurate accounting and evaluation for maintenance planning and for the corresponding of financial statement preparation.
- f) evaluate fixed assets and define appropriate and adequate method of revaluation of fixed assets in the Division's financial statements. Liaise on this matters with other departments of the RDC.
- g) provide training to the administrative clerk(s) of the Water Division.
- h) review data processing requirements, including the introduction of appropriate hardware and software systems which are needed for administrative and financial staff.
- i) define, in coordination with other services of the RDC, adequate internal auditing procedures of the Water Division. Implementing these recommended procedures and practices.
- j) recommend and implement, in coordination with other financial departments of the RDC, adequate procedures to ensure billing of all customers of the public water supply system.
- k) recommend procedures designed to expedite collection time and limit level of arrears for both private and public sector customers. Implement these procedures in agreement with the regional and local authorities.

Administrative Management

In coordination with other departments of the RDC, the Administrator of the Water Division will:

- a) conduct a manpower needs assessment for implementation of maintenance operations of the Division and its financial management. He will write job descriptions and assist in local hiring.

- b) identify and evaluate the existing resources of qualified Somali staff with a solid technical, engineering, managerial and financial background which are available in the region or overseas who would be interested in joining the Water Division or any other service of the new RDC.
- c) evaluate these candidates and possible local recruits, proposing the most suitable to the various RDC services. Evaluate their training needs and support them with advice for joining the small but qualified RDC administrative task force.

SOMALIA
NUGAL TECHNICAL MISSION
Water Supply Working Group

REGIONAL DEVELOPMENT COMMITTEE
WATER DIVISION

INDICATIVE JOB DESCRIPTION

Mechanical Technician

A. Qualifications

The Mechanical Technician should be a qualified professional with 10-15 years of experience, of which at least 5 years have been with a public water authority serving a population of the size of the Nugal Region. He should have suitable experience in managing the operation and maintenance of mechanical systems. Experience in implementing both Somali and externally funded water development projects will be appreciated. Fluency in both written and spoken English and Somali, and the ability to communicate ideas easily is also required.

B. Duties

The Mechanical Technician will report to the Chief Engineer (Head of the Nugal Water Division). He will advise and assist the districts and local authorities (committee of elders) with all aspects of the maintenance and operations of mechanical equipment including but not limited to the following:

- a) day-to-day operation of stationary diesel engines, pumps, construction machinery and vehicles.
- b) organizing central and field mechanical workshops for maintenance purpose.
- c) prepare and introduce a schedule of preventive maintenance for all mechanical equipment, machinery and vehicles.
- d) manage, under the control of the Administrator and the Chief Engineer, the

stock of spare parts of the Division and, if necessary, field stores of spare parts and tools.

- e) provide operational manuals and instructions, to the technicians of the districts, as necessary.
- f) provide on-the-job training for personnel at all levels in operational maintenance, safety regulations and management of mechanical equipment at the district level and eventually to other technical services of the Department of Public Works.
- g) review, in cooperation with the Water Division management, the fuel consumption records and run an adequate inventory control system.

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NUGAL TECHNICAL MISSION
Water Supply Working Group

REGIONAL DEVELOPMENT COMMITTEE
WATER DIVISION

INDICATIVE JOB DESCRIPTION

Electrical Technician

A. Qualifications

The Electrical Technician should be a qualified professional with 10-15 years of experience, of which at least 5 years have been with a public authority serving a population of the size of the Nugal Region. He should have suitable experience in managing the operation and maintenance of electrical systems. Experience in the implementation of development projects will be appreciated. Fluency in written and spoken both English and Somali, and the ability to communicate ideas easily is required.

B. Duties

The Electrical Technician will report to the Chief Engineer (Head of the Water Division). He will advise and assist the technical staff of the districts and local authorities, on all aspects of the operations and maintenance of electrical equipment including but not limited to the following:

- a) day-to-day operation of generators, water pumps, electric motors and instrumentation.
- b) organize central and field electrical small workshops for maintenance purposes.
- c) prepare and introduce a schedule of preventive maintenance for electrical equipment and instrumentation.

- d) assist management in preparation of a list of spare parts, organizing central and small field stores for spare parts and tools.
- e) communicate operational manuals and instructions, as necessary, to the fields technicians of the districts and other local authorities.
- f) provide on-the-job training for field personnel at all levels in operation, maintenance, safety regulations and management of electrical equipment.
- g) review, in cooperation with the management, consumption records and advise the management in introducing adequate inventory control systems.

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NUGAL TECHNICAL MISSION

Water Supply Working Group

REGIONAL DEVELOPMENT COMMITTEE

WATER DIVISION

OUTLINE JOB DESCRIPTION

Technical Assistant Regional Water Management Advisor

A. Background

1. The former Nugal Region Water Agency was operating under the Water Development Agency, an autonomous agency, overseen by the Ministry of Water and Mineral Resources. With the fall of the S. Barre Regime, most of the senior staff of the Agency left the region and since this date, the public wells network has been left totally unmaintained. In many places, pumps and power engines have been looted.

The present amount of water supplied to livestock is totally inadequate in most areas in particular during the dry season. This shortage has been accentuated with the diversion towards the more peaceful Nugal Region of important nomadic herds avoiding neighbouring regions plagued by the civil war.

2. The same phenomenal was also observed for human consumption since a considerable number of families running away from unsecured cities or regions decided to settle in Nugal. The number of these displaced people is not known, but in certain areas it contributes to double the size of the resident population. This resulted in a dramatic change in the pattern of water consumption of the region, since both human settlement and herds, looking for water tend to concentrate, mainly in the dry season, around the few water wells and resources available. In some areas this contributed to accentuate the already apparent overgrazing phenomena. In the long term, if the present situation is maintained it will inevitably contribute to create serious environmental problems which will affect the major economical asset of the region i.e. its livestock.

B. Objectives of the T/A Mission

3. The Regional Council of the Nugal Region has created, recently, under the Department of Public Works a new Water Division.

This Division will need, for at least the next three years, the assistance of a qualified water manager consultant, who will:

- a) advise on the daily organization of the works of the Division.
- b) help the Regional Development Committee to define, more clearly, the nature of the relationship of this new service with - upstream the political authorities in particular the Regional Council and - downstream the District Development Committee.
- c) assist the technical services of the Water Division to undertake or supervise the detail engineering, design, cost estimates, economic and financial evaluation, and preparation of bid documents for the most important rehabilitation works which will be supervised by the Water Division.
- d) The Technical Assistant of the Water Division will also help to reconstitute, with the help of short term consultant, the bank of data available on the sector on meteorology, physiology, stratigraphy, hydrology, hydrogeology and water quality. In relation with the Planning Department, he will review and up-date the data available on the urban development of the new towns of the region, the rural population growth and water demand projections by main grazing areas in order to provide adequate information for the preparation of the long term land used/water supply development plan of the Nugal Region.

C. Scope of Work

4. The Technical Assistant will include but not necessarily be limited to the following and in his work programme proposal, the Regional Water Management Advisor shall indicate the sequence and timing of carrying out the tasks.

The Technical Assistant will:

- a) review and update the population forecast and water demand projections for the Nugal Region, by districts, major towns and supply zones, and by consumer categories (i.e. residential, institutional, commercial, industrial) for cities and by economic activities (livestock, fishing and farming).
- b) review and analyze the design proposals for the rehabilitation work extensions works envisaged for both the public and private supply system. Submit final proposals for consideration and approval by the regional authority.
- c) review the water distribution network of main towns of the Nugal Region and

submit proposals for the distribution network extension. The proposal shall also take into consideration the recent trend(s) in the major towns' urban development, the physical conditions of the existing distribution network, and additional capacity offered by rehabilitation works, as required.

- d) review and assess the water quality of major population settlement. Assess the need of chlorination devices and equipment at the sources works and in the urban systems. Prepare proposals for improving the water quality in urban areas, as necessary.
 - e) establish information on the production and operating cost of the existing wells and for the distribution network of major towns.
 - f) prepare detailed design and cost estimate of a proposed radio-telecommunication system between the wells fields and mobile units, and the Water Division office.
 - g) supervise the preparation of bid documents for the contract. The bid documents will be prepared in accordance with the procurement guidelines of the prospective funding agencies.
5. In addition to tasks (a) through to (g) listed above, the Technical Assistant shall assist the Water Division in the Nugal Region to prepare proposals for the provision of the following services:
- h) review the availability of existing maps covering geological, hydrological, physiological and stratigraphical features of the region. He will assist the Division chief to prepare proposals and cost estimates of additional aerial , as required. He will liaise with the water authorities of the other regions of North Eastern Somalia.
 - i) the consultant shall prepare a field survey to be carried out by the Water Division staff for the establishment of a bank of data on the characteristics and conditions of utilization of each well and spring of the region. These tasks should be carried out as early as possible under this TOR.
 - j) the consultant shall draft proposals for a water quality study of the water produced in major towns and population settlement in rural areas. The proposals shall also include recommendation for the creation of a water quality laboratory for the North Eastern Region and prepare detailed designs for this facility (including building, furnishing and laboratory equipment).
 - k) the Technical Assistant shall collect from the various sources of information available, an estimate of the costs of each type of operation (routine maintenance, periodic maintenance, rehabilitation actions, reconstruction and new investments). These cost will be updated periodically to reflect the economic environment of the Nugal Region.

For each new rehabilitation and investment operation in the sector, the technical assistant shall carry out detailed economic analysis of the proposed project with the object of identifying the least cost solution. The analysis shall provide an estimate of the relevant marginal cost of water, its affordability and the social and health benefits of the envisaged project.

- l) for each major water project of the region, the Technical Assistant shall undertake an analysis of the environmental impact of the proposed project and recommend countermeasures therefore.
- m) for each project, the Technical Assistant shall prepare a financial analysis to assess viability of the proposed project. The analysis shall include alternative proposals for the financing of the project. The analysis shall estimate the related tariff levels to achieve various degrees of cost recovery from the beneficiaries of the project. It will assess the impact of the proposed cost recovery policy on the revenues of the Water Division.

D. Contribution to Sectoral Planning

6. The Water Technical Assistant will coordinate with the Technical Assistant Team in charge of the preparation of the economic and social rehabilitation plan of the Nugal Region, under the Department of Planning, in particular.

The Water Technical Assistant and the Water chief Engineer (Head of the Water Division) will provide to this planning, programming unit an analysis of the present situation of the water sector, review development options and develop a preliminary draft policy framework for short and medium term sections. This draft policy framework will cover the following areas:

- the aims of the Nugal Region Government for the water sector, including, in particular, the provision on water supply in already overgrazed areas.
- the methods of regulation of the presentation of the livestock in overgrazed areas during the dry season.
- financial objectives and resource mobilization strategies for the Water Division.
- pricing policies and monitoring water consumer charges for the public water supply network.
- the adoption of institutional structures to the effective achievement of sector goals.
- development of manpower and training policies.

- coordinate the cost recovery general policy of the Water Division with those of other sectors.

E. Water Tariff Study

7. In collaboration with the technical assistant team for the Department of Planning, the Water Management expert will also propose principles and procedures to guide formulation and implementation of appropriate tariff levels and structures, recommend changes as appropriate.

The analysis will cover the following area:

- a) description and analysis of the former water tariff structure implemented under the former administration, its evolution after the collapse of the central government , and the present tariffs structure.
- b) data collection on the economic and financial costs and benefits of the different services offered by the existing water supply facilities including a full analysis of the consumers characteristics, in particular, livestock, the pattern of the available facilities, the seasonality and trends observed in the consumption pattern.
- c) tariff formulation on the basis of available data and selected methodology.
- d) determine appropriate pricing methodology to adopt and propose adequate user charges levels for the provision of water of the public owned water points.
- e) identify further data collection necessary to allow the Water Division to continue to refine the formulations proposed and identify how this might be done.
- f) determine an appropriate tariff review process and a procedure coherent with that one recommended for other public services.

F. Reporting

8. The reporting requirements by the technical assistant shall include, but not necessarily limited to:
 - a) Preliminary Work Programme Report
 - b) Quarterly Progress Reports
 - c) Ad hoc Reports such as those presenting project proposals for the Water Division and also economic and financial analyses of the projects with all necessary engineering designs and computations.

- d) A mission final consolidated report, to be submitted within two months after the end of the mission of the Technical Assistant.

G. Facilities to be Provided by the Regional Administration

9. The Nugal Regional Development Committee shall provide to the technical assistant all available information and reports needed for the execution of its mission and will assign suitable counterparts to work with him.

The Regional Government shall also provide to the technical assistant the necessary office space, office supplies, as well as secretarial and clerical services. The funding agency, however, will make its own arrangements for living accommodation, local transportation and the provision of office furniture and equipment needed by the technical assistant. This furniture, equipment and transportation vehicle will remain the property of the Nugal Water Division at the end of the mission of the technical assistant.

H. Regional Administration Reporting

10. The Water Division of the Department of Public Works shall submit to the Chairman of the Nugal Regional Development Committee quarterly reports within 15 days of the end of the quarter giving a statement of the work performed and its results. This report will include a detailed account of the project progress including supporting table illustrating the project expenditure to date and cost of the project to complete. The report will include if needed, the latest conclusions and recommendations concerning the execution of the project.

SOMALIA

NUGAL TECHNICAL MISSION

Water Supply Working Group

APPENDIX D

PROJECT COST RECOVERY - SUSTAINABILITY

SOMALIA
NUGAL TECHNICAL MISSION
Water Supply Working Group

REGIONAL DEVELOPMENT COMMITTEE
WATER DIVISION
COST RECOVERY - SUSTAINABILITY

A. COST RECOVERY

I. Main issues

1.1. Overgrazing

1. Under the emergency situation prevailing in most parts of Somalia during the last three years the assistance of the international community focused mainly on humanitarian relief actions in regions devastated by the civil war. As the Nugal Region benefitted acceptable security conditions, it did not attract particular attention from the donor community. However these good security conditions incited an important number of displaced people, fleeing away from insecure regions, to come and settle in the Nugal Region. A large part of this displaced families moved with their livestock contributing to the increase in pasture demand even in grazing areas which were already over-exploited.
2. Insecurity in the ports of Mogadishu and Kismayu and their periodic closure has also contributed to redirect flows of livestock destined to the crucial Gulf States export market, in the northern regions near the ports of Berbera and Bosasso. During the dry season, this increased livestock population is concentrated around the limited number of water points available in the region, contributing therefore to increase the already excessive imbalance between limited grazing resources of the region and an increased demand for foliage and water. In some cases, this imbalance can have negative impact on the animal health since it can reduce its resistance to disease. This has already lead to suspicion on the health of the Somali livestock in some traditional importing countries of the Gulf. This deficiency in water resources and concentration of livestock has also a negative impact on the economic and financial profitability of the livestock sub-sector since it contributes to increase the price of water but also decrease the livestock price.

SOMALIA

NUGAL TECHNICAL MISSION

Water Supply Working Group

REGIONAL DEVELOPMENT COMMITTEE

WATER DIVISION

COST RECOVERY - SUSTAINABILITY

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1.2. Decrease of Livestock Price

3. Prices of animals usually decrease sharply in an area which register high concentration i.e. high supply of animals. This is a general trend in Somalia but it can contribute to increase the important fluctuations of the prices already registered, in particular, when exports rise as the Haj season approaches.

1.3 Deficient public water supply system

4. Since the collapse of the former administration, no agency is now responsible for the maintenance and management of the public wells network of the Nugal Region. In some cases, public wells have been simply confiscated by private interests, in others, they are operated by groups of owners of private barkads with the approval of the representatives of the local community but in most cases, the equipment of public wells has been looted or left without maintenance. This lack of attention has contributed to the decay of the public wells supply system which, anyway had never benefitted from adequate maintenance under the Siaad Barre regime.
5. Since most of the public water supply systems of the region of Nugal are out of order, a large part of the consumption of water is supplied by the owners of private wells and barkads or by truckers who supply water to villages where perennial wells are not available. Since these resources are also limited the price of water vary considerably since it reflects the adjustment between a demand for both human livestock consumption, which increase during the dry season and resources that decrease progressively since a large part of the water sold comes from rain-fed reservoirs (barkads, wharos or shallow togga wells) which dried up progressively during the dry season. Livestock has then to concentrate around the few perennial wells available in the region increasing the overgrazing problem of the region. and the price of water around the available wells.
6. Under the former administration a large part of the water available at the public wells was delivered free. Some water charges might occasionally be collected but they represented usually a limited expenses since the water supply system in particular investment and maintenance expenses was financed by the administration or projects financed by the international community but at highly concession terms. However, the absence of adequate revenues from sales of water at the public wells lead to poor periodic maintenance and frequently to a rapid decay of the public wells. After the fall of the former administration, large herders realised investments in the sector, in drilling private wells, but more frequently in constructing private barkads. Since this was an absolute necessity for the good health of the livestock and might also be a profitable business in particular during the early months of the dry season when water is becoming scarce and prices are rising up sharply.

At present, an important part of the water sold during the dry season is sold by the private owners of wells and barkads or by the water truckers of Garowe and Eil but at prices significantly higher than before.

1.4. Water high salinity

7. For large areas of the Nugal region, the poor quality of water in particular, its high salinity is also a problem. One of the major cause of this high water salinity is the presence of evaporitic rocks such as gypsum anhydride and gypsiferous limestone covering part of the region. In arid or semi-arid regions such as the Nugal region, the population have usually no choice but to accept the available water with high salt content. While local population and livestock are used to drinking high salinity water, the displaced population originating from Mogadishu or the Juba and Shebelle valleys, who are used to drinking good water, react very unfavourably to this water of marginal quality. The high salinity of some wells in the Nugal region represents a hazard to man and livestock. A fair cost recovery policy should take in to consideration the quality of water in fixing water price.

Possible short-term actions

8. It is recommended that some kind of water quality standards be established for the region (as well as for neighbouring regions of north eastern Somalia with similar characteristics) and that local population should be helped to differentiate on the correct use of water for various purposes (drinking, washing, human consumption, livestock consumption) according to the level of salt content. Some existing boreholes yielding high salt contents might eventually be abandoned.
9. / Some appropriate technology such as the mixture of distilled water with existing salted water can be a solution for villages where small solar distillation installation can be envisaged for human consumption and possibly/ for animals (cows) which do not support high salt content.

1.5. Water pollution

10. Some users, in particular well educated displaced women from Mogadishu or other urban areas, are more exigent on the quality of water than traditional *pastoral or semi-pastoral consumers of the Nugal region*. These new residents are increasingly reluctant to pay high prices for polluted water. Despite this new exigence, the mission observed also that in many villages of the Nugal region, water is seriously polluted (Garowe, Eil, Baday, Burtinle and most of the water store in barkads is improper to human consumption). One of the first actions of the new Regional Water Division should be to undertake an exhaustive survey of the quality of the water supplied for human consumption in each village and undertake the necessary sanitary operation (cleaning of wells and chlorination of reservoirs suppression of nearby latrines). This action has already started in the city of Garowe with the assistance of local and international NGOs but should be extended to all villages. Permanent control of the water pollution should be established.

