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1.0 Introduction

Drought Emergency Response Project – Kordofan Region is one of Unicef drought emergency response interventions fully funded by European Community Humanitarian Office. The project duration was initially 6 months, covering April 1 to September 30, but was later extended by 1.5 months to mid November 2001.

The specific objective is to increase access to safe drinking water with approximately 195,000 persons benefiting in the selected drought affected communities of North, West and South Kordofan Region.

The expected Results/ Outputs from the project:

- 24 No. non-functional water yards were rehabilitated, fenced, supported with separate places for people and animal drinking for the benefit of 96,000 persons;
- Rehabilitated water yards are operated with trained operators, Village Health Committees (water sanitation and hygiene committees – VHCs) and supported with activated Tariff system to promote sustainability;
- Projects' 4 drilling rigs were maintained and their capacities were restored, to become able to implement emergency drilling programme in the optimum time;
- 21 new bore holes were drilled, equipped with hand pumps and fenced for the benefit of 5,200 persons;
- 370 non-functional hand pumps were rehabilitated and fenced for the benefit of 92,500 persons;
- New and rehabilitated hand pumps were associated with trained mechanics, VHCs (if not available) activated Tariff system and linked with the nearest spare parts sale centres to promote sustainability;
- 391 fast moving hand pumps spare parts sets were distributed to the hand pumps VHCs to guarantee smooth O&M at the first stages;
- 25 Hygiene education/ mobilisation TOT courses for the VHCs were conducted for the benefit of 1000 persons (50% women participation is targeted);
- 3 water yard operation maintenance and management courses were conducted for the water yards operators and VHCs members for the benefit of 120 persons (30% women participation is targeted)
- 10 hand pumps operation and maintenance and management courses for selected members from the VHCs were conducted for the benefit of 400 persons (50% women participation is targeted)

The purpose of this assessment/evaluation is to undertake an in-depth quantitative/qualitative assessment of the ECHO funded Unicef Drought Emergency Response – Kordofan Region starting from the project preparation (Feb 2001) up to the project completion (mid-Nov 2001)

The major issues on which the evaluation focused were the project phases from planning through physical implementation; achievements in terms in terms of quantity, quality and timeliness; Project role in sustainable mainstreaming of hardware issues, community management, tariff systems, capacity building and awareness raising; community

involvement and participation; role in reducing the drought effects in the intervention areas; WES capacities with regard to implementation of the project; private sector involvement; lessons learnt and recommendations. (See Terms of Reference, Appendix 1)

The evaluation was conducted from Nov. 22 to Dec. 19, 2001. The evaluation sought to emulate the participatory spirit of the Drought Emergency Response project itself. The Consultant used the following evaluation methodology:

- Review of documents at Khartoum and Kordofan levels including project documents, progress reports and Financial/ procurement documents.
- Interviews with the project key actors including ECHO, Unicef, National Water Corporation, Project Staff, State water Corporation, CARE Sudan and communities at Khartoum and Kordofan level were conducted.
- Field visits to representative samples from each activity in the intervention areas in the three states were made.

The following facilities were visited in the 3 States:

North Kordofan

- 5 No. Water yards- Hamrat Esheikh , Swani El Huwarab, As Sidir, (Sodari Province), Dazin Gor and Kabish Nor (Jebrat Al Sheikh Province) and Banat El Maagla (Um Ruwaba province)
- 3 No. newly drilled bore holes equipped with Indian mark II hand pumps (Wad Toda, El Rokab and Um Darag villages)
- 7 No. rehabilitated hand pump installations

South Kordofan

- 4 No. Water Yards –Abassiya, Um – Al Khairat, Um brembita (Rashad province) and Dalami (Dilling Province)
- 2 No. Newly drilled and equipped bore holes (Kaw village)
- 7 No. rehabilitated hand pump installations (Habilla Village)

West kordofan

- 4No Water Yards (Saata Birtilla, Saata Taganno, Mumu and Aburay)
- 2 No. newly drilled and equipped bore holes (Mahfora and Abu Avis villages)
- 15 No. rehabilitated hand pump installations (Abuzabad, Tama, Mahfora and Sunout villages)

Detailed programme for the evaluation and a list of the people met are contained in appendices 2 and 3 respectively.

The above sample facilities visited represents the following percentages of the total facilities provided under the ECHO funded drought Emergency Project.

- Water Yards – 52%
- Newly drilled and equipped bore holes – 35%
- Rehabilitated hand pump installations - 8%

Because a limited number of facilities were visited, it was not always possible to draw tested binding conclusions. However the consultant approached his task from two points of view. First, discussions at the States level provided insights, which seem valid. Secondly, the- in depth visits to a relatively small sample of facilities, were organised like a double- sample (quality control) exercise. Having defined a set of principles for the Project, evidence was sought regarding adherence to these in each intervention. Example; are water supply systems functioning? Were users involved in decision – making about site selection?

1.1 General water situation in Kordofan

Kordofan Region lies geographically between longitudes 27 –32.3 degrees east. And latitudes 9.14 – 17 degrees North. The Region comprises the three states of North South and west Kordofan. It has an average annual rainfall of 400mm. Rainfall increases from North to South. It relies mainly on the annual rainfall for the provision of water supplies and agriculture. The economic main stay of the people is sorghum and millet farming and livestock rearing.

The main sources of water supply are:

- surface sources; hafirs/dams, natural depressions and seasonal streams
- Ground water sources; water yards[bore holes equipped with motorised pumps], hand pumps, and dug wells

Surface water sources constitute about 65% of the Region water supply and ground ware sources 35%. The number of water supplies per technology per state are given in the table below:

Table 1 Distribution of water supplies in Kordofan Region.

Type of water supply	Total No. Facilities by State			Average % Functioning
	North	South	West	
Hand pumps	2652	4000	1270	65
Hand dug wells	3600	-	2500	40
Water yards	277	86	273	60
Hafirs	100	176	69	50

During severe droughts most of the surface sources are depleted and yields from shallow wells get quite low. As indicated in the above table the main problem is the non-functionality of the principal sources of water; the hand pumps and the water yards. 35% of the hand pumps are not functioning due to shortage of spare parts and management

problems. 40% of the water yards are not functional because of aging pumps, wells incrustation, running sands and shortage of spare parts.

