DRAFT REPORT

THE REPUBLIC OF THE SUDAN

THE NATIONAL CORPORATION FOR
RURAL WATER RESOURCES
DEVELOPMENT
(NCRWRD)

and

U N I C E F
SUDAN

January 1989.

This paper is extracted from the original text of the Report:

COMMUNITY MANAGED WATER SOURCES IN THE NORTHERN REGION, prepared for

By

M. O. EL SAMMANI, (Ph.D.)

January, 1989.

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COMMUNITY MANAGED WATER SOURCES IN THE NORTHERN REGION

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CHAPTER ONE

I N T R O D U C T I O N

FIG. (1)

SITES SURVEYED AND ROUTE FOLLOWED

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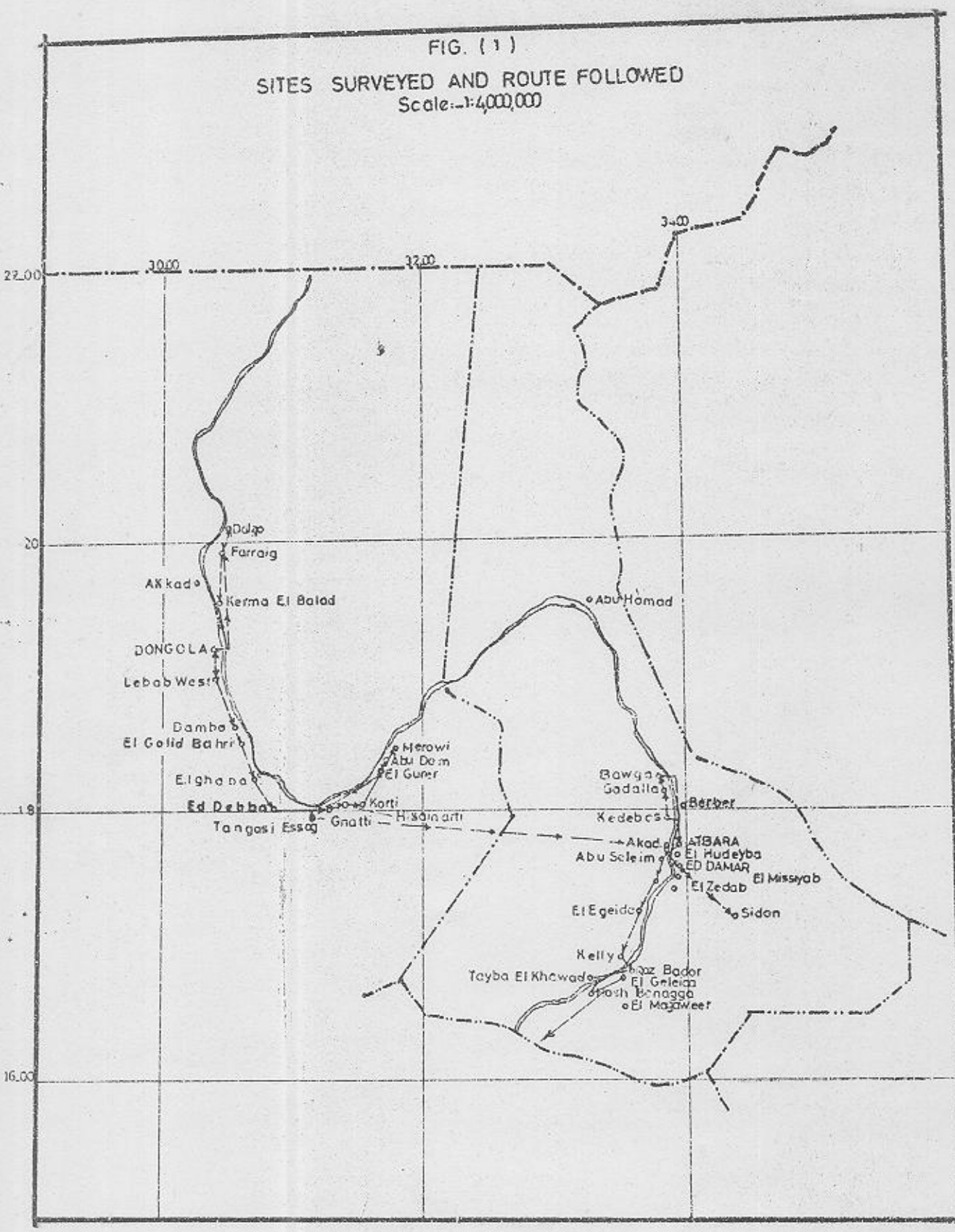


CHAPTER ONE

INTRODUCTION

1.1. The Scope of the Study:

This is a report on community managed water sources in the Northern Region. The study was carried out for the National Corporation For Rural Water Resources Development (NCRWRD) and was financed by UNICEF (Sudan). The study covered the two provinces; The Northern Province and the Nile Province of the Northern Region. The aim of the study is to investigate the "model" of community managed water sources, as an established practice in the Northern Region. Based on the findings of the investigation the study would make recommendations for enhancing the effeciency of the model within the Region, and explore the feasibility of applying it in other parts of the country. The detailed objectives of the study are stated in the terms, given as Annex III of the Report.

1.2. The Study Schedule:

The study was developed in 4 stages: preparation, field work, data analysis, and report writing. The field work was conducted during November involving a

period of 18 days. The analysis was done during November and December, and the report writing was completed by January (1989).

1.3. The study team:

The team which carried out the study was comprised of Dr. M.O. El Sammani in the capacity of a socio-economist, assisted by: Hilal El Fadil Ahmed a hydrogeologist and Executive Director of NCRWRD Northern Province; Saad El Din Ibrahim; Kamil Osman and Ahmed Mohamed Kheir, all three are agriculturist with post graduate training in environmental science.

1.4. Methods:

The study utilized the office data available in the two regional offices of the NCRWRD at Dongola and Ed Damer, and applied questionnaires. Three questionnaires were used; (i) water source characterization questionnaire, (ii) community perception questionnaire, and (iii) official perception questionnaire. Copies of the three questionnaires are included in Annex IV.

Due to the vastness of the region, which entailed extensive travel and the crossing of the Nile at a number of points by ferry boat, and the limited time of

and resourceful people, with knowledge about this mode of management, living within the area. The community perception questionnaire detected users' perception of the efficiency of the community managed water sources. Samples selection was done at random and the samples divided equally between the two provinces.

1.5. Report Organization:

The report falls in six chapters :

i) Introduction

ii) The Northern Region: Main features and water supply sources.

iii) The status of water provision in the region,

iv) The participation of communities in the provision and management of water sources,

v) Community Management of water sources,

vi) Key lessons and recommendations.

CHAPTER TWO

THE NORTHERN REGION

MAIN FEATURES AND WATER SUPPLY SOURCES

CHAPTER TWO

THE NORTHERN REGION
MAIN FEATURES AND WATER SUPPLY SOURCES.

2. Main Features

2.1. Geographic Setting

The Northern Region is located between Lat. 16° and 22°N. The total land area of the Region is 477,074 sq.km predominantly constituted of desert and semi-desert land, with the Nile crossing it and acting as the main axis around which the population is concentrated. The Region has a total population of 1.07 million persons according to 1983 census.

Due to the prevalence of desert conditions, the Region receives little rainfall ranging from 100 mm in its southern part to zero mm in its northern part, with a mean annual of 21 mm. Temperatures are high during most of the year, with a mean maximum of 36.7°C. Temperatures as high as 49°C are not uncommon in the period extending from April to June. In winter temperatures as low as 1.5°C have been recorded in December and January. The mean minimum is 18.5°C. There is a wide range in temperature between day and night conditions, especially in the northern part of the Region.

The preponderating aridity of the Region has limited population habitation and economic activity to the Nile Valley and the few basins linked to it, where flood irrigation and the extraction of groundwater support perennial agriculture. Only few and small dispersed communities of pastoralists live away from the Nile, in Wadis which carry some rain water during the rainy season, mostly to be found in the southern districts of the Nile Province.

While the majority of the population is engaged in agriculture, there is a small segment practicing livestock raising. The agricultural economy is served by a number of small and large urban centres, where trade and government services are housed. The break-down of population by mode of living, according to 1983 Census, is reflective of the general occupational pattern and form of residence in the Region.

Urban settled	%	Rural settled	%	Nomadic	%	Total Northern Region
230,341	21.45	793,414	73.8	50,269	4.7	1,074,024

It is evident that the rural settled and rural nomadic categories make 78.5% of the inhabitants of the Region which indicates that the majority of the population lives on agriculture. The 21.5% urban is founded on this agricultural base.

2.2. Agriculture:

Agriculture is the base of the economy and the source of the livelihood of the population. The prevalence of fertile soils, coupled with the availability of perennial irrigation and favourable climatic conditions have lead to the growth of a diversified agriculture, with field and horticultural crops being produced. Wheat, fava beans, fasolia, lentils and ~~clover~~ Bersim are the most important field crops; and dates, citruses and mangoes are the main horticultural crops.

The estimated total cultivable area is 1.5 million feddan, out of which about 0.5 million is presently utilized under different forms of management :

Thousand feddans	
95	Public sector schemes, under Northern Region Agriculture Production Corporation.
272	Private sector and companies.
65	Co-operative sector.
70	Basins and Wadis (Private).
26	Mataras (Private).
528	

For the irrigation of the above areas about 1.75 milliards of Nile water and 0.16 milliards of groundwater are presently utilized.

Agriculture employs the majority of the population, and provides living for most of the rural households. There has been, during the recent decade, a substantial investment in agriculture, as a result of capital flow from employment in urban areas, and emigration to the petroleum countries. The direct impact of this investment is an increase in reclaimed land, and more use of mechanization, e.g. pumps and tractors.

Expansion of the Regions' agricultural production is to a great degree impeded by a poor transportation infra-structure. The long distance to Khartoum, the National Capital, as a major consumer of horticultural products undermines the marketing credibility of the Region.

2.3. Settlement Pattern:

The smallness of the area cultivated and its concentration on the banks of the Nile have resulted in the existence of a high population density, and a linear pattern of settlement, with a continued alignment of villages, small centres and urban places on both sides of the river. The data on the population size of the 30 settlements surveyed is indicative of this high density feature; Table 1.

Table 1: Population Size of the 30 Settlements Surveyed, by Province, District and Rural Council

Province, District, Rural Council and Settlement	Population Size	Number of Households	Average size of Household.
NORTHERN PROVINCE:			
1. Northern District			
1.1. Dalgo Rural Council			
1.1.1. Dalgo	5,000	700	7.1
1.1.2. Farraig	6,000	800	7.5
2. Central District			
2.1. Hafir Rural Council			
2.1.1. Aked Saroj	4,000	600	6.7
2.2. Argo Rural Council			
2.2.1. Kerma El Belad	16,000	3,500	4.6
2.3. Dongola Rural C.			
2.3.1. Lebab Gharb	700	115	6.1
2.4. El Golid Rural C.			
2.4.1. Dambo	2,112	400	5.3
2.4.2. El Golid Bahri	15,000	2,550	5.9
3. Southern District			
3.1. Ed Debba Rural C.			
3.1.1. El Gaba	5,000	800	6.3
3.1.2. Ed Debba	20,000	3,000	6.7
3.1.3. Ganeti El Onia	2,000	300	6.7
3.1.4. Hissain Narti	3,400	415	8.2
3.2. Merowe Rural C.			
3.2.1. Korti (*)	1,000	25	8.6
3.2.2. El Goreir Qoz Gorafi	2,600	300	8.6
3.2.3. Abu Dome	4,000	500	8.0
3.2.4. Merowe	6,500	925	7.0

Cont.../..

Table 1(Cont..)

Province, District, Rural Council and Settlement	Population Size	Number of Households	Average size of Household
NILE PROVINCE:			
1.Central District			
1.1.El Bauga Rural C.			
1.1.1.El Bauga	3,000	400	7.5
1.2.Berber Rural Council			
1.2.1.Gadalla	4,000	600	6.7
1.2.2.Kedabas	15,000	2,100	7.1
1.3.Sidon Rural Council			
1.3.1.Sidon	3,700	580	6.4
1.4.Ed Damer Rural C.			
1.4.1.El Hudiaba	3,000	400	7.5
1.4.2.El Miseyab	850	120	7.1
1.5.El Zeidab Rural C.			
1.5.1.Abu Silaim	6,000	1,250	4.8
1.5.2.El Zeidab	3,750	750	5.0
1.5.3.El Egeida	4,000	1,000	4.0
2. Central District			
2.1.El Metamma Rural C.			
2.1.1.Keli	4,000	500	8.0
2.1.2.Qoz Bedor	2,500	300	8.3
2.1.3.Tyabt El Khawad	2,000	300	6.7
2.1.4.El Magawir	6,000	950	6.3
2.2.Shendi Rural Council			
2.2.1.El Gilaia El Gania	5,000	652	7.7
2.2.2.El Selafeeb	3,400	477	7.1
Averages for the Region (Approximated)	6,000	850	7.00

(*) Korti has a large number of schools, with about 785 pupils.

Source: Field Survey data.

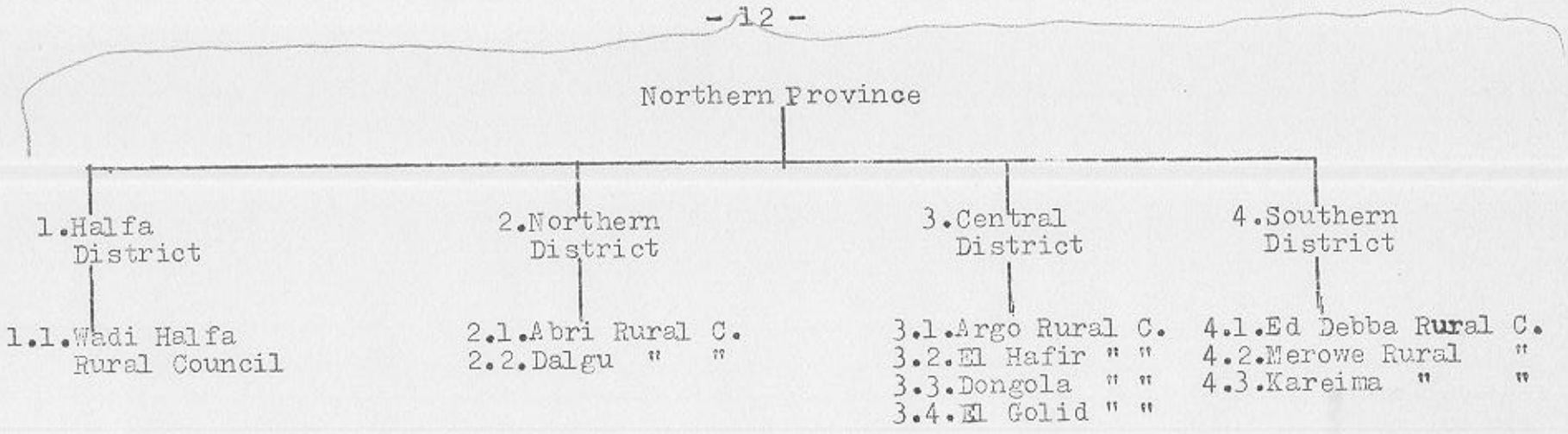
Settlement size ranges between 1,000 and 20,000 persons, and 850 and 15,000 persons for the Northern Province and the Nile Province respectively. The average settlement size for the Region is 6,000 persons.

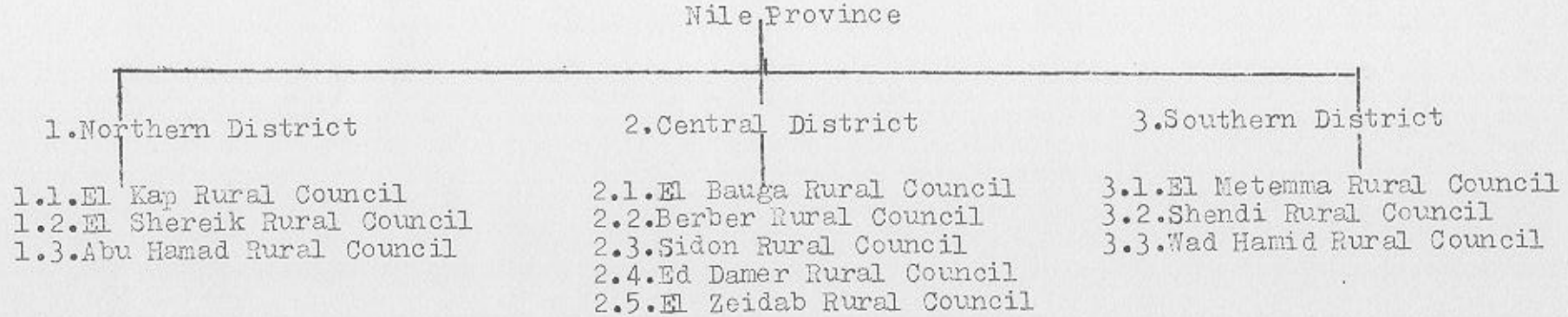
These features of high population density and growth of settlements have provided favourable conditions for the provision and the development of an infra-structure of community services, including rural water supplies.