11. The problem of water quality in the Nugal region has never been seriously addressed by the former administration. The control of water salinity and its improvement was never included in a law or government policy. In the present context of rationing of water points and utilization of any source of water available is it urgent to set up a coherent water supply master plan which will address not only the increase of water supply but also the improvement of the quality of water in particular for human consumption. In addition, as already mentioned, a policy of dispersion of wells coherent with the resources of the grazing areas should be established and should be one of the first priority action of the new Regional Water Division.

1.6. Seasonality of demand

12. The purchase of water vary considerably between the wet and dry seasons.
- i) During a normal rainy season, like the last two rainy seasons, surface water was abundant in toggas, in natural underground reservoirs and other natural water points and the need for the purchase of water was limited. In addition, the drinking frequency at wells and barkads of animals is lower during the wet season than in the dry season. From interviews with villagers, it can be estimated that percentage of water paid by the herder-families during the wet season represents between 10 to 30% of the water consumed. For the calculation of the level of water expenses, we have assumed that in average, only 15% of the water consumed is purchased during the wet season. This percentage is probably very conservative for small herders who do not own private wells or barkads but may represent a correct estimate for medium sized herders of the villages visited, since a majority of them owned water supply facilities or can manage to have free access to these facilities.
 - ii) During the dry season, the situation is different since all private rain-fed reservoirs (barkads) progressively dried-up and consequently the price of water increased sharply. Except in the case of villages which benefit from perennial wells, a large part of villages of the Nugal region cannot supply adequate water. The herder families have to immigrate temporarily to areas where water is still available usually in the Nugal valley and along the togga Nugal in the region of Eil. However, the demand for water in these areas of high concentration of livestock is such that the price of water of these grazing areas increased also considerably during this transhumance period. Usually only the members of the families who cannot migrate remain in the villages. This included persons who keep the property or who are able to pay for the high price asked by the water truckers of Garowe and Eil. But usually because of this high price the consumption of water during this period is reduced to the strictest minimum (about 10 to 15 litres/capita/day for human consumption).

1.7. Transhumance

13. Even in the Nugal valley and hill region where water is more abundant, water is not free and owners of private wells usually sell their water at a price significantly higher than during the wet season. In some cases, public wells, familial or clan arrangements, some water can be offered free but in general it is estimated that about half of the transhumant households have to pay for their water.

1.8. High Water Price

14. The reduction for water supply in recent years has contributed to the increase of its price. This can affect the profitability of cattle raising. While the price of water is usually considered acceptable during the wet season, i.e. about Ssh5000/drum of 200 litres (Ssh 25000/m³ or US\$ 5/m³) at the end of the dry season the average price of water made available by private owners of wells easily reaches Ssh 25000 per drum, i.e. Ssh 125,000/m³ or US\$ 25/m³.

This high price incited sometimes entire villages to migrate to areas which benefit better water supply but in most cases, the water available in these new grazing areas is not free and the purchase of water for the livestock in some case represent an important expense for the herder family, particularly for the small herders.

15. Available studies on household budgets of livestock owners, indicate that most of the small herd owners are continuously in debt. Due to the limited size of and the structure of their herd, they are not in a position to plan livestock sales and purchase in a rational way in order to maximize commercial operations of their herd. Sales are frequently made on a contingency basis when these families are obliged to sell or buy. In some cases, poorer pastoralists have to advance livestock to traders in exchange for consumer goods. The financial difficulties of small herders, has contributed in the past to the migration of many of the families of small herders out of rangelands into urban areas.

1.9. Conclusion

Necessity of a case by case analysis and tarification

16. The site visits made by the Water Supply Working Group confirmed that the conditions of adjustment between the water demand and water resources may vary considerably between villages or districts of the Nugal region.

Any analysis of the economic viability of the envisaged programme of rehabilitation of the water supply system of the region, in particular, of the former public wells network should be made site by site. The definition of a fair and coherent cost recovery policy should also take in to account the specific characteristics of the local community and should be discussed with the beneficiaries of the improvement.

Need for coherent water management framework

17. But this micro-economic analysis should be integrated in to a coherent overall framework which should aim at rationalizing the location of the water supply structures of the region such as boreholes, pump sets, barkads and wharos in coordination with a well accepted plan of protection of the various grazing areas of the region.
18. Since it was not possible for the working group to undertake a detailed analysis of the economic viability and tarification of the twenty villages visited, we have tried to evaluate as a preliminary indicator a rough estimate of the importance of water expenses of a herder who can expect to make an annual cash income from the sale of his livestock more or less equivalent to the income of an unskilled worker permanent employed in the areas of Nugal i.e. Ssh 15000 per day (or US\$ 75 per month). For the Nugal region, this herder can be considered as a relatively wealthy herder but even in this case, the purchase of water for both the human and livestock consumption can represent a significant part of the household budget.

II. Expenses of Water for Livestock

2.1. Basic assumptions

Wet and dry seasons

19. The calculations have made with the following assumptions:

- a wet season of about 140 days/year i.e.

April to June:	about 80 days
October to November:	about 60 days
- a dry season of about 225 days.

For the purpose of evaluating the level of consumption of water, we have separated the dry season into two periods:

- a period usually of one to two months maximum during which rain water stored in reservoirs, barkads, wharos is still available.
- after the exhaustion of these reserves, if no well is available in the village, the herds and the population have to move to areas where water is available. Naturally, the importance and duration of this migration depends on both the climatic conditions and grazing resources.

The proposed figure shows the pattern of periodic transhumance on water consumption. These estimates do not pretend to represent an exact picture of the existing situation but are used to illustrate the importance of the level water supply on the budget of a transhumant average family.

20. The calculations have been done for two situations:

- a village with no well. In the village, the water is provided by rain water stored in underground reservoirs (barkads). During the dry season, when the reserves are exhausted, the village has to move temporarily to the Eil Region or to the Nugal valley. These transhumant people usually come back before the end of the dry season to prepare the water reservoirs for the next rainy season.
- a village with a permanent well. Even in this case transhumant movement occurred because of the limitation resources of the grazing areas. But usually, the transhumant period is shorter than in the first case.

These assumptions on the average migration movements are summarized as follows:

		<u>Season (number of days)</u>		
		<u>Wet</u>	<u>Dry</u>	
		<u>In Village</u>	<u>In Village</u>	<u>Transhum.</u>
1.	Villages with well (40%)	140	120	95
2.	Villages without well (60%)	140	90	135
	Average	140	100	125

Percentage of water purchased

21. Very few herders paid for the totality of the water consumed by the herd, since some herders own barkads. Herds can also use freely the water of some public shallow wells and during the wet season the water of wharos or the water of natural ponds, natural underground reservoirs or the water of the togga.

During the wet season, the purchase of water for livestock is limited. While local conditions may vary considerably from one grazing areas to another, the percentage of water effectively paid represents a small fraction of the water effectively drunk by the herds. For the purpose of our evaluation of the relative importance of expenditures of water for the livestock we have estimated this percentage to 15%.

22. During the dry season, when all rain-fed surface water resources are exhausted, water has to be purchased either from the owner of private barkads who filled their reservoirs with water imported from Garowe or Eil or from public and private wells. Since a number of public wells are now out of order, most of the nomads or transhumant herders have to buy water at private wells. The percentage of water purchased during the dry season, vary also considerably from village to village or grazing areas, perhaps between 30% to 70%. For the calculation of the expenses of water by an average herder we have estimated this percentage to about 50%.

Price of Water

23. During the wet season, the price of water is usually Ssh 5000/drum of 200 litres i.e. Ssh 25000/m³ (or US\$ 5/m³).

During the dry season, the price increases progressively with the scarcity of water but the price most frequently announced is about Ssh 25000/drum or Ssh 125000/m³ (or US\$ 25/m³).

Annual Consumption

24. The frequency of drink vary with the season, in particular, for the camels. Cows more dependent on water have a frequency of drink which is more constant. The following consumption levels have been adopted:

	Cow	Goat Sheep	Camel
1. Interval drinks (days)			
- wet season	1.3	3.9	12
- dry season	1.1	3.7	10
2. Litres per drink			
- wet season	25	5.0	110
- dry season	27	6.0	120
3. Average litres per day			
- wet season	20	1.3	9
- dry season	25	1.6	12

2.2 Seasonal Expenses25. Cows

For a cow valued at Ssh 650,000 (US\$130) and which requires about 20 litres of water per day, the expenses are:

Wet season (140 days): (15% of water drank purchased)
 $(140 \text{ days} \times 20 \text{ l/day} \times \text{Ssh } 25/\text{litre}) \times 15\% = \text{Ssh } 10500$
 equivalent to US\$ 0.45/month

Dry season (225 days): (50% of water drank purchased)
 $(225 \text{ days} \times 25 \text{ l/day} \times \text{Ssh } 125/\text{litre}) \times 50\% = \text{Ssh } 351560$
 equivalent to US\$ 9.4/month

26. Goats/Sheep

For Goats/Sheep valued at Ssh 90,000 (US\$ 18) which drinks about 2 litres/day (1 drink every 3 or 4 days and 5 litres/drink)

Wet season (140 days): (15% of water drank purchased)
 $(140 \text{ days} \times 1.3 \text{ l/day} \times \text{Ssh } 25/\text{litre}) \times 15\% = \text{Ssh } 680$
 equivalent to US\$ 0.30/month

Dry season (225 days): (50% of water drank purchased)
 $(225 \text{ days} \times 1.6 \text{ l/day} \times \text{Ssh } 125/\text{litre}) \times 50\% = \text{Ssh. } 22500$
 equivalent to US\$ 0.6/month

27. Camels

For Camels valued at Ssh 900 (09) for a male or US\$ 160 which drink during the wet season an average of 9 litres per day (1 drink of 120 litres every 2 weeks)

Wet season (140 days): (15% of water purchased)
 $(140 \text{ day} \times 9 \text{ l/d} \times \text{Ssh } 25/\text{litre}) \times 15\% = \text{Ssh } 4725$
 equivalent to US\$ 0.20/month

Dry season (225 days): (50% of water purchased)
 $(225 \text{ days} \times 12 \text{ l/d} \times \text{Ssh } 125/\text{litre}) \times 50\% = \text{Ssh } 168750$
 equivalent to US\$ 4.5/month

2.3. Annual Expenses (per head)

28. As indicated below, the ratio: (expenses of water)/(value of livestock) is very favourable for camels and goats/sheep but less for cows. This explains that cows are usually considered as sedentary animals and owned mainly by residents of the villages.

Annual Expenses for Water
(Ssh/per animal)

<u>Season</u>	<u>Cows</u>	<u>Goats/Sheep</u>	<u>Camels</u>
Wet	10500	680	4720
Dry	<u>351560</u>	<u>22500</u>	<u>168750</u>
Total cost/year	362060	23180	173470
Equivalent US\$	72.6	4.6	34.6
Value livestock US\$/head	130	18	180
Ratio water exp/animal value	56%	25%	19%

The important fact to notice is the importance of expenses during the dry season largely due to the deterioration of the public water system. For small ruminants sold at the age of about 4 years, the cumulated total expenses for water is approximately equal to the market price of the animal.

Table A

Livestock Water Expenditure

	Cow	Goat sheep	Camel
	-----	-----	-----
A. <u>Animal Drinks</u>			
1. Interval drinks (days)			
- wet season	1.3	3.9	12
- dry season	1.1	3.7	10
2. Litres per drink			
- wet season	25	5.0	110
- dry season	27	6.0	120
3. Average litres per day			
- wet season	20	1.3	9
- dry season	25	1.6	12
B. <u>Expenditure Wet Season (140 days)</u>			
4. Price Ssh/drum/200 l	5,000	5,000	5,000
5. Price Ssh/l	25	25	25
6. Consumption season (litres)	2,800	182	1,260
7. Value water (Ssh '000)	70	4.6	31.5
8. % purchased	15%	15%	15%
9. Expense/season/Ssh.	10,500	690	4,725
10. Average expense (Ssh) (expense/month/head)	2,250	148	1,012
Equivalent (US\$)	0.45	0.03	0.20
C. <u>Expenditure Dry Season (225 days)</u>			
11. Price of Water (Ssh/drum)	25,000	25,000	25,000
12. Price Ssh/l	125	125	125
13. Consumption (litres)	5,625	360	2,700
14. Value/water (Ssh. '000)	703	45	337
15. % paid	50	50	50
16. Expenses/season (Ssh '000)	351	22	169
17. Average expense (Ssh) (expense/month/head)	46,800	2,933	22,533
Equivalent (US\$)	9.4	0.6	4.5

	<u>Cow</u>	<u>Goat Sheep</u>	<u>Camel</u>	
D. <u>Annual Consumption/Expenditure</u>				
18. Litres consumed	8,425	541	3,960	
19. Market value of water (Ssh '000)	173	50	369	
20. Water exp/animal (Ssh '000)	362	23	174	
Equivalent (US\$)	72.4	4.6	34.8	
E. <u>Market value of animal</u>				
in Ssh '000	650	90	900	
in US\$	130	18	180	
F. <u>Ratio</u>				
Water expenses/value animal		56%	25%	19%

III. Expenses of Water for Human Consumption

3.1. Basic Assumptions

Villages with or without deep boreholes

29. Most of the villagers of the Nugal region are obliged to migrate during the dry season.

- because of insufficient quantity of water
- because of overgrazing
- because of the excessive price of water which often has to be imported by trucks.

In order to evaluate the importance of the expenses of water for the budget of a typical semi-nomadic family of about nine persons in a small village in the Nugal Region, we have to compare two cases:

- the village has a deep borehole which provide a minimum of drinkable water during the dry season.
- the village has no local source of drinkable water during the ^{dry} rainy season and is obliged to migrate to the Nugal valley or the Eil region where water is available.

All villages are afflicted by the drought period but villages with deep boreholes and permanent supply of water considerably less than villages without water. Since the prices of water are usually lower, the period of migration is usually shorter and the number of persons obliged to migrate is usually lower.

Size of the Family

30. The average size of a family living in the village has been estimated to 9 persons. During the transhumant period, in villages without water only 3 persons remain in the village for personal, social reasons or to take care of the property or of the cattle which do not migrate (cows) and six persons migrate with the livestock.

In the case of the village with wells, where price of water is usually cheaper, we have estimated that 4 persons can remain in the village.

Transhumant Movements

31. Because of the availability of water, transhumant movements are usually shorter in villages with wells. The 225 days of dry season have been shared as follows:

	Village <u>without Well</u>	Village <u>with Well</u>
Stay in village	90	120
Transhumant period	<u>135</u>	<u>105</u>
Total	225	225

Price of Water

32. The price of water communicated to the mission is very coherent in the various villages visited.

During the wet season, when water is abundant, the price of water at private barkads and some public wells fluctuates around Ssh 25 per litre (Ssh 5000/drum of 200 litres).

The price of water increases progressively during the dry season when availability of water decreases to reach a maximum of about Ssh 90 per litre (Ssh 18,000/drum of 200 litres) when water has to be imported by truck usually from Garowe. The high price contribute to reduce dramatically the consumption of water.

In villages with wells, the price of water is usually cheaper during the dry season. Ssh 60 per litre instead of Ssh 90 per litre.

In the transhumant areas, water is more abundant but because of the concentration of livestock, the demand is high and the price remains in the range of Ssh 12,000 to Ssh 15,000 per drum. For that calculation of the water expenses of a typical semi-nomadic family the average price has been estimated at Ssh 65 per litre, equivalent to Ssh 13,000 per drum or US\$13/m³.

Purchase of Water

33. The total wet season period is estimated at about 140 days per year. During this period, in villages without wells, water is available in the natural reservoirs, wharo and barkads. The price of water remains accessible, about Ssh 25 per litre (0.5 cents/litre) to the average herd owner. As various sources of free water are available, the percentage of water effectively paid for human consumption remains limited to one third of the total familial consumption. In districts where a public well is available, the poorest population, in particular displaced families and small herders or nomads can obtain their water free or at a reduced price. In these villages, it has been estimated that 25% of water for human consumption is purchased.

At the end of the dry season, after all the rain-fed reserves have been exhausted, the percentage of families who have to buy their water increase significantly. In a village without public wells, about 80% of the households' consumption has to be purchased mainly from water truckers. On the

contrary, in villages with public wells, this percentage is significantly lower, probably around 35%. In the areas of transhumance the percentage is probably between these two figures. It has been estimated at about 50 %.

Per capita consumption

34. In the arid and semi-arid areas of the Nugal region, the consumption is very low when compared with world standards. During the rainy season, the consumption for a family of 9 persons vary between 1 and 1.5 drums per day which represent an average of about 30 litres/capita/day. During the dry season, the villages which have to import water, the per capita consumption falls to only 15 litres/capita/day. During the transhumant period, the consumption is estimated to about 20 litres/capita/day.

In villages with permanent wells, the consumption, during the dry season, is slightly higher, about 20 litres/capita/day.

3.2. Water Expenses

35. On the basis of the above assumptions, it is possible to propose a rough estimate of the expenditure of water for a semi-nomadic family of about 9 persons.

Village without permanent well

36. The assumptions on which are based the calculations are summarized in Table A. The monthly expenses of an average family of 9 persons increase from the equivalent of US\$ 13.4 during the wet season to US\$ 32.4/ month at the beginning of the dry season when some barkads, shallow well water is still available. During the transhumance period of the dry season when no water is available locally, the average monthly expense for the whole family amounts to the equivalent of about US\$ 43 per month. This expenses include the purchase of water by the member of the family who stay in the village and have to import their water as well as the purchase of the member of the family who migrate with the livestock.

The total annual expenses of water for human consumption for an average family of 9 persons, in a village without permanent water supply represents a total expense equivalent to about US\$ 352 per year or an average of US\$ 29 per month or US\$ 1 per day. The expenses is quite acceptable during the wet season but can become prohibitive for low income families during the dry season (US\$ 1.3 per day).

Table 3. A

NUGAL REGION

Price and Consumption of Water

Transhumant Village Family

Village without wells

	<u>Wet Season</u>		<u>Dry Season</u>
	<u>In Village</u>	<u>In Village</u>	<u>Transhumance</u>
1. Number of Days	140	90	135
2. Price of water in village	25	60	90
in migration area			65
3. Size of the family in village	9	9	3
in migration area			6
4. Water consumption (l/c/d) in village	30	20	15
in migration area			20
5. Percentage of water paid in village	33%	50%	80%
in migration area			50%
6. Water expenses (Ssh) in the village	311 850	486 000	437 400
in migration area			<u>526 500</u>
			963 900
7. Water expenses/month (US\$) in the village	13.4	32.4	19.4
in migration area			<u>23.4</u>
			42.8
8. Total annual expenses	Ssh 1,761,750		
	US\$ 352.4		

Village with Permanent Well

57. The same kind of calculations have been made for a village where a permanent source of water is available for human consumption (deep borehole). Usually because of the necessity of preserving the grazing area around the village some migration movements are needed but usually the transhumant period is shorter than in the preceding case but most important, the price of water is cheaper than in villages with no water resources. This allows more people to stay in the village.

In this case, the household expenses of water for human consumption represent the equivalent of US\$ 10 per month or 33 cents per day during the wet season.

At the beginning of the dry season when water in rain-fed reservoirs and barkads is still available, the expenses represent the equivalent of about US\$ 19 per month or 63 cents per day (7 cents/cap/day). During the migration period, the expense reach the equivalent of US\$ 31 per month (or US\$ 1 per day). In this last case, 63% of the expenses is paid to purchase water in the grazing areas.