Access to safe drinking water in this Region is contrary to the NPA objective of universal access by the turn of the century as more and more people are lacking access to this Basic Human Right day by day. This sad state of affairs needs to be addressed urgently with a view to revising this trend.

2.0 The project phases from planning to completion

2.1 Planning

WFP/FAO, Unicef, States Water Corporations, CARE and others late 2000 reported Early signs of serious drought.

Different situation assessments of the available water sources and the required action to be taken to reduce the drought effects were carried out by the States Water Corporations, WES Projects and Unicef. These assessments were conducted in the different drought affected areas of Sudan mainly Darfur, Kordofan and Butana regions.

Based on this, a drought Response Proposal was prepared by Unicef specifically for water, hygiene and sanitation interventions in the drought affected areas and distributed to the donor Community. This was a part of the UN Drought Response Supplementary Consolidated Appeal (CAP) that was prepared by the different concerned UN Agencies in January 2001.

ECHO was the first and the biggest Donor Agency to respond to the Unicef Appeal with EURO 650,000 donation for the drought response in Kordofan Region.

An Updated detailed proposal was then prepared for ECHO using its specific format. Unicef WES prepared the proposal with full participation from National and States Water Corporations.

Further updating of the proposal was carried out after discussions with the ECHO correspondent in Sudan. The final version was submitted to ECHO in March 2001, and the Project contract was signed between ECHO and Unicef in end of April 2001. Disbursement of funds for the Project was made in end May 2001.

From the above and the details of the field findings, the dry spell had persisted for three seasons prior to this response and that the drought had started taking its toll by the time the interventions were initiated. In fact some interventions were incomplete by the time the rains came in June/July. It appears like the Drought Early Warning System was not early enough to facilitate early response to the drought by Unicef and others, in Kordofan Region.

2.2 Inputs

Funding contract for the project for EUR 650,000 was signed in end of April 2001 and funds received in end May 2001. The implementation of the project commenced as earlier scheduled (April 2001) with Unicef, and her counterparts (National and States Water Corporations) initially utilising their own resources in form of cash, materials and equipment.

The resources that had been allocated to the WES projects in the three states for the regular development projects were diverted to the Drought Emergency Response Project. From its stocks held for general emergencies in the National Water Corporation stores, Unicef replenished these stocks on regular basis.

The ECHO funds have been utilised as per the contract except for slight re-allocation of funds amongst some budget lines which was necessitated by the fact that on the recommendation of the Technical Committee that evaluated the bids for the water yards rehabilitation, the actual cost of the rehabilitation activity increased from EUR 240,960 to EUR 298,224. This additional cost was basically due to the increase of the prices as well as the need to match the power requirements of the high quality pumps with the generators.

The position of a Project Co-ordinator that had been planned for was later found to unnecessary and in its stead the position of an external evaluator was introduced and the excess funds on that budget line was added to water yard rehabilitation budget line. The following budget re-allocations were made with the approval of ECHO and with no increase to the overall budget. The activities from which funds were reallocated did not suffer because Unicef supported the activities from its own resources.

EUR 19,771.50	> from Reserve Budget Line;
EUR 20,250.00	> from the Project co-ordinator budget line;
EUR 11,219.46	> from drilling 21 bore holes
EUR 5,920.00	> from rehabilitation of 370 hand pumps
EUR 104.04	> from procurement and distribution of 391 fast moving hand Pump spare parts

The Administrative cost increased from EUR 38,503.50 to 39573.46

Table 2 Initial and Actual Budget

Code	Heading	Initial Budget (EUR)	Final Budget (EUR)
01	PERSONNEL	35,916.00	8,916.00
01.01	Expatriate staff	27,000.00	0.00
01.01.01	Salaried staff	27,000.00	0.00
	Project Co-ordinator	27,000.00	0.00
01.02	Local Personnel	8,916.00	8,916.00
	Project Manager	5,100.00	5,100.00
	3 Field Supervisors	3,816.00	3,816.00
07	WATER AND SANITATION	506,521.00	538,072.54
07.01	Rehabilitation of 24 water yards	240,960.00	298,224.00
	Drilling of 21 bore holes	95,991.00	84,771.54
	Rehabilitation of 370 hand –pumps	78,440.00	72,520.00
	Procurement & distribution of 391 fast moving hand pump spares	11,730.00	10,557.00
	Maintenance of 4 drilling rigs	72,000.00	72,000.00
07.02	Activities & Equipment for Sanitation and Hygiene	7,400.00	0.00
	Conducting of 25 hygiene /mobilisation courses	7,400.00	0.00
10	Transport	29,400.00	29,400.00
10.02.02	Sub- contracted transport	29,400.00	29,400.00
	Supplies transportation (7 trucks)	29,400.00	29,400.00
11	EVALUATION		
14	TRAINING	16,888.00	24,288.00
	Conducting 25hygiene/ mobilisation courses	0.00	7,400.00
	Conducting 3 water yard O&M and management courses	4,188.00	4,188.00
	Conducting 10 hand pumps O&M/management Courses	12,700.00	12,700.00
17	VISIBILITY PROGRAMME	3,000.00	3,000.00
	Visibility	3,000.00	3,000.00
	Sub Total	591,725.00	610,000.00
19	ADMINISTRATIVE COSTS	38,503.50	39,573.00
20	RESERVE	19,771.50	0.00
	TOTAL	650,000.00	650,000.00

Unicef must be commended for the good financial management and discipline and for her efforts to secure supplementary resources which has not only ensured optimum use of the overall budget but also a successful and logical conclusion of the project.

Apart from the ECHO funds there has been considerable local inputs from the State Water Corporations in the rehabilitation of Water Yards. They have provided resources in form of cash, labour and materials for fencing, construction of concrete benches and pipe work installations for human users, repair/replacement of elevated storage tanks and repair/construction of generator houses.