2.4. Administration:

The Region is comprised administratively of two provinces; the Northern Province, and the Nile Province. The first has a population of 424,391 persons, and the second a population of 649,633 persons.

The provinces are divided into Districts(Area) Councils, with each council divided into a number of Rural Councils. The following schematic presentations show the districts and rural councils of each province.


Northern Province
1.Halfa District
2.Northern District
3.Central District
4.Southern District
1.1.Wadi Halfa Rural Council
2.1.Abri Rural C.
2.2.Dalgu " "
3.1.Argo Rural C.
3.2.El Hafir " "
3.3.Dongola " "
3.4.El Golid " "
4.1.Ed Debba Rural C.
4.2.Merowe Rural "
4.3.Kareima " "


Nile Province
1.Northern District
2.Central District
3.Southern District
1.1.El Kap Rural Council
1.2.El Shereik Rural Council
1.3.Abu Hamad Rural Council
2.1.El Bauga Rural Council
2.2.Berber Rural Council
2.3.Sidon Rural Council
2.4.Ed Damer Rural Council
2.5.El Zeidab Rural Council
3.1.El Metemma Rural Council
3.2.Shendi Rural Council
3.3.Wad Hamid Rural Council

In total there are 4 districts and 10 rural councils in the Northern Province, and 3 districts and 11 rural councils in the Nile Province.

The Region and the District are corporate bodies, normally with electorate councils' membership and have annual semi-independent budgets. They have legislative powers and the function of initiation and implementation of development activities in their areas. Rural councils are the grass-root tier of the local administration hierarchy, constituted to enhance the self-reliance of rural communities in managing their local affairs. They have too, elected councilors and annual budgets, allocated by the district council to which they belong.

Other than the elected bodies, districts and rural councils are run by local government executive officers, assisted by technical, clerical and accounts staff, plus workers. At all three levels : the province, the district and the rural council, much of the planning work and programme operation are carried out through committees, which include in their membership councilors and civil servants.

According to the Regional Government Act, the Region exercises powers over the services and other technical departments operating within it. This power ranges from

direct supervision, to a form of co-ordination with the centre in the case of those departments with more specialized functions. The National Corporation for Rural Water Resources Development is an example of an agency whose programmes in the Region are co-ordinated with the centre. The NCRWRD has three main offices; the Regions headquarters at Ed Damer, The Northern Province headquarters at Dongola, and the Nile Province headquarters at Ed Damer. Each of the provincial offices operates a number of maintenance centres.

2.5. Water Supply Sources:

The Nile is still the main source of community water supply in the Northern Region with water obtained in raw form from the river and the irrigation canals or by means of slow-sand filters. Tube wells are the other important source of supply, established at places where the geological conditions favour the drilling of wells. The water resources of the Region cover :

a) Surface water: The River Nile, Atbara River and seasonal Wadis, e.g. Wadi El Mugadam, El Hawad, etc..

b) Groundwater: The Nubian Sandstone aquifer (best aquifer in Sudan), the alluvial deposits (of minor importance) the weathered Basement Complex aquifer (of minor importance).

Fig
Annex I gives a detailed picture of the existing community water sources by province and district council. The data in the Annex is contained in columns carrying the following headings :-

- Name of District, Rural Council, and Sites.
- Type of Water Source: Water-yards, slow sand filters, Raw water from the Nile (with or without house connection, for all three sources).
- Co-ordinates.
- Well depth and water levels:(Total depth, Static water level and dynamic water level)
- Type of pump.
- Type of engine.
- Yield.
- Capacity
- Mode of Management: National Corporation for Rural Water Resources Development, Community managed, Agency managed, Privately managed.
- Date of Establishment.
- Condition of Source.

The geographic distribution of the sources inventored in Annex I is given in Annex II, in maps which exhibit the existing sources by province.

The data in Annex I and II was compiled by the NCRWRD offices at Dongola and Ed Damer. The data in both annexes is organized to be read from north to south; i.e. the Northern Province, first, with its district councils

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arranged in geographic succession from North to South, and the Nile Province, second, with its district councils arranged in the same order.

The data on type of water source in ~~Annex~~ Fig I is summarized in Table 2.

Table 2: Existing Water Sources in the Northern Region by Province, District and Rural Council.

Province, District and Rural Council	Number of Boreholes	Number of Wateryards	Number of Raw water stations	Number of slow-sand filter Stations	Number of Hafirs	No.of Sources with house
1.NORTHERN PROVINCE:						
1.Halfa District						
1.1.Wadi Halfa Rural Council				1		1
1.2.Northern District						
1.2.1.Abri Rural Council				4		1
1.2.2.Dalgu Rural Council				4		2
1.3.Central District						
1.3.1.Argo Rural Council	16	16	-	-	-	7
1.3.2.El Hafir " "	7	7	1	-	-	3
1.3.3.Dongola " "	17	17	-	-	-	6
1.3.4.El Golid " "	15	15	-	-	-	7

Cont../..

Table 2(Cont..)

Province, District and Rural Council	Number of Boreholes	Number of Wateryards	Number of Raw Water Stations	Number of slow-sand filter stations.	Number of Hafirs	No.of sources with house connections.
1.4. Southern District						
1.4.1.Ed Debba Rural Council	31	30	-	-	-	6
1.4.2.Merowe Rural Council	28	24	-	3	-	22
1.4.3.Karima Rural Council	20	18	-	1	-	11
Total Northern Province	134	127	1	13	-	66
2.NILE PROVINCE:						
2.1.Northern District						
2.1.1.El Kap Rural Council	-	-	1	-	-	-
2.1.2.El Shereik Rural "	-	-	3	-	-	1
2.1.3.Abu Hamad " "	-	-	11	-	-	7
2.2.Central District						
2.2.1.El Bauga Rural Council	5	5	-	-	-	1
2.2.2.Berber Rural Council	14	13	-	1	-	3
2.2.3.Sidon Rural Council	4	4	-	-	-	1
2.2.4.Ed Damer Rural Council	14	14	-	-	-	7
2.2.5.El Zeidab Rural Council	25	25	-	-	-	6
2.3.Southern District						
2.3.1.El Metamma Rural Council	56	50	-	-	-	18
2.3.2.Shendi Rural Council	71	65	17	-	-	25
2.3.3.Wad Hamad Rural Council	-	-	11	-	-	7
Total Nile Province	189	176	39	1	-	76
Total Northern Region	323	303	40	14	-	142

Based on ~~Annex~~ Fig I and Table 1 the water supply situation of the Region may be summarized as follows :-

In the Northern Province there exist 127 water-yards (of which 45 are incomplete), 13 slow-sand filters, 1 raw water station, and 66 systems of house connections.

In the Nile Province there exist 176 water-yards (of which 49 are incomplete), 1 slow-sand filter station, 39 raw water connections and 74 systems of house connections.

CHAPTER THREE

THE STATUS OF WATER PROVISION IN THE REGION.

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3.1. Progress Stages:

Most of the rural communities in the Northern Region used to get their drinking water supply from the Nile and River Atbara. Traditionally rural communities have had no shortage in domestic supply, compared for example to some parts of the country. The only obstacle has been accessibility to the Nile, in places where some parts of the Region the Nile is not accessible because of the presence of sandy islands and sand homock sands. In this and other areas, including the small rural settlements away from the Nile, communities relied on large diameter wells i.e. open wells.

Open wells are dug in the Nile alluvium to tap the sub-surface water which receives a direct recharge from the Nile. Alternatively they are dug at favourable geological locations to tap groundwater for domestic use and irrigation. Manual extraction of water and the use of the water-wheel (on mataras) continued as major devices for quite a time. Hand pumps were introduced, especially in shallow wells, as in the case of the Central District of the Northern Province. Dependency

on open diameter wells for domestic supply has been undermined by the fluctuations in water level and the water pollution from pit latrines especially in densely settled areas.

Deep tube wells and slow-sand filters came as a third stage in the progress of water provision in the Northern Region. Tube wells are provided in areas that are geologically favourable, while slow-sand filters are installed at places which fall within the Basement Complex formation.

Drilling of bore-holes by means of drilling machines (rigs) for the extraction of water for irrigation purposes came about during the period (1950-60) in the Sileim basin and Hedaiba Research Station. It is worth mentioning that there was no plan to provide drinking water for rural communities in the Northern Region, because it was held that the Region had plenty of water from the Nile. Drilling for provision of water for domestic use was started in the early 1960's in the Nile Province and in the early 1970's in the Northern Province. The drilling programmes are being implemented in areas of Nubian Sandstones formation where groundwater is available in large amounts and the quality is extremely excellent. For the areas falling within the Basement Complex rocks where

groundwater availability is generally poor, like Wadi Halfa, Abri, Dalgu, Abu Hamad and Wad Hamid Rural Councils, connection from the Nile by means of slow-sand filters, or as raw water, began in 1966 and 1982 in the Nile and the Northern Province respectively.

House connections came as a fourth stage in the development of water provision in the Region. It was introduced in the 1970's and spread by the early 1980's. By now it has become a basic request of the rural communities there, as a result of the socio-economic transformation that are taking place. Since the seventies the people of the Region started realizing the importance of reliable and hygienic drinking water supply. The change has come as a result of the fluctuations in the rivers' level, increased awareness that good quality water is a preventive measure against water-borne diseases and also because of improvements in the socio-economic life in the rural areas, instigated by the adoption of urban attitudes.

3.2. Water Supply Technologies:

The technologies in use are conditioned by the type of water resource utilized:

3.2.1. River Water

River water, sand-filtered or in raw form, is pumped to the filteration system (in case of slow-sand filters) or directly to the storage tanks by lifting mechanical units; centrifugal pumps, diesel engine and rising main. Water is either obtained at the tank which would be fitted with a stand-pipe, or piped to users by means of a distribution network.

3.2.2. Groundwater

Groundwater is tapped by 3 types of wells :

a) Hand-dug wells :

Hand-dug wells (open wells) are the oldest type of wells in the Region. They are easy to construct and operate and require no particular technology or instruments. This type is gradually disappearing and is being replaced by driven wells, because it provides insignificant quantity of water and is liable to being polluted by foreign bodies drifting from the ground surface.

b) Driven wells :

This type represents a good example of the use of simple technology, adopted and improved by people to fit local conditions. All wells constructed by means of driven iron pipes fall within this category. Tube-wells fitted with hand-pumps are very popular in the Northern Region

for producing small quantities of water for domestic use only. Driven wells for agricultural purposes are usually equipped with lifting mechanical units.

c) Bore-holes :

Bore-holes are constructed by means of percussion or rotary drilling machines. The bore-holes are usually fitted with steel casing, screen gravel pack and equipped with either turbine or resprocating pumps driven by diesel engines.

3.2.3. House Connections

House connections are a community founded activity, in response to changes in ways of living, leading to an increase in household consumption. Local communities would organize member-households in a settlement to support the water network project, throughout the various stages from initiation to project management. The technology required would involve lifting mechanical units, the network, and the accompanying surveys to prepare the network plan. Network projects are usually carried out as a joint activity between rural communities and the NCRWRD.

3.2.4. Lifting Units

Tables 3 and 4 give successfully the diesel engines and pumps in use in the Northern Region. From the two tables there exist the following totals of diesel engines and pumping units in the community managed water sources of the Northern Region.

Diesel Engines		Pumping Units	
Bukh	62	Grundfos	158
Torpedo	22	Scholler	22
Yanmar	45	Edico	11
Lister	57	Adler	7
Perkins	32	Uggerini	9
Andoria	61	Hitashi	2
Detize	3	M.D.M.	9
Ercolomoreii (Fiat)	9	Nimtsaso	1
		Cato	27

Table 3: Existing Diesel Engines by Province, District and Rural Council

Province, District and Rural Council	Bukh	Torpedo	Yanmar	Lister	Perkins	Andoria	Detize	Erocolomoreti (Fiat)
1.NORTHERN PROVINCE:								
1.1.Halfa District								
1.1.1.Wadi Halfa R.C.	-	-	1	-	-	-	-	-
1.2.Northern District								
1.2.1.Abri Rural C.	-	-	4	-	-	-	-	-
1.2.2.Dalgo " "	-	-	3	1	-	-	-	-
1.3.Central District								
1.3.1.Argo Rural C.	-	-	4	5	1	2	-	-
1.3.2.El Hafir " "	1	-	3	-	1	3	-	-
1.3.3.Dongola " "	-	1	3	-	4	2	-	4
1.3.4.El Golid " "	5	-	-	-	1	4	-	-
1.4.Southern District								
1.4.1.Ed Debba Rural C.	6	-	5	1	2	7	-	1
1.4.2.Merowe Rural C.	5	-	1	5	4	13	-	-
1.4.3.Karima Rural C.	5	-	-	2	-	5	-	-
Total Northern Province	22	1	24	14	13	36	-	5

Cont../..

Table 3(Cont.)

Province, District and Rural Council	Bukh	Torpedo	Yanmar	Lister	Perkins	Andoria	Detize	Erocolomorcii (Fiat)
2.NILE PROVINCE:								
2.1.Northern District								
2.1.1.El Kap Rural C.	-	-	1	-	-	-	-	-
2.1.2.El Shereik " "	-	-	-	3	-	-	-	-
2.1.3.Abu Hamad " "	-	-	-	7	-	-	-	-
2.2.Central District								
2.2.1.El Bauga Rural C.	-	1	3	1	-	-	-	-
2.2.2.Berber Rural C.	1	-	1	4	4	1	-	3
2.2.3.Sidon Rural C.	1	1	1	1	-	-	-	-
2.2.4.Ed Damer " "	9	-	-	1	1	-	-	1
2.2.5.El Zeidab " "	5	3	2	-	1	1	-	-
2.3.Southern District								
2.3.1.El Metamma R.C.	11	2	1	4	10	10	1	-
2.3.2.Shendi Rural C.	13	14	8	17	3	12	2	-
2.3.3.Wad Hamid " "	-	-	4	5	-	1	-	-
Total Nile Province	40	21	21	43	19	25	3	4
Total Northern Region	62	22	45	57	32	61	3	9

Source: NCRWMD Office Files.

Table 4: Existing Pumping Units by Province, District and Rural Council

Province, District and Rural Council	Grundfos	Scholler	Edico	Adler	Uggerini (Fiat)	Hitashi	M.D.M.	Nimtsase	Cato
1.NORTHERN PROVINCE:									
1.1.Halfa District									
1.1.1.Wadi Halfa R.C.	-	-	-	-	-	-	-	-	-
1.2.Northern District									
1.2.1.Abri Rural C.	-	-	-	-	-	-	-	-	-
1.2.2.Dalgo " "	-	-	-	-	-	-	-	-	-
1.3.Central District									
1.3.1.Argo Rural C.	7	-	-	-	-	-	1	-	4
1.3.2.El Hafir " "	3	-	-	-	-	-	2	-	2
1.3.3.Dongola " "	7	1	-	-	4	-	1	-	3
1.3.4.El Golid " "	8	-	-	-	-	-	2	-	-
1.4.Southern District									
1.4.1.Ed Debba Rural C.	16	-	-	-	1	-	-	-	5
1.4.2.Merowe Rural C.	20	-	-	1	-	-	3	-	1
1.4.3.Karima Rural C.	10	1	-	-	-	-	-	-	-
Total Northern Province.	71	2	-	1	5	-	9	-	15

Cont../..

Table 4 (Cont.)

Province, District and Rural Council	Grundfos	Scholler	Edico	Adler	Uggerini (Fiat)	Hitashi	N.D.M.	Nimtsaso	Cato
2.NILE PROVINCE:									
2.1.Northern District									
2.1.1.El Kap Rural C.	-	-	-	-	-	-	-	-	-
2.1.2.El Shereik " "	-	-	-	-	-	-	-	-	-
2.1.3.Abu Hamad " "	-	-	-	-	-	-	-	-	-
2.2.Central District									
2.2.1.El Bauga Rural C.	-	1	1	-	-	-	-	-	3
2.2.2.Berber Rural C.	6	-	3	-	3	-	-	-	1
2.2.3.Sidon Rural C.	1	1	1	-	-	-	-	-	1
2.2.4.Ed Damer " "	10	1	-	-	-	1	-	-	1
2.2.5.El Zeidab " "	7	2	-	-	-	1	-	-	2
2.3.Southern District									
2.3.1.El Metamma Rural C.	32	2	1	4	-	1	-	1	1
2.3.2.Shendi Rural C.	31	13	5	2	-	-	-	-	3
2.3.3.Wad Hamid " "	-	-	-	-	-	-	-	-	-
Total Nile Province	87	20	11	6	4	2	-	1	12
Total Northern Region	158	22	11	7	9	2	9	1	27

Source: NCRWRD Office Files.