The total annual expenses for water amount to the equivalent of US\$ 231. The savings when compared with a village without water resources during the dry season is about US\$ 121 i.e. 34% of the water expenses.

Table 3. B

NUGAL REGION

Price and Consumption of Water

Transhumant Village Family

Village with wells

	Wet Season		Dry Season
	<u>In Village</u>	<u>In Village</u>	<u>Transhumance</u>
1. Number of Days	140	120	105
2. Price of water			
in village	25	40	60
in migration area			65
3. Size of the family			
in village	9	9	4
in migration area			5
4. Water consumption (l/c/d)			
in village	30	25	20
in migration area			20
5. Percentage of water paid			
in village	25%	35%	40%
in migration area			50%
6. Water expenses			
in the village	236 250	378 000	201 600
in migration area	-	-	<u>341 250</u>
			542 850
7. Water expenses/month (US\$)			
in the village	10.1	18.9	11.5
in migration area			<u>19.5</u>
			31.0
8. Total annual expenses	Ssh 1,157,100		
	US\$ 231.4		

Table 3. C

NUGAL REGION

Water Consumption and Expenditure

Typical semi-nomadic family (9 persons)

Characteristics of Consumption	Type of Villages	
	With Permanent Well(s)	Without Permanent Well
I. <u>Season (days)</u>		
Wet season in village	140	140
Dry season in village	120	90
Dry season Transhumance	<u>105</u>	<u>135</u>
	365	365
II. <u>Price of Water (Ssh/litre)</u>		
Wet season	25	25
Dry season in village/transhumance	40/60	60/90
Transhumance areas	65	65
III. <u>Consumption (l/c/d)</u>		
Wet season (village)	30	30
Early dry season (village)	25	20
Transhumance period:		
in village	20	15
in transhumance areas	20	20

Characteristics of Consumption	Type of Villages	
	With Permanent Well(s)	Without Permanent Well
IV. <u>% Water purchased</u>		
Wet season village	25	33
Early dry season village	35	50
Transhumance period:		
in village	40	80
in transhumance areas	50	50
V. <u>Total Consumption/family (m³)</u>		
Wet season village	37.8	37.8
Early dry season village	27.0	16.2
Transhumance period:		
in village	8.4	6.1
in transhumance areas	<u>10.5</u>	<u>16.2</u>
	83.7	76.3
VI. <u>Total expenditure water /year (Ssh '000)</u>		
Wet season village	236.2	311.8
Early dry season village	378.0	486.0
Transhumance period:		
in village	201.6	437.4
in transhumance areas	<u>341.3</u>	<u>526.5</u>
	1157.1	1761.7
VII. <u>Expenditure Water (US\$/month)</u>		
Wet season village	10.1	13.4
Early dry season village	18.9	32.4
Transhumance period:		
in village	11.5	19.4
in transhumance areas	<u>19.5</u>	<u>23.4</u>
	19.3	29.4

3.3. Economic justification

38. The improvement of the water supply system in villages which do not benefit all permanent water resources can lead to important savings in the expenses bill for water consumed by the villagers. The following table summarizes the estimates of the cost of water in the two alternatives:

- Village without permanent well
- Village with permanent well

The improvement of the water supply of the village contribute to increase the consumption level per capita, usually improve the quality of water but also reduce significantly the daily expense of the household. In the reference case considered here, of a semi-nomadic family of 9 members, the average price of all water consumed reduced

- from Ssh 4826 per day (US\$ 0.96) in a village without water to Ssh 3170 per day (US\$ 0.63) in a village with permanent water resources.

39. This saving of US\$ 0.33 per day (or US\$ 120 per year) per family confirmed that improvement of the water system at the village level is economically highly justified.

If we assume that the total construction cost of a new borehole 150 m depth is $150 \text{ m} \times \$ 250/\text{m} = \text{US\$ } 37,500$ (maximum cost).

This cost with the water savings as calculated above will be covered in only one year by the savings of a population of only 310 households. In fact, a deep borehole can easily serve a population of 400 to 500 families. A good well like the well of Dangorayo has a capacity of $200\text{m}^3/\text{day}$ i.e. $200\text{m}^3 \times 365 = 73,000 \text{ m}^3$ per year. If we assume a total consumption of 80m^3 per family per year such a well can serve a population of $73,000 \div 80 = 910$ families

This preliminary rough estimate obviously needs to be improved to reflect the situation of each village as recommended in para. 16 above but they confirmed the general assessment of both local population and of international organizations, as well as local and international NGOs which rank the rehabilitation of the water supply system of the North Eastern region as a first priority.

Annual Water Consumption per family
(family of 5 persons)

	<u>Village without permanent well(s)</u>	<u>Village with permanent well(s)</u>
1. Average consumption (l/c/d)	23.2	25.4
2. Total consumption m ³ /year	76.3	83.7
3. Volume of water purchased m ³ /year	33.6	27.5
% of water purchased	44.0	32.8
when in the village	42.3	30.4
when in transhumance	50.0	50.0
4. Total expenditure/year		
Ssh '000	1761.7	1157.1
US\$	352	231
5. Average household water daily expenditure (Ssh/d)		
wet season	2228	1668
dry season	6444	4093
annual average	4827	3170
6. Average price of water purchased (Ssh/l)		
water purchased in the village	48.6	36.6
water purchased in transhumance	65.0	65.0
all water purchased	52.4	42.1
US cents/litre	1.0	0.8
7. Average annual price in the village (4÷2)		
Ssh/litre	23.1	13.8
US cents/litre	0.46	0.27
US\$/m ³	4.6	2.7

Average Income

41. This high price of water can represent an important part of the budget of herd owner of the Nugal Region.

Pre-war survey on cattle owners of Northern Somalia involving a population of 300,000 persons belonging to 10 herdsman association regrouping 360 families were centrally an average of 33,000 small ruminants (goats and sheep), 4,800 camels and 300 cattle mainly cows, which means by family an average of:

90 goats
13 camels
7 cows

Assuming that this average herd generates cash revenue from the annual sales of about Ssh 5.8m or US\$ 1150.

<u>Animal</u>	<u>No. Sold</u>	<u>Value</u> <u>Ssh '000</u>	<u>Total Sales</u>	
			<u>Ssh '000</u>	<u>US\$</u>
Goats/Sheep	60	60	3,600	720
Camels	2	800	1,600	320
Cattle	1	600	600	120
	63		5,800	1,160

42. This average income compares favourably with the actual level of salary paid to unskilled labour in Somalia.

Mogadishu: Ssh 20,000/day
Jowhar District
and Garowe: Ssh 15,000/day

or for a permanent job:

Mogadishu: $20,000 \times 23 \times 12 = \text{Ssh } 5,520,000$
Garowe: $15,000 \times 23 \times 12 = \text{Ssh } 4,140,000$

Share of water expenses in the household budget

43. For a family with an average revenue of about Ssh 6 million per year (or US\$ 12,000 per year i.e. US\$ 100 per month) the annual expenditure for water will represent about:

- 19% of the income of the family living in a village with permanent water supply.
- 29% of the income of family living in a village without permanent water supply.

B. PROJECT SUSTAINABILITY

I. Background

44. In all villages visited by the mission, as well as in remote grazing areas, it appears that most public water supply infrastructure suffered considerably. The lack of maintenance and in some cases, physical destruction of water supply facilities or looting of hand-pumps, generators and solar panels are a direct consequence of the lack of administrative responsibility. On the contrary, private water facilities such as shallow wells and private barksads have usually received adequate attention from their owner and in many cases this effort has permitted them to limit the negative impact of the public water sector, but usually at a high cost for the users in particular during the dry season.

45. All rehabilitation works proposed to the programme will have an excellent economic return. It is then important to set up procedures which will guarantee the long term sustainability of these investments. From the discussion with the regional and local authorities and with local and international NGOs, it is possible to formulate a certain number of recommendations which contribute to guarantee the sustainability of the projects:

- restoration of a regional administrative capability
- adequate monitoring of project implementation
- participation of local groups in the execution of works
- choice of adequate technology
- adequate security
- involvement of local authorities
- assistance to the private sector
- adequate water tarification policy
- contract of responsibility.

II. Restoration of a regional administrative capability

46. Since the Addis Ababa meeting in November/December 1993, the importance of the restoration of the Somali ownership in the process of reconstruction and rehabilitation of the country has been highlighted in many occasions. This objective is officially supported by the international donor community. The Somali Aid Coordination Body (SACB) of the United Nations Development Office for Somalia endorses this high priority objective with a particular emphasis on the role which will be devoted to the Regional Development Committee¹, in the absence of an internationally recognized central government. The Regional Development Committees (RDC) will be the corner-stone by which Somalia would assure ownership in the reconstruction of its economy since it is now certain that a future government will be obliged

¹ Institutional strengthening at the Regional Level - Revisiting the Approach (SACB, 19 May 1994)

to adopt a decentralised approach in the preparation and implementation of reconstruction and development actions. The strengthening of local and regional administrative capability will allow, in the future, the regions to function more effectively than in the past with an amalgamated local, regional and central government system of responsibilities clearly defined.

47. For example, the SACB paper mentioned above anticipate an important input of the regional administration in project identification and design and in programmes formulation. This need for an effective regional administrative capability is particularly obvious in the Nugal region for the management of the water/rangelands sectors. Largely due to good security conditions of the region and the dynamism of the port of Bosasso for export of livestock and three consecutive good rainy seasons, the livestock herd size grazing in the areas has possibly reached a record high while water supply infrastructure is weak. There is now a permanent pressure for livestock owners - at least the wealthiest of them, to develop privately new sources of water to satisfy the increased demand of water for livestock. For the time being, the private investment has been made mainly for increasing the capacity of rain-fed underground reservoirs (barkads) which provide adequate water during the rainy season. However, the pressure will be strong in the coming years to develop, on a private basis, without adequate planning, new permanent sources of water such as deep boreholes, to satisfy the need of the livestock. The danger being that these new water facilities are realised without adequate consideration to the long term protection of the rangelands grazing potential.
48. Many local communities, in particular, the councils of elders of villages have expressed their wish to see a regional water administration recreated as soon as possible to provide them assistance:
- in the implementation of the rehabilitation programme of private water facilities. (This can include in some cases financial assistance)
 - in the implementation of a permanent control of the quality of water. This can include, in some cases, the creation of micro-desalination installations at the village level.
 - for defining a coherent programme of rehabilitation of the public wells system and contacting the NGO and donor communities for its funding.
 - for opening a permanent dialogue with the local communities on the most appropriate way to manage grazing areas.
 - for the definition of a fair water pricing policy.

III Adequate monitoring of projects

49. At present most of the rehabilitation works in the water sector in the region of Nugal are executed by local or international NGO. Since the NGO involvement is relatively young in Somalia, some organizations might appear inexperienced in particular, in the execution of infrastructure works. While it is usual to meet qualified professional in the health or education sectors (doctors, nurses, vets, pharmacists or teachers) it seems that the NGO community faces more difficulties to mobilize manpower with good technical skills such as road or port engineers or even qualified water/sanitary engineers. For the good sustainability of the projects it appears indispensable that the donor community verify that an adequate staffing is involved in the preparation and execution of the water rehabilitation projects. The presence of these qualified technicians is indispensable in the preliminary phases of its identification preparation and evaluation, as well as during the execution of the works in order to ensure that the choice of an adequate technology, the good quality of materials, a correct execution of the works, the respect of delay are done correctly in order to provide a good quality work at a reasonable cost. This control is particularly important in the case of NGOs which execute the works with their own force account or proceed to direct contract for part of the works with a local contractor without tendering and competitive bidding procedures. A budget for assisting local and international NGOs in the preparation of technical dossiers of projects can also be considered.
50. On the other hand, international NGOs working in association with local NGOs can provide a first-hand experience with local communities. They usually benefit of a good acceptance since NGOs are part of the community. This is usually reflected by the support and encouragement they receive from the community and the authorities. NGOs have, frequently, a good ability to mobilize women and bring them into the local water committees where they can share responsibility with men on the operation of the local water supply system.

IV. Local participation in the execution of works

51. The participation of the local community in the identification, preparation and implementation of the project usually increase significantly the sustainability of the project. From the experience accrued by several local and international NGOs, it seems that the involvement of the community is stronger when several groups of the community have been involved . These groups usually include:
52. The unskilled labour who can be involved in simple labour intensive work either directly by the NGO with adequate supervision or more preferably through a local entrepreneur. It is interesting to note that in the present free market environment prevailing in the region. A cash for work participation in the execution of the project is recommended preferably to the former food for work assistance provided in the past in some emergency humanitarian aid programme.

This form of involvement is in line with the recommendations of the Multi-Lateral Task Force of July 1983 coordinated by the World Bank and which anticipated for the post-war period an accelerated move from the traditional nomadic pastoralism towards an agro-pastoralism or eventually settled agriculture and from traditional auto production towards more involvement in the monetary system.

53. Local contractor. The utilization of local contractors should be recommended when the rehabilitation works requires some kind of technical expertise. The participation of these entrepreneurs is important since they can provide, later on, advises for the operations of the well and the maintenance of equipment. If needed, they can proceed to the repairs. It is also important to note that these contractors very frequently influence members of the local authorities. The involvement of other professions such as local transport enterprises, fuel supplies, security groups, might also widen the local community support for the project.
54. Women association. When such association exists, it should be associated to the preparation of the project. Women are usually in charge of supplying water for the household and usually they are far more exigent than men on the quality of water.
55. Displaced people. Many villages of the region of Nugal has registered an important influx of displaced people from the Mudug region, from Mogadishu or even from the Juba and Shebelle valleys. These displaced people, at least the poorest of them, benefit usually from some kind of assistance from the local community. This assistance can be in the form of free drinking water or of price reduction. The rehabilitation of the public well system will facilitate the continuation of this form of assistance, strengthen solidarity within the community and contribute to the sustainability of the project after its completion.

V. Choice of adequate technology

56. Several wells have been abandoned or have not received adequate maintenance because of their high operating cost. Usually these wells were drilled and operated by the contractors building the Belet Weine - Bosasso road (chinese and italian roads sections). The local population was not involved in the construction of these water facilities and very likely the diesel engines were over-designed for the needs of the villagers.
57. On the contrary, for their rehabilitation project, in the Middle Shebelle region, NGO ADRA (Germany) has given adequate consideration to a standardized pump system which is reliable, economic and sustainable for long term usage. This is the Monolift borehole pump powered with a diesel engine.

This pumping system is very simple since it is just a rotating shaft screwing up the water. This system is well known in Somalia and in the whole of Africa. It is less fragile than submersible pumps which are also more difficult to repair. This pump is also very economical since with the new Lister diesel engines 6.5 kw it is possible to pump 10 m³ in one hour using only one litre of fuel. In other work, it can supply the daily water needed by about 50 families at a cost of half a dollar (or 1 US cents/family/day).

When compared with the price of water actually paid from private barkads, this investment appeared affordable and easily sustainable by the local community.

58. In the Nugal region, an NGO, LVIA (Italy) is implementing a system of windmills, which for the time being has operated quite satisfactorily, but this technology depends on meteorological conditions and should possibly be associated with a more classical diesel engine..

VI. Adequate Security

59. The installation of solar pumping systems by a local NGO has not always been successful since this kind of installation might attract looters. With the present security condition prevailing in Somalia, it is recommended to request from the local community that a firm commitment for guaranteeing that the rehabilitated water supply installations will be efficiently protected against thieves and looters.

VII. Assistance to the private sector

60. After the collapse of the Somali Administration and the rapid deterioration of the public water supply facilities, private interests, usually local herders or informal association of private barkad owners have been obliged to invest in new water facilities such as private hand-dug shallow wells but more frequently in the extension or construction of new barkads. These investments, considered as expensive by the rural community, have usually benefited not only to their owners but to the whole community since part of the water was sold to the villagers. Very often these investments were obviously made in view of making profit from the sale of water. The rehabilitation of public wells financed by grants or at highly concessional terms by the international donor community can ruin these expectations and create some unnecessary strained relationships between people supporting the rehabilitation of the public wells system and the owners of private water supply facilities. It is then indispensable to discuss openly this issue at the community level in order to find a satisfactory solution which will protect the legitimate interest of the private investors.

61. The new Regional Water Division as well as the District Committee should encourage the private sector to invest in water facilities and provide them adequate support for the periodic control of the quality of water, assistance in the cleaning of wells and barkads, eventually support in the maintenance or rehabilitation of barkads or eventually participate with the private sector to the construction of new wells or barkads.

VIII. Creation of a Village Water Committee:

62. A Council of Elders exists in almost all small towns and villages of the Nugal region. While these councils are not formally constituted authorities, they exercise the fact an indispensable representative function. They constitute an important channel of communication with local populations and can provide a valuable assistance for the identification of priority rehabilitation project of the local community and for mobilizing its support. If necessary, the Council of Elders can also benefit from the assistance of educated professional or administrative personnel who accept to provide some kind of expertise on a voluntary basis. The Council of Elders are involved in all the water supply rehabilitation projects financed by European Community in the Nugal region.
63. The Council of Elders can plan a very useful role in assisting in the creation of a Village Water Committee be responsible for the management of the water supply facilities in the village. This committee should include representative of both the suppliers of water i.e the owners of private wells and barkads and the consumers as defined in chapter IV above.
The water committee should directly be associated:
- i) to the identification and preparation of the project. It will participate in the selection of the water facilities to be rehabilitated. It will discuss with the NGO, or International Organization and the funding agency of the design of the project, the choice of the technology to be used. If needed it will provide all information available at the village level on the previous conditions of the water system to be rehabilitated.
 - ii) it is highly recommended, when feasible, that the local community contribute even in a limited amount to the financing of the project either through the provision of labour, construction material or the mobilization of funds from the local community or through the association of owners of private barkads or any group of users which will be interested in the sustainability of the project.
 - iii) since they usually carry the water and are more exigent than men on the quality of water, women individually or collectively, (through the local Women Association), should be directly associated to the management of the water supply system.

In the rehabilitation works undertaken by UNICEF/EC and NGO ADRV in the Middle Shebelle region, usually three women sit in the Water Committee of the District. A similar representation is recommended in the Nugal region at the village level since water, in particular, during the dry season, play a paramount role in the life of the household. This direct involvement of women in the management of the water supply facilities of the village improved dramatically the sustainability of the project in particular when this involvement is associated with some form of train or information on water quality requirements and water usage.

- iv) The cornerstone of the sustainability of the project will be the appointment, by the Water Committee, of a member directly responsible for operating the well and for providing normal routine maintenance. If necessary this operator can also provide assistance to the private water supply facilities. This person(s) in charge will operate the well under the guidance of the Regional/District Water administration. He will be responsible for fuel purchase, keep the spare parts and fuel stocks, collect water fees. He will inform in time the Regional/District Administration on the conditions of operations of the installations and solicit, when appropriate, assistance for periodic maintenance or repair works. This operator should record permanently all information concerning the operations of the public wells as well as the overall situation of water in general in the village.

IX. Contract of responsibility

could that work in S?