It is evident that the State Water corporations lack financial resources to invest in neither new water facilities nor in major rehabilitation of old ones like the water yards, yet this is so necessary in the reduction of drought emergencies. There is therefore urgent need for the Federal Government of the Republic of Sudan and the local and international donor agencies in Sudan to introduce interventions in Kordofan and other drought prone regions, in the model of the ECHO/Unicef Drought Emergency Response Project- Kordofan Region.

2.3 Procurement and delivery of work materials and equipment

For the purposes of this evaluation only the procurement of the major work materials and equipment was considered necessary for analysis and therefore carried out.

2.3.1 Hand pumps

The list of the 21 No. Hand pumps together with the one for the fast moving spares were prepared at WES project at Kordofan level and passed on to the Kordofan Area WES Co-ordinator who is the representative of the National water Corporation.

Upon the receipt of this list, Unicef WES raised a requisition for the same to the Unicef Copenhagen procurement office for further processing vide Requisition No. PGM/SUDA/00000115-1 dated...

By the time of this evaluation, Unicef had not received both the hand pumps and the spare parts. All the hand pumps installed together with the spare parts that have already been distributed have all come from the old stocks held by Unicef WES. It is evident that without these old stocks, the ECHO/Unicef Drought Emergency Response Project in Kordofan would not have been possible to implement within the stipulated time.

2.3.2 Submersible Pumps and The Diesel Generating Sets

Specifications for the 24 No submersible pumps together with those for the 24 No. Generating sets were prepared by the State Water Corporations and reviewed by the National Water Corporation technical Team. The same were passed on to Unicef Wes in

May 2001. A decision for local procurement was taken in an emergency meeting held on 21st May 2001 in the Unicef Country representative's office. It was anticipated that offshore procurement would easily have taken 3-4 months (minimum) for the supplies to arrive and therefore the local procurement would be the only solution to address the emergency need of the water in the drought affected region.

An invitation for submission of bids for supply of the pumps and generators was made in two National Daily Newspapers (Al Ayam on 28 May, 2001 Issue # 7066 and on 29 May, Issue # 7067; Al Rai Al Akhar on and 28 May, Issue 1542 and 29 May, issue 1543). Due to the high value of order, press advertisement was done with the intention of wider publicity for better participation from reputable companies.

8 interested bidders collected the bid documents on submission of a performance bond of SD 2,000, 000 in the form of Bank draft in favour of Unicef. Six (6) bidders responded by the submission deadline date of 12 June at 12.00. Bids were opened on at 12.30 p.m. on the same day in the presence of 4 representatives from the bidders.

A technical evaluation committee composed of 4 members drawn from the Faculty of Engineering – University of Khartoum, National water Corporation, Unicef supply Section and Unicef WES was formed to assess the bids and provide recommendations. Bids received and their corresponding financial offers are as shown in Table 3 below :

Table 3 Bids as received

Name of bidder	Financial offer		Delivery Time
	Submersible pumps US \$	Generator US \$	
M/S DIESEL GENERATOR	US \$122,068.97 SD 31,329,000 (Italy R4C)	US \$178,063.51 SD 45,700,000 U.K/F.G.Wilson	8 Weeks
M/S STA- RAITE ENG.	\$157,560.88 (Denmark Grundfos) SD40,438,000 \$130,122.74 (U.S.A/STA-RAITE) SD 33,396,000	US\$144,769.14 SD 37,155,000 Turkey	Ready stock
M/S AL SALHAB INT.	54,801.00 (ITALY/4EWRX		30 Days
M/S SUPAK TRADING	\$125,289.38 Denmark Grundfos SD 32,155,519 \$105,165.00 Italy/ Iowara SD26,990,596	US \$179,033.42 SD 45,948,928 U.K/F.G.Wilson	90 Days 60 Days
M/S TECHNOLOGY OF SUBMERSIBLE PUMPS	US \$112,871.03 Italy/BBC SD 28,968,350		40% Immediately
M/S SUDARU TRADING	\$172,887.98 Denmark Grundfos SD 44,371,700	17,066.04 China/ 8GF/ 10KV 43,510.62 25KV SD 4,380,000 SD 11,167,000	90-120 Days

The received bids were assessed on the basis of the following criteria:

- Compliance with the technical specifications
- Delivery time
- Past performance and reputation of the company
- price

After a thorough assessment based on the above criteria, the technical Assessment committee recommended further price negotiations with 2 bidders for the supply of 24 submersible pumps. Unicef Supply Section negotiated the offers of the two recommended bidders for pumps and came with the following revised offers;

- 1 Bidder- Technology of Submersible Pumps (11% discount)
Revised offer of SD 25,790,540 down from SD 28,978,135
- 2 Bidder- STA- RAITE (3% discount)
Revised offer of SD 37,641,820 down from SD 38,806,000

The lowest offer from M/s Technology of Submersible Pumps to supply 24 submersible pumps complete with riser mains, control panels, cables, impellers, 2 years Operational parts etc. for the negotiated total sum of SD 25,790,540 (USD 100,489.14) was awarded finally. 40% of the order was delivered immediately and the rest within 2 weeks.

The Unicef supply section further negotiated with the recommended bidder for the supply of the generators, M/s Diesel Generator Company who gave a discount of 7% on their previous offer of SD 49,500,000 to the revised offer of SD 46,000,000.

Thus the lowest offer for supply of 24 No. Diesel Generators of the globally popular type F.G. Wilson UK, at a revised tender sum of SD 46,000,000 (US \$ 179,232.41) awarded to the lowest bidder M/s Diesel Generators. 100% supply was made on order.

2.3.3 Other work materials /equipment

Other work materials /equipment were either ordered offshore through the Unicef Procurement Division in Copenhagen or locally from regular suppliers through the annual contracts as per the table below:

Table 4 Summary of Procurements Deliveries.