Both of the engines and pumps are of different make. There exist 8 makes of engines and 9 of pumps. The diversity is a function of market availability and the provision of equipment by many sources. The contribution of local communities to the installment of water supply systems, by providing the accessible units in the market is a major factor behind the diversity in make.

Grundfos pumps driven by Bukh/Andoria diesel engines, Scholler and Edico pumps driven by Torpedo/Lister engines are the main mechanical units operating in the Region. Other types such as Cato/Yanmar, M.D.M., Fiat, are recently introduced in the Region in few locations.

3.3. The NCRWRD Duties and Responsibilities:

The main objective of the NCRWRD is to provide adequate and safe drinking water to the rural population. The NCRWRD realises this objective through the following means :-

i) Drilling of bore-holes and fitting them with pumping units, in areas where groundwater is available.

ii) Construction of slow-sand filters and water-pumping units from the Nile, in areas where groundwater is not available.

iii) Maintenance of water-yards and slow-sand filters.

iv) Repair and maintenance of Corporation's vehicles, machineries and equipments.

v) Implementation of house connection throughout the region at the people's cost.

vi) Continuous monitoring and evaluation of groundwater.

vii) Institution building in the area of water supply provision, and administration of the activities of the corporation.

The duties and responsibilities of the Corporation include :-

i) Cooperation with the Regional authorities in the field of rural development.

ii) Preparation of regional plans for water resources development and water provision programmes.

iii) Following-up, supervision and execution of the approved development programmes.

iv) Formulation of the regional budget for water provision.

v) Distribution of manpower in the region, and personnel management (promotions, transference, training, etc..)

vi) Supplying the provincial offices with their requirements of equipments, materials and machineries.

vii) Providing the National H.Q. with all the information and technical data concerning water potentialities and use in the region.

3.4. Structure and Staffing of The NCRWRD :

The Regional and Provincial structure of the Corporation is exhibited in Figures 2 and 3.

Figure 2:

Regional Structural Set-up
NCRWRD
Northern Region

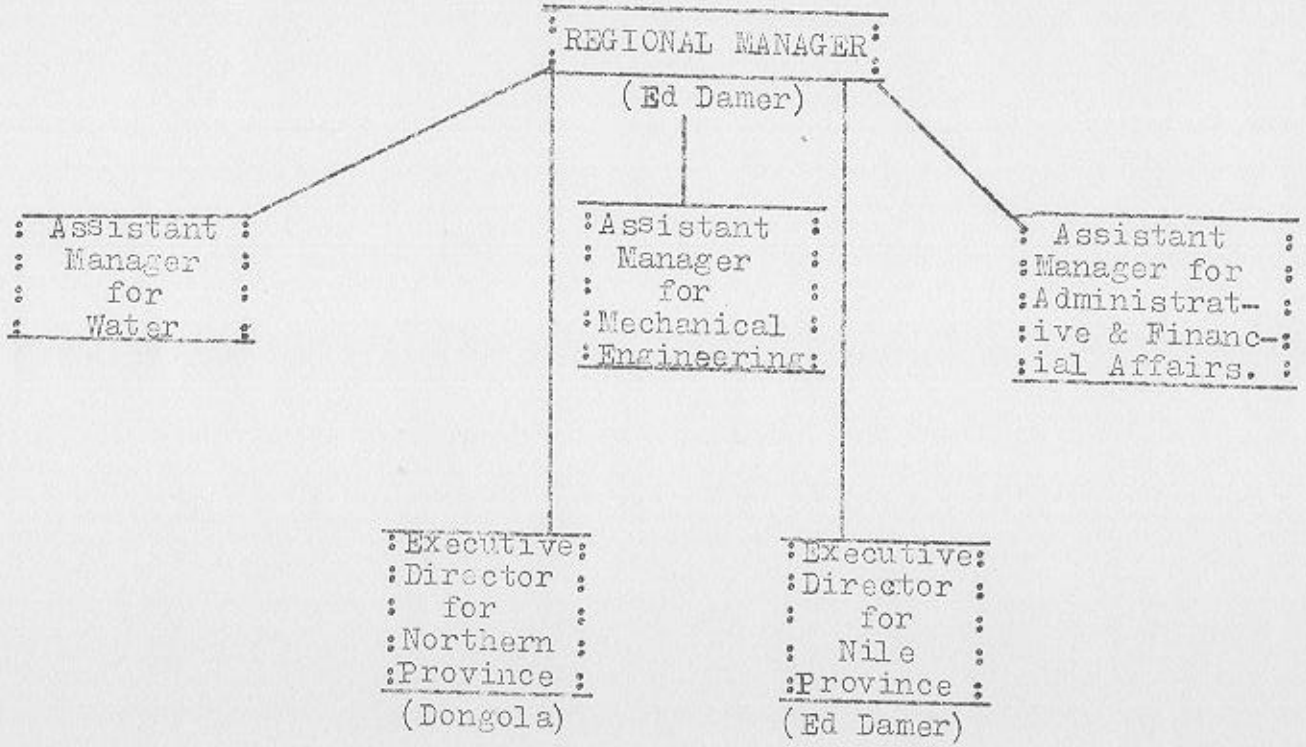
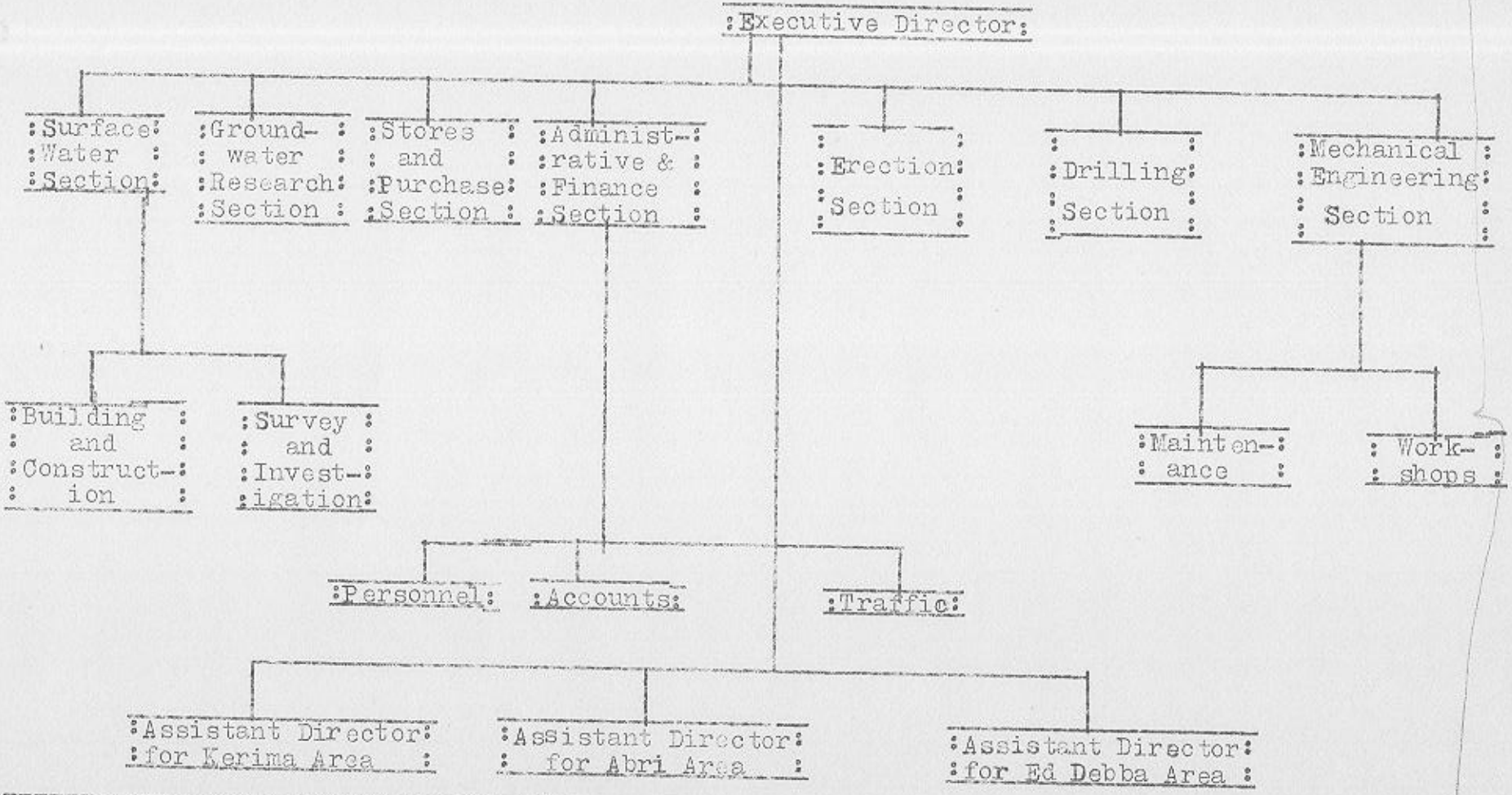


Figure 3: Provincial Structural Set-up

NCRWRD

Northern Province



Note: A similar set-up exists for the Nile Province.

The staff employed at present under the two provincial offices of Dongola and Ed Damer is given in Table 5.

Table 5: Personnel Employed by NCRWRD in The Northern Region.

Occupation	Northern Province (Dongola)	Nile Province (Ed Damer)
Geologists	3	3
Drillers	5	6
Surveyors & Draftsmen	4	5
Civil Engineers	1	1
Groundwater Tech.Eng.	2	2
Erection Tech.Eng.	5	6
Groundwater Asst.Technicans	-	3
Accountants	12	20
Store-keepers	10	11
Clerks	31	40
Drivers	27	30
Skilled Labours	15	30
Unskilled Labours	184	200
Daily paid labours	?	?
Foremen	8	15
Water-yards Mechanics	70	120
Mechanical Engineers	-	2
Mechanical Technician	5	15
Mechanical Supervisors	9	20

In addition to the regional and provincial offices, the Corporation has succeeded in establishing 8 maintenance centres with workshops, Table 6.

Table 3/6: Maintenance Centres

Province and Name of Centre	Date of Establishment
1. NORTHERN PROVINCE:	
Abri	1982
Dongola	1982
Ed Debba	1988
Qoz Corafi(Nerowe Rural Council)	1983
Karima	1987
2. NILE PROVINCE:	
Abu Hamad	1988
Ed Damer	1982
El Metamma	1987
Shendi	1983

The maintenance situation in the Northern Province is satisfactory. Only about 5 water-yards are out of order in the whole Region, and few mechanical units need to be replaced.

CHAPTER FOUR

THE PARTICIPATION OF COMMUNITIES IN THE PROVISION AND MANAGEMENT OF WATER SOURCES

4.1. The Magnitude of Community Involvement:

It has become almost a characteristic of the effort of water provision in the Northern Region, that local communities are involved in one form or the other in the provision and management of domestic water sources. This is true for all types of community water sources inventored under Annex I. In fact the 30 water sites surveyed for the purpose of this study were selected at random, and all have shown an input of community resources in their establishment and their current management.

This wide spread involvement of rural communities in the provision and management of water sources is arising from a growing awareness by local communities, that an adequate and permanent supply of domestic water is an essential utility for the comfort of the household. Timewise, this awareness started to show by the mid seventies, and since then it gained momentum. Till that time, little attention was given to the Northern

Region in the national programmes of water provision, on the premises that the Region has an established dependency on the Nile as a permanent source of domestic water supply.

The change in the policies of the National Corporation, by giving consideration to the Northern Region, and the adoption and promotion by the Corporation of a self-help input from local communities in the provision of water sources, has drawn public interest into the effort and strengthened community participation. It has thus become an established practice for communities to initiate water supply projects and approach the Corporation to join efforts for implementation. However, there are certain factors common to the population of the Northern Region which have enhanced the community participation approach.

4.2. Some Socio-Economic Factors:

These shall be discussed under :-

4.2.1. Population Homogenuity:

Many factors contribute to give a homogeneous rural community in the Northern Region. From the

ethnic angle there is dominance of people of the same tribal origin in any specific locality. This may be partly refered to the geographic setting of the region, with tribal groups aligned on both banks of the Nile, and with minimal east and west contact with other population elements. It may also be explained by the limited land resources of the region and the acquired rights by the indigenous population groups over the available land, which has restricted population movements from the rest of the country into the region. The cultural homogenuity of the rural communities there, has facilitated adopting common standing towards problems in general, and a co-operative attitude towards solving them.

4.2.2. Population stability:

Despite a continuous trend of out-migration from the region to the other parts of the country, the settlements there, still have sizeable populations working in the land and managing the different forms of the agrarian economy. The stability of the population is a factor of the economic stability of the area, being founded on irrigated agriculture with a low risk,

in comparison to populations and settlements on rain-fed areas for example. Migrants too, look at their home villages as places of origin with which they would maintain contact. Some of the savings of migrants find their way back, as different forms of investment including housing. Stability in this context is a conducive factor in settlement growth and the improvement of ways of living. The 30 settlements surveyed reflect sizeable populations which provide a sound base for project initiation and founding.

4.2.3. Enlightment:

Since early times the Northern Region has had close links with Egypt. For many decades the border regulations between the two countries facilitated the education of children, especially from the northern districts of the Region, in Egypt. The spread of migrants into almost all other parts of the Sudan and recently in the neighbouring petroleum countries has added to the knowledge and experience of the population. At present the Region has one of the highest levels of primary education enrollment in the country: 2,500 persons per primary school. Enlightment increases

population awareness of good quality life, and enhances its organizational capabilities.

4.2.4. A Spirit of Co-operation:

There is an observed spirit of co-operation among the population of the region. ~~In their culture~~, the Nile has been a common enemy and people have to come together to safeguard their property against its floods. Kinship and neighbourly relations call for reciprocation at different occassions. People co-operate in carrying out agricultural operations, in the use of machinery and in the sharing of irrigation water. The development of irrigation schemes under the Northern Agricultural Production Corporation, or privately, has strengthened and formalized the co-operation relationships. It is to be mentioned that, of the first co-operative societies developed in the country a good number was in the Northern Region. Four of the Halfawyeen co-operatives in New Halfa Scheme for example, were originally founded in settlements in old Nubia area. The spirit of co-operation extends to cover the other facets of life, including the organization and management of settlements' water supply projects.

4.2.5. Connectivity:

The rural communities of the northern region are well connected to their relatives residing in urban areas, to a large segment of government employees, to emigrants in the neighbouring countries, and to local and national politicians. This wide base of connections is a result of the high level of education attained by the population of the region, outgoing migration, choice of urban life, and employment outside agriculture. Such linkages facilitate for the settlement communities to count on the support of population elements outside the settlements, and to draw on a large resource base in the implementation of self-initiated projects. This has materialized in relation to community water supply projects; in financial donations; equipment and the securing of government agencies approval for the execution of the project.

4.2.6. Emigration:

In the majority of the settlements surveyed, the contribution of the emigrants in the realization of community water supply projects has been substantial. This goes back to the strong link the emigrants maintain with the settlements and area of origion.

Nearly in all of the cases studied, the emigrants assisted in the implementation of the community water supply projects by collecting money and purchasing equipment and sending both home. The large diversity in diesel engines and pumping units touched upon earlier has partly resulted from emigrants' equipment donations.

4.2.7. Flow of wealth and capital:

As previously mentioned there is a continuous flow of capital and investment into the region. The sources of this capital include elements living in the national capital, those resident in the other parts of the country and the emigrants. These finances are invested in agricultural activities, including reclamation of new areas and improvements of existing farms, and in housing. Investment in housing could be judged from the new extensions of settlements and the improvement of old housing. The availability of cash, definitely helps in raising funds for the implementation of community development projects.

4.2.8. Competition between communities:

The closeness of rural settlements in location, the familiarity of people in neighbouring settlements

with the ongoing activities at each settlement, and the concern of the population about improving living conditions, have founded a sense of competition between rural settlements, to undertake community projects, including rural water supply. All of the previously discussed socio-economic conditions enhance the competition between settlements.