64. It is strongly recommended that when a well is rehabilitated the implementing agency (NGO, UN organization) as well as the funding organization requests a contract of responsibility with each community. This contract should be drafted both in Somali and English languages and signed by the qualified representative of the Council of Elders including the members of the water committee. The contract should clearly stipulate that the local community through its Water Committee will guarantee in the future an adequate maintenance of the installation newly rehabilitated. The contract should certify also that the well belongs to the local community as a whole and not to the NGO or the central government.
65. Since a legal framework and a chain of command is necessary for the management of the water sector, the contract of responsibility needs to be established within an appropriate regulatory framework. While the village community should be given the main responsibility for the daily operation of the public water facilities and its routine maintenance, the regional authorities in particular the Regional Water Division should keep all its kingly prerogatives concerning the enforcement of the legislation on water management and in particular on the control of the quality of water, protection of epidemics etc. This regional administration should assist the

Village Water Committees in providing assistance in the execution of periodic maintenance works and major repairs, in the procurement of spare parts which have to be imported, and if necessary in training personnel.

X. Rehabilitation work request

66. In order to guarantee that the rehabilitation works are coherent with the water management development plan of the region, the regional authorities should not only approve the proposed rehabilitation works but formulate, in association with the Village Water Committee, an official request to the contracting authority (i.e. the funding agency) for the execution of the rehabilitation works.

XI Introduction of a fair water fee system

67. The installation of a diesel pump requires a permanent cost recovery for fuel, oil and filters. This issue should be carefully discussed with the committee representatives before the execution of the rehabilitation works. These discussions should be supported by accurate estimates of these recurrent costs. It should be made clear to the local community that water supply services should not be free and charges should be set to allow at least:

- full cost recovery of the pumping engines ?
- salary of the operator
- routine and periodic maintenance costs
- a modest reserve for exceptional repairs

68. As already indicated with the choice of adequate equipment the operating costs of the well can be reduced at a very affordable level, far below the actual price paid even during the wet season. It is then very likely that an adequate pricing structure should also include:

- the exoneration of charge for some categories of persons who need the community support (displaced people)
- the payment of some water taxes in favour of the community and the financing of the Regional Water Administration.

69. Since a tariff as good as its billing and collection service, a system of individual metering for each water supply facility would be the ideal solution since it encourages water conservation.

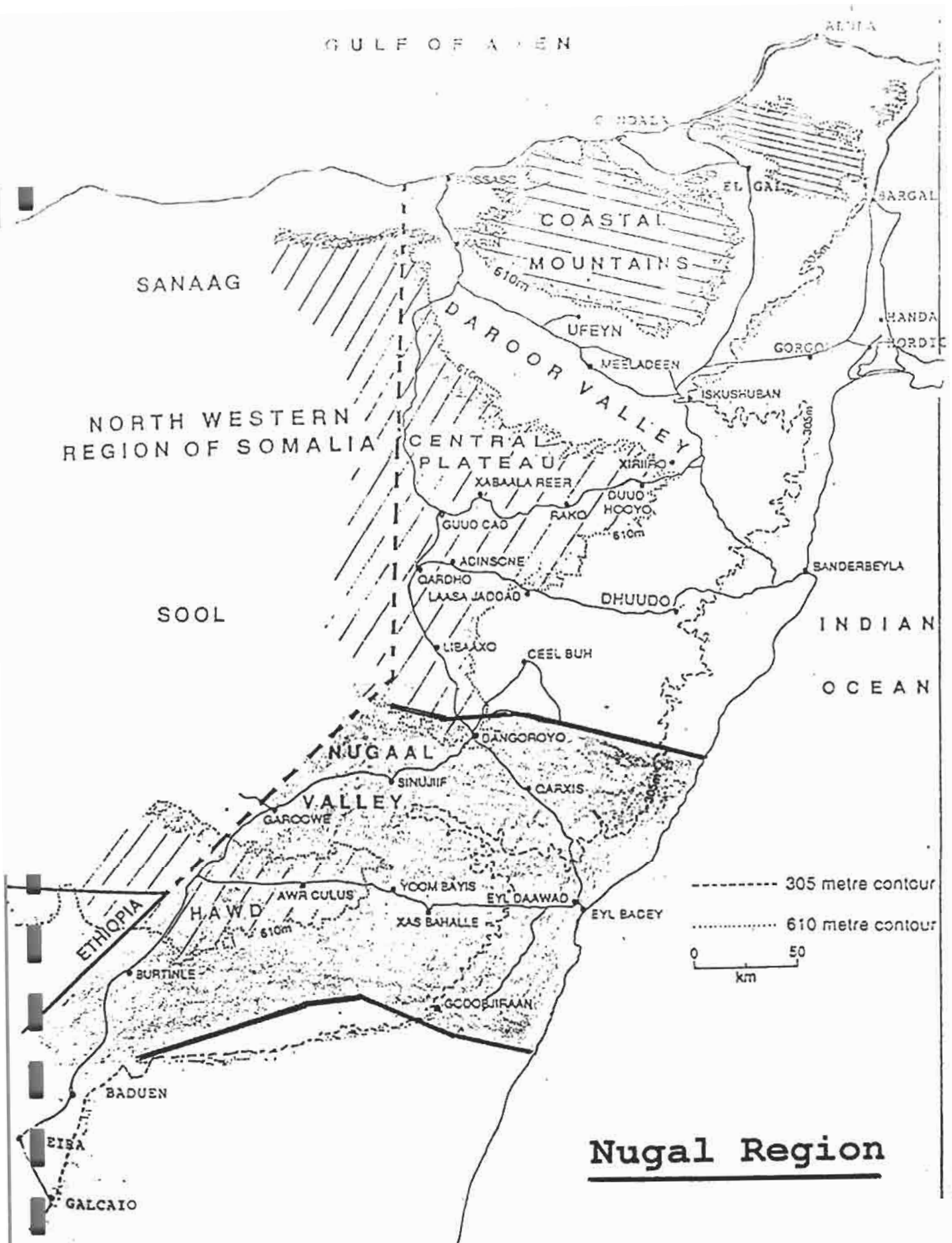
SOMALIA

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Water Supply Working Group

APPENDIX E

SITES VISITS - FIELD NOTES



GULF OF ADEN

ALUJA

SANAAG

NORTH WESTERN
REGION OF SOMALIA

SOOL

DAROOR VALLEY
CENTRAL PLATEAU

NUGAAL

VALLEY

HAWD

ETHIOPIA

Nugal Region

COASTAL
MOUNTAINS

610m

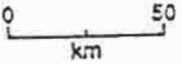
610m

610m

610m

----- 305 metre contour

..... 610 metre contour



GONDALA

EL GAL

BARGAL

UFEYN

HANDA

GORCO

BORDIC

MEELADEEN

ISKUSHUBAN

XIRIIFO

XABAALA REER

DUUD HOOYO

GUUD CAO

RAKO

ACINSCH

GARDHO

LAASA JADAD

DHUUDO

SANDERBEYLA

LIBAXO

CEEL BUH

INDIAN

OCEAN

DANGOROYO

CARXIS

GARCOWE

SINUJIF

AWR CULUS

YOOM BAYIS

EYL DAAWAD

EYL BACEY

XAS BAHALLE

BADUEN

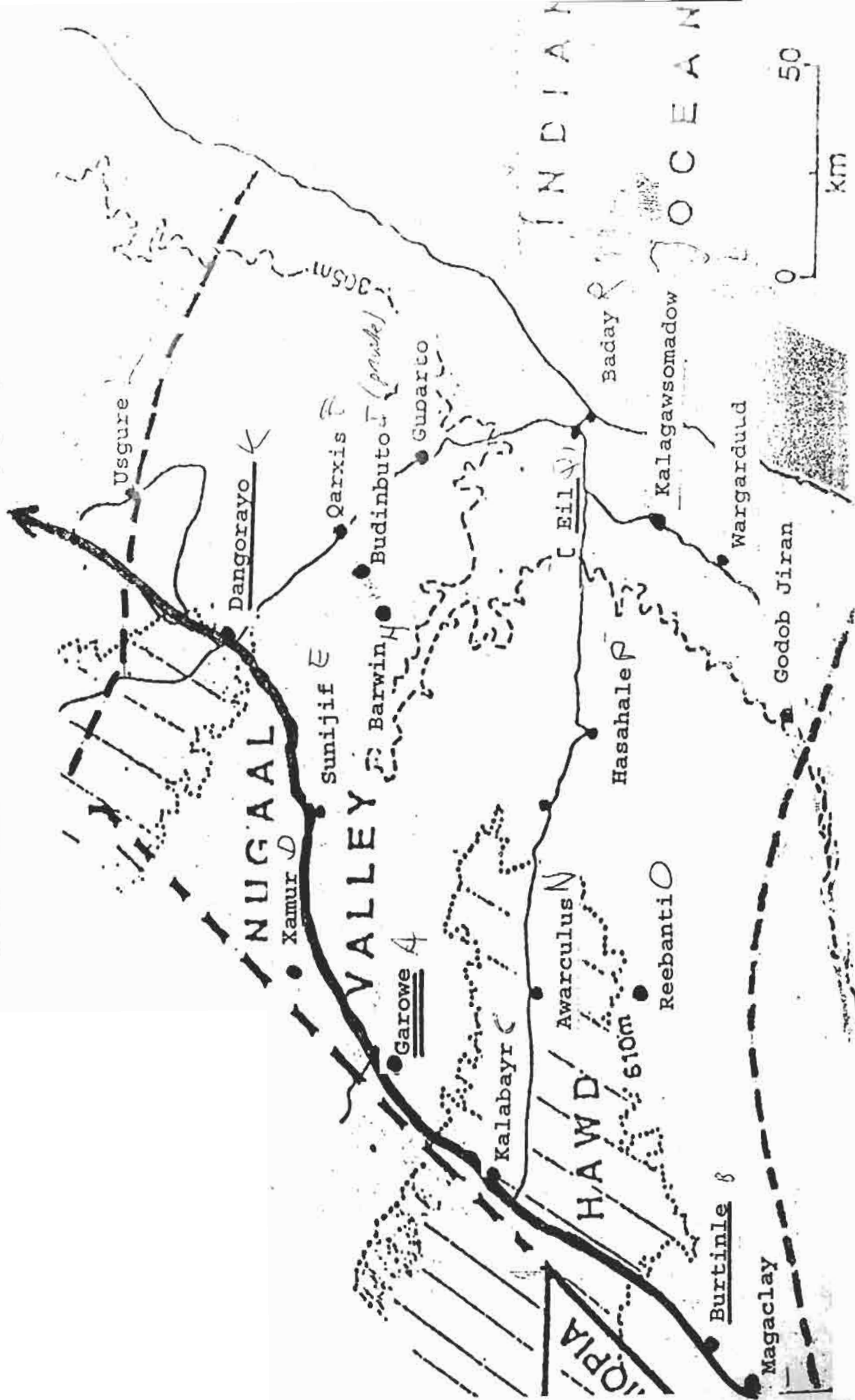
GCOOBUJIFAAN

EISA

GALCAIO

NUGAL REGION

--- Sites visited by the water working group



SOMALIA

NUGAL TECHNICAL MISSION

Water Supply Working Group

A. GAROWEI. The Site

1. The main physiographic features of the region of Garowe is the Nugal Valley. This valley, about 600 km of total length is about 100 km wide at the level of Garowe and narrow progressively in its eastern part. At Eil, the coastal city on the Indian Ocean, at the mouth of the Nugal River, the valley reduces to only 1 km. The basin of the togga Nugal (River Nugal) covered an area of about 70,000 km² and is fed by numerous small toggas (rivers) which run from the Sool Plateau on the North, a semi-arid plain covered by limestone and worl, and from the Sool-Hand plateau similar to the Sool Plateau to the South. These plateaux are characterized by a thick (250m) Karbar formation over the Taleex Formation and are superficially covered by more recent sedimentary deposits in the form of typical net sand dunes which give to this regions their character of aridity.
2. The city of Garowe is situated on the Southern bank of the togga Garowe which follows a north-eastern, south-western direction and enters in the depression of the Nugal valley north of the city. The togga Garowe has a permanent underground flow of water provided by a shallow perched aquifer. This aquifer is topped by numerous shallow wells serving daily numerous herds of animals. Very recently nearby the togga, some small scale market gardening has been initiated on an experimental basis.

The perched aquifer

- 3 This perched aquifer is located in the alluvial deposits of togga Garowe and in the upper part of sequences of Taleex formations exposed along the togga Garowe. The analysis of the water tables of the shallow aquifer indicate that the underground water flows towards the togga Garowe, implying that the river drains the water tables. The water reserve of this perched aquifer in the area where hand-dug wells are located, was estimated 28,000m³ by the former Water Agency of Nugal. This reserve constitute the main source of water at Garowe.

In this shallow aquifer, the water level vary between 6 to 12 metres below the surface. This aquifer lies on clay sediment 12 to 16 m deep which constitute the impermeable basis of the perched aquifer. This aquifer is recharged periodically by the flow of the togga. Over 30 hand dug wells tap this shallow aquifer. The well depth usually vary from 5 to 10 metres and the water level is usually found at about 5 to 6 metres.

- The water produced by the aquifer is of marginal quality. The EC index range usually from 3400 to 6000 micromhos/cm with high sulphate, fluoride and iron contents. EC index up to 8000 micromhos./cm has been registered in some wells. The pollution of neighbouring latrines may have been the cause of the high salinity of these wells. Water up to 5000 microhomos/cm is used for all purposes including drinking while water of wells with higher mineralisation is used only by washing. Water temperature range usually between 28 and 31 degrees.

The deep semi-confined aquifer

- Other water reserves are provided by a deep semi-confined aquifer located in limestone and anhydride of the Taleex formation. Available records of 3 drilled wells made by the Water Development Agency (WDA) and by GTZ confirmed the availability of water resources in the deep aquifer.

Deep Wells Characteristics

Drilled wells	Well No.	Depth (m)	Water Level (m)	Yield (m ³ /h)	Draw Down (DD)	Specific Capacity m ³ /h/m	Recommended Exploitation rate m ³ /h
WDA (1976)	WDA	160	40				
GTZ (1983)	GTZ-I	36	9	24	21	1.17	15
GTZ (1984)	GTZ-II	145	11	110	22	4.93	

GTZ -II well has a much higher production since it taps both the shallow and deep aquifers. The specific capacity is 4.9 m³/hr/metre, significantly higher than the shallow well GTZ-I of 36 metres.

- The GTZ tests shows that there is only a small difference of water quality between the shallow well, GTZ-I and the two deep wells, GTZ-II and WDA.

GTZ-I	E.C. 2900-3900 micromhos/cm
GTZ-II	
and WDA	E.C 3200-4200 micromhos/cm

7. Because of the start of the civil war in North Western Somalia, the project of the former government to explore deep boreholes, did not materialize and finally GIPB closed its well.

II. Proposed Emergency Rehabilitation

8. An emergency rehabilitation programme was proposed in 1991 by consultant, A.GIBB for the major towns of Somalia. This proposed programme was defined in a way that it can easily be incorporated in to a long term rehabilitation and modernization programme. Funds for this emergency programme were expected from an EC grant.

The A.GIBB project proposal included:

- 2 Grundfos pumps (150m, 35m³/h)
- 500 metres of flexible riser pipes.
- 1 steel reservoir (200m³)
- 1 generator (Cumins 100 KVA with switch box.)

Project Cost

9. The cost of the project was estimated at about US\$ 219,000

A. <u>Basic Equipment</u>	<u>Quantity</u>	<u>Unit Price</u> (US \$)	<u>Total</u> (US\$)
Grundfos pump	2	12,000	24,000
Flexible riser pipes	500	120	60,000
Steel reservoir 200m ³	1	35,000	35,000
Generator 100 KVA	1	30,000	30,000
Control panel	1	30,000	<u>30,000</u>
Sub-Total			179,000
B. <u>Other Expenses</u>			
Electrical cables	400m	35	14,000
Tools, Welding consumables			18,000
Rental transport equipment			<u>8,000</u>
Sub-Total			40,000
 <u>Total Project Cost</u>			 <u>219,000</u>

Recurrent Costs

Salaries WDA

Fuel generator

(25 litres/hour, US\$ 0.5/litre, 10h/day) US\$ 46,000/year

These figures can be used as a preliminary estimate of the emergency works which can be envisaged for the city of Garowe. It is very likely that the investment costs will be spread on a period of two years i.e.:

Year 1	US\$ 130,000
Year 2	US\$ 89,000

III. Garowe Water Supply

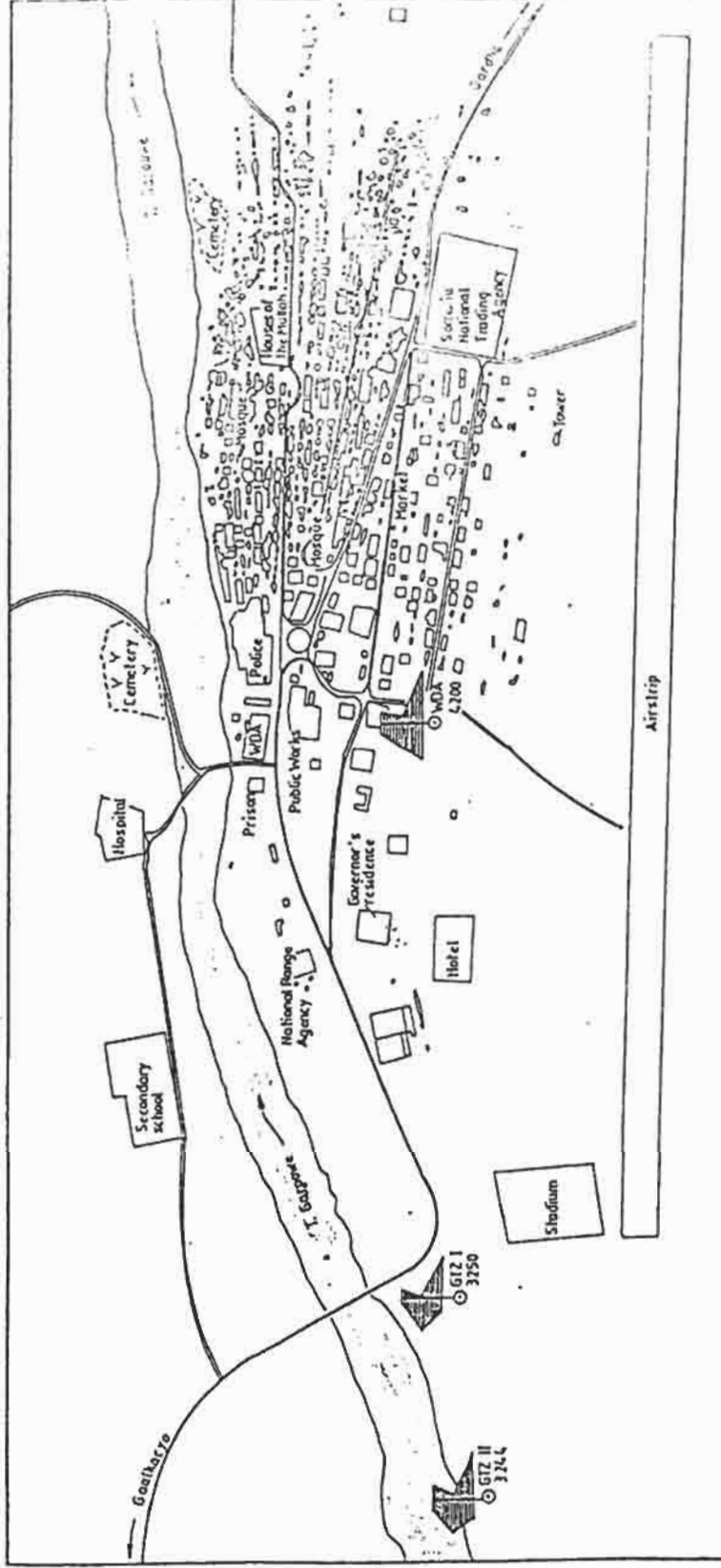
10. The GTZ survey of 1984 identified and made measurements on 9 operating drilled wells, 12 dug wells and 1 small spring in the area of Garowe. Most of the City of Garowe buy water from tanker trucks to fill their private barkads or use free water from shallow public wells. Water sold to truckers is supplied by the one working borehole located in the outskirts of the city. The well is run by a technician of the Water Division. The water is sold to the truckers at Ssh 5000/m³. In addition, the trucker has to provide 5 litres of diesel oil to the well to cover the cost of operating the generator. The well is operated only when there are customers.
11. While most of the city houses follows an acceptable street alignment, no houses are presently receiving piped water. An urban water distribution project which has been envisaged by the former administration is not, actually a first priority.