Item	Type of procurement	Date of requisition/Order	Date of receipt by Unicef	Date received in Kordofan Area Co-ordinator's Stores
Casings	Offshore	May, 2001	Nov 2001	Continuos Delivery
Oil & Lubricants	Local	May	Continuos Delivery	Continuos Delivery
Drilling foam	Offshore	May	Nov 2001	Continuos Delivery
Cement	Local	May	Continuos Delivery	Continuos Delivery
Hand pumps	Offshore	May	Nov 2001	June/July
Hand pump spares	Offshore	May	Nov 2001	June/July
Reinforcement bars	Local	May	Continuos Delivery	June/July/ August
Spares for Rig	Offshore	May	Nov 2001	Not yet
Generators	local	May	May/June 2001	June/July
Submersible pumps	Local	May	May/June	June/July

Although the procurement process of work materials and equipment was initiated and executed in an expeditious manner, there was considerable delay in the delivery of materials and equipment especially those that were done offshore. Unicef had not received some of the materials and equipment that were ordered as early as May 2001 by the time of this evaluation. The decision by the senior management of Unicef to allow local procurements of some critical materials and equipment was timely and assisted greatly in accelerating the pace of project implementation.

It is a fact that were it not for the stocks held by Unicef and counterparts that were quickly mobilised and delivered to site together with timeliness and flexibility of the procurement process and commitment of both WES and Supplies staff at Unicef it would not have been possible to implement this Drought Emergency Response Project in time to mitigate the effects of the drought

From the above the need to incorporate the component of emergency into regular development programmes is evident.

2.3.4 Monitoring

All the partners carried out monitoring of efficiency of the project implementation. At the project level, the users who are the main stakeholders did their part of monitoring as they were had the vested interest to have the facilities functioning at the earliest possible. However their monitoring role is not institutionalised and there is need to do so in the near future as part of the empowerment process. The Project Manager who worked closely with the WES Area Co-ordinator, the Project Supervisors and the management of State Water Corporations played a key role in monitoring the implementation of the project in terms of inputs and outputs as a result of which he was able to get the states to mobilise their resources to cover the miscellaneous works that were not included in the ECHO funding. The Area WES Co-ordinator based in Kordofan also played a key role in monitoring the project implementation on behalf of the National Water Corporation, in collaboration with the project manager and the project supervisors. He had a specific role of monitoring the delivery and use of materials and equipment.

Unicef through the Project officer, the finance office both at kordofan and Khartoum and the procurement office played a prominent role of monitoring the efficiency of project implementation including procurements and utilisation of funds. This monitoring was carried out through site visits, progress reports, financial returns, budget and procurement plans and requisitions for materials and equipment. Action on information was taken promptly and hence the reason for the efficiency of implementation.

The ECHO Correspondent in Sudan did intensive monitoring of the project implementation through field visits, discussions with Unicef WES and the interim report. **Close Monitoring of this project by all the partners contributed greatly to its success as it kept on alert all those concerned with its implementation. This is one of the many aspects of this project that should be replicated in other future projects.**

2.3.4 Logistics

The Project utilised all the transport resources (trucks and small cars) available at the WES Area coordination office in Kordofan, the WES Projects in the 3 states and others at the States' Water Corporations to transport materials equipment and personnel to the sites of the interventions. In addition, trucks from the National Water Corporation were also utilised to ferry materials and equipment to the project stores in El- Obeid. Due to the inadequacy of the internal transport capacity, private trucks were hired to transport materials and equipment to various sites within the Region. As a result of the rains that came during the implementation period, some roads became impassable especially in South Kordofan and private tractors had to be hired to access the sites. Inaccessibility to the intervention sites caused considerable delay in the implementation of the project and raised transport costs. However, In view of the vastness of the project area and the poor condition of the roads, the planning and the management of the logistics were professionally executed.

2.3.5 Documentation

Documentation of the project activities has been done through regular activity proposals that facilitate the disbursement of funds, monthly progress reports from the Project Manager to Unicef WES, Monitoring formats for financial disbursements to implementers and spare parts distribution, regularly updated financial reports and financial returns from the field.

An interim report has been submitted to ECHO in accordance with the funding contract and a final one, which is due in November, is under preparation. Together with the report of this evaluation the amount of documentation is deemed sufficient.

3.0 Project achievements

3.1 Overall progress Made

The progress in physical implementation of systems and capacity building are the best measurable outputs of the project. The quantitative achievement from the start of the project in April 2001 to the end in November 2001 are given in table 5 below.

Table 5 Project implementation statistics April – November 2001

Activity	North Kordofan		South Kordofan		West Kordofan		Total Kordofan Region	
	P	A	P	A	P	A	P	A
Rehabilitation of hand pumps	150	150	100	100	120	129	370	379
Drilling of boreholes equipped with hand pumps	7	7	7	7	7	7	21	21
Conducting of O&M and management courses	4	5	3	3	3	2	10	11
Conducting of hygiene / mobilization courses for VHCs	10	10	7	7	8	8	25	25
Procurement and distribution of fast moving spares	157	157	107	107	127	127	391	391
Rehabilitation of Water Yards	10	9	7	6	7	7	24	22
Conducting of Water Yards O&M and Management courses	1	1	1	1	1	1	3	3

P – Planned

A- Actual

The general performance regarding the progress of physical implementation of the project and the timeliness thereof is excellent. As per the above table, there is 100% achievement in almost all the planned activities except in the rehabilitation of the water yards where there is a balance of two (one in North and the other South Kordofan) which are still being worked on. The one in the south called UM- Al Khairat water yard, was inspected during the field visits on 4/12/2001 and the position was that the submersible pump was already installed, electrical wiring was done and pumping of water was being done with the generator temporarily installed outside the house. The outstanding works was the renovation of the generator house, construction of a platform for the generator, repair of the elevated storage tank, construction of a bench for users to draw water from, pipe work, and fencing.

The delay in completing these two water yards was caused by the inaccessibility of the site due to the rains. As mentioned earlier, elsewhere in this report, rains hampered the smooth implementation of this project but the determination and commitment of the implementers ensured overall timeliness in implementation.

3.2 Work quality

3.2.1 Rehabilitation of hand pumps

The 8% sample of rehabilitated hand pumps that were inspected during the field visits were found to be of satisfactory quality in terms of the workmanship and quality of construction materials used. Out of the 370 rehabilitated hand pump installations, 150 of them were done by a contractor (M/S Sagai company based in El-Obeid) and the rest by the WES Units. The rehabilitation work of the hand pumps ranged from replacement of several rising mains to replacement of minor spare parts.