4.2.9. Touch with technology:

People in the region have been in touch with technology for quite a long time, The start was the traditional peasantry technology of the water wheel and animal traction for land preparation. These were gradually substituted with the irrigation pump and tracterization. Other forms of mechanization are in use also, the flour mill, trucks, small vehicles, simple factories, workshops, etc. This technological familiarity could be utilized in other fields including water supply projects.

4.2.10. Management Experience:

This is revealed by the involvement of individuals and communities in various management situations, like in the Northern Region Agricultural Production Corporation schemes and in privately owned schemes. In the

two cases the relationship between the farmer and the owner is organized through certain production relations. Co-operatives established for different purposes is another forum which brings many beneficiaries together. Local government councils also provide organizational experiences from which management capabilities would be drawn. These learning situations provide ~~the~~ grounds for the management of community water supply projects.

4.3. Community representation:

4.3.1. Initiation:

Out of the surveyed 30 samples 27 water sources (90%) are community managed. Almost all of these sources (100%) stand as community initiated projects. Only in 4 cases strong individuals' influence on the community was mentioned. This connotes the impact of the various socio-economic factors discussed previously, and emphasises the concern of the Northern Region's communities in improving the domestic water supply situation. There is a common understanding that the implementation of water projects is a joint activity between the NCRWRD and communities, which entails the formation of a community representative body to approach the NCRWRD.

4.3.2. The water committee:

Once the community realizes the need for having a water project, whether the installation of water facility or the construction of house-network, a "water committee" is instituted by the community to look after the implementation of the project. Committees are usually elected in public meetings organized for this purpose. Only in 3 out of the 30 sites studied no election of committees had taken place, and the water project is run in the one case by a group appointed by the management of an irrigation scheme, and in the other two cases by persons taking the initiative to act on behalf of the community.

4.3.3. Regulation of committee works:

The 30 samples studied revealed that none of the communities have written laws to regulate elections of committees and their annual working; and that the activities of the water committees are regulated by community concensus. The terms of office of the committees was found to be 4-5 years. 20 of the committees are operating within the terms of office, while the remaining 10 are exceeding it by a variant

number of years. In most cases the same committee members are elected for successive terms of office, for reasons related to efficiency.

4.3.4. Size of committees:

The size of the committee varies from 5 to 10 members. In selecting committee members the main qualities observed are the interest and ability of the individual to serve the community, as confirmed by the answers given by 22 communities. However, this does not exclude choice on prestige and status considerations, including education, wealth, leadership positions and a good family history, as indicated by 8 cases. Each committee would have the following offices, a president, a secretary, a treasurer, with the rest as committee members.

4.3.5. Characteristics of committee members:

The age structure of the committee members shows the following ranges, as furnished by the survey results from the 30 samples:

Age group	%
19 - 24	3.6
25 - 34	25.2
35 - 44	27.1
45 - 60	39.3
over 60	4.4
	100.0

This indicates clearly that the majority of the committee members come from the age groups 25 - 60 which represent the bulk of the active working population.

The level of education of committee members could be detected from the following percentages computed from the survey results of the 30 samples:

Level of Education	%
Illiterate	18.3
Khalwa	12.7
Primary	26.3
Intermediate	18.0
Secondary	19.4
University	5.3
Post University	0.0
	100.0

Illiterates represent 18.3% in the committees. The rest of the members have received some formal education. This tallies with the previously concluded fact about high levels of enlightment and education in the region. Occupation-wise the committee members are engaged in the following occupations as reflected by the survey results:

Occupation	%
Civil servant	34.4
Farmers	41.0
Traders/merchants	14.8
Others (including workers)	9.8
	100.0

The two main categories are farmers and civil servants, which indicates that representation comes from the core of the settlement population of farming elements, assisted by those in government service, with the preparedness to push community objectives for improving living conditions.

4.4. Implementation of a community water project:

A community water project could be of two kinds: a water station which may be a water-yard, or a lifting station from the river with or without a slow-sand filter unit, or a house connection scheme. Project implementation in the two cases follows certain steps, from initiation to completion; with the responsibilities of the execution of the project falling on the water committee. These steps embrace:

4.4.1. Meetings:

Holding a series of meetings; with the community members at the various stages of the project to review progress and report on the obstacles encountered and agree on possible solutions. 25 of the 30 cases studied reported convening regular meetings to address the above issues.

4.4.2. Fund Raising:

Fund raising involves the collection of money to meet the contribution of the community in the project costs, since part of the costs is borne by the NCRWRD. The amount to be collected varies according to the size of the project. In some projects the community would contribute to the initial drilling costs of the bore-hole(s) or to the costs of the slow-sand filter(s). Amounts in the range of 300 thousand pounds were reported as being raised by communities for this purpose. In other projects the amount required would be to cover the costs of the installations (engine, pump, tank) and the construction of the water network.

Fund raising may be staged, by a collection of a certain amount at the start of the project (the average was Ls 50 per household), to be substantiated by

additional amounts at the later stages of the project as need arises. 24 of the 30 samples studied indicated applying this procedure.

4.4.3. Contact with Government Agencies:

The authorities contacted usually include the Region's offices of the NCRWRD, the Region's Ministry of Finance and Planning and the Local District Councils Headquarters to clear the approval of the project, agree on community obligations towards project's costs and the operations to be carried out by each side, and on the schedules of execution. 24 of the communities studied had gone through these processes.

4.4.4. Travel to Khartoum:

Project approval, raising of funds from relatives residing in Khartoum, and purchase of project equipment including engines, pumps and pipes may entail of the committee to travel to Khartoum. In some cases a branch committee is formed at Khartoum to pursue same of these matters, and also in the countries where the emigrants work, for fund raising. 24 of the 30 communities studied had applied these practices.

4.4.5. Organization of Manual Labour:

This is related to house connections projects. Usually the NCRWRD would survey and design the network. The water committees would in this stage help with the transport and the hospitality of the team. Executing the design would require manual digging for the laying of the pipe lines, which is normally organized and paid for by the water committees. This activity was carried out in 22 of the settlements surveyed.

4.4.6. Procurement of Equipment:

Equipment would either be provided by the corporation at cost, paid by the water committee; or directly availed by the committee. In the latter case, equipment is obtained from two sources: purchased from Khartoum; or shipped by the emigrants from where they live. 16 of the communities studied had dealings with providing equipment for their community projects.

In conclusion to this ~~chapter~~ section, the organization of the community water supply actively in the Northern Region and the institutional development that has been associated with it is very much a function of the 10 socio-economic parameters characterizing the rural

communities there. The impacts of these parameters are reflected in the clear vision people have about public participation as a tool for realizing community projects, the clarity of objectives, and the ability to organize and utilize resources.

CHAPTER FIVE

COMMUNITY MANAGEMENT OF WATER SOURCES

CHAPTER FIVE

COMMUNITY MANAGEMENT OF WATER SOURCES

5.1. Management fields:

5.1.1. general:

Community invclement in the provision of water sources covers the establishment of the water source and its management once it becomes operative. The management responsibility is carried out by the "water committees". It involves many functions including: working closely with the NCRWRD which caters for the maintenance of the source and the network, contacting the local councils' authorities to obtain diesel and lubricants at official price to run the pumping units, purchasing of the spare parts and the other needed equipments including fittings and pipes, management of the staff working at the water source including payment of the salaries of some of them, collection of the water fees from customers and the daily supervision of the operation of the water source. Each of these areas shall be discussed in detail.

5.1.2. NCRWRD/Committees Relationships:

Community management of water sources is only effective through the roles played by the NCRWRD and the services rendered by it. Community/water to be defined in more specific terms, is a joint activity between the NCRWRD and the local communities.

In essence, the task of the communities in the provision and the management of the water sources was initially engineered by the NCRWRD with the target of promoting self-help contribution by local communities in the field of rural water supplies. Hence the way the process has evolved dictates maintaining a strong link between NCRWRD and the water committees.

The NCRWRD provides most of the technical services required for the maintenance of the diesel engines and the pumping units, and assists in the major maintenance operations of the networks. It provides most of the engine operators (mechanics) and guards, and pays their salaries, and undertakes the training of mechanics to upgrade their efficiency. The corporation renders these services through its 8 maintenance centres, located in the different districts.

5.1.3. water committees/Rural Councils Relationship:

The committees obtain a monthly fixed cota of diesel and lubricants at the official price rate, from the Rural Councils authorities for the running of their water source. However, it would often occur that the local council would not receive their cotas in time, which forces committees to opt for the black market. At present the rationing of fuel requirements at official price seems to be the only official link between the committees and the Rural Councils authorities.

The Rural Councils executive officers complain about the weak link presently existing between the councils and the water committees. The executive officers mentioned that the committees approach the councils at the early preparatory stages of the project, for the approval of some of the matters related to project implementation and then disappear, and only come out again when the project is operative, to be issued with fuel. While there is this weak link with the councils, when conflicts arise between the committees and the participants in the project, people approach

the councils to settle these disputes as administrative and legal bodies. The Executive Officers recommended that the relationship between the water committees and the Rural Councils authorities should be institutionalized.

5.1.4. Purchase of spare-parts and other Equipment:

The annual maintenance and the major maintenance operations of the tube wells and the slow-sand filter units is usually carried out by the NCRWRD. The water committees contribute spare-parts for the maintenance operations, whether being carried out by the NCRWRD or at the market. The investigations made at the 30 water sources studied, indicated that each unit of the water system requires certain fast-moving parts, and maintenance operations as follows:

Unit	Fast moving parts and operations
i) Engine	Piston
	Casing
	Fuel pump
ii) Pump	Bearing
	Belt

	Unit	Fast moving parts and operations	
iii)	Tower	Cleaning Painting Welding Tower Raising	operations
iv)	Distribution System	Pipes Fittings Reconstruction	operation.

As stated previously spare-parts are obtained from three sources: NCRWRD, the local market, and Khartoum market.

As to which of the units of the system require more frequent maintenance, the following responses were recorded from the 30 samples studied, which point out that the distribution system, the engine and pump cause the main maintenance problems.

	Answers received	
Unit	More frequent	Less frequent
Well	9	21
Engine	17	13
pump	15	15
Tower	7	23
Distribution system	21	9

5.1.5. Staff Management:

A limited number of staff is employed in the running of the water systems. The permanent staff includes the mechanics and guards. Their number per water source flucuates between 1 and 5 in the case of mechanics, and 1 and 3 in the case of guards, depending on the number of pumping units, and whether the system includes a network or not.

Mechanics and guards represent the two categories of the regularly salaried staff. Mechanics are usually young men chosen from the community, and trained for a short period by the NCRWRD to operate the diesel engine and the pumping units. The salaries of the mechanics and guards are mostly met by the NCRWRD. A few of them are paid by the water committees, which should not have been the case, since in the policy of the NCRWRD it is stipulated that this component should be part of the responsibility of the water committees. That is why mechanics are selected from within the community to be trained by the NCRWRD.

The management of the mechanics and guards is divided between the NCRWRD and the committees. Depending on the life time of the water project, the dura-

tion the mechanics and guards have been in service, varies from 1 to 15 years, with an average of 5 years for the sample surveyed.

For the rest of the management fields, including: daily supervision; the collection of water fees; the execution of new house connections; the procurement of fuel , spare-parts and other inputs; and the keeping of accounts, the president,the secretary and the treasurer of the committee are in direct charge. They would also assign some of the committee members plus other individuals in the community, certain responsibilities. The collection of the water fees for example is carried out in some cases by the treasurer and in others by a person who is paid a fixed salary. A third method applied would be through certain shopkeepers, to whom customers would pay the fees.

5.1.6. collection of water fees:

Of the 30 settlements surveyed 26 have house connections, and 4 are without networks. However, except for 2 communities, the existing 26 networks do not cover all of the housing in the settlements. The following ranges of coverage would reflect the ~~following~~ situation:

percentage coverage	number of settlements
less than 10%	3
10 - 19	4
20 - 39	6
40 - 59	5
60 - 79	4
80 - 99	4

Accordingly, the water rates vary between settlements, and within the same settlement, as to whether water is obtained directly from the source or by means of a network. The following ranges reflect the current water price rates per household per month.

Range in LS	Number of settlements
Free	3
Less than 5	3
5 - 10	22
11 - 15	1
16 - 30	1

The average paid by a household for the sample surveyed is 8.6 pounds.

No water metres are used to guage household consumption, neither at source nor at houses. All

households in a settlement have equal access to using water for domestic purposes, and would pay the same monthly rate, irrespective of the amount each household would draw, provided that it is for domestic use. Uses outside domestic needs, such as excessive irrigation for gardening, or the drawing of extra amounts for house construction are charged additional fees. Controlling the use of water outside domestic needs is one of the day to day supervision responsibilities of the water committees, to reduce the misuse of water and charge additional fees. This is one of the areas of conflict between the committees and users.

Communities do not see a need for installing water metres. The reason behind that as gathered from the survey findings, centres around, the facts that: water metres are costly and require elaborate management, the expenses of which are beyond the resources available to the community; that there are no big variations in household consumption, and that there is scope for adjusting the rates any time through community conscent.

As explained previously, water fees are collected directly by the water committees by an assigned member, the treasurer in most cases, or through paying at specified shops. It is to be noted that, adherence to month by month payment is not strictly followed by customers, resulting in arrears. However, committees usually target to have all arrears paid before closing the accounts for a fiscal year.

5.2. Financial performance:

The success of the community managed water sources could be judged on many yard-sticks. One of them would be the ability of the community to install the system and satisfy a felt need. Another would be the provision of domestic water to the daily requirements of the household. A third could be the financial performance and to what degree it is self supporting.

On investigating this last point the following data ~~statistics (Table 7) prefered to be given in more detail~~, provide a good basis for the discussion of the financial performance of the water committees.

Table 4: Revenue, Expenditure, Surplus/deficit(Ls.) for 23 water sources with House Connections 1987/88.

Settlement (For location see Figure 1)	Revenue	Expenditure	Surplus/ deficit
1.NORTHERN PROVINCE:			
1.1.Dalgo	4,200	40,380	- 36,180
1.2.Akked/Sarag	13,800	17,680	- 3,880
1.3.Kerma El Balad	156,000	53,300	+102,700
1.4.Labab	13,800	10,800	+ 3,000
1.5.Dumbo	12.600	8,610	+ 3,990
1.6.El Golid Bahri	12,260	12,230	+ 0,030
1.7.El Gaba	18,000	12,080	+ 5,990
1.8.El Debba	28,000	28,076	- 0,076
1.9.Genette El Onia	12,000	5,620	+ 6,380
1.10.Hissain Narti	7,800	6,780	+ 1,020
1.11.Korti	10,500	11,180	- 0,680
1.12.Qoz Gurafi	10,500	8,460	+ 2,040
1.13.Abu Dom	18,000	21,000	- 3,000
1.14.Merowe	78,600	22,200	+ 56,400
2.NILE PROVINCE:			
2.1.El Bauga	10,800	8,260	+ 2,540
2.2.Gdalla	9,000	8,618	+ 382
2.3.Kedebas	23,040	14,480	+ 8,560
2.4.Sidon	3,540	9,480	- 5,940
2.5.El Hudaiba	6,000	10,000	- 4,000
2.6.Abu Seleim	9,600	5,312	+ 4,288
2.7.El Zeidab	45,000	26,400	+ 18,600
2.8.El Aigeida	3,240	7,840	- 4,600
2.9.Kelley	25,200	21,600	+ 3,600

Source: Field survey Data.

The information covers 23 out the 26 settlements with networks, from which the survey team was able to collect data on revenue and expenditures at the time of the survey. The missing data on the 3 settlements was either due to committee member in charge of the accounts being not available, or that the accounts were not ready.

It is apparent from the data, that the annual revenue collected ranged from 4,200 to 156,000 pounds, and the annual expenditure from 5,620 to 53,300 pounds. The size of the revenue is a function of the number of customers and the efficiency of collection. Expenditure covers the normal operation costs and the major replacement and development requirements of the water system. High expenditure is incurred by the last two necessities.

On relating expenditure to revenue, 15 of the committees register a surplus income and 8 register a deficit. The main reason behind deficit, from the point of view of committees, goes back to one of the ~~following~~ these factors: spending on major maintenance operations, cost of replacement of machines, and inefficient

collection. Financial deficits are usually made for by subscriptions from the community which are collected as additional funds. Surpluses on the other hand are kept as reserves carried into the next year budget. Some communities, however, are contemplating organizing new community founded projects, like electricity connection to houses, thus suggesting the use of surpluses from water revenues for these purposes.

In the final assessment of the financial performance of community managed water sources, the picture would not be complete if the support given by the NCRWRD is not taken into consideration, which in a way is a form of subsidy in evaluating the cost recovery of the water sources.