IV. Price of Water

12. The price of water in Garowe is Ssh 1400 to 2000/drum of 200 litre i.e. about Ssh 7000 to 10,000/m³ but the price is considerably higher when the water is delivered in rural areas. During the dry season the water truckers can deliver at a distance of up to 60 km of Garowe. While the price of water in the city of Garowe still remains moderate in comparison to the price paid in some rural areas, some users in particular, the displaced people, consider that the increase of price has been too important. In the pre-war period, the price of water supplied by the Water Agency was reported to be only Ssh.1000/m³ i.e. one fifth of the present price but of this time the selling of water was highly subsidized. Actually, a large part of the population of Garowe has the possibility to use freely the water of public shallow wells. The consumption of private wells including new hand-dug wells, is unknown but might represent 40 to 50% of the consumption of the city of Garowe. This explains the decrease of the water trucking activity in recent years. One main trucker was reported to sell about 100 barrels/day as opposed to at least 150 barrels/day before the war. There is presently no serious problem of water supply in Garowe but an improvement of the water quality is required.

GAROWE

Drilled Wells - Location and Water Quality



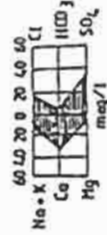
GAROWE — WATER QUALITY MAP

LEGEND

○ DRILLED WELL

— PAVED ROAD

— UNPAVED ROAD



NOTE: E.C. values adjacent to water source in umbos/cm



B. BURTINLE

I. Location

1. The small town of Burtinle, located near the Ethiopian border, 110 km South of Garowe on the Garowe-Galkayo paved road, has registered considerable fluctuations of population in recent years. Following the evacuation of Galkayo, the capital of the Mudug Region, in 1981, the town of Burtinle became temporarily the capital of the Mudug region. With the mass arrival of displaced people the population of this small town almost doubled. The mission was not able to obtain reliable official population figure even for the pre-war period, but presently, it seems that about 1000 families live in the city which can represent about 9000 inhabitants. One local relief organization estimated the number of displaced families to about 400 to 500 i.e. about 4000 inhabitants.

II. Water Supply

2. At present, Burtinle has one public borehole 230m deep, built by the Water Development Agency in 1983. The characteristics of the well are as follows:

Total depth:	224m
Surface water level:	190m
Yield:	5m ³ /l
Quality:	EC 4340 micromhos/cm
Reservoir:	85m ³

The operations of the well are reported to be unsatisfactory. The well is equipped by an old Lister Peter diesel generator with a normal capacity of pumping about 50 barrels/day i.e. about 10m³/day. In fact, the yield of the well has progressively declined in recent years probably because of silting up and the actual yield is only 5m³/day. The pump operates usually during a period of 15 to 30 minutes after which the yield decreases considerably. Presently, the water is pumped about 10 times for a period of 25 to 30 minutes each day i.e. total operating time of 5 hours/day.

3. While the well was formerly a public well, it was not clear who is now operating the well. Since the production is insufficient for the needs of the population and animals, water is also supplied by owners of private boreholes. Apparently, the caretakers of the well also sell water from their private barkads.

III. Water Price

4. The water is sold at SSh 3000 per drum (200 litres) i.e. the equivalent of SSh 15,000/m³. During the mission visit (wet season), the caretakers of the well were selling about 20-25 barrels per day i.e. about 5m³/day.

During the dry season, since there is always a concentration of cattle around the existing wells the total sales of water, including those of the private barkads is estimated to 60 barrels/day i.e. 12m³/day.

IV. Other Water Points

5. In several occasions, Burtinle tried to improve its water resources but these projects did not materialise or led to poor results.

Second well

In 1975, an attempt was made to drill a second well but due to technical difficulties encountered during the drilling operation, and very likely lack of expertise by the drilling contractor, the drilling was abandoned.

Chinese well

A third well was drilled for the Chinese road construction but the water produced was of poor quality and low yield. The local authorities were not associated with the drilling and the characteristics of this well are not known. The well was closed after the construction of the road.

GTZ Well

GTZ started the drilling of a new well in 1987 but the operations were abandoned due to insecurity problems.

V. District Development Committee request

6. The local community requested, as a first priority, for:
- one more borehole in the city of Burtinle;
 - the chlorination of the existing reservoirs;
 - in a second phase, the construction of a water pipe system.

VI. Comments

Since no maintenance has never been provided to the existing well since its construction, there is now an urgent need to clean the well and provide necessary maintenance both to the pump and the generator and eventually adapt the size of the pump to the well yield.

One member of the mission, former engineer of the Water Development Agency, considers that it should be possible to tap a deeper aquifer. However, some complementary technical investigations are necessary to evaluate the possibility of increasing the depth of the existing well since there are risks that the existing well may collapse during this operation. Perhaps GTZ regional office which own a well-camera to inspect deep boreholes can assist in this survey.

If this solution is not feasible, the drilling of one borehole to 300m with complete case and equipment will then be necessary. Some office equipment and maintenance tools will also be necessary for the small Water Administration of the District of Burtinle to perform regular inspection and routine maintenance operations of the public wells and establish statistical records of the production and consumption of water of each public well of the District.

C. KALABAYR

I. Location

1. This small town (2000 to 3000 inhabitants) located 66 km South of Garowe and about 40 km North of Bu-dinle, on Galbeib-Garowe, the "Chinese road", has also registered a rapid increase of population because of the arrival of displaced people from the Mudug Region, Mogadishu and also from the Shabelle region.

This town is an active centre of concentration of herds which are loaded on trucks to be exported to the Gulf states through the port of Bosasso. There is no borehole in the city. The Chinese tried to drill bores for the construction of the road but these attempts were unsuccessful. All the water is provided by rain-fed barkads. Due to the important concentration of animals, there are about 50 private barkads in the area. There are also a good number (about 150) of natural shallow underground reservoirs. The average capacity of one reservoir is about 1500 drums i.e. 300m³.

During the rainy season, these water reservoirs system of the area of Kalabayr supplies adequately the demand of:

5000 camels/day (1 drum/camel per drink every 15 days)
 20,000 goats & sheep/day (1 litre per goat/sheep every 5 days)
 1000 cows/day (10 litres every day)

During the dry seasons all the barkads and reservoirs are dry. Most of the herds, in particular, the big herds have to move North to the Nugal Valley still served by shallow wells. Only one third of the cattle population remains in Kalabayr. The water needed for this sedentary population and herds is tankered from Garowe.

II. Water Price

2. During the rainy season, the owners of private barkads sell their water at about Ssh 5000 per drum of 200 litres i.e. Ssh 25000/m³.

During the dry season when the water has to be tankered from Garowe, the price can reach up to Ssh 50,000 per drum i.e. 10 times the price asked during the rainy season. These sales are however, very limited since few families can afford to pay such prices. This explains the importance of the seasonal migration of both people and animals towards the Nugal Valley.

III. Water Quality

2. Since most of the water is provided by barkas and natural underground reservoirs, the quality of water is inadequate. Cases of diarrhoea among adults and diarrhoea with respiratory infection among children are frequently reported. Malaria due to the presence of numerous natural reservoirs is also a main illness of the region. The community has been severely stricken by the recent cholera epidemic.

Because of these deficiencies, the human consumption is very low, about half a drum (100 litres) for a family of 8 to 9 persons i.e. about 12 litres/capita/day. The consumption is even lower during the dry season.

Since hydrogeological conditions appear similar to those of Burtinle, the drilling of a deep borehole might be envisaged. However, considering the unsuccessful attempt of the Chinese Contractor during the road construction, some preliminary engineering studies and surveys, similar to those recommended for Burtinle should be first undertaken for the town of Kalabayr but also, if necessary, in some major grazing areas of the region.

D. XEMUR

I. Location

1. Xemur is a very important grazing area located about 60 km north of Garowe and well known for the good quality of its grass. During the visit of the mission, several thousands of animals, including a high population of camels, were grazing around this water point.

II. Water Supply

2. An 80 m borehole was drilled in 1988, in the Taleex formation, but the yield of this well is low. A local NGO, Ecumenical Development Group for Somalia (EDGS) undertook the rehabilitation of the well in 1988. The well was equipped with a solar pump, concrete tank, troughs, and a guard-house. The installation was undermined by a recent important river flow. At present the well has been uncovered, the pump and solar panels taken away. The water is now provided from a shallow well (7 metre depth - water level 3m) located in the Togga and water is drawn the traditional way with ropes and buckets.

The quality of water is acceptable EC - 3400 micromhos/cm. The well is used also for the consumption of a small semi-nomadic community of about 100 persons.

III. Comments

3. According to elders, the Xemur region is one of the most important and best grazing area of the Garowe region. Despite a significant increase of the herds in the areas, since the beginning of the civil war, no signs of overgrazing have been registered. If improved, the Xemur water supply system can play a useful role, by relieving, during the dry season, the grazing pressure on other neighbouring areas where grazing should be reduced. The next well is said to be about 80 km of Xemur. It has not been possible to obtain reliable information on the level of consumption of water at the well but the demand is certainly extremely high. The elders representatives estimate that about 100,000 camels transit every year in this area of 60 km around the well and 1,000,000 of sheep and goats plus or important but unknown number of semi-wild donkeys.
4. The existing water supply is obviously insufficient for livestock demand and some complementary investigations are needed to evaluate the optimal water supply level of Xemur or investigate other sites. The construction of an infiltration gallery or infiltration well along the Xemur Togga might be an acceptable solution. these complementary investigations should be included in the list of high priority actions to be undertaken under the envisaged water rehabilitation programme of the Nugal Region.

E. SUNJIF

I. Location

1. Sunjif is a small city 62 km north of Garowe which developed rapidly after the construction of the "Italian Road", Garowe-Bosasso, since it became a centre of concentration of livestock to be trucked to Bosasso port for export.

The population is estimated about 6000 inhabitants of which an important number (about 30%) are persons displaced by the war who came mainly from Mogadishu and Galkaiyo. Most of the economic activities are related to livestock, grazing, trading and trucking animals to Bosasso. Some limited rain-fed market-gardening has developed along the togga or at proximity of the wells. (About 20 farmers/herders cultivating 1 to 3 hec. fields). The trade and trucking business has generated some hotel, restaurant activities along the main road. A number of these restaurants are operated by widows displaced by the war.

The city has one primary school, one intermediate school and one health post.

II. Water Supply

2. There are several private shallow wells in the village but the main source of water was expected to be provided by three boreholes. Two were built by the Italian contractor in charge of the construction of the road, but the production of these wells were stopped later on because of the alleged high consumption of fuel and also probably some technical problems. A third borehole was equipped with solar pump in 1991 by a local NGO, Ecumenical Development Group for Somalia (EDGS).

Borehole No. 1

3. The first borehole was drilled by the Italians in 1977 for the construction of the road. This 75 m well was reported to have a satisfactory yield but since it was a public well, no maintenance has been made after the collapse of the regional administration. The well operations stopped during the war. The pump is still in the well but no investigation has been done so far to identify the course of the failure. Some attempt to operate the well has been done after the construction of the road and the departure of the road contractor but in this case also, the consumption of fuel was judged too high and the water production was abandoned. The regional office of GTZ might provide useful assistance for inspecting the well and identify the cause of this failure.

Borehole No. 2

4. This borehole, similar to the first one, was also drilled by the road contractor in 1987. The well is equipped with a 20 m³ reservoir. The water production of this well was adequate 600m³/day and of good quality. The water was used mainly for livestock but also because of its low salt content for some small market gardening around the well. This public well faced engine problems in January 1990 and the well was abandoned. Due to the lack of mechanics and management authority, no maintenance was done and pipes are now very corroded. The mission was not able to obtain precise information on the characteristics and conditions of operations of this well. It is very likely that the well was operated only by the contractor for the road construction with limited involvement of the local population. If necessary, information on this well can be obtained from the road contractor or the supervision team of the project TECHINT MILANO.

Borehole No. 3

5. This relatively new well is the main water source for the city. The well is equipped now, with a generator Ansaldo of 40 kva. Previously, the well was equipped with a solar pump installed by EDGS in 1991 but the power system was too weak. It takes almost three hours to fill the water tank of 27m³ as opposed to 1 hour with the former generator. The solar power system has been abandoned to be replaced by a diesel fuel generator. As for the Xemur well, the mission was not able to obtain reliable information on the fate of these solar panels.

During the visit of the mission, this unique well was not operating correctly because of a valve problem in the generator and a failure in the electrical command panel of the pumping system. As a result of this deficiency in maintenance, the production of water in Sunijif is very erratic and some supply of Garowe water by tankers is necessary.

III. Road Erosion Protection

6. Over-floods of the last two rainy season have created serious damages on a 2 km section of the right embankment of the road Garowe-Sunijif. Now urgent rehabilitation works are needed, as well as major consolidation and settlement of the drainage system on this section. Without adequate protection similar floods can rapidly, totally destroy the road, stopping totally the truck traffic between Garowe and its unique port during the rainy season.

IV. togga Bilil bed dredging

7. Following the heavy flood of the 1983 rainy season, the togga Bilil has been modified naturally. The floods have created a new earth embankment on the right bank of the river and the water flood during the rainy season is diverted to the unfertile plain on the left bank of the river. As a result, the rain-fed agricultural areas located in the plain on the right side of the river are not irrigated any more.

In this case again, some public work equipment is needed to destroy the embankment created by the last flood on the right bank of the togga to allow the river water to irrigate again the small market gardening area of the left bank of the river.

V. Water Demand

8. The concentration of livestock waiting along the road to be loaded in trucks for Bosasso, fluctuate considerably and it was not possible for the mission to obtain on the spot reliable information on the level of water consumption of the city. Part of the herds drinking Sunijif water belong to semi-pastoral farmers who cultivate rain-fed farming areas and need to stay in the village until the crop. Like in many villages of the Nugal Region, it is only during the dry season that these farmers adopt a transhumant system of production and move to grazing areas where water is available.

VI. Water Price

9. As in many villages of the Nugal region, the water is sold usually at Ssh 5000/drum of 200 litres during the wet season up to Ssh 60,000 per barrel when trucked from Garowe. Because of the water shortage, the population of camels which drink daily to the water points of the Sunijif region (village and surrounding wells and barkads) is limited to about 5000/6000 drinks per day or about 800m³/day. Consumption of water for sheep and goats is estimated about 300m³/day and cows, donkeys about 50m³. Considering the dilapidated state of the public wells most of the water requirements are supplied by the private wells and barkads.

VI. Comments

10. The satisfactory conditions of operations of existing wells before the war confirm that the water is available in Sunijif and in at least one well (Italian Well No.2) the water quality is very satisfactory for human consumption and market-gardening.

The rehabilitation programme should include:

- i) an immediate repair programme including:
 - emergency repair of the existing well no. 3 (repair of the generator and electrical system)
 - investigate problem of the pump of this well and eventually change the size of the pump.
 - ii) pull-out the pumps of well no.1 and 2 drilled for the road construction, replace at least one of the pumps and install the adequate power system to provide a minimum security level in the water supply. If a solar pumping system is installed, verify that the solar powered installed is adequate.
11. The example of Sunijif confirmed that the availability of water is not enough to guarantee the sustainability of the rehabilitation of public water supply facilities. A small unit of qualified technicians is necessary at the regional/district level to supervise periodically the good operating conditions of the public wells of Sunijif. The Elders Committee should appoint an operator to provide routine daily maintenance, protect the installations and control the water consumption, collect water fees and liaise with the Regional Water Division for the execution of major repairs.

I. QARXIS

I. Location

1. The village of Qarxis situated about 170 km east of Garowe is located in the middle of a grazing area of acceptable quality. The village counts about 150 dwellings i.e. about 1,500 to 2,000 inhabitants. The population is for a large part composed of displaced people from the Shabelle and Mogadishu regions. Practically all the population is living from livestock. During the dry season, most of the population move to Eil where they usually have relatives, some of them assist in fishing.

These displaced people appear very dynamic and considering the number of new houses in construction, intend to settle in Qarxis Region when water is available. The periodic migration to Eil is accepted as a necessity but also resented as a painful constraint. During the severe drought of 1991/1992, all the population had to abandon the village for Eil.

II. Water Supply

2. There is no public borehole in Qarxis. A well was drilled in the 1950s before the installation of the actual village but nobody remembered its characteristics and yield. The Italian contractor who built the Garowe-Bosasso road proceeded some test but abandoned the drilling. Apparently, the drilling depth was insufficient to reach the water level.

The water is provided during the wet season by about 20 barkads, all private.

III. Water Demand

3. The size of displaced families is important, frequently 15 people per dwelling, and the consumption for such a family during the wet season is about 2 barrels/day i.e. 25 to 30 litres/capita/day; during the dry season the consumption has to be reduced by almost 50%. This is a reason why these seasonal migrations to Eil take place.

The livestock consumption of water vary considerably according to the season. During the wet season when grass and water are abundant, the water demand for public wells is not very important. It is estimated about 500 camels drinks/day i.e. 75m³/day. During the beginning of the dry season, when few water points are available, the demand for water in Qarxis can reach: 4000 camel drinks/day; 15000 sheep/goat drinks and 500 cow drinks i.e. a total of about 1650 m³/day for the whole livestock population of the area. When the reserves of the private barkads are exhausted, most of the herds have to move to the Eil area (80 km) where the water is more abundant. Few people remain in the village. They usually buy water from truck tankers from Eil.

IV. Water Prices

4. During the wet season, the price of water sold by the owners of the private bakads is about Ssh 3000/drum of 200 litres. During the dry season, since a large part of the population with livestock leave the area. The sale of water is then limited only to the few residents of the village, mainly displaced families including widows, but the price of water is limited to Ssh 10,000/drum.

V. Comments

5. Without adequate hydrogeological information, it is not possible to assess the water availability of Qarxis. A repertory of the available hydrogeological studies for this area should be established first and complementary surveys conducted. If justified another solution would be to develop water supply of the Bugato site, located 35 km of Qarxis, where good water is available.