Unlike the previous handpump constructions, these ones have incorporated a livestock watering facility in form of a chamber in which the wastewater also drains and those without the livestock watering facilities are well drained. Repairs on the platforms have satisfactorily been carried out where necessary. However, there is need to construct proper troughs as opposed to chambers for livestock watering that can accommodate at least 6 camels on both sides at one go.

Out of the 29No. Rehabilitated hand pumps that were visited in the three states, 3 of them in Habila village (Mahalia Headquarter) - South Kordofan were not operational as they were said to have broken down only 2 months after rehabilitation. No one including the WES unit seemed to know what had gone wrong and when the breakdowns had occurred. 7 hand pumps were rehabilitated in this village under the ECHO/Unicef Project. These hand pumps and others rehabilitated/drilled under different projects are in a cluster, within 50 - 100 metres of each other. There is also a Hafir within the village where villagers obtain water free of charge.

3 broken down hand pumps does not sound many but one wonders how many similar cases exist in Kordofan Region that were not detected. This question is necessary in view of the numerous broken down hand pumps that were observed in clusters of even as many as 8No. within short distances of each other in almost all the villages that the consultant visited or just drove through. Another question is, could

the effects of the drought have been so severe on water supply if all these broken down handpump installations were operational?

Is time that the WES Projects and the States Water Authorities stopped any drilling and installation of new hand pumps and concentrated on rehabilitation of the old ones including harvesting of the excess ones that the communities may not be in need of.

3.2.2 Drilling and equipping of new bore holes with hand pumps

21 new boreholes were drilled and equipped with Indian Mark II hand pumps in all the 3 states. The criteria for selection of the sites was as follows:

- Remoteness of the area from existing water sources
- Extent of concentration of IDPs
- Extent of concentration of human and livestock
- Possibility of striking water

A total number of 24 boreholes were drilled out of which 21 were successful in terms of water quantity and quality. This represents a success rate of 84%, which is commendable. The drilling was done in-house using the 4 No. Drilling rigs available in the Region and which are under the control of the WES Area coordinator. Although spare parts for the rigs were procured early enough together with the other offshore procurements they never arrived in time to facilitate the rehabilitation of the rigs for enhanced efficiency. Some spares that were held in old stocks by Unicef supplemented with some inferior quality ones that were purchased from the local market were used to carry out some modest repairs that enabled the rigs to operate at low efficiency and with regular breakdowns.

The quality of construction work is quite satisfactory with well-drained apron and incorporating livestock watering facilities where necessary. All the 7 new installations visited were operational and well maintained.

3.2.3 Rehabilitation of Water yards

A Water Yard is a deep bore hole equipped with a motorised pumping installation with a storage tank and a limited pipe distribution network providing for human and livestock watering mostly around the facility. Most of these water yards are installed with over 30 years old-reciprocating pumps powered by diesel generators. Today, only about 60% of these installations are operational with constant breakdowns and operating at very low efficiency. They have ceased to be the reliable sources of water that they once were, a situation that has been aggravated by the fact that they are now serving populations much higher than those they were designed for back in 1970s. `

Out of the 24 water yards that were planned for rehabilitation under the ECHO/Unicef Drought emergency Response Project, 22 are substantially complete and operational. The position with one of the incomplete ones in south Kordofan, together with reasons for the delay in implementation is explained under the general progress hereabove. The 13

installations visited were of satisfactory construction quality with renovated/newly constructed generator houses, elevated/raised storage tanks, professionally installed generators, submersible pumps and control panels. The water yards are well fenced with separate places for human and livestock users. For human users concrete benches/ platforms fitted with several taps have either been provided or are under construction, just as it was in the olden days before things fell apart and human users joined the livestock in drinking water from the troughs.

The rehabilitated water yards are well drained and the hygiene situation around most of them is quite good. It is gratifying to note that the yields from the boreholes have increased 2-3 times and meeting the immediate needs of the target human and livestock populations.

The consultant wishes to single out the North Kordofan State Water Corporation for commendation for a job well done in providing barbed wire fence with angle iron around all the 5 water yards that were visited and for the generally good workmanship of structures, and good hygiene around the water yards. It is suggested here that the other state water authorities could copy this good example.

It was observed that there were some outstanding works of fencing, repair of storage tanks and construction of concrete bench with taps for human users at the following water yards, which were the responsibility of the respective State Water Authorities.

- As Sidir – Minor works (N. Kordofan)
- Dazin Gor – Minor works (N. Kordofan)
- Kabish Nor – Minor works(N.Kordofan)
- Banat El Maagla –Minor works (N. Kordofan)
- Um-Al Khairat – Major works (S. Kordofan)
- Dalami Diling - Minor works (S. Kordofan)
- Saata Taganno – Minor Works (W. Kordofan)
- Mumu – minor Works (W. Kordofan)
- 11 Others not visited

It is recommended here that Unicef follows up the completion of these works to ensure that this project is brought to its logical conclusion. The States Water Corporations need to be commended for their local contributions, cooperation and excellent team spirit which they have shown in the implementation of this project.

As in the case of the rehabilitated hand pump installations this question is relevant regarding the water yard installations;

Is time that the State Water Authorities with the assistance of the Federal Government, local and International donor agencies and Humanitarian organisations stopped any drilling and installation of new water yards except in situations of absolute need and concentrated on the rehabilitation and upgrading of the old ones including building local management capacities to ensure the sustainability of the developed WES services.

3.2.4 Training of VHC and Water Yard Operators

The training of Village Health Committees and the Water yard operators took place in different in the 3 states as planned. Village Health committees were given hygiene education/mobilisation TOT course which was aimed at building capacities in terms numbers and skills to manage the hygiene, water and sanitation services in the villages. This group was also given the hand pumps O&M and management course to equip them with the knowledge and skills needed in sustaining the WES the services.

Water yard Operators and some members of VHC were given a Water Yard O&M and Management course whose aim was to equip them with knowledge and skills to operate and maintain the new facilities. The impact of this training was observed during the field visits both at the hand pump installations and at the water yards.