The field survey revealed that there are two types of water sources in the region, from funding point of view;

i. water sources where all the fixed costs are provided by the NCRWRD, and

ii. water sources where the fixed costs are shared between the NCRWRD and the beneficiary communities.

The share of the community is represented by the payment in the drilling phase (including transport of material to site) partial payment for the installations (engine, pump and tank) and full payment for the network. The running cost is shared between the community and the NCRWRD. The corporation share appears in the technical supervision and the maintenance, besides the salaries of the mechanics and guards, at most water yards.

In the 30 samples covered the water committees do not include the corporation's expenditure on maintenance and the salaries of mechanics and guards in their accounts. Costing the maintenance services of the corporation by water source is not easy to work out due to the lack of this kind of accounting. However, an amount of Ls 5,000 per annum is estimated as an average maintenance cost per water source which is incrurred by the corporation. Added to that an amount of Ls 4,800 as the salaries of the mechanic and guard, it could be estimated that on the average, a community managed water source receives a subsidy of Ls 10,000 per annum from the NCRWRD.

CHAPTER SIX

KEY IESSONS AND RECOMMENDATIONS

CHAPTER SIX

KEY LESSONS AND RECOMMENDATIONS

6.1. Introduction:

This final chapter aims at assessing the capabilities of community managed water sources, revealing the key lessons to be learned, and making recommendations as to how their performance would be improved within the region, and pointing to the possibilities and shortcomings of replicating the Northern region experience in the other parts of the country. The data collected through the community perception questionnaire (70 samples) and the official perception questionnaire (22 samples) shall be used as a basis for discussion.

6.2. Results of the two questionnaires:

6.2.1. Systems' supply capability:

The systems' capability is judged from users' stand point of view, as to whether it provides adequate and timely water or not. Data from the 30 settlements reveals an average daily household consumption of 56 gallons, which is effectively provided by the community managed systems. All respondents confirmed that they

obtain their daily requirements of water when the system is working. However, the stoppage of the system from time to time was reported, due to various kinds of break-down, which result in either a complete failure of supply, or in a shortage of supply. In both cases people resort to the Nile or to the open diameter wells as a substitute. The irregularities of supply are a source of dissatisfaction to communities.

In the final assessment, 47% of the respondents are satisfied with their systems and 53% are dissatisfied. The dissatisfaction due to the inefficiencies of the system is referred to: poor network 43%, poor performance 26%, limited capacity of the source 24%, and complete stoppage 7%; of the answers received.

6.2.2. Reliability of the Community Managed System:

Whether the community managed water supply system is reliable or not, was one of the issues put before the group of officials and resourceful persons interviewed and before the users of the system. The responses gathered from the first category confirm

that the system is reliable; 90% of all answers received. Its reliability is attributed to the facts that it matches peoples' needs and resources 54%, and that the alternative at hand i.e., the government to shoulder the responsibility of water provision is very weak 35%; of all answers received. The proofs to reliability are cited in good performance 52%, effective management 34% and low cost 14%.

In the same context, but coined differently, users were asked to ~~different~~ rate possible alternatives of water provision and management. The assessment given of the three proposed systems with regard to efficiency revealed the following pictures: management by water committees 59%, by NCRWRD 38%, and by Local Government Councils 3%. It is therefore evident that the local communities of the Region view the present system of community managed water sources as reliable, and see limited alternatives to it.

6.2.3. Performance of the water committees:

On the overall, users were positive about the performance of the management committees, with 71% satisfied with the performance of the committees and

29% dissatisfied. Answers received from the officials and the resourceful persons confirm similar results: good, 66%; obstacled by frictions 17%; and inefficient accounting 17%.

Frictions due to competition over leadership, mostly stimulated by political rivalry, a factor which emerged recently with party politics, was mentioned in many settlements. Inefficient accounting was also raised at many places; sometimes elevated to an accusation of the committee members of financial violations of the cash resources under their disposal.

6.2.4. Obstacles of the Community Managed System, and solutions:

Some of these are physical, and the others are management constraints. The ones mentioned include: lack of spare-parts 32%, shortage of fuel and lubricants (sometimes bought at black market price) 27%, low quality and capacity of engines 13%; continuation of committees to lead beyond their term of office 12%; inefficient design and poor construction of networks 8%, and the non-legal and non-institutionalized status of the water committees, 8%.

The solutions to the above problems are indicated by the answers to the question: what are the best conditions required to run an efficient community managed water system; which was asked to officials, resourceful persons and users. The answers gathered pointed out to the following solutions: improvement of the designs and the laying of the network, 26%; availing of spare-parts 21%; giving financial support by the government to replace inefficient engine and pumping units, 20%; legalizing and institutionalizing the status of the committees, 19%; introducing a system of official/public monitoring of the work of the committees, 11%; and minimizing the conflicts arising from political rivalry, 3%.

6.3. Key Lessons:

The key lessons to be learned from the findings of the study could be summarized in the following :-

1. Domestic water sources in the Northern Region used to be provided by the Corporation, recently and increasingly their provision has become a joint activity between the NCRWRD and the beneficiary communities.

ii. The management of the water sources, as well as the development of the network is fully the responsibility of the local communities with the corporation assisting in some of the technical matters and the maintenance of the source, the engine and the lifting units.

iii. There are certain socio-economic factors that are characteristic of the Northern Region which provided the conducive conditions for the flourishment of community managed systems in the region.

iv. Though the approach of management by communities was initially ~~stated~~ introduced and encouraged by the NCRWRD, communities are presently taking the lead and are promoting the approach, while the corporation lagged behind in matters related to the institutional development of the system.

v. In founding the activity people have relied on their system of social organization of relationships in organizing the participants and raising funds; borrowing from the modern systems the election of committees, and without realizing a need for any written laws.

vi. Through the system, communities have succeeded in obtaining adequate water for their domestic needs, and in their houses. water from the tube-wells is of good quality, while that from the Nile is potable and its quality did not picture out in the survey as ~~is not~~ an urgent priority at present.

vii. The cost of running the system is reduced by the free of charge management and supervision responsibilities carried out by the members of the committee and the other assigned individuals in the community; while the subsidy made by the NCRWRD enhances the capabilities of the system. The revenues collected suffice to meet the expenditure in the majority of cases and when there is a deficit the community is prepared to make up for it through subscriptions and donations.

viii. Generally people are satisfied with the performance of the system and see no alternative to it. The major problems encountered by the system centre around shortage of spare-parts, irregularity of fuel supplies, poor quality engines in some cases and limited capacities of engines in others, inefficiency and inadequacy of housing connections, and lack of

iv. Despite the market limitations regarding the availability of the right kind of machines for the pumping units, the NCRWRD should work towards implementing a scheme for the standardization of the mechanical units mainly engines and pumps in use and should take a leading role in that.

v. The control of water quality in irrigated areas should be routinely undertaken to protect water quality.

vi. The scheme of institutional development would consider creating a kind of a set-up which would bring together the water committees of each province under a form of association. One of the tasks of the association would be to develop a revolving fund for the procurement of spaare-parts. The fund shall be built from fixed contributions by the water committees, and subscriptions by NCRWRD and the regions' Government. The spare-parts shall be sold at market price to the committees.

vii. House connection networks present ~~are~~ one of the drawbacks of the system due to the fact that they are poorly designed and by time ~~the~~ network expands beyond the capacity of the system as a result of uncontrolled connections. This is an area which requires revision by both the water committees and the NCRWRD.

viii. Finally on the prospects of replicating the Northern Region model in other parts of the country, judged on the interplay of the socio-economic factors discussed ~~under chapter three~~ previously, there seems to be possibilities for the replication of the model in the Khartoum Commissionarate and the Northern Gezira Province. Outside these two areas the model lacks the credibility of the viable socio-economic base found in the Northern Region.

A N N E X E S

(I - IV)

ANNEX I:

SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

1. NORTHERN PROVINCE:

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Hills: With house connection	Raw Water from Hills: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management: NCRWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Inc.= Incomplete O.D.= Out of water yard
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1.1. Halfa Dist.																					
1.1. Wadi Halfa R.C.																					
Sorkemeto			/				30 34 45	20 58 45				Centrifugal	Yanmar		34	/	/			86	
1.2. Northern Dist.																					
1.2.1. Abri R.C.																					
Abri			/				30 20 15	20 47 40				Centrifugal	Yanmar		68	/	/			79	
Saai Siaab				/			30 19 15	20 45 15				"	"		34	/	/			87	
Saai Addu				/			30 21 45	20 43 15				"	"		34	/	/			84	
Goubat Salseem				/								"	"		34	/	/				
1.2.2. Dalgu R.C.																					
Dalgu			/				30 33 50	20 08 45				Centrifugal	Yanmar		34	/	/			82	

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(*) NCRWRD = National Corperation for Rural Water Resources Development

SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management: NCRWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Inc.= Incomplete; U.D.= Out of water yard; Out of Order
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Kukka						/	30 35 40	20 00 40				Centrifugal	Yanmar		34	/	/			87	Inc.
Shadda				/			30 34 00	20 04 00				"	"		34	/	/			86	
Farraig			/				30 30 00	19 56 15				"	Lister		34	/	/			86	
1.3.Central Dist.																					
1.3.1.Argo R.C.																					
Kerma El Balad (A)	/						30 24 30	19 36 00	100	6.8	10	Grundfos	Lister	44		/	/			78	
" " (B)	/						30 24 30	19 46 00	78	7.4	8.9	"	"	23.4		/	/			84	
" " (C)	/						30 24 30	19 36 00	64	3.1	10	"	"	33.4		/	/			84	
Kerma El Nuzzle (E)		/					30 24 30	19 38 00	56	5.6	7.4	"	"	39		/	/			84	
Argo (A)	/						30 25 00	19 32 00	91.5	17	-	Cato	Yanmar	36		/	/			73	
Argo (B)	/						30 25 00	19 32 00	111	6.7	-	Grundfos	Andoria	36		/	/			74	

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(*) NCRWRD = National Corporation for Rural Water Resources Development.

SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

er Source			Co-ordinates		Well depth and water levels			Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management				Date of Establishment	Condition
w a ter	Raw Water from Hills		Longitude	Latitude	Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)					NCRWMP (*)	Community Managed	Agency Managed	Privately Managed		
Without house connection	With house connection	Without house connection															
5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
			30 25 00	19 31 30	67	7	-	Cato	Yanmar	45				/		84	
			30 26 00	19 34 00	88.4	7.3	-	V.D.M.	Andoria	50				/		84	
			30 25 00	19 32 00	107	7	17	Cato	Yanmar	23		/	/			79	
			30 25 00	19 40 00	48.8	6.7	8.7	Grundfos	Lister	30		/	/			83	
			30 26 30	19 32 00	85	9.2	13.5	Cato	Yanmar	47		/	/			85	
			30 25 00	19 41 00	38	7	8	Grundfos	Perkins	45		/	/			83	Inc.
			30 26 00	19 28 30	91	8.2	12.2	-	-	46		/	/			87	Inc.
			30 27 00	19 30 00	104	6.8	8.5	-	-	46		/	/			87	Inc.
			30 27 00	19 31 00	92	12	15	-	-	45		/	/			87	Inc.
			30 25 00	19 39 30	43	16.3	10.8	-	-	45		/	/	/		87	Inc.

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oration for Rural Water Resources Development.

SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management: NCRWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1.3.2.El Hafir Rural C.																					
Akkad	/						30 22 00	19 40 20	34	9	-	M.D.M.	Andoria	50		/	/			82	
Sorog		/					30 22 00	19 27 30	47	12.8	18	Cato	Yanmar	41		/	/			82	
El Haffir		/					30 22 00	19 37 00	76	7.7	9.1	Cato	Yanmar	33		/	/			82	
Musho(Hospital)		/					30 23 00	19 34 00	113.0	6	7	Grundfos	Bukh	17				/		76	
Musho		/					30 23 00	19 34 00	77	9.4	10.5	M.D.M.	Andoria	36		/	/			82	
Birkia	/						30 23 00	19 33 00	120	7.6	12.8	Grundfos	Andoria	40		/	/			77	
Koya		/					30 24 30	19 31 00	118	10	12	Grundfos	Perkins	35		/	/			82	Inc
Makjour					/							Centrifugal	Yanmar		34	/	/			87	

(*) NCRWRD = National Corporation for Rural Water Resources Development.

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SURVEY OF COLLECTIVITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management: NCRWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Inc.= Incomplete; O.D.= Out of
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1.3.3. Dongola R.C.																					
El Seir	/						30 28 40	19 20 00	112	7.8	12.6	Uggerini	Ercolomoreii	46		/	/			87	
Ettrua		/					30 27 40	19 18 30	88	8.5	16.2	Cato	Yanmar	44.7		/	/			87	
N.C.R.W.R.D.	/						30 28 20	19 10 20	152	8.2	32.6	Uggerini	Ercolomoreii	43		/				77	
Dongola Air Port	/						30 28 00	19 10 30	145	5.6	18	Grundfos	Electric (Motor)					/		77	
Lebah Sharg		/					30 28 30	18 59 30	110	8.4	14.8	Grundfos	Perkins	45		/	/			82	Inc.
Wad Niwairi	/						30 24 00	18 57 30	151	28	29	Grundfos	Andoria	39		/	/			77	
Lebah Gharb	/						30 27 00	18 59 30	129	21	24	Monolift	Peters	20		/	/			76	
Sortoad	/						30 28 00	19 03 30	108	15.6	19.9	Uggerini	Ercolomoreii	43		/	/			83	
Sheikh Sharief (A)		/					30 29 00	19 07 00	92	10	14	Cato	Yanmar	39		/	/			83	
" " (B)		/					30 29 00	19 05 00	149	8	9	Cato	Yanmar	30		/	/			83	

(*) NCRWRD = National Corporation for Rural Water Resources Development.

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SURVEY OF COLLECTIVITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management: NCRWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Ino.= Incomplete; O.D.= Out of
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
El Meheila (B)		/					31 01 34	19 00 52	103	15.9	-	Scholler	Torpedo	7		✓				82	
El Daim		/					30 27 00	19 12 30	82	9	12	Grundfos	Electric (Motor)	49			✓	✓		83	
Maragha		/					30 28 00	19 12 30	99	9	12	Uggerini	Ercolgm-oreii	48		✓	✓			83	
Kabtoad		/					30 27 00	19 14 00	111	8	10	Grundfos	Perkins	31		✓	✓			83	
El Khanag		/					30 29 00	19 08 00	135	10	14	Grundfos	Perkins	45		✓	✓			83	Inc.
Garada		/					30 26 30	19 16 40	118	9.5	13	Grundfos	Perkins	39		✓	✓			82	Inc.
Hassan Arbab		/					30 27 00	18 57 00	149	23.7	27	M.D.M.	Andoria	41				✓		83	
1.3.4.El Golid Rural C.																					
Urbi (South)	/						30 32 15	18 44 00	152	6	8.5	Grundfos	Bukh		14	✓	✓			76	
El Khandag	/						30 33 45	18 36 00	152	20	21	Grundfos	Bukh		13	✓	✓			76	

(a) NCRWRD = National Corporation for Rural Water Resources Development.

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SURVEY OF COLLECTIVITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source							Co-ordinates		Well depth and water levels			Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management				Date of Establishment	Condition: O.K. = Complete Inc.= Incomplete (Out of
	Water-yard		Slow sand Filter		Raw Water from Nile												NCRWRD (a)	Community Managed	Agency Managed	Privately Managed		
	With house connection	Without house connection	With house connection	Without house connection	With house connection	Without house connection		Longitude	Latitude	Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)										
1	2	3	4	5	6	7		8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Shabatout	/							30 34 00	18 35 00	122	10	12	M.D.M.	Andoria		12	/	/			77	
El Golid Shabaana	/							30 38 00	18 31 00	136	10	17	Grundfos	Andoria		33	/	/			77	
El Golid Bahri	/							30 32 00	18 30 00	131	11	13	Grundfos	Andoria		65	/	/			77	
El Golid Hospital	/							30 32 00	18 30 00				Grundfos	Bukh		--	/		/			
Romi El Bakri		/						30 42 00	18 23 00	145	5	14	Grundfos	Bukh		65	/	/			77	
Dambo(North-A)	/							30 34 00	18 35 00	125	8	14	M.D.M.	Bukh		65	/	/			77	
Dambo(South-B)	/							30 35 15	18 34 00	123	7	11	Grundfos	Andoria		65	/	/			77	
Sali		/						30 33 00	18 40 00	157	10	17	Grundfos	Perkins		33	/	/			83	
Nawa El Atter		/						30 43 00	18 29 00	110	19	34.5	-	-		43	/	/			87	Inc.
Amentgo		/						30 43 00	18 26 00	117	7	13.5	-	-		47	/	/			87	Inc.
Arab Hag		/						30 43 00	18 23 00	133	9	13	-	-		47	/	/			87	Inc.