G. GUBATO

I. Location

1. Due to difficulties of access and time constraints, the site of Gubato was not visited by the mission. Gubato is located in the Eastern part of the region, about 150 km from Garowe at a distance of about 50 km from the coastal city of Eil. A well has been drilled in the 1960 but technical details on the well are not available. Local NGO, EDCS visited the site and found the pump column stitched in the borehole and very likely not repairable. Local population remember that good water was found at a depth of about 60 metres.

II. Comments

2. More information is needed to evaluate the potentiality of this well. If as said, by local population, the yield and water quality were satisfactory may be this site can be selected to construct a new well which can serve not only the Gubato community but also relieve the pressure on the Qarxis area, 35 km from Gubato, during the dry season.

II. BARWIN

I. Location

1. Barwin is an isolated well located in an arid grazing area located about 110 km north-east of Garowe and about 80 km from Eil

The Barwin well was drilled in 1981 in the centre of this grazing area. The well has a depth of 222 m and a surface water level of about 181 m. ED-18 built a 20m³ concrete water tanker in 1993 and installed a new power generator. Here again the pumping capacity is too low considering the depth of the well. The potential of the aquifer might also be a problem. The water flow decrease significantly after about 30 minutes of pumping and after 1 hour of pumping the water reserve of the well is exhausted.

2. The water, very salty, EC = 14280 micromhos/cm, is improper for human consumption and also for sheep and goats, only camels accept such high salinity. About 100 camels were using the well daily at the time of the visit of the site.

II. Comments

3. The operation of this well has never been satisfactory. Nomadic herders of the area have to rely on the few surface water sources available. Complementary surveys are necessary to identify if the rehabilitation of some surface water source in the area is feasible and justified.

I. BUDINBUTO

I. Location

1. Budinbuto is a small village of about a dozen houses located a few kilometres from Barwin in the middle of a dry and rocky grazing area. The residents of the village have built something at high cost for their own needs, five covered concrete barkads of 150 to 300m³ capacity. These private barkads are well maintained and water can occasionally be sold to nomadic herders but the majority of the water is consumed by the owner of the barkad and his relatives.

II. Comments

2. Create a public well in this site, if feasible, might bring tension with the private owners because of the importance of expenditure already done in the private barkads.
3. Considering the limited resources of this grazing area during the dry season, the improvement of water resources in this area is apparently not a first priority. This issue should be addressed in the framework of the envisaged integrated land-use/water supply master plan of the region.

3. KALAGAWSOMADOW

I. Location

1. This site, frequented by nomads only, is located in a totally deserted grazing area about 30 km from Eil along the road built for the Konoco oil exploring company. The site is important since the next permanent well is located at Hasbahale about 50 km from Kalagawsomadow. Actually, since the well is closed, the livestock has only two sites of permanent water, Hasbahale and Eil, a distance of about 80 km. The well was also considered as an important drinking point for the camel caravans supplying the isolated villages along the coast, South of Eil.

In the past, the site had two wells:

Well No. 1

2. The well was drilled by Konoco, the oil exploring company. The well was reported to provide water of good quality with a good yield. The well was left fully operational by the contractor, after the construction of the road, in 1990, and equipped with a hand pump. The hand pump was broken in 1991 and has since not been repaired.

Well No. 2

3. A second well in the area was also drilled by the American oil company but for reasons unknown, the well was sealed after the departure of the company. The water quality and yield were said to be similar to the well no. 1.

II. Comments

4. The repair of the well no. 1 (hand pump broken) is a very simple rehabilitation works and should be one of the first work of the rehabilitation programme of the Eil district.

K. DONGORAYO

I. Location

1. Dongorayo is located on the northern border of the Nugal Region, about 120 km north of Garowe on the main paved road Garowe-Bosasso and about 40 km from Qarxis. Since 1989, Dongorayo is the capital of the Dongorayo District which include 6 sub-districts (beels). The population of the town of Dongorayo is estimated to about 8000 to 9000 inhabitants of which about 20 to 25% are displaced families, mainly from the Mogadishu area. As a district capital, Dongorayo is equipped with one health post, one primary and intermediary school, plus coranic schools. The economic activities are very similar to those of Sanjif. Livestock is the dominant activity, with some limited rain-fed market gardening. The city is also an important centre of concentration of livestock to be trucked for export to the port of Bosasso. This business has generated the creation of new restaurants along the main road, as well as other commercial activities.

II. Water Supply

2. Dongorayo has now one public borehole in operation and about 10 private barkads. The well, drilled in 1988, is about 280 metres deep with a water table at 220 metres. As in many other towns, the operation of this public well is unsatisfactory due to pump problems. Two pumps have already been replaced, the actual pump is working but is too weak to provide adequate yield. Actual production is only 90m³/day while the original pumps were providing 200m³/day. For the time being, the power generator equipment is working satisfactorily but no spare parts are available. The water quality is low and at the limit of acceptability for human consumption (EC - 5260 micromhos/cm). During the wet season the private barkads owners have no problems to supply their own herds. The reserves of barkads and wharos are also sufficient to supply water but a poor quality during a period of about 1 month to six weeks during the dry season until these facilities are empty.

During the dry season when most of the neighbouring surface water sources are dried the demands for the public well of the village is very high considering the important concentration of livestock for exports in Dongorayo.

The well operator evaluated this potential demand to about 5 times the actual yield of the well i.e. $5 \times 90 = 450\text{m}^3$ per day.

III. Water Price

3. The District Committee has fixed the maximum price of water at the public well at Ssh 4000/drum of 200 litres. Exceptionally in Dongorayo, probably because of the existence of a public well, the price is the same for the whole year. The price at private wells or baskads is Ssh 5000/drum and is also the same during the wet and dry season.

In Dongorayo, probably largely due to importance of displaced families, the price of water is strictly controlled and lower than in other villages of the region. According to the District Commissioner, only 30% of users pay the maximum price. For the poor and displaced families, the supply of public water is free. Nomads who bring their livestock to Dongorayo for exports do not pay for familial drinking water.

IV. Comments

4. What Dongorayo needs is:
- i) a new stronger pump to adjust water supply to the demand
 - ii) the rehabilitation of the water pipe system which will save a return trip of $2 \times 3 = 6$ km to collect the water at the public well. These easy repairs should be included in the first phase of the water supply rehabilitation programme of the Region of Nugal.

Piped Distribution System

5. The town disposed of a 2.5 km pipe system which connect the well to a reservoir located in the centre of the city. This system do not operate due to leaks in the corroded pipe system.

Soil Erosion

6. During high rainy season, the city of Sunijif face risks of floods by the overflowing of the Togga Bilil. The construction of a protective embankment of the eastern bank of the Togga, completed with the digging of several flood diversion channels usually protect efficiently the city from the river floods. During the last two rainy seasons the abundant rainfalls have generated important over-floods of the river which have totally washed out the protective embankment and silted the flood diversion channels. This protective embankment and all the associated river diversion channels should be rebuilt in order to stop the erosion of this valuable grazing and gardening areas and protect the town construction and road facilities including the vital paved road of Garowe-Bosasso.

I. USGURE

I. Location

1. The small village of Usgure, located in the northern part of the Nugal Region 160 km from Garowe, is isolated in the middle of the dry and rocky northern plateau which surrounded the Nugal valley. The village includes about 100 houses i.e. about 1,000 persons. The only activity is livestock production. There are three livestock production systems in the area:
 - i) transhumant production by settled farmers
 - ii) a small market-gardening production by sedentary residents of the village who also own milk-cows and sheep, and who do not move except in exceptional drought period (like in 1991)
 - iii) traditional nomadic pastoralism
2. When there is water a maximum of 1000 camels and an average of 10,000 sheep/goats and plus some cows frequent daily the grazing area and its water supply system.

II. Water Supply

3. The village was previously equipped with an old SUC1 wheel balance pumping system which failed in 1980 and has never been repaired. The metallic 20m³ tanker has been knocked down by the wind, all the pumping and piping system is totally corrugated. The well depth was 284 metres and the water table level 234 metres. The water quality of the well was reported as salty. In the late 1980s, the village tried to drill a new well but the drilling was unsuccessful.
4. The water is provided now by a system of 25 private barkads plus one large wharo of about 50 m x 50 m x 1.5m = 3,750m³ which supplies water only during the rainy season. This system provides water for about one month to six weeks during the dry season. Normally during the dry season, the sedentary farmers purchase the water from truckers to fill their barkads, while nomads and transhumant producers move to the Nugal valley or to the Eil region where shallow wells are available. In some cases, the transhumant farmers send water trucks directly to the grazing areas. During the severe drought of 1991, about 1000 cows died of thirst, malnutrition or diseases in the grazing area of Usgure. This year, the whole population was obliged to leave the village for either the Nugal valley which is about 100 km away, or the Eil region, about 80 km away on the coast.

III. Water Price

5. Water at the public wharo is free, but the water of the private barkads which is of better quality is sold at a price of about Ssh 5000 per drum. During the dry season some water is imported by trucks at very high prices (more than Ssh 50,000 per drum) but this water is only for human consumption and for the limited permanent livestock of cows of the village. The transport of water to the grazing areas is said also to be very high but no reliable figure has been provided to the mission.

IV. Comments

6. In the short term, the only evident solution is to increase the storage capacity of surface water. The deepening of the existing wharo might extend the availability of water for a period of up to 6 weeks after the rainy season and reduce the length of the transhumant period. This work should be associated with a deepening of the water access channels to the wharo. In order to limit the pollution in the wharo, the digging of small drinking troughs at the periphery of the wharo should be made.
7. In the medium term, the collection of available hydrogeological data on the Usgure region is necessary to assess the water potentiality of the area. If justified, the drilling of a new well might be envisaged.

M. SALAFILY

1. This site is isolated in a depression located about 12 km east of Garowe. Surface water accumulate during the rainy season. The water is of good quality and truckers come regularly during the wet season to pick up the water for the small market-gardening in the outskirts of the town of Garowe. Nomads occasionally frequent this site.
2. Water truckers want this site to be artificially deepened and a small pump installed.

N. AWERCZEKUS

I. Location

1. This small, isolated village, located 45 km south east of Garowe has a population of about 1000 inhabitants but the dispersed semi-nomadic population is said to be equivalent to the population of the village. The village has no health centre but a small coranic school. At the time of the visit of the mission, at the end of the rainy season, the elders representative evaluated the livestock population grazing in the area (20 to 30 km around the village) to about: 5000 camels, 9000 sheep and goats, 1000 cows.
2. There is no serious problem of water during the rainy season. But during the dry season the living conditions are very difficult. Human consumption is reduced to the minimum and livestock sent to the Nugal valley. In 1991, during the drought period, the whole village emigrated to the Nugal valley.

II. Water Supply

3. There only borehole of the village is not operational. The well has a total depth of 140m and the surface water level is at 70m. The power system, a Lister diesel engine is in acceptable condition but no spare parts are available. In 1988, the pump broke down and fell into the well, another pump was installed but too weak and the yield was insufficient. A solar pump system was installed in 1989 but stopped working after 4 months. Before its break down in 1989, the well produced about 800m³/day of water of excellent quality. Some limited gardening was developed around the borehole by the well operator.

The water supply is now provided by a system of 25 private barkads and a large private wharo. This water supply system is adequate only during the rainy season.

III. Water Price

4. During the wet season, the price of water sold by the owners of the private barkads is about Ssh 5000/drum. During the 1 or 2 months of the dry season, when some limited amount of barkads water is still available, the price may raise up to Ssh 50,000. When water has to be imported by water tankers from Garowe, the price was reported to increase up to a maximum of Ssh 70,000/Ssh 100,000 per drum, but this situation was exceptional (drought of 1991). During the dry season, the consumption is reduced to a maximum of about half a drum per day for a family of 10 persons. Livestock of the village is sent to the Nugal valley.

IV. Comments

5. The replacement of the pump is an easy operation which should be included in the list of the first priority works of the rehabilitation programme of the water supply of the Nugal Region. The deepening of the existing wharo is also recommended as a normal periodic maintenance operation.

O REEBANTI

I. Location

1. Reebanti is a small village located in the centre of an important grazing area about 80 km south-east of Garowe. The population of the village is estimated at about 100 families. There is a small primary school but no health facilities and no veterinary services in the village. All the families own livestock. According to the elders, the importance of the livestock of the village is as follows:

Goats	about 4000
Sheep	about 4000
Cows	about 600
Camels	less than 100

2. At the time of the mission visit (end of the rainy season), the total frequentation of the grazing areas was important and requests for animal drinks including nomadic herds at the barkads was estimated by the village elders at:

Camels	1000 drinks/day
Goats/sheep	4000 drinks/day
Cows	600 drinks/day

i.e. a total of about 150m³ of water per day. The frequentation of this grazing area is limited by the lack of adequate water supply, even in the wet season.

3. Some residents of the village are also involved in small rain-fed farming, and produce beans, sorghum, tomatoes, sweet potatoes for the village community.

II. Water Supply

4. There is no public well in Reebanti. The water supply system is limited now to 20 private barkads which operate only during the wet season and extended to about one month maximum at the beginning of the dry season depending on the storage capacity of the barkads. During the dry season, the herds leave the area for the Nugal valley where shallow wells are available. During the last 10 years the village has been abandoned completely 4 times during the dry season.

III. Water Price

5. During the wet season, the owners of the private markets sell their water at the price of Ssh 5000 per drum of 200 litres, a normal price for the region.

During the dry season, the water has to be imported by truck tankers and is sold up to Ssh 60,000 to Ssh 80,000 per drum.

The consumption of a family of 10 persons is estimated to be 1.5 drums per day during the wet season i.e. about 300 litres. The consumption is reduced by about 50% during the dry season.

IV. Comments

6. There is no well in the village and no wharo. No attempt to drill a borehole has ever been made. The residents of the village expect better water facilities. More information is needed to assess the underground water availability in the area. The opening of a new well will certainly increase the sedentary population and also increase the grazing demand on the range. Reebanti, with its good grazing potentiality, is a typical case where the improvement of water supply can attract important herds. So the impact of water availability on land use should be carefully and simultaneously assessed. This analysis should be one of the high priority studies to be undertaken under the authority of the new Water Division to be created under the Development Committee of the Nugal Region. (see Annex A)

P. HASBAHALE

I. Location

1. Hasbahale is a small village of an estimated population of 3000 inhabitants but with only half (150 dwellings) concentrated in the village. The village is located on a dry plateau in the middle of the Nugal Region, about 165 km from Garowe and 85 km from Eil on the coast. The village is equipped with one primary school, one health post and one MCH.

Some limited rain-fed farming is done by few families who usually own a small herd of cattle, sheep and goats.

II. Water Supply

2. The water system include:
 - a well with a total depth of 280m, a water table level of 150m. The water is of good quality.
 - 30 private barkads
 - 1 wharo (75m x 75m x 1.5m = 8500m³)

The deep well was built in 1983. It is connected to a 23m³ water tank and powered by an old Lister Peter Generator. It is possible that the construction of the well was not done adequately and the well driller missed an aquifer, since the old pump de-waters the well in about one hour. The old pump broke down in 1989, a new pump was installed but the new pump is too weak and the daily yield is only 15m³/day i.e. six times lower than the yield obtained with the old pump.

III. Water Price

3. As a result of the low yield of the well, the water supply is provided
 - i) partly by the public wharo which supplies water mainly to the transhumant and nomadic herds grazing in the area
 - ii) partly by the private barkads which provide water first to the herds of the owner, but also to the herdsmen of the village who do not have barkads and also occasionally to nomadic or transhumant herds.

During the wet season, the marketed water is sold at Ssh 5000 per drum. During the dry season, the marketed water price rises up to Ssh 20,000 per drum.

Very exceptionally, the water has to be trucked by tankers from Eil Region, but prices are usually considered too high for most of the families of Hasbahale (about Ssh 2,000,000 for a 35 drum truck, i.e. 7m³ or about Ssh 60,000 per drum) and then the water purchase is limited only to human consumption. Usually, during long dry seasons, the population of Hasbahale and their herds migrate to the Eil region. This happens, in average, every three years.

IV. Comments

4. The problems of Hasbahale are very similar to those of Reebanti. The most obvious rehabilitation action is to deepen the existing wharō. This work can be undertaken rapidly and at a reasonable cost, if the necessary equipment is available. The Water Division of Garowe should contact the NGO Africare, who have already successfully undertaken such rehabilitation works in the Sool Region.
5. Before considering the construction of a new well, some additional technical investigations are needed in order to evaluate the causes of the rapid de-watering process of the existing borehole. However any water supply project should be integrated with a comprehensive range development/preservation project.
6. The case of Reebanti is similar to many other grazing areas of the Nugal Region, it confirms the mission's opinion that an integrated land-use and water master plan is needed to define the sustainable livestock population of the grazing area and improve the livestock food supply through the creation of permanent and rotational grazing areas and drought reserves, ranger users associations, stock water ponds and fodder production water. These studies should be undertaken under the authority of the Nugal Regional Water Division.

Q. EIL

I. The Site

1. The small city of Eil, distance about 200 km from Garowe is a coastal city located at the mouth of the Nugal valley on the coast of the Indian Ocean. The city itself is perched about 50 metres high on the scenic limestone cliffs which dominate the Nugal River. The centre of the city is about 6 km off the coast and off the Eil-Baday settlement where a small community of fishermen live. Eil is the centre of a district which include 8 beels. The population of Eil is estimated at about 20,000 inhabitants of which about 3000 live in the fishermen's village of Baday or in the neighbouring area. The access to Eil is very difficult. The northern access is by a dangerous stone road which falls down sharply from the Iyax plateau which dominates the left bank of the togga Nugal. A similar difficult access exists on the southern bank of the river through the limestone cliffs of the Haud Plateau.
2. The main geological formation of Eil area is a massive limestone formation of the "Hafun Series" which outcrops along the togga Nugal and overlies the Karkar formation. The banks of the togga Nugal are constituted of alluvial materials.

II. Water Resources

3. There are three water sources in the area of Eil: the springs, the shallow aquifer along the coast, the river Nugal.

The Springs

There are four springs inventoried in the area of Eil:

- i) A small spring of a yield estimated at about 0.1 litres/sec which sweeps at the bottom of the cliff, west of Eil. The water is of good quality (EC = 2690 micromhos/cm) but the spring is usually not used because of its low flow.
- ii) The Karin spring situated on the slope of a cliff, 5 km East of Eil about 5 metres above the sea level. The yield is only 0.5 litre/sec. The water is of fair quality (EC = 3350 micromhos/cm) but because of the abundance of water of better quality this spring is not much used.

- iii) A third spring with a temperature of 38 degrees exists also about 1 km E of Eil at the base of the alluvial terrace which dominates the togga Nugal. The flow of the spring varies with the intensity of rains from 1.5 to 3.2 litres/sec. This water is highly mineralized (EC = 130 micromhos/cm) and is not much used because of its high salt contents.
- iv) The II Dabei main spring is located in the centre of the city. The spring flows out of a base layer of white marls and the overlay of sandstone at the base of the Eil cliff. The spring is subject of large variation of yield between 9 litres/sec and 20-25 litres/sec. The water is of good quality with an EC ranging from 1700 micromhos/cm to a maximum of 2450 micromhos/cm. The average yield of the spring is about 800m³/day minimum. This spring is the principal source of water for the city of Eil.