At the hand pumps, it was observed that almost all the rehabilitated and the new hand pump installations under the ECHO Unicef project that were visited had a trained VHC in place who were confident of carrying out any type of repairs on their hand pumps and a tariff system of some kind. An exception to this was observed at Abu Aris village in W. Kordofan where it was reported that the VHC had not been trained as the information about training reached the villagers rather late and therefore could not travel to El-Fula for training. **One wonders how many such cases exist that were reached for detection. It is worthwhile to note that there is still some room for improvement of hygiene around the hand pumps.**

At the water yards the consultant observed that except 2 operators one at Banat El Maagla water yard in Um- Ruwaba Province – N. Kordofan and the other at Mumu water yard in W. Kordofan who kept the new generators in very dirty condition all the others maintained the generators and the pump houses in very clean condition and knew exactly the steps to be followed before starting the generators in the morning.

There is need to build on and replicate the achievements made under the ECHO/Unicef project. The VHCs and Water Yard Operators should be given refresher courses on regular basis and the good ones used to train others in the nearby villages. This type of training should be extended to all villages where WES facilities exist.

NB. The consultant observed a lot of efforts by Unicef to promote the image of ECHO on all signboards to the installations and labels appearing on all major pieces of equipment.

4.0 Project role in sustainable mainstreaming of hardware issues

4.1 Technology used

Ground water is the only reliable source of water supply in Kordofan Region as it indeed is in many other regions in Sudan. There are many technologies of abstracting ground

water today. Some are low cost and relatively easy to operate and maintain while others are expensive and unsuitable for village level operation and maintenance. The choice of a particular technology is dependent on many factors such as aquifer characteristics, socio-economic situation, local capacities for operation and maintenance and management, etc. In the case of the ECHO/Unicef Drought Emergency Response Project, two types of technologies have been employed namely; hand pump and diesel powered submersible pumps

4.2 Handpump

Hand pump technology will remain popular for a long time to come in Sudan and other countries of the world where reliable surface water sources are scarce. In Sudan hand pumps are standardised in two types; the Indian Mark II and the Afridev. In Kordofan Region Indian Mark II hand pump is in common use. There are over 7000 of them already installed. This type of pump is quite suitable for deep bore holes over 45 metres.

It is a durable pump and suitable for village level operation and maintenance. However, it has some disadvantages like the steel rising mains that are very prone to corrosion where water is hard (saline). Compared to the Afridev pump it is less easy to operate and maintain in that one must withdraw the whole rising main to be able to replace minor parts like the foot valve. The first disadvantage is being eliminated with the introduction into the market of the plastic rising main. The second disadvantage is less important since it is not such a big task to withdraw the rising mains. The advantages far outweigh the disadvantages. The problem issue with the hand pumps lies with the availability of spare parts. Presently there is no organised system of spare parts supply either at the National or the project level. The spare parts that are currently held by numerous sources (private individuals, WES units, VHCs) were procured by or with the assistance of Unicef WES.

The main reasons given for the rampant breakdown of hand pumps is lack of spare parts and in a few cases lack of funds. Continued lack of such a system will mean constant breakdowns and consequent lack of water for human and livestock populations, which will lead to increased poverty. Another likely situation to develop is that the sale of spares may be taken over by the black market, which will be very difficult to control. The core problem in this issue is that one of availing spares in the country; otherwise systems for local distribution are easy to work out.

A considerable percentage of the people of Sudan will continue to depend on hand pumps for their water supply for a long time to come. In view of this, it is therefore necessary that the issue of hand pump spare parts supply is addressed not only at the project level but also at the National level. Private entrepreneurs should be identified, encouraged and assisted to import hand pump spare parts which will be made available to users at sales centres to be established in the local trading centres within the vicinity of the villages.

4.3 Diesel powered submersible pumps

Although not suitable for village level operation and maintenance, the technology used in the rehabilitation and upgrading of the water yards is quite appropriate especially when compared with the replaced installations of diesel powered reciprocating pumps. Technically a reciprocating pump is only slightly better than a hand pump. A submersible pump on the other hand has a much huge pumping capacity and it is possible to exploit the full borehole potential with it. It is not an entirely new technology to the staff of the State Water authorities.

The selected pump type -BBC is a popular Italian make which is durable and with a local agent for supply of spares and after sales back up service. The selected generator sets F.G.Wilson U.K., which is of British make, is widely known for its durability and efficiency. A local agent is available to supply spares and provide after sales service.

Future projects on rehabilitation of Water yards should explore the possibility of using Solar power, a natural resource that is available free of charge and in abundance in Sudan. The installation costs are high but quite cheap to run.

5.0 Projects role in sustainable mainstreaming of community management, tariff system, capacity building and awareness creation

5.1 Management of Hand pumps

Since 1990s when the hand pumps were installed their management has been in the hands of the communities through the Village Health Committees (VHCs). The VHCs have been supported by the WES units, which are based at the Mahalia level. The VHC members are volunteers appointed by the Village Public committees, which can appropriately be described as Village Governments. A WES unity is supposed to be composed of officers at Mahalia level in the fields of water, health, teaching and community mobilisation. A case deviating from this rule was found in Habila village where the WES unit is composed of a pump mechanic, a housewife and some students. A WES unit is technically composed of volunteers as it lacks an in-charge as well as a clear line of authority. It is not institutionalised within the Mahalia organization structure.

During the field visits it was observed VHCs were either very weak or have disintegrated altogether in some villages. Most WES units were observed to be only existing by name, as they do not support the VHCs in the manner that is expected of them. The State Water Authorities at the Provincial level on the other hand have left out from their agenda the monitoring of the hand pumps operations and maintenance. Interviews with some members the WES units and Rural Water Corporations confirmed this observation. WES units attributed this situation to lack of support from the Mahalias.

Due to the vastness of the states and inadequate logistical support the WES Projects at states level that are supposed to monitor the operations of the WES units are not able to do so effectively. This has led to a situation where the management of hand pumps is either inadequate or absent altogether resulting to lack of tariff systems and breakdowns en mass.