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(a) NCRWRD = National Corporation for Rural Water Resources Development.

SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Source: Water-yard With house connection	Type of Source: Water-yard Without house connection	Type of Source: Well water With house connection	Type of Source: Well water Without house connection	Type of Source: Raw Water from Nile With house connection	Type of Source: Raw Water from Nile Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Well depth and water levels: Static Water Level (Metres)	Well depth and water levels: Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management: NCRWRD (*)	Mode of Management: Community Managed	Mode of Management: Agency Managed	Mode of Management: Privately Managed	Date of Establishment	Condition: Inc.= Incomplete; U.D.= Out of water yard; Out of Order
1	2	3	5	6	7		8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Latti		/					30 44 30	18 15 00	188	7	8	-	-		45	/	/			87	Inc.
El Gaddar		/					30 34 00	18 16 00	145	7	18	-	-		45	/	/			87	Inc.
1.4 Southern Dist.																					
1.4.1.Ed Debba R. Council																					
Garb Dongola	/						30 44 15	18 12 15	156	13.7	17.7	Grundfos	Andoria	14		/	/			77	
Hummour	/						30 46 30	18 11 00	200	24.4	-	Grundfos	Lister	45		/	/			85	
Dabbat El Fugara	/						31 01 10	18 01 50	116	8.8	98	Grundfos	Bukh ,	14		/	/			76	
Arabnarti	/						30 45 00	18 10 10	154	6.0	10.4	Grundfos	Andoria	14		/	/			76	
El Kerad	/						30 56 00	18 04 30	97	7.2	9.4	Grundfos	Andoria	17		/	/			72	
Ed Debba (A)	/						30 57 00	18 03 10	114	12	14.8	Grundfos	Andoria	30		/	/			72	
Ed Debba (B)	/						30 57 00	18 03 10	68	12.6	28.8	Grundfos	Andoria	28.4		/	/			69	

(*) NCRWRD = National Corporation for Rural Water Resources Development.

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SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management: NCRWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: U.D. = Incomplete Out of water yard
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Ed Debba(Hospital)	/						30 57 00	18 03 10	50	10	—	Grundfos	Andoria	59		/	/	/		69	
El Baga	/						30 43 45	18 14 15	—	—	—	Grundfos	Andoria	—		/	/				
(El Tadamon Hospital)	/						31 17 45	17 59 45	98	—	—	Cato	Yanmar	45		/	/	/		86	
Faquirin Kotti	/						31 18 30	18 01 15	165	10	50	Grundfos	Bukh	—		/	/			78	
Mansurkotti	/						31 20 15	18 01 50	167	7	8.2	Cato	Yanmar	16		/	/			72	
El Gabria	/						30 52 30	18 07 45	116	8.5	-	Grundfos	Bukh	—		/	/			78	
El Debba H. 2nd. school.	/						30 57 10	18 03 15	130	9.1	27.4	Cato	Yanmar	23		/		/		78	
Gira Bara	/						31 02 45	18 01 50	75	—	—	Grundfos	Bukh	—		/	/			78	
Ganati El Onia	/						31 15 15	17 58 45	133	10	20.7	Uggerini	Ercolomoreii	14		/	/			78	
Ganati Es Sug	/						31 14 00	17 59 30	119	6.6	—	Grundfos	Bukh	—		/	/			78	

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(*) NCRWRD = National Corporation for Rural Water Resources Development.

SUPPLY SOURCES

Name of Rural C Sit	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management: NCRWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Inc.= Incomplete; O.D.= Out of water yard; Order
14		15	16	17	18	19	20	21	22
Hisainari	Sukh	—		/	/			72	
Ganati By	Yanmar	30.00		/	/			84	
El Mana	Perkins	44		/	/			83	Inc.
Abu Okaz		48		/	/			88	Inc.
El Affad	—	49		/	/			88	Inc.
El Affad	—	33		/	/			83	Inc.
Wad Diab	erkins	45		/	/			84	
Artimog	anmar	49		/	/			87	Inc.
Tangasi	—	47				/		87	Inc.
Tangasi	—	41		/	/			87	Inc.
Tangasi	—	47		/	/			87	Inc.
Argi (N	—								

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SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Hills: With house connection	Raw Water from Hills: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management: NCRWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Inc.= Incomplete (U.S. of water Yard
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Argi (South)		/					30 57 10	18 04 15	115	10.4	26.6	—	—	47		/	/			88	Inc.
Bukitoul		/					30 45 10	18 12 30	193	10.5	21.3	—	—	45		/	/			87	Inc.
Banganarti		/					30 48 00	18 09 30	330	19.9	35.5	—	—	33		/	/			87	Inc.
1.4.2.Merowe Rural Council																					
Korti (A)	/						31 33 30	18 07 00	158	15.5	18	Grundfos	Bukh	14		/	/			76	
Korti (B)	/						31 33 30	18 07 00	148	15.2	33.5	Grundfos	Andoria	14		/	/			76	
Usli		/					31 39 00	18 13 15	229	11.3	13.7	Grundfos	Bukh	16.3		/	/			76	
El Ghoraiba		/					31 52 20	18 08 00	220	10.1	16	Grundfos	Perkins	26		/	/			82	Inc.
Magnarti	/						31 32 30	18 05 50	140	2.2	24.1	Grundfos	Andoria	15		/	/			76	
Musawi		/					31 40 00	18 14 15	163	14	21	Grundfos	Perkins	45		/	/			84	Inc.

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(*) NCRWRD = National Corporation for Rural Water Resources Development.

SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management: NCRWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Inc.= Incomplete; O.D.= Out of water yard
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Es Saggai	/						31 51 00	18 31 30	39	9.7	10.7	Grundfos	Andoria	34.0		/	/			81	
Galaat Es Saggari	/						31 51 30	18 32 00	26	6.7	—	M.D.M.	Andoria	136		/	/			81	
Qoz Gorafi	/						31 41 10	18 16 20	135	11.3	15.4	Grundfos	Bukh	14		/	/			72	
Qoz Gorafi	/						31 41 10	18 16 20	115	—	—	—	—	—		/	/			88	Inc.
Qoz Hindi(West)	/						31 41 00	18 15 50	102	10.6	11.9	Grundfos	Bukh	14		/	/			76	
Hai El Shatti	/						31 41 45	18 16 50	110	9	14	Grundfos	Andoria	18		/	/			76	
Umm Shedeira	/						31 43 00	18 18 30	79	9	21	Grundfos	Andoria	13		/	/			76	
Galaat El Gureir	/						31 42 00	18 17 15	115	7	10	Grundfos	Lister	28		/	/			81	
Banat El Gureir	/						31 42 00	18 16 20	138	12.8	15.4	Cato	Yanmar	28		/	/			81	
Umm Bakoul	/						31 31 00	18 04 40	128	10.4	11.3	Grundfos	Lister	15		/	/			78	
Tangasi El Daim		/					31 47 30	18 24 00	61	9	35	Grundfos	Perkins	45		/	/			81	Inc.

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(*) NCRWRD = National Corporation for Rural Water Resources Development.

SURVEY OF COLLUNITY LANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management: NCRWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: I.O.D. = Incomplete Out of water yard
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Tangasi Er Ruweis		/					31 47 15	18 23 20	105	3	33	Grundfos	Perkins	46		/	/			81	Inc.
Tangasi Samareit	/						31 47 00	18 24 20	72	9	24	Grundfos	Andoria	17.8		/	/			81	
Abu Dom	/						31 48 10	18 27 10	38	13	—	Grundfos	Andoria	31		/	/			81	
Abu Dom El Debeiba	/						31 48 10	18 27 10	120	7.8	8.8	Grundfos	Andoria	16		/	/			72	
Abu Ranat	/						31 47 00	18 22 10	123	10	27	Monolift	Andoria	15		/	/			76	
Merowi (Hospital)	/						31 49 30	18 29 00	32	8.5	—	Adler	Lister	—		/		/		71	
Merowi Girls H. 2nd. School.	/						31 49 30	18 29 00	38	8	—	Grundfos	Bukh	7				/		72	
Merowi Boys H. 2nd. School.	/						31 50 00	18 29 00	42	7.6	—	Grundfos	Lister	—				/		72	
Merowi (Wasat)	/						31 50 00	18 29 30	111	15	45	M.D.M.	Andoria	23		/	/			81	
Merowi (South)	/						31 49 00	18 28 45	97	16	50	M.D.M.	Andoria	16		/	/			81	

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(*) NCRWRD = National Corporation for Rural Water Resources Development.

SURVEY OF COLLUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management: NCRWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Inc.= Incomplete; O.D. = Out of water yard
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Merowi Airport	/						31 49 00	18 27 00	88	—	—	--	--	--				/		88	Inc.
Merowi			/				31 50 00	18 29 30	--	--	—	Centrifugal	Andoria	—	68	/	/			87	
GGerief Nuri			/				31 52 00	18 32 15	—	—	—	Centrifugal	Lister	—	34	/	/			87	
Duweim Wad Hag			/				31 50 10	18 30 00	—	—	--	Centrifugal	Yanmar	—	34	/	/			87	
1.4.3. Karima R. Council.																					
El Meheila (A)		/					31 28 27	18 46 44	113	45	—	Scholler	Lister	7		/				82	
El Arak (A)	/						31 37 00	18 13 00	67	13.7	16.6	Grundfos	Andoria	44		/	/			74	
El Arak (B)	/						31 37 00	18 13 00	60	14	29	Grundfos	Bukh	14		/	/			74	
El Hugir	/						31 38 00	18 14 30	92	13.4	32	Grundfos	Bukh	16.5		/	/			78	

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(*) NCRWRD = National Corporation for Rural Water Resources Development.

2. NILE PROVINCE:

SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management: NCRWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Inc.= Incomplete; O.D.= Out of Order; water yard
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
2.1.Northern Dist.																					
2.1.1.El Kap R.C.																					
Shirry						/	32 33 00	19 08 00				Centrifugal	Yanmar		34	/	/			85	
2.1.2.El Shereik Rural Council																					
El Sheriek					/		33 32 00	18 48 00				Centrifugal	Lister		34	/	/			83	
Kurgus						/	33 29 00	19 13 00				Centrifugal	Lister		34	/	/			87	
Awaki						/	33 33 00	19 07 00				Centrifugal	Lister		34	/	/			87	
2.1.3.Abu Hamed Rural Council																					
El Singirab					/		33 21 00	19 27 00				Centrifugal	Lister		34	/	/			78	
Kalaabii					/		33 16 00	19 29 00				Centrifugal	Lister		34	/	/			78	

(*) NCRWRD - National Corporation for Rural Water Resources Development.

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SURVEY OF COLLECTIVELY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management (*): Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Inc.= Incomplete; U.D.= Out of water yard; Out of Order
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
El Girief Ras El Gezeira.						/	33 10 00	19 31 00				Centrifugal	Lister		34	/	/			78	
El Diphallab					/							Centrifugal	Lister		34	/	/			85	
Mugal					/		33 20 00	19 29 00				Centrifugal	Lister		34	/	/			78	
Shotek & Kadetta							33 16 00	19 28 00				Centrifugal	Lister		34	/	/			85	
Abu Salam						/	33 21 00	19 18 00				Centrifugal	Lister		34	/	/			87	
2.2. Central Dist.																					
2.2.1. El Banga Rural Council																					
El Banga(Hospital)		/					33 55 00	18 15 00	30.5	6.1	—	Edico	Lister	6.55				/		70	
El Banga	/						33 55 00	18 15 00	22.9	7.3	7.6	Cato	Yanmar	6.55		/	/			69	

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(*) NCRWRD - National Corporation for Rural Water Resources Development.

SURVEY OF COLLECTIVE MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management: NCRWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Inc.= Incomplete; O.D. = Out of Order	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
El Takawin		/					33 55 00	18 13 00	47.3	6.1	—	Scholler	Torpedo	5.45		/	/			70		
El Graneis		/					33 51 00	18 28 00	134.1	6.6	22.3	Cato	Yanmar	43.64		/	/			87		
El Gool		/					33 55 00	18 28 00	57.9	8.3	7.6	Cato	Yanmar	32.72		/	/			87		
2.2.2.Berber Rural Council.																						
Kadabass	/						33 58 00	17 38 00	42.7	4.6	—	Grundfos	Andoria	32		/	/			70		
Kadabass	/						33 59 00	18 00 00	109.8	13.1	15.5	Cato	Yanmar	1545		/	/			87		
Jebel El Rakhami		/					33 31 00	17 38 00	286.9	50.3	—	Edico	Lister	31.82		/	/			69		
El Makilab		/					33 59 00	18 15 00	20	7.3	9.1	Edico	Lister	6.55		/	/			69		
Goz El Fong		/					33 59 00	18 11 00	59.5	9.8	—	Edico	Lister	6.05		/	/			69		
Kannour		/					33 59 00	17 45 00	76.2	11.5	12.1	Grundfos	Perkins	35.45		/	/			83	Inc.	

(*) NCRWRD = National Corporation for Rural Water Resources Development.

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SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management: NCRWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Inc.= Incomplete O.D.= Out of water yard Order
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
2.2.3.Sidon R.C.																					
Sidon		/					34 26 00	17 19 00	49	9.1	—	Grundfos	Bukh	4.73		/		/		76	
Kafr Abu Sanon(A)		/					33 16 00	17 22 00	47.9	12.2	18.3	Cato	Yanmar	43.64		/	/			78	
El Abaka	/						34 25 40	17 18 40	65.5	7.3	9.7	Scholler	Torpedo	45.45		/	/			78	
Umm Shadida		/					34 26 30	17 28 00	101.8	49.7	-	Edico	Lister	5.0		/	/			78	
2.2.4.Ed Damer Rural Council																					
El Mahmiya	/						33 43 00	17 09 00	329	27.4	—	Grundfos	Bukh	34.09		/	/			73	
Kangari		/					34	17 34 00	169	10.4	—	Cato	Yanmar	27.27		/	/			74	
Goz El Hulug		/					34 17 00	17 24 00	99.1	7.9	10.9	Grundfos	Bukh	40.9				/		73	

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(*) NCRWRD = National Corporation for Rural Water Resources Development.

SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management (*): NCRWRD	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Inc.= Incomplete; O.D.= Out of order
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
El Nedeaba		/					33 57 00	17 33 00	64.02	7.6	20.1	Grundfos	Bukh	10.9		/	/			73	
El Hawia		/					33 49 00	17 20 00	176.8	14.5	27.6	Grundfos	Perkins	26.18		/	/			84	Inc.
El Mutmar	/						33 42 00	17 06 00	192.0	17.8	22.8	Grundfos	Bukh	21.81		/	/			80	
El Nuhoud		/					33 34 00	17 24 00	132	37	—	Scholler	Lister	5		/	/			71	
El Basli		/					34 11 40	17 32 00	193	6.2	7.2	Uggerini	Ercolom-creii	65		/	/			78	
El Hassaia El Houtab	/						33 54 00	17 29 20	222.2	10.4	14	Grundfos	Bukh	43.63		/	/			77	
El Maksbrab	/						33 54 00	17 26 00	114.3	12.5	17.3	Grundfos	Bukh	73.64		/	/			77	
El Akaad	/						33 59 00	17 38 00	50.7	6.7	—	?	?	16		/	/			-	O.D.
Qoz El Halaq		/					34 18 00	17 23 15	34.8	7.5	12.6	Grundfos	Bukh	65.45		/	/			77	
Aliab	/						33 47 40	17 18 30	166.2	21.0	27.1	Grundfos	Bukh	43.64		/	/			77	

(*) NCRWRD = National Corporation for Rural Water Resources Development.

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SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management (*): NORWARD	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Ins.= Incomplete O.U.= Out of order
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
El Hedeaba	/						33 57 00	17 34 00	49.1	6.5	—	Grundfos	Bukh	6				/		63	
2.2.5.El Zeidab Rural Council																					
Abu Silim	/						33 52 00	17 37 00	269.8	10.8	—	Grundfos	Bukh	25.92		/	/			72	
El Temerab		/					33 55 30	17 36 00	42.7	4.7	6.3	Scholler	Torpedo	10.9		/	/			77	
Oumarab		/					33 55 00	17 34 30	39.3	6.2	11.5	Grundfos	Perkins	32.73		/	/			82	
Sagadi(West)		/					33 40 00	17 07 00	307.6	17.1	—	Grundfos	Bukh	16.36		/	/			72	
El Hura	/						33 44 00	17 14 00	243.9	17.1	—	Grundfos	Andoria	17.72		/	/			72	
El Egeida		/					33 43 00	17 17 00	237.8	18.9	19.3	Grundfos	Bukh	10.91		/	/			77	
Wehaib		/					33 46 30	17 22 30	219.5	8.6	18.3	Hitashi	Torpedo	32.73		/	/			82	
El Ferikh	/						33 46 30	17 21 40	91.5	10.3	—	Grundfos	Bukh	—		/	/			84	

(*) NORWARD = National Corporation for Rural Water Resources Development.