The water is pumped directly in the natural well created by the flow of water at the mouth of the spring and then sent through a pipe system of about 600 metres to a water reservoir of 25m³ built by EDGS, a local NGO.

4. During the visit of the mission, the water supply system of this spring was not working, due to the following reasons:
- some minor technical difficulties with the generator set.
 - important leaks in the pipe system connecting the spring to the reservoir at the top of the city.
 - the refusal by most of the users to pay the fuel of the generator for filling the main reservoir since important water reserves were still available in the few private wells and barkads of the city. These private wells and barkads were not visited by the mission.

The togga Nugal

5. According to the GTZ report "Water Quality Data Book of Somalia" 1986/87, the togga Nugal benefits a large drainage area of about 25,000 km² before reaching the sea but the water flows vary considerably with the season. Flows are important during the rainy season on a distance of 10-12 km before reaching the sea, but these river flows can become very small during the dry season. Measurements made in 1979 indicate variations of flow at the level of the city of Eil decreasing from about 20 litre/sec during the wet season to only 3 litres/sec during the dry season. In addition, important variations are observed along the river. These fluctuations are caused by the variation in the thickness of the alluvial deposits in the bed of the river and also probably by the variations of the width of the stream bed.

II. Comments

5. In the short term works to generate water security in Eil are limited to:
 - the cleaning of existing wells and backads.
 - periodic maintenance of the existing generator set of the main spring.
 - improvement of the intake reservoir system at the mouth of the spring.
 - replacement of the pipe system which connect the spring intake well to the EDGS reservoir at the top of the city.

6. In the medium term, since abundant unexploited water resources exist in the togga during the flood period, a programme for the storage and use of these water resources possibly through a system of infiltration galleries adjacent to the togga might be considered in the future. This will require the gathering of all analyses, data and studies available on the water system of Eil, and eventually the realization of complementary surveys.

It is only after the most urgent rehabilitation works mentioned above will be completed that the more important works such as the construction of a more adequate urban water supply system might be envisaged.

1. Economic Background

1. Baday is a small enclosed village of fishermen located on the coast, at the mouth of the Nugal river. While some local coastal villagers have always been involved in fishing activities, the village of Baday became famous in the 1970s-80s because of a project unique in its kind: the reconversion of some 5000 nomads dramatically stricken by the 1975 drought in fishing activities. Virtually from the 5000 nomads originally resettled in Baday about half of them could not adapt to fishing life and so returned to their traditional pastoral activities, but 2500 of them finally accepted this reconversion. They now constitute the major part of the population of Baday. During the war, an important number of families from Mogadishu and the Shabelle region emigrated to in Eil and Baday. These displaced people as well as the community of former nomads who abandoned the fishing activities and returned to pastoral activities have always maintained strong ties with Baday and during the dry season when the water supply in the grazing areas becomes insufficient, these semi-nomads move to the Eil. Usually during this transhumance period, one part of the family takes care of the herd, the other one assist their relative fishermen in their fishing activities. It was reported, to the mission, that strong ties exist between the population of Eil/Baday and some villages of the rangelands, in particular, Xarxis and Budinbuto.
2. During the 1970s, the Russians assisted the Baday community by building schools, health centres, workshops and an electricity generating station. They also provided training in fishing and implement a technical assistance programme to the fishing cooperative. After the departure of the Russians, the fishermen community of Baday continued to benefit from the financial support of the Government and various donor agencies (UNDP, Sweden, EEC and Sri Lanka), mainly in the form of boats supply, spare parts and subsidized fuel. However, as soon as the technical assistance programme was stopped, the former fishing cooperative collapsed and was then restructured under a private company, "Baday Company".
3. The fishing fleet of Baday is estimated at about 50 boats of which 9 are out of order. The ownership of part of this fleet remains unclear since the members of the former cooperative reclaimed 34 boats while the Baday Company also claims the ownership of these boats. The other 16 boats have been allocated to individual fishermen or small fishing "companies" by the Somali Development Bank from a grant of the European Commission.
4. Fishing activities are seasonal in Baday. During the monsoon season, the main catches are sharks, while during the dry season, the fishermen concentrate on lobster fishing. Sharks are sold for about US\$ 40 per kg and lobster for about US\$ 24 per kg. Landings are very variable, ranging from 3 tons per day for lobster to 15 tons per day for demersales species and shark

catches. During the rainy season when the sea is too stormy, part of the fishermen move to other fishing ground along the coast to assist neighbouring fishing settlements.

5. In the past, the main market for sharks was Zanzibar, Mogadishu and Mombasa, while lobsters were exported mainly to France, Djibouti, and the Gulf mainly Abu Dhabi. Almost all exports were done through the Government-owned export company, NECFISH which has also the monopoly of delivering export licences. Direct exports from fishermen to foreign fleet was extremely limited.
6. The collapse of the former government controlled system has totally disorganized the export market of Baday since the NECFISH company disappeared and now export licences cannot be delivered. This situation and the lack of adequate surveillance of the Somali territorial waters has incited some foreign companies to operate "illegally" in Somali waters.

II. Most Urgent Needs

7. Many fishing companies and foreign development agencies have shown interest in the development of the fishing activities of Baday but so far, these visits have not been followed by any concrete action and thus worry the Baday fishermen community.

There is a common agreement on the problem and need of the Baday beel.

- i) Suppress the landlocked situation of Eil and Baday in order to widen the market of fish product to the North East region and to exports.
 - This include the improvement of the road and communication system.
 - Assistance in the marketing of the Baday fish products so that they can have access again to European market.
- ii) Improve fishing operations through:
 - the procurement of fishing equipment (nets, goggles and spares for boats)
 - the rehabilitation of the boats maintenance workshops.
 - construction of a fishing jetty.
- iii) Rehabilitate/modernize the former Russian shore fishing facilities. This include the cold storage system, fish processing facilities and the workshops.

- b) Rehabilitate simultaneously the Baday water system and the power station,
- c) Provide technical assistance in the marketing of fish products and in the management of the shore facilities.

III. Water Resources

The Shallow Aquifer

8. The village is served by a system of hand-dug well which taps a shallow aquifer located at the outlet of the togga Nugal. This aquifer is created during the dry season when the flows of the Nugal river are low and the river cannot force its way through the sand dunes of the littoral which are renewed permanently by the sea. An elongated water pond is then naturally constructed in the togga Nugal bed. This pond feeds a small local aquifer which is tapped by small hand-dug wells. The mission visited 8 well sites.
9. During the Russian period a small water distribution system had been built in Baday. The water was delivered by a small metallic piping network to the processing plant, the workshops, the Russian barracks and the housing complex, most of the administrative buildings and the some private enterprises. The system is totally out of order because of lack of maintenance, corrugation or looting. The reconstruction of this distribution network is needed but the basic water supply facilities of the beel should be rehabilitated first.

Well No. 1

10. This well is located near the sea shore, at proximity of the togga. The well is used actually by the local population. The surface water level is about 3 metres and the water depth about 1.5 metres. Water quality is acceptable (EC = 3260 micromhos/cm). Temperature of about 20.4 degrees. The well was formerly covered and equipped with a pump powered by a small generator set. The fuel of the pump was provided by the Russians during their presence at Baday and later by the Government. After the fall of the government because of lack of free fuel, the well was abandoned and the local population went back to the traditional rope and bucket system.

Well No. 2

11. The characteristics of this neighbouring well are similar to the Well No. 1. The well is not covered and needs to be cleaned. The well is also operated with rope and bucket but can easily be equipped with a small pump and a tank.

Well No. 3 and No. 4

12. These wells are closed and dry.

Well No. 5

13. This well, located at proximity of the togga bed, is highly polluted by organic debris and garbage in the well. Water characteristics are the same as the well No. 1 and 2. During the Russian period, the well was used mainly by the neighbouring Russian hospital. Now, because of its pollution, the water is used only for small gardening (tomatoes and water melon) along the togga bed.

Well No. 6

14. This well is located in the middle of the village and during the Russian period was the major source of water for the fish processing activities. The surface water level is about 7 metres and water depth of about 1.5 metres. The EC = 4150 micromhos/cm. Temperature of 21.4 degrees. The water is used for household consumption and for small gardening along the sea-shore.

Well No. 7

15. This well is located also in the middle of the village. Water is salted (EC = 5440 micromhos/cm) with a temperature of about 19.6 degrees. The water is mainly used for farming.

Well No. 8

16. The well is located along the beach. The water is found at about 1.5 metres. The water depth is about 1 metre. The water characteristics are similar to those of well No. 6. i.e. EC = 4140 micromhos/cm and temperature of about 19.6 degrees.

IV. Comments

17. All the economic and social life of Baday is dominated by fishing. The local population is aware of the good potential of this sector and obviously regret the "good old Russian period" when it benefited adequate basic urban infrastructure and important assistance in fishing and processing operations. Since the resettlement of nomads in Baday and their reconversion into fishing activities was a unique experience which caught the attention of the government and the international donor community, the fishing community

has always been fully supported financially. The fall of the former government left this community alone. The foreign market for the Baday product was considerably reduced and income decreased sharply. The combined lack of experience and lack of financial means explains that most of the public infrastructure installed by the Russians dilapidated rapidly.

18. The situation has changed recently with the arrival of displaced population, mainly from the Mogadishu area, who are more exigent concerning living conditions and are ready to promote a new start in the development of the beel. The Women Association of Baday which include a number of former teachers and civil servants, displaced from Mogadishu are very active and formulate pressing requests concerning the betterment of living conditions of the community including the water supply. The improvement of the water supply system is one of the first priority since this improvement can be done at a relatively low cost.

Immediate Action

Two of the togga Nugal aquifer wells can be immediately cleaned, protected and equipped with adequate low yield pumps. Reservoirs should also be provided to facilitate the chlorination of water.

Further Action

In a later stage, the potential resources of the floods of the togga Nugal can be better exploited by the construction of adequate river in-taking arrangement such as infiltration galleries and underground reservoirs. This might also help to promote some seasonal market gardening activity for the population of Baday and Eil.

SOMALIA

NUGAL TECHNICAL MISSION

Water Supply Working Group

APPENDIX F

TERMS OF REFERENCE OF THE:

- Technical Mission
- Water Planners



Terms of Reference
Technical Mission to Nugal Region

Objective

To work with the RDC to prepare a costed, viable programme of complementary standardized activities within priority sectors. The programme should, as far as possible, consist of small-scale quick impact projects which build on local initiatives, and which will kick-start the economy and improve the delivery of essential social services.

Tasks

To review the programme document produced by the regional administration of Nugal and the prioritized sectors and activities agreed between the administration and the multi-donor mission.

Taking the above documents as a starting point, develop detailed project proposals in each sector, including design and costing (capital and recurrent international and local contributions). Cost effectiveness analysis should be undertaken to ensure that the least-cost solution is being proposed. Priority should be given to labour intensive solutions and use of locally available materials and expertise.

Outline the institutional and financial arrangements that need to be put in place to ensure that projects are implemented effectively and are sustainable. Particular attention should be paid to arrangements designed to strengthen the capacity of regional institutions and local NGOs to plan, manage and implement project activities.

Detail any follow-up work needed.

Time Frame

The mission should spend eight days in Nugal (21-29 June 1994).

DRAFT TERMS OF REFERENCE FOR A WATER MASTER PLANNER on Technical Mission to Nugal

The Terms of Reference of the water expert who will be a member of the Technical Mission to Nugal should, among others, include the following points, i.e.

(A) Obtaining Data On:

1. Climate, rainfall, water resources--surface and ground water, geological structures/formations, current use levels and projected future needs, etc.
2. Demographic data--such as present estimated population of region, distribution by districts/villages and towns, demographic trends: pop growth rates, density, migration, urbanisation, etc.
3. System and types of water sources in current use and size of populations served by each system--depending on season and area. It is also important to obtain a rough idea of total quantity of water available as well as annual production and consumption, and per capita consumption data.
4. If water is sold, then it will be important to obtain details of prices and quantity and method of purchase/sale.
5. An estimate of distribution of the available water between the different uses: domestic, agriculture, livestock, industrial, etc will be useful in working out an equitable distribution on a priority by priority basis among the various competing uses.
6. Proposing administrative and legal measures to govern the water regime in general and water uses in particular, eg. control of quality through minimising pollution. Moreover, identification of the most critical water related problems and suggesting possible solutions is vital for a water master plan.
7. Social and cultural factors--ethnic/clan make-up and inter-ethnic/clan relations, social and family structures, patterns of housing--dispersed or clustered, role of women in water related decision-making, eg. location of water points, design and type of pump to install.
8. Lastly, it is advisable to combine water policy with other social and economic intervention programmes as water affects other sectors of the economy.

(B) Preparation of a Draft Water Master Plan: The water planner should, in consultation with the RDC and in collaboration of other sectoral experts:

1. prepare a draft Water Master Plan for the Nugal region in which priority projects to be implemented in the short, medium and long-term on the basis of hierarchy of uses should be indicated.

2. draft a water policy document to be submitted to regional authorities for consideration and adoption.
3. propose an administrative and legal framework to govern the overall regime of water resources and use patterns.
4. identify the most critical water related problems/constraints and suggest alternative possible solutions to be considered by the regional authorities.
5. do all other activities relevant to the preparation of a Water Master Plan.

Brief Terms of Reference for Water Planner on
Technical Mission to Nugal

Objective

Work with the RDC, District Council, communities and other mission members, particularly the water master plan consultant and the environmental expert, to prepare a costed, viable programme of rehabilitation of existing ground and surface water sources. The programme should, as far as possible, consist of small-scale quick impact rehabilitation projects which build on local initiatives, maximise Somali participation in design and management, and improve the delivery of clean and safe water.

Tasks

1. Conduct a preliminary survey of existing and potential ground and surface water resources, paying particular attention to:
 - (i) coverage;
 - (ii) sustainability (including cost recovery);
 - (iii) management and institutional arrangements;
 - (iv) cost recovery issues;
 - (v) links with other sectors, in particular livestock, agriculture and health sectors;
2. Using this analysis, review the water rehabilitation components of the programme documents produced by the regional administrations with a view to ensuring, as far as possible, that the water programme designed compliments ongoing and planned work and that there is standardisation of approach. The programme should be designed to take account of needs across the region in both rural and urban areas. It should also address the availability of animal water sources. The water master plan should also account for future needs taking into consideration population growth of people and livestock, new needs arising from industrial and other development perspectives.
3. Work with the RDCs, District Councils and mission members, as appropriate, to prioritise these further. Proposed activities should first be divided into two broad categories:
 - (A) Short Term small-scale interventions which build on local initiatives and are sustainable within the limited financial and institutional base of the region, and for which implementation capacity can be readily identified;
 - (B) Medium and Long Term longer-term rehabilitation, reconstruction and development which will need more detailed design and appraisal within the budgetary and institutional framework of the RDC in order to meet growing needs for water.
4. For activities falling into category A work with RDC, District Council, communities and mission members, as appropriate, to prioritise these further and develop detailed project

proposal and plan of action for implementation.^{1,2} In particular, rehabilitation activities should be aimed at achieving the highest impact in terms of number of consumers receiving an adequate quantity and quality of water. This will involve *inter alia* the following activities:

- (i) In collaboration with RDCs and District Councils allocate planned activities into categories A and B;
- (ii) Undertake field visits with RDC, District Council and mission members, as appropriate, to proposed locations of category A activities;
- (iii) Reach agreement with formal decision makers (eg administration, elders, community leaders), and informal decision makers (eg womens' groups) on category A priorities within each District and explore potential community contributions (financial and in-kind);
- (iv) Consult with community leaders and local authorities to establish appropriate management arrangements for the water sector;
- (v) Work with an economist (who is the team leader) to explore options for cost-recovery or cost-sharing based on ability and willingness to pay;
- (vi) Prepare action plan for involvement of communities in project design, implementation and management;
- (vii) Analyse implementation capacity, and explore options for implementation including use of local NGOs, local businesses and communities;
- (viii) Make recommendations on how to build local capacity of Somali NGOs, private sector and communities to design, implement and manage projects;
- (ix) Consult with RDC and District Councils their financial and administrative capacity to support the water sector.

5. Prepare project proposals and implementation plan which will include following components:

- (i) design;
- (ii) costing (capital and recurrent: broken down by local and international contributions);
- (iii) cost-benefit or cost-effectiveness analysis, as appropriate;
- (iv) detailed proposal for implementation, maintenance and management;
- (v) recommendations for institutional arrangements within the sector, and links with the institutional structures of local government at district and regional level;
- (vi) proposals for cost-recovery or cost-sharing;
- (vii) proposals for capacity building of Somali partners;
- (viii) policy issues which impact on sectoral activities but which need to be addressed at more macro level eg water tariffs;

¹ Activities should be designed taking full account of the draft World Bank Framework for Planning of long-term Rehabilitation and Reconstruction.

² Priority should be given to labour intensive techniques and use of locally available material and expertise.

(ix) recommendations for sectoral packages: livestock, agriculture, industry, health, etc.;

6. For activities falling under category B, identify feasible project ideas and alternate options for consideration by the regional authorities in preparing a long-term development plan/programme for the region.³

³ This should take full account of the draft World Bank Framework, the Muggeridge draft report "Institutional Building for Regional Planning in Somalia" and related "Project Proposal: Institutional Support for Regional Planning in Somalia", for which donor funding is being sought, and the UNDO paper "Institution Building for Regional Planning in Somalia: Revisiting the Approach".

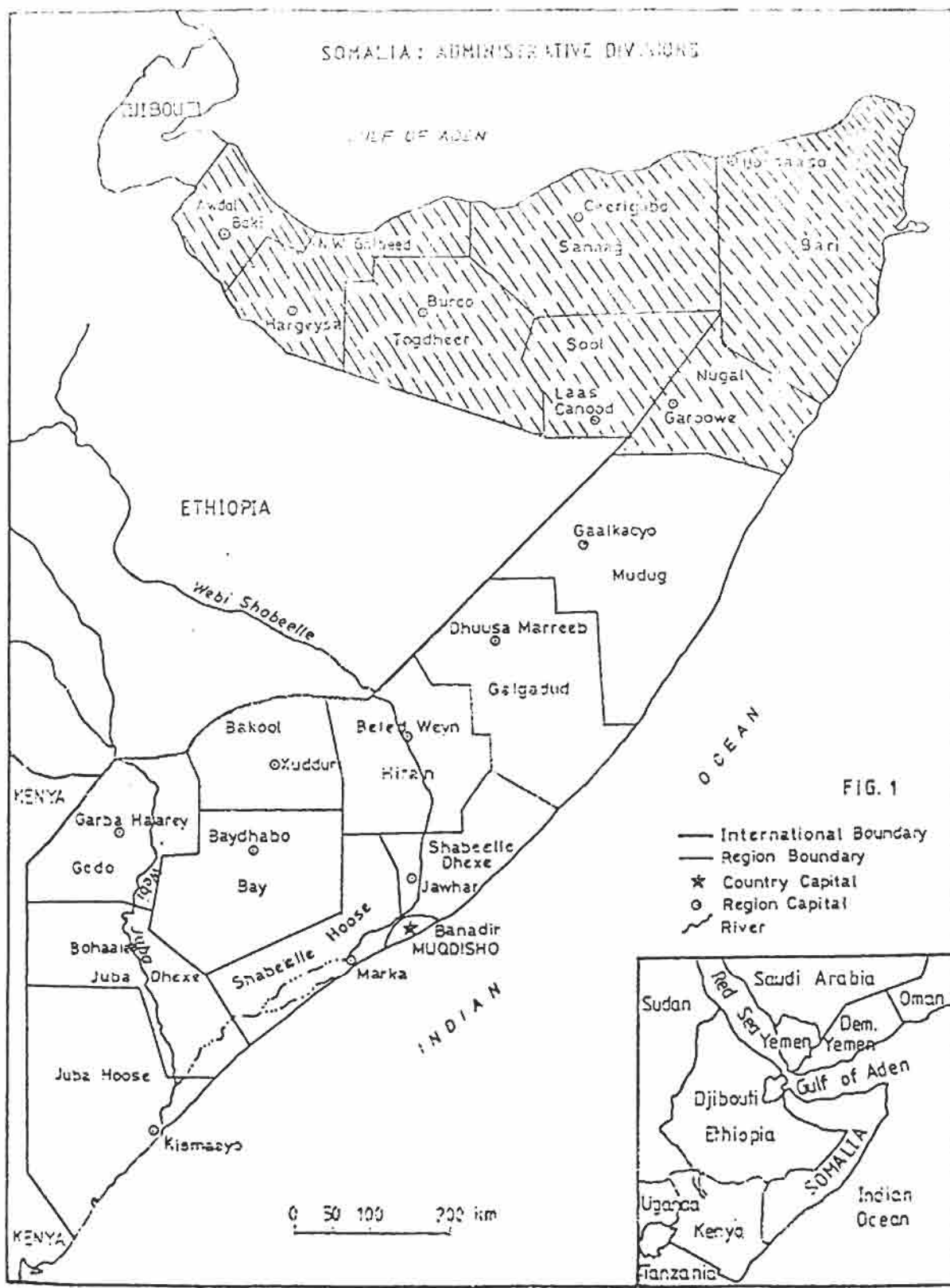


FIG. 1

NORTHERN SOMALIA - Area covered by the report



SOMALIA

TECHNICAL MISSION - NUGAL REGION

Water Supply Working Group

(Experts Draft Report)

SOMALIA

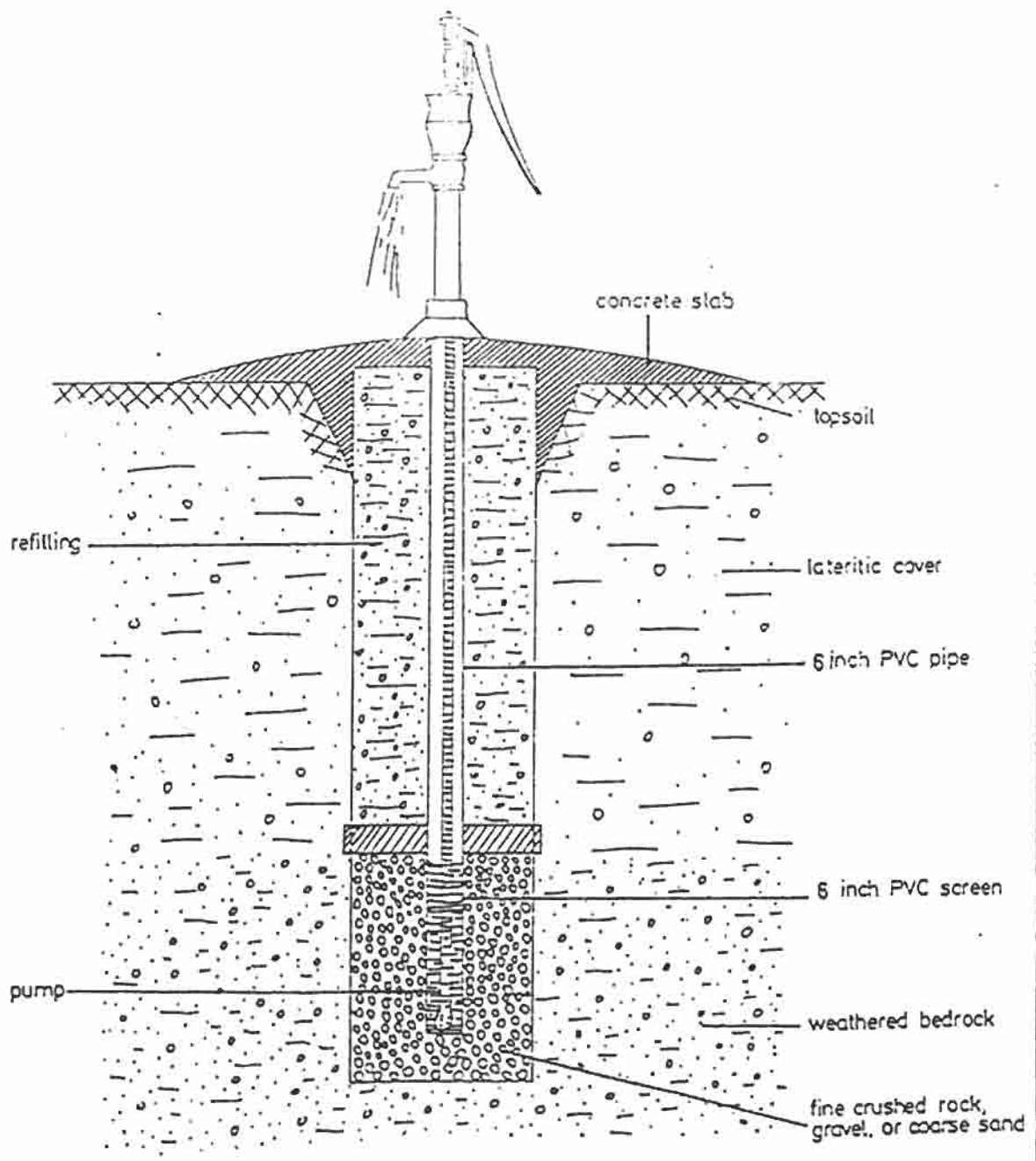
NUGAL TECHNICAL MISSION

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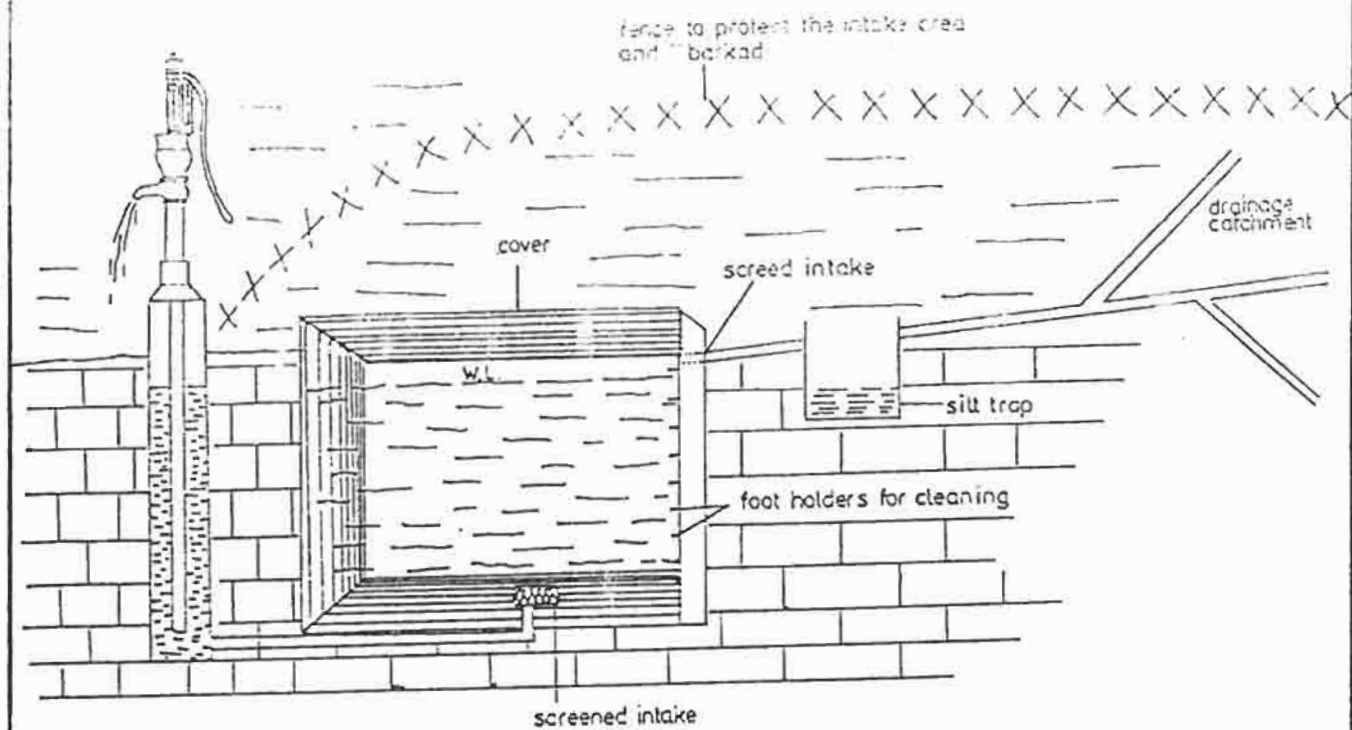
APPENDIX G

Sketches of some water supply facilities
suitable for Somalia villages.

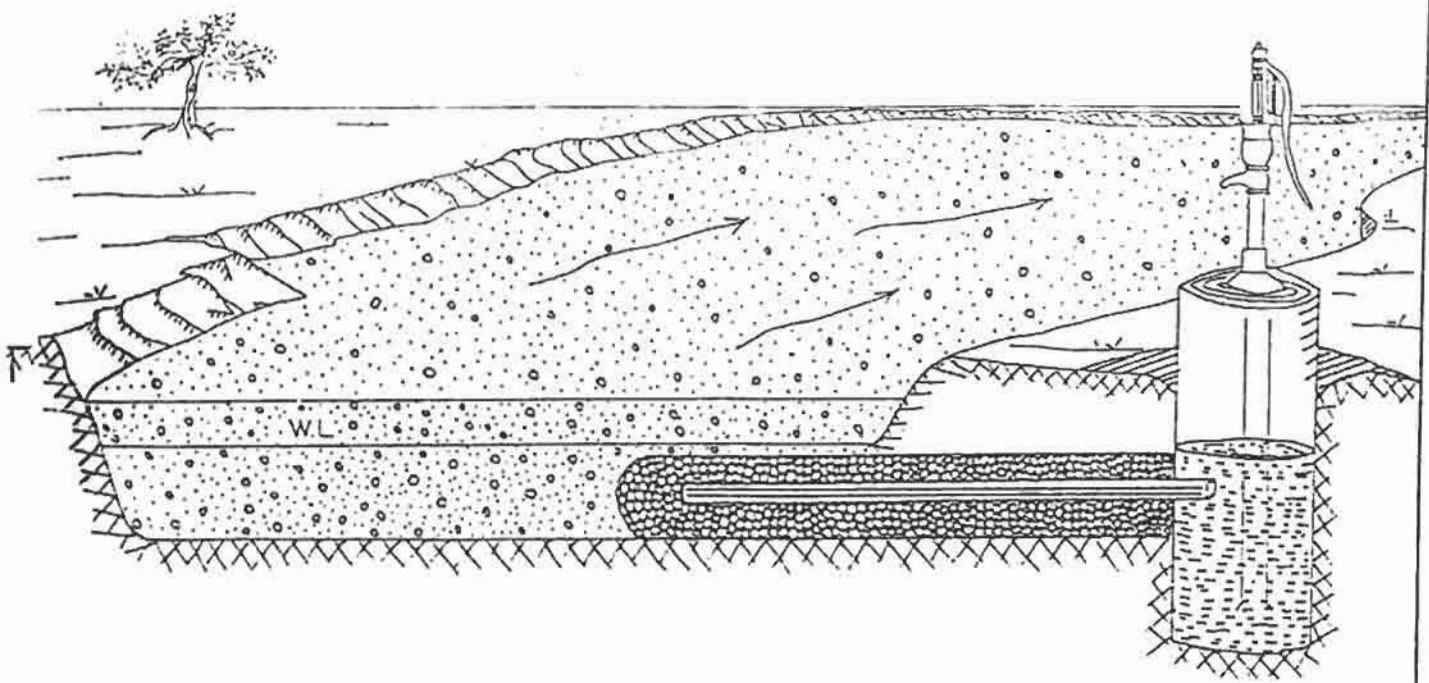
Extracts from the " Water Quality Data Book of Somalia"
(Water Development Agency of Somalia / GTZ - 1987.)



BACKFILLED WELL



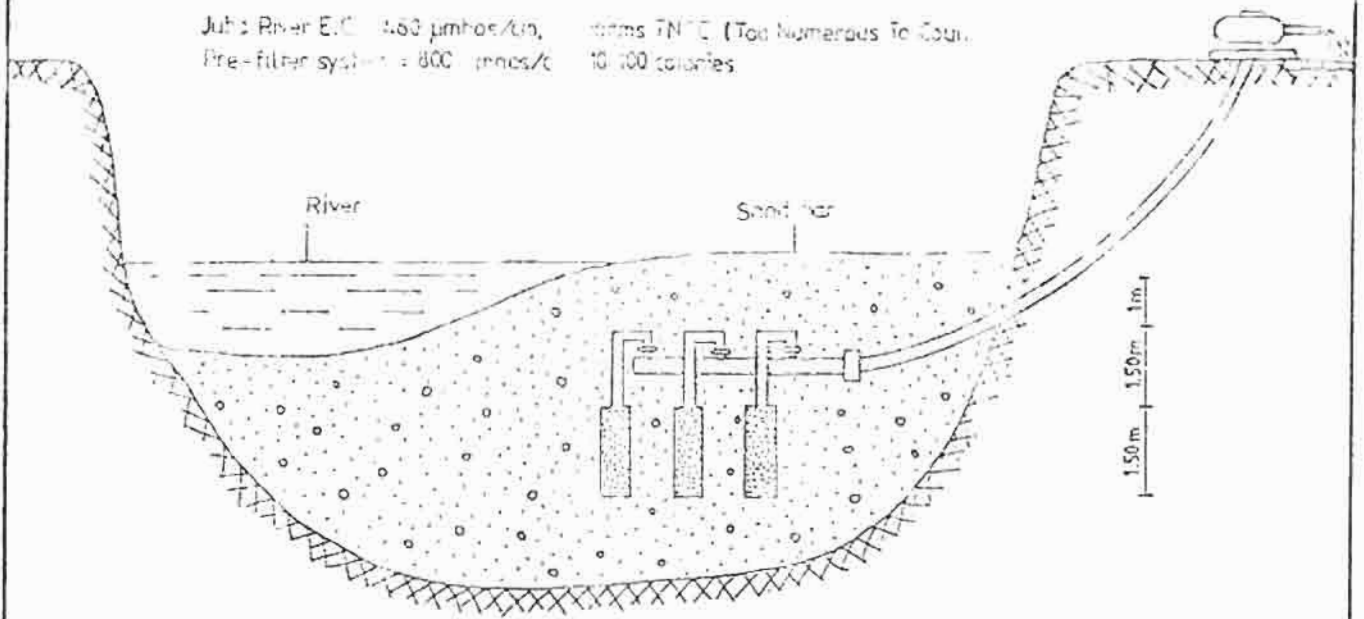
SKETCH OF AN IMPROVED "BARKAD" AND OF ITS INTAKE AND WATER DISTRIBUTION



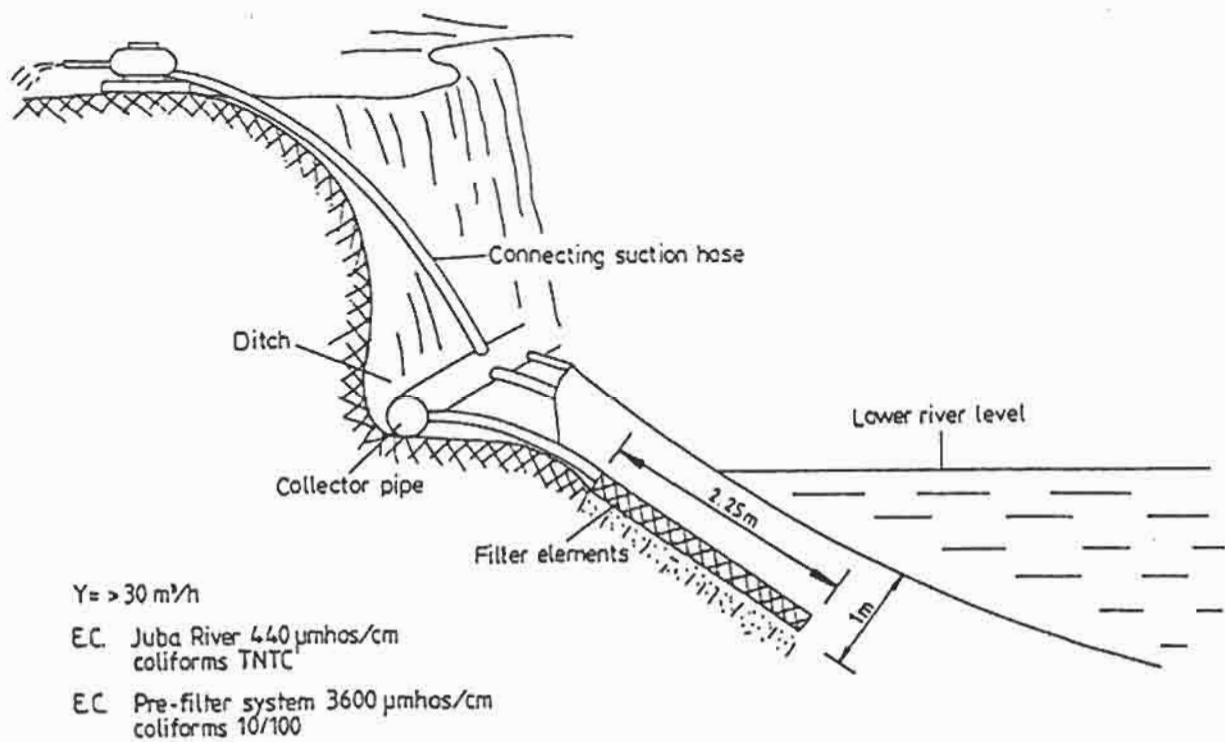
INFILTRATION GALLERY WITH COLLECTOR WELL IN THE
REFUGEE CAMPS IN NORTHWEST SOMALIA

Q = >30 m³/h

Juba River E.C. 4.60 µmhos/cm, coliforms TNTC (Too Numerous To Count)
Pre-filter system = 800 µmhos/cm, 10/100 colonies



PRE-FILTER INSTALLATION IN HALBA REFUGEE CAMP



PRE-FILTER SYSTEM IN ALI MATAN