The ECHO/Unicef Drought Emergency Response Project has introduced some form of community management, tariff system, capacity building and raised awareness on good hygiene at water points, O&M and management of hand pumps installations. During the field visits the following was observed in 95% of all the hand pump installations that have either been rehabilitated or newly drilled and equipped,

- had a VHC responsible for the facility
- had tariff system in place with varying charges for different amounts of water consumed
- had pump mechanics in place;
- users were aware of the reason and need to pay for water
- Users were aware of hygiene issues at the water point.

These indicators of community management were conspicuously absent in a majority of facilities that were outside the ECHO/ Unicef interventions and those within the trading/commercial centres.

As pointed out earlier elsewhere in this report, hand pumps will continue to play a key role in the provision of safe water supply. It imperative therefore that the issue of their management is addressed urgently. It is not good practice to leave the management of these important installations entirely to voluntary bodies. It is in this light that the following recommendations are made:

- **That the responsibility of monitoring the operations and the management of hand pump installations is extended to the State Rural Water Corporations at the Provincial level.**
- **That the WES unit is established as a structure within the Mahalias under a responsible person and with a clear line of responsibility. The present mandate for WES units is sufficient.**
- **That all the re-structured WES units receive similar training to that which has been given under ECHO/ Unicef Project.**
- **That new VHCs in all installation where they have dis-intergrated are formed and trained.**
- **That all the inactive VHCs are re-activated by way of re-training.**
- **That the management's committees of hand pump installations are left free to decide on the tariff structure including the mode of payment. The WES units will need to facilitate these decisions especially as regards water charges, which should be based on operation and maintenance and system replacement, costs.**
- **That the management committees of hand pump installations are encouraged to invest their money in stocks of hand pump spares instead of accumulating large sums of money that lose value and can also become a source of conflicts amongst the users which may lead to the disintegration of the tariff systems.**

5.2 Management of water yards

Since 1970's when the water yard installations were made, their management has shifted from the central Government to the State Water Corporations, Mahalias and the public committees. Presently the management of these installations is shared between the State Water Corporations and the Public Committees. The revenue collected is shared in proportions varying from state to state (North Kordofan – 60% public committee: 40% State Water Corporation, South Kordofan 0 % public committee: 100% State Water Corporation and West Kordofan 50% public committee: 50% State Water Corporation). The revenue that goes to the Public Committee is supposed to meet the fuel and spare parts expenses while that one, which goes to the State Water Corporation, is supposed to cater for the salaries of the staff deployed in the installations. Field investigations revealed that cases exist where some public committees do not meet their obligation and the installations are not repaired because of lack of spare parts or do not operate because of lack of fuel.

In case of water yards that have been rehabilitated under the ECHO/ Unicef Drought Emergency Response Project, different management models have emerged in the 3 states. In North Kordofan the state water corporation has taken over full management for the rehabilitated water yards including the take over of 100% of the tariff collected. In South Kordofan the state water continues to maintain the management responsibility and take over of 100% tariff collected, while the west Kordofan state Water Corporation has maintained the 50: 50 share of tariff collected with the Public Committees.

In addition to the management issues the ECHO/Unicef has raised awareness on hygiene issues in the water yards. The Provincial Director of Sodari Province Rural Water Corporation said; *“Hygiene conditions have not been considered in the water yards before, but the training that has been provided within the drought response interventions has created the necessary awareness in this regard.”*

As pointed out earlier the technology used is not suitable for community management on its own. The State Water Corporations have the necessary capacities needed to operate and maintain these installations for example, they have qualified and skilled electricians, pump mechanics and operators. The communities on the other hand lack these capacities yet their participation in the management of these installations is very necessary. **It is in view of the above that the following recommendations are made:**

- **That the communities through the public committee should be involved in the management of the water yards. They should monitor the operations of the water yards and be responsible for the day to day supervision of the staff of the state water corporations working at the water yards.**
- **That the state water corporations continue to collect and manage the tariff and that part of this tariff is deposited in a water fund account operated jointly by the state Water Corporation at the Provincial level and the community through the Public Committee. This fund shall only be used for purchasing major spare parts needed for major rehabilitation of the water yards and for system replacement. Funds required for day today running of**

the installation and the staff salaries should be handled by the State Water Corporations

- **A system of collection of tariff that is more transparent with the necessary checks and balances should be introduced at the water yards. A receipted or metered system or combination of the two is recommended.**
- **Unicef should continue to assist in building capacity of the water yard staff particularly in the areas of hygiene and monitoring**
- **The water tariff should be reviewed to reflect the actual cost of producing water together with the element of system replacement**

6.0 Community involvement and participation in the project

The communities have been reasonably involved in the implementation of the project .A lot of consultations regarding site selection and their participation took place both during the learning and physical implementation phases of the project .In the rehabilitation, drilling and equipping of hand pumps the communities assisted in the following:

- Supply of locally available materials
- Fenced the water points using locally available materials
- Provided unskilled labour
- Provided food for the staff
- Volunteered people to be trained as VHCs and pump mechanics
- Village mechanics participated in the rehabilitation of hand pumps

In the rehabilitation of water yards the communities participated in the fencing work and in the off loading of the equipment from the trucks.

Under the prevailing circumstances then this level of participation and involvement is considered adequate. **However the Public Committees should be encouraged to consult the communities widely over decisions that they take on their behalf especially as regards the management of hand pumps and water yards.**

7.0 Project role in reducing the drought effect in intervention areas

The following are the reported effects of the year 2000 drought:

- Livestock deaths
- Closure of schools
- Displacement of people
- Breakdown of water facilities due to over use
- Conflicts and fights amongst water users
- Increased cost of water
- A lot of time was taken fetching water

- Increase in diarrheal and other water related diseases
- Reduced incomes
- Increased cost of foods
- Over burden on women and children travelling long distances in search of water
- Children dropping out of schools to search for water
- Too little or no water for hygienic use
- Environmental degradation around the water points due to concentration of human and livestock populations.

All the above effects culminated in increased poverty amongst the people. The ECHO/Unicef drought emergency project has played a key role in reducing the above drought effects in the intervention areas .Where no interventions took place people remain camped in their areas of migration and continue to put pressure on land and existing water facilities. In west Kordofan already herders have started moving the animals to areas with water facilities as the rains did not replenish the surface water sources adequately. The Director General of state water general has sent an appeal to the government and donors for assistance in rehabilitating ten bore holes in the northern and southern parts of west Kordofan. This request together with others that may be in the pipeline should be looked at favourably

8.0 WES capacities with regard to the implementation of the project

As mentioned earlier the pace and efficiency in which this project has been implemented is quite commendable. This has been possible because of the adequate capacity both at Unicef WES , National Water Corporation and State Water Corporations and the excellent working relationship amongst the partners.

8.1 Human resource

The human capacity in terms of numbers and skills were sufficient for the implementation of the Project. Apart from the project manager, all the members of staff that were involved in the implementation of this project are regular employees of the WES partners . The added value from the recruitment of a project manager from the private sector assisted in the co-ordination of project activity and in the mobilisation of the resources held by the 3 State Authorities.

8.2 Vehicles, Plant and Equipment

The partners have reasonable number of vehicles, plant and equipment at their disposal. However private transport had to be hired to transport materials and equipment to site partly because of the unserviceability of the vehicles owned by the Government WES partners. The drilling rigs had to work at low efficiency because of lack of maintenance.

There is need to maintain a stock of spares for the drilling rigs especially those that are not available in the local market in addition to maintaining them in serviceable condition all the time to cater for both regular and emergency situations

Private sector involvement in the project

In this project private sector was involved in the supply of work materials and equipment, supervision of the implementation work, transport of materials and equipment to the various sites, installation of submersible pumps, training of water yard operators and in the rehabilitation of the hand pumps. The all round performance of the private sector was excellent. The participation of the private sector is one of the factors that have contributed immensely to the success of this project.

Private sector involvement in the rehabilitation of the hand pumps especially is a new concept that the ECHO/Unicef Project has brought along which should be explored further because it ties in with the prevailing problem of availing spares within the vicinity of the villages. A former director general of one of the state Water Authorities who is very familiar with the area and the problems of the operations and maintenance of hand pumps owns the private firm that was involved in this activity. Interviews with this person revealed that he is interested in establishing hand pumps spares sale centers in Kordofan region. He appeared to have good ideas on how to go about this business which he hopes to back up with other specialist services related to hand pump installations. Unicef should hold further discussions with this person and others who are interested in this business with a view to identifying a suitable private firm to promote in this regard.

Locally Unicef should consider piloting private sector involvement in supplying spare parts in Kordofan Region. This will entail the identification of a private firm that will be supported to develop a system of supplying spare parts to the villages through outlets that are linked to other business concerns in trading centres within the vicinity of the villages. Such support could be in the form of initial stocks that the private firm can pay for gradually as business picks up.

1 0.0 Lessons learnt

1) The idea to introduce the Emergency Preparedness and Response component within the Unicef WES Programme is a good one given that in Sudan, emergencies resulting from natural and man made causes are quite common, culminating in many cases of internal displaced persons (IDPs). It is in view of this that the need arises to advocate for the inclusion of a component of emergency into regular governmental WES Development Programmes.

2) The following factors have contributed to the success of the project:

- Timeliness and flexibility of the procurement process and commitment of both WES and Supplies staff at Unicef.

- Involvement of the private sector in the rehabilitation work which added Efficiency and Effectiveness.
 - The role played by counterparts who are quite knowledgeable in their work and have reasonable implementation capacity.
 - The role played by the project manager who was hired on Consultancy basis instead of deploying the skeleton staff available at Unicef WES programme contributed enormously to the efficiency and effectiveness of the project. Without any doubt, value for money spent was realised. This arrangement is suitable for replication for such urgent and short-term assignments
 - Enhanced communication (Fax, telephone, Computers) for the counterparts which Unicef WES has contributed towards played an important role in increasing the implementation efficiency.
- 3) The training that Unicef WES has provided to the counterparts over the last 3 years or so paid dividends in this particular project as the staff trained proved quite knowledgeable in planning implementing and in carrying out monitoring and evaluation activities of the project. They provide information for preparation of the proposal to ECHO and participated in preparation of the project budget. there is need to continue on capacity building initiatives of the counterparts not only to cater for regular development programmes' needs but also for emergency situations.
 - 4) The availability of WES staff in decentralized positions also assisted the speedy implementation process of the Project. there is therefore need to decentralise and maintain a well trained and equipped WES staff on the ground.
 - 5) The existence of standardization of handpumps in the country, which the users are familiar to, contributed greatly to the speedy procurement process.
 - 6) The existence of old stocks of materials and equipment at Unicef WES, National Water corporation and at Governmental WES stores minimised the delays in implementation that would otherwise have resulted from the delayed procurements.
 - 7) Information available indicates that the dry spell had persisted for three seasons prior to this response and that the drought had started taking its toll by the time the interventions were initiated. In fact some interventions were incomplete by the time the rains came in June/July. It is evident therefore that the Drought Early Warning System was not early enough to facilitate early response to the drought by Unicef and others, in Kordofan Region.
 - 8) All the drought effects culminated in increased poverty amongst the people. The ECHO/Unicef drought emergency project has played a key role in reducing the above drought effects in the intervention areas. Where no interventions took place people remain camped in their areas of migration and continue to put pressure on land and existing water facilities.
 - 9) Close Monitoring of this project by all the partners contributed greatly to its success as it kept on alert all those concerned with its implementation. This is one of the many aspects of this project that should be replicated in other future projects.

11.0 Recommendations

1) It is evident that the State Water corporations lack financial resources to invest in neither new water facilities nor in major rehabilitation of old ones like the water yards, yet this is so necessary in the reduction of drought emergencies. There is therefore urgent need for the Federal Government of the Republic of Sudan and the local and international donor agencies in Sudan to introduce interventions in Kordofan and other drought prone regions, in the model of the ECHO/Unicef Drought Emergency Response Project-Kordofan Region.

2) In view of the numerous broken down hand pumps that were observed in clusters of as many as 8No.within short distances of each other in almost all the villages that the consultant visited or just drove through, the WES Projects and the States Water Authorities should stopped any drilling and installation of new hand pumps and concentrate on the rehabilitation of the old ones including harvesting of the excess ones that the communities may not be in need of.

3) In view of the large numbers