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SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Capacity M^3: Yield M^3/Hour	Mode of Management: NCRWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: U.D. = Inc.= Incomplete Out of Order
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
El Egeida(North)		/					33 43 00	17 20 00	146	17	36	—	—	39		/	/			87	Inc.
El Degorab		/					33 44 00	17 16 00	189	17.9	35.4	—	—	22.73		/	/			88	Inc.
Hilat El Faki		/					33 33 00	17 16 00	158.5	22.4	37.2	—	—	19.78		/	/			88	Inc.
El Fadnia		/					33 41 00	17 07 00	129.6	18.8	46.9	—	—	16.36		/	/			88	Inc.
El Nuba		/					33 42 00	17 08 00	154.0	17.5	38.1	—	—	57.6		/	/			88	Inc.
Sagadi(North)		/					33 40 00	17 06 00	182.9	19.7	24	—	—	36.82		/	/			88	Inc.
El Shiwairib		/					33 34 00	17 16 00	189	21.5	28.2	—	—	50.35		/	/			88	Inc.
Hamodat		/					33 40 00	17 08 00	158.5	6.7	33.5	—	—	35.45		/	/			88	Inc.
Mufraa		/					33 32 00	17 04 00	189	17	—	—	—	33		/	/			87	Inc.
El Hadabied		/					33 42 00	17 01 00	171	17	—	—	—	36		/	/			87	Inc.
El Kitieb		/					33 32 00	17 04 00	148	21	35.4	Cato	Yanmar	24		/	/			87	

(*) NCRWRD = National Corporation for Rural Water Resources Development.

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SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Mode of Management: NCRWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Inc.= Incomplete; U.D.= Out of order; Out of water yard
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
El Gabrab		/					32 33 30	17 17 00	99	22	40.4	—	—	38		/	/			87	Inc.
El Naksab		/					33 50 00	17 27 00	140	16	32.8	—	—	33		/	/			87	Inc.
El Aliab El Jabal		/					33 47 00	17 22 00	93	12.9	26.8	—	—	39.27		/	/			87	Inc.
El Zeidab (A)	/						33 49 00	17 24 00	55	7.6	—	Grundfos	Bukh	-				/		82	
El Zeidab H. 2nd. school	/						33 50 00	17 25 00	86.9	6.3	—	Cato	Yanmar	-				/		84	
El Aliab (West)	/						33 46 20	17 21 00	239.3	12.9	13.2	Scholler	Torpedo	8.18		/	/			77	
2.3. Southern Dist.																					
2.3.1. El Metemma Rural Council																					
El Makuia	/						33 41 00	17 01 00	—	6.8	—	Grundfos	Andoria	—		/	/			70	

(*) NCRWRD = National Corporation for Rural Water Resources Development.

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OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of Dis Rural Counc Sites	Co-ordinates		Well depth and water levels			Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management (*)				Date of Establishment	Condition: U.S. = Inc= Incomplete Out of water yard
	Longitude	Latitude	Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)					NCRWRD	Community Managed	Agency Managed	Privately Managed		
1	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
El Maknia	33 41 00	17 01 00	176.8	6.8	12.8	—	—	41.03		/	/			88	Inc.
Umm Iwaidat	33 42 00	16 01 00	170.7	6.7	50.6	—	—	35.91		/	/			88	Inc.
El Hilaila	33 32 00	16 43 00	152.4	7.0	12.2	—	—	41.36		/	/			88	Inc.
El Abyadab	33 41 00	16 51 00	170.7	10.9	14.6	—	—	39.31		/	/			88	Inc.
El Harirab	33 35 00	16 50 00	147.9	6.7	27.4	—	—	43.64		/	/			88	Inc.
El Ogada	33 26 00	16 41 00	122.0	13.1	17.4	—	—	50.0		/	/			88	Inc.
Olad Hag Gab	33 31 00	16 41 00	146.3	15.1	18.0	—	—	37.4		/	/			88	Inc.
Gubat El She Suliman	33 31 00	16 41 00	134.1	14.8	22.9	—	—	45.45		/	/			88	Inc.
El Syal El S	33 22 00	16 43 00	86.9	9.0	11.9	—	—	50.0		/	/			88	Inc.
Gubrona	33 03 00	16 33 00	36.6	15.5	18.9	—	—	36.82		/	/			88	Inc.
Goz Badur	32 37 00	16 51 00	30.5	11.6	13.7	Grundfos	Bakh	27.27		/	/			70	

(*) Mion for Rural Water Resources Development.

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SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Capacity M³/Hour: Yield M³/Hour	Mode of Management (*): NCRWRD	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Inc.= Incomplete; Out of Order
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Tybat El Khwad	/						33 35 00	16 49 30	134.1	14.6	—	Grundfos	Andoria	13.6		/	/			70	
El Farahseen	/						33 32 00	16 59 00	272.0	36.0	--	Grundfos	Andoria	9.09		/	/			71	
El Norab	/						33 41 00	16 47 00	127.7	13.1	—	Grundfos	Bukh	36.36		/	/			69	
El Norab(Hospital)	/						33 41 00	16 47 00	127.1	12.2	—	Grundfos	Bukh	7.27				/		71	
El Shagra & El-Orfia		/					33 22 00	16 43 00	123.5	9.7	41.5	—	—	32.73		/	/			88	Inc.
Wadi Khalil	/						33 16 00	16 40 00	109.5	11.0	--	Grundfos	Bukh	17.27		/	/			72	
Tabaga		/					33 07 00	16 34 30	38.1	10.4	11.6	Grundfos	Perkins	31.82		/	/			81	
El Sayal Karim El-Din		/					33 24 00	16 43 00	67.1	11.4	28.9	Grundfos	Perkins	30.0		/	/			82	
El Hemirab		/					33 26 00	16 43 00	103.7	17.2	21.5	Grundfos	Perkins	32.73		/	/			82	
El Abdotab		/					33 27 00	16 45 00	118.9	13.4	17.6	Grundfos	Perkins	35.45		/	/			82	

(*) NCRWRD = National Corporation for Rural Water Resources Development.

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SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield m^3/Hour	Capacity M^3	Mode of Management: NCRWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Inc.= Incomplete; O.O.= Out of Order
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
El Quba & Kramab		/					33 43 00	16 17 00	100.6	11.3	15.9	Grundfos	Perkins	36.36		/	/			82	
El Keigera		/					33 28 00	16 48 00	115.9	20.3	35.8	Grundfos	Perkins	24.55		/	/			82	
El Gewear	/						33 32 00	16 46 00	179.9	19.8	—	Grundfos	Andoria	18.18		/	/			69	
Kimair El Awadia	/						33 28 00	16 28 00	154.3	22.3	—	Grundfos	Bukh	9.09		/	/			68	
El Magawear	/						33 33 00	16 48 00	140	21.3	—	Grundfos	Andoria	36.36		/	/			73	
El Magawear	/						33 33 00	16 48 00	117.4	14.5	32.9	—	—	32.73		/	/			88	Inc.
Shukaba		/					33 16 57	16 40 52	95.1	11.9	—	Grundfos	Perkins	—		/	/			85	
El Tibna		/					32 29 00	16 33 00	140.8	35.0	—	Edico	Lister	22.72		/	/			—	
Umm Arda		/					33 30 00	17 03 00	134.1	—	—	Adler	Lister	5.91		/	/			59	
Umm Arda		/					33 30 00	17 03 00	128.4	—	—	Adler	Lister	5.91		/	/			59	
Umm Rubul		/					33 12 00	16 53 00	93.3	—	—	Adler	Lister	4.77		/	/			59	

(*) NCRWRD = National Corporation for Rural Water Resources Development.

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SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source						Co-ordinates		Well depth and water levels			Type of Pump	Type of Engine	Yield m^3/Hour	Capacity M^3	Mode of Management (*)				Date of Establishment	Condition: Inc.= Incomplete O.O.= Out of water yard
	Water-yard		Slow sand Filter		Raw Water from Nile		Longitude	Latitude	Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)					NCRWRD	Community Managed	Agency Managed	Privately Managed		
	With house connection	Without house connection	With house connection	Without house connection	With house connection	Without house connection															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Umm Rabul		/					33 12 00	16 53 00	95.1	—	—	Adler	Detize	5,45		/	/			59	
Umm Agaga		/					33 35 00	16 32 00	337	42.6	—	Scholler	Torpedo	13.6		/	/			73	
Kimair El Godalab		/					33 40 00	17 04 00	307.9	17.6	—	Grundfos	Bukh	16.36		/	/			72	
El Matama(A)	/						33 30 00	16 40 00	80.2	16.8	—	Grundfos	Andoria	45.45		/	/			67	
El Matama(B)	/						33 30 00	16 40 00	48.8	15.9	18.9	Hitashi	Danyo(M)	6.55		/	/			68	
El Matama(C)	/						33 30 00	16 40 00	103.7	18.3	—	Grundfos	Andoria	9.09		/	/			71	
El Matama(Hospital)	/						33 30 00	15 40 00	58.5	25.6	27.3	Grundfos	Andoria	31.82				/		81	
El Solaab El-Madaris	/						33 15 00	16 40 00	102.1	13.7	14.7	Grundfos	Bukh	9.25		/	/			77	
El Solaab El-Shigia	/						33 13 00	16 40 00	81.4	9.6	10.0	Grundfos	Bukh	13.09		/	/			77	
El Hobagi	/						33 10 00	16 37 00	48.8	11.0	11.6	Grundfos	Bukh	8.18		/	/			77	

(*) NCRWRD = National Corporation for Rural Water Resources Development.

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SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield m^3/Hour	Capacity m^3	Mode of Management: NCRWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Ino.= Incomplete O.D.= Out of order
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Wad El Humad		/					33 59 00	16 25 00	108.8	—	—	Scholler	Torpedo	4.0		/	/			59	
Wad El Humad		/					33 59 00	16 25 00	108.8	--	--	Scholler	Torpedo	6.0		/	/			59	
Koa El Sariah		/					33 57 20	16 43 00	278.5	37.6	39.9	Edico	Lister	16.81		/	/			72	
El Naqaa		/					33 17 00	16 16 00	92.7	—	--	Adler	Detize	--		/	/			58	O.D.
El Naqaa		/					33 17 00	16 16 00	96.3	--	--	Adler	Detize	--		/	/			59	O.D.
Humerabiya		/					33 30 30	16 27 30	143.3	89.3	--	Scholler	Torpedo	9.09		/	/			80	
Gandato(South)	/						33 17 00	16 38 85	94.8	9.2	—	Cato	Yanmar	16.38		/	/			72	
Gandato(North)	/						33 17 00	16 39 00	86.9	13.5	18.3	Grundfos	Andoria	65.5		/	/			77	
Umm Ali	/						33 42 20	17 03 30	187.5	21	41.6	Grundfos	Andoria	21.82		/	/			80	
Bigrawia	/	/					33 43 00	16 54 00	115.9	5.8	—	Grundfos	Bukh	22.73		/	/			70	
Bigrawia	/						33 42 10	16 55 10	182.9	20.6	31.1	Grundfos	Perkins	22.73		/	/			83	

(*) NCRWRD = National Corporation for Rural Water Resources Development.

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SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management: NORWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Inc.= Incomplete; O.O.O. = Out of Order
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
El Suluma		/					33 12 30	16 35 30	30.2	13.5	15.7	Grundfos	Andoria	43.64		/	/			77	
El Suluma(Bahri)		/					33 12 00	16 34 00	48.8	14.9	18.0	---	---	29.5		/	/			88	Inc.
Qoz El Hag	/						33 40 00	16 49 00	203.6	18.6	—	Grundfos	Andoria	36.36		/	/			73	
El Diwemat	/						33 19 00	16 39 40	109.5	14.7	—	Grundfos	Carlesca	17.27		/	/			72	
El Diwemat	/						33 19 00	16 39 40	104.3	13.8	25.4	Cato	Yanmar	21.82		/	/			80	
El Misaktab El-Oshara	/						33 29 00	16 44 00	113.7	17	19.6	Grundfos	Andoria	65.45		/	/			77	
El Misaktab El-Oshara	/						33 29 00	16 44 00	93.9	18.7	25.4	Grundfos	Andoria	65.45		/	/			77	
El Misaktab El-Qoz	/						33 29 00	16 44 00	92.4	—	—	—	—			/	/			88	Inc.
El Misaktab El-Qoz	/						33 29 00	16 44 00	108.2	—	—	—	—			/	/			88	Inc.

(*) NORWRD = National Corporation for Rural Water Resources Development.

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SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management: NCRWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Inc.= Incomplete; O.O.= Out of Order	Water yard
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
Gadow Weaving Factory (1)	/						33 42 10	16 54 00	212.2	24.2	39.7	Grundfos	Bukh	32.7					/	78		
Gadow	/						33 41 25	16 53 50	146.3	18.8	0.0	Grundfos	Lister	--		/	/			85		
El Tragma El Gaba		/					33 32 05	16 44 50	135.7	12.6	16.6	Grundfos	Perkins	32.73		/	/			85		
El Tragma El-Fatarab		/					33 34 00	16 44 00	155.2	19.8	--	Grundfos	Andoria	27.27		/	/			74		
El Giheid		/					34 09 00	16 13 00	139.6	84	—	Edico	Lister	—		/	/			77		
El Giheid		/					34 10 00	16 14 00	128	—	—	Edico	Lister	—		/	/			70		
Gulaa El Awadab		/					33 25 00	17 00 00	305	27.4	—	Grundfos	Bukh	29.3		/	/			75		
El Sitair		/					34 03 00	16 29 00	192.7	59.7	—	Scholler	Torpedo	15.73		/	/			72		
El Shigla Abu El-Hasan		/					33 15 00	16 36 00	48.7	10.6	—	Cato	Yanmar	--		/	/			71		

(*) NCRWRD = National Corporation for Rural Water Resources Development.

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EY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water-yard: With house connection	Type of Water-yard: Without house connection	Type of Water-tap: With house connection	Type of Water-tap: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Well depth and water levels: Static Water Level (Metres)	Well depth and water levels: Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Capacity M³: Yield M³/Hour	Mode of Management (*): NCRWRD	Mode of Management: Community Managed	Mode of Management: Agency Managed	Mode of Management: Privately Managed	Date of Establishment	Condition: No. = Incomplete / Out of order
1	2	3	7		8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Esh Shain		/			33 43 30	16 19 00	131.1	89	—	Scholler	Torpedo	—		/	/			80	
Fulg El Sawad		/			33 45 00	16 13 00	133.5	—	—	Scholler	Torpedo	15.22		/	/			73	
Dame El Garai	/				33 38 00	16 48 00	110.6	8.8	—	Grundfos	Andoria	34.0		/	/			74	
Tondob		/			33 19 30	16 40 00	87.2	13.8	18	Grundfos	Bukh	85.45		/	/			77	
El Miraikh		/			33 20 00	16 40 00	46.0	11.9	19.4	Grundfos	Bukh	43.63		/	/			77	
El Zakyab		/			33 16 55	16 36 20	58.8	20.0	21.6	Grundfos	Bukh	21.82		/	/			80	
Kaboshia	/				33 41 00	16 52 00	46	7	—	Scholler	Lister	3.45		/	/			65	
Kaboshia	/				33 41 00	16 52 00	42.7	4.5	—	Scholler	Torpedo	5.45		/	/			66	
Kaboshia	/				33 42 00	16 53 00	211.6	19.9	—	Grundfos	Andoria	32.73		/	/			77	
Kaboshia(Hospital)	/				33 42 30	16 53 00	152.4	10.1	—	Grundfos	Bukh	—				/		85	
El Matarees(3)		/			33 41 00	16 52 00	164.6	—	—	—	—	—		/	/			88	Inc.

(*) NCRWRD = National Corporation for Rural Water Resources Development.

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SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water-yard: With house connection	Water-yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Static Water Level (Metres)	Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Mode of Management: Capacity M^3	NORWRD (*)	Community Managed	Agency Managed	Privately Managed	Date of Establishment	Condition: Inc.= Incomplete; Out of Order
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Kaboshia El-Mashikha		/					33 41 00	16 52 00	146.3	--	--	--	--	--		/	/			88	Inc.
El Hamadab		/					33 41 00	16 52 00	158.5	--	--	--	--	--		/	/			88	Inc.
Meweas	/						33 21 30	16 40 30	46.3	4.3	--	Grundfos	Bukh	65.64		/	/			88	
Meweas	/						33 21 00	16 40 00	88.4	--	--	--	--	--		/	/			88	Inc.
Umm Hatab ?		/					33 25 00	16 40 00	105.2	14.7	32.7	--	--	14.5		/	/			88	Inc.
Hilat Mustafa		/					32 25 00	16 35 00	44.2	14.0	24	--	--	13.09		/	/			88	Inc.
El Mudnob and El Brorab		/					33 27 00	16 48 00	62.5	12.5	24.8	--	--	15.9		/	/			88	Inc.
El Galaa El Norab		/					33 25 00	16 30 00	105.2	--	--	--	--	--		/	/			88	Inc.
Wad El Hag		/					33 10 00	16 24 00	32	11.2	19.8	--	--	40.9		/	/			88	Inc.
Dame Umm El Trief		/																			

(*) NORWRD = National Corporation for Rural Water Resources Development.

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SURVEY OF COMMUNITY MANAGED DRINKING WATER SUPPLY SOURCES

Name of District, Rural Council, and Sites	Type of Water Source: Water yard: With house connection	Water yard: Without house connection	Slow sand Filter: With house connection	Slow sand Filter: Without house connection	Raw Water from Nile: With house connection	Raw Water from Nile: Without house connection	Co-ordinates: Longitude	Co-ordinates: Latitude	Well depth and water levels: Total Depth (Metres)	Well depth and water levels: Static Water Level (Metres)	Well depth and water levels: Dynamic Water Level (Metres)	Type of Pump	Type of Engine	Yield M^3/Hour	Capacity M^3	Mode of Management: NCRWRD (*)	Mode of Management: Community Managed	Mode of Management: Agency Managed	Mode of Management: Privately Managed	Date of Establishment	Condition: Inc.= Incomplete; O.D.= Out of order; water yard
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
El Shiekhab					/							Centrifugal	Lister		34	/	/			85	
Kagayna					/							Centrifugal	Yanmar		34	/	/			85	
El Kanderya					/							Centrifugal	Andoria		34	/	/			87	
El Salafeeb					/							Centrifugal	Yanmar		34	/	/			87	
Dame Mayo					/							Centrifugal	Lister		34	/	/			87	
El Mallaha					/							Centrifugal	Lister		34	/	/			87	
El Lidayat						/						Centrifugal	Listeo		34	/	/			81	
Banaga El Mahata						/	33 08 00	16 31 00				Centrifugal	Lister		34	/	/			87	
El Heimaidab						/						Centrifugal	Lister		34	/	/			87	
El Hasanat & El-Fageerat						/						Centrifugal	Andoria		34	/	/			87	

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(*) NCRWRD = National Corporation for Rural Water Resources Development.

ANNEX II: DISTRIBUTION MAPS.(*)

II.1. Distribution of Existing Water Sources - Northern Province.

II.2 Distribution of Existing Water Sources - El Nile Province.

(*) (At end of the Report).

ANNEX III:

TERMS OF REFERENCE.

In terms of geographic scope, the study shall cover the whole Northern Region. However, investigation shall be limited to rural settlement water sources, more particularly to those waterysrds provided by the Corporation. Within the above scope, the terms of reference of the study shall address the following issues :-

a) Stock-taking:

An inventory of existing Corporation wateryards by District Council in tables giving name, location, date of establishment, depths, capacity, status (performing/non-performing) and mode of present management (Corporation/people). A map showing location, and mode of management shall be furnished.

b) Source-based developed projects:

On the assumption that local communities have contributed to the development of the water source, and have founded community projects on the source, namely water connections to settlement residents, such development activities shall be investigated. Investigation shal cover, inventoring these development activities, categori ing and mapping them.

c) Institutional Set-up:

Investigate existing institutions in terms of: history of involvement, initiation, responsibilities, relationships (Corporation/Local Government/Community/ Other institutions in settlement).

d) Systems Working:

Organizational mechanisms (written codes/charters/ constitutions) accountability to community (meetings/ accounts).

e) Leadership Characteristics:

Leadership (form/committee), leadership characteristics in terms of status and role played in community, level of education, wealth, age, connectivity, selection to office, period in office, other involvements in community affairs.

f) Financial Resources:

Financial resources from inside and outside community, use of resources (expended/generated) adequacy (balance of generated resources against expenditure on management and development).

g) Technology Status:

i) Technical know-how: for maintenance and running of source, types of inputs, availability of inputs from inside and outside community, degree of control of inputs by community.

ii) Spare-parts: types needed, source of supply, availability from inside and outside community, costs.

iii) Power supply: Fuel/electricity, source, accessibility from inside and outside community, costs.

h) Assessment of People's Management Systems Performance :

i) Users' perception of performance of participatory systems of management, with regards to: regular and adequate delivery of water to community, satisfaction with water supply development activities, judgement of systems mechanisms and leadership performance, and problems and constraints as sensed by users.

ii) Official stand point (Regional Water Corporation Staff/Local Government Executives) on systems performance, with emphasis on: reliability of system, judged on ability to cope with regular provision of water to communities, judgement of

benefits of system in promoting self-reliance approaches, and maintaining a service to local communities otherwise would be the responsibility of the Region's Government bodies, main shortcomings of the system as officially viewed.

j) Results and Recommendations, as to :-

- coverage of system,
- conditions of effective performance,
- problems and constraints,
- improvements to enhance performance of system within Northern Region,
- likelihood of extension of system to other parts of the country,
- requisites for extension.

4. Research Methods, Techniques and Reporting:

The following research methods and techniques shall be applied :-

- A general survey of available data on community water facilities of Northern Region, for stock-taking activity.

- Field visits to Corporation offices and District Headquarters in the Region, for assessment and supplementation of office data, review and sorting out of people's run water facilities, and identification of community developed water supply projects.
- Selection of a representative sample of people's run facilities and community developed project in each district for detailed field investigation.
- Field surveys of sampled sites to cover items detailed under terms of reference. Spread sheet technique/or questionnaires shall be used for assessment of people's perception. Results of the exercise shall be tabulated, presented and analyzed in text.
- Following preliminary results derived from data, interviews shall be held with concerned staff in Corporation offices and District headquarters for an official assessment of the system.
- Findings shall be synthesized and presented in a draft report for assessment. A final report shall be submitted incorporating assessment of results. At the draft stage 5 copies shall be

provided to be increased to 10 copies at the final stage. Both reports shall be adequately substantiated by tables, maps and diagrams.

- The organization of the report shall closely reveal the topics listed under the terms of reference, concluding by a scheme of recommendations for application of the system of "People's Management" on a wider scale if proved feasible.

ANNEX IV: The Questionnaires

1. Water Source Characterization questionnaire.

2. Community perception Questionnaire.

3. Official Perception Questionnaire.

1. WATER SOURCE CHARACTERIZATION

1. General Information

1.1. District Council:

1.2. Name of Site :

1.3. Size of Population of Site :

1.4. Number of Households :

1.5. Type of drinking supply water source :

Tube wells ( ) Filters ( )

Other (Specify)_____

1.6. Number of Units :

Tube wells ( )

Filters ( )

Other (Specify)_____

1.7. Date of dependancy of settlement on water source:_____

1.8. Source of supply prior to provision of above source:_____

1.9. Whether population obtain water directly from source or by means of distribution system :

- Directly from source : ( )
- By means of distribution system: ( )

1.10. Agency Running Source :

- Community ( )
- National Water Corporation ( )
- Others(Specify)_____

2. Community Managed Water Sources

2.1.Historical: at project development

2.1.1.Trace leadership behind initial source provision:

_____

_____

2.1.2.Whether leadership only for water provision, or involved in other community development activities:

- Only for water provision ( )
- Involved in other community activities ( )

2.1.3.What other community activities:

_____

_____

2.1.4.Was water project provision idea, community supported, or only of leadership initiation?

- Community supported ( )
- Only of leadership initiation ( )

2.1.5.What kinds of support were given by community for project realization?

_____

_____

_____

2.1.6. What steps were taken by leadership from initiation to project completion?

- Meetings with community ( )
- Fund raising ( )
- Contact with local authorities ( )
- Travel to Khartoum ( )
- Procurement of Equipment ( )
- Manual labour ( )
- Others(Specify):_____

2.2. Present, in current project operation:

2.2.1. Who leads project at present ?

- A committee?( ) Specify Number ( )
- Other:Specify_____
  Specify Number_____

2.2.2. Whether entrusted with other community activities?

- Yes ( ) No ( )

2.2.3. In case entrusted, what activities?

_____

_____

2.2.4. Age structure of leadership :

	Number.
- 19-24	( )
- 25-34	( )
- 35-44	( )
- 45-60	( )
- Above 60	( )

2.2.8. Leadership functions :

- Supervision of daily operation ( )
- Maintenance ( )
- Provision of spare parts ( )
- Provision of lubricants and fuel ( )
- Collection of water fees ( )
- Consultation with community on management matters. ( )
- Raising of funds when needed ( )
- Other(Specify)_____

2.2.9. How leadership community relation is regulated?

- Committee has written codes rules

  Yes ( ) No ( )

- In case "No" operate through community consult? Yes ( )
- Hold regular meetings, ( )
- How many meeting held during this year ( )
- Meets on request of any member, group of members :

  Yes ( ) No ( )

- Holds annual meeting to disclose accounts situation.

  Yes ( ) No ( )

- Term of office, leaders elected for:( ) years.
- When was present leadership elected, Year( )
- Operating within term of office of exceeding it?
  - Within term of office ( )
  - Exceeding it ( )

  Reasons for exceeding it:_____

- Any change in faces of leadership between time project was developed and now?

  - There is change in faces ( )
  - No change in faces ( )

- Reasons for no change in faces :_____

_____

2.3. Operation of Water Source :

2.3.1. Type of supply :

- Source based ( )
- With delivery system ( )

2.3.2. Total quantity of water extracted monthly in metres/gallons ( )

2.3.3. Is demand on water stable or fluctuating from month to month ?

- Stable ( )
- Fluctuating ( )

2.3.4. Is fluctuation because of change in demand or in extraction rate ?

- In demand ( )
- In extraction rate ( )

2.3.5. What are reasons behind change in demand ?_____

_____

2.3.6. What are the reasons behind change in extraction rate?_____

_____

_____

2.3.7. In case of shortage in supply, how community makes for the shortage?_____

_____

_____

2.3.8. What percentage of all households in settlement is covered by delivery system :

Percentage

( )

2.3.9. Are metres used to record water consumption?

Yes ( ) No ( )

2.3.10. Why are metres not used ?_____

_____

2.3.11. If metres are not used, how is household consumption valuated?_____

_____

2.3.12. Are monthly payments equalized for all households?

Yes ( ) No ( )

2.3.13. In case "equalized", how much a household pay :

- Per month? Ls.( )

2.3.14. Is it collected monthly, or otherwise ?

- Monthly ( )
- Every.....( )

2.3.15. How collection is made ?

- By appointed clerk. ( )
- Heads of Households deliver it to committee. ( )
- Committee members collect it. ( )
- Other(Specify)_____

_____

2.3.16. In case water is obtained at source, with no delivery system, is it :

- Obtained free? ( )
- Sold ? ( )

2.3.17. In case sold at what price ?

Specify : Unit( ) Price( )

2.4. Staffing of Water Source :

2.4.1. Inventory of personnel regularly employed for running of water source :

	Number
- Mechanics.	( )
- Clerks.	( )
- Revenue collectors.	( )
- Accountants.	( )

2.4.2. For how long has each been in service?

	Years
- Mechanics	( )
- Clerks	( )
- Revenue collectors	( )
- Accountants	( )

2.4.3. To whom the personnel officially belong ?

- The management committee ( )
- The local Government Council( )
- The Water Corporation ( )
- Other:(Specify)_____

2.5. Maintenance of Source :

2.5.1. What kind of maintenance problems the source encounters in a year cycle :

- Well maintenance :
  Frequent( ) Less frequent( )
- Engine maintenance:
  Frequent( ) Less frequent( )
- Pump maintenance:
  Frequent( ) Less frequent( )
- Tower maintenance:
  Frequent( ) Less frequent( )
- Distribution system maintenance:
  Frequent( ) Less frequent( )

2.5.2. What are the fast-moving spare-parts required for maintenance?

- Well : -
  -
  -
  -
  -
- Engine: -
  -
  -
  -
  -
- Pump : -
  -
  -
  -
  -

- Tower : -
  -
  -
  -
  -
- Distribution system -
  -
  -
  -
  -

2.5.3. From where spare-parts are usually obtained?

- National Water Corporation ( )
- Local market ( )
- Khartoum market ( )

2.5.4. Who does the maintenance?

- Water-yard mechanic ( )
- National Water Corporation ( )
- Market mechanic ( )

2.5.5. From where fuel is obtained?

- National Water Corporation ( )
- Local Council ( )
- Free market ( )

2.6. Economics of Running water source, in a year period:

	Ls.
- Total salaries of staff	( )
- Cost of spare-parts	( )
- Cost of fuel	( )
- Cost of maintenance (if done in market)	( )
- Other costs:(Specify)_____	( )
Total running cost	( )

- Revenue from selling water to community ( )
- Balance: revenue minus cost ( )
- In case there is deficit between revenue and cost, how deficit is made for ?
  - Collect extra-funds from community ( )
  - Receive support from National Water Corporation. ( )
- In case there is surplus of revenue to cost, how is it utilized?
  - Kept for operation of source ( )
  - Used in development activities related to source. ( )
  - Channelled to other community services. ( )

2. COMMUNITY PERCEPTION

1. Name of Settlement: _____

2. Head of Household No.: _____

   - Age : _____
   - Occupation: _____
   - Level of education: _____
   - Size of Household: _____

3. Means of obtaining water :

   - Directly from source ( )
   - From a stand pipe/Kiosk ( )
   - By a delivery system ( )

4. Amount of water consumed :

   - Daily in gallons ( )
   - Daily in metres ( )

5. How much he pays for water per month. Ls.( )

6. How he pays for water?

   - Daily in cash ( )
   - By means of monthly bill ( )

7. Has respondent contributed in any form to development/ running of water source?:

   Yes ( ) No ( )

8. In case "Yes" what he contributed ?

- Donation of funds for development of source ( )
- Donation of funds for running of source ( )
- Contributed labour in any development activity? ( )
- Other:(Specify)_____

_____

_____

9. Is respondent obtaining regularly the amount of water his family needs ?

Yes ( ) No ( )

10. In case "No" how much of his requirements he rates are regularly obtained ?

Less than 50%( ) More than 50%( )

11. In case he obtains less, from where he meets the deficit?

- _____
- _____
- _____

12. What months of the year water shortage is most felt? _____

13. What are the reasons behind water shortage ?

- Capacity of source is limited.: ( )
- Low performance of system. ( )

14. Is respondent satisfied with performance of system?

Yes ( ) No ( )

15. In case "No" list reasons for dissatisfaction:

- _____
- _____
- _____
- _____

16. Is respondent satisfied with the handling of the water source by the local committee?

Yes ( ) No ( )

17. If case "No" What are the reasons for his dissatisfaction?

- _____
- _____
- _____
- _____
- _____

18. In case he is dissatisfied what alternative system he suggests in place of running by local committee?

- National Water Corporation ( )
- Local Government ( )
- Other(Specify)_____

_____

19. In case respondent is supporting community managed system, what improvements he suggests to enhance the performance of the system?

_____
_____
_____
_____
_____
_____

3. OFFICIAL PERCEPTION.

1. District Council:_____

2. Name of Respondent:_____

3. Title of Respondent:_____

4. How many drinking water supply sources (Tube wells, Filters, hafirs) in his district that are :-

   - National Corporation Run ( )
   - Local Government Run ( )
   - Agency Run ( )
   - Community Run ( )

5. In case number of community run water sources is high, what in your opinion are the reasons for such high motivation of communities to run their water sources?

   _____

   _____

   _____

   _____

6. How do you rate the performance of community run water sources in relation to the others that are government run?

   - Less reliable ( )
   - More reliable ( )

7. In case more reliable give reasons :_____

   _____

   _____

   _____

   _____

   _____

8. What kind of support services are given by your department to community-run water sources?

9. How do you view relationship between leadership running water source and the local community?

10. What are in your opinion the best conditions to have a well managed community-run water source?

11. What are the main constraints that face a community-run water source?

12. Are you personally participating for the promotion of community managed water system?

Yes ( ) No ( )

13. In case "No" give your reasons ?

14. In case "Yes" what improvements you think should be brought on the system to increase its efficiency?

_____

_____

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_____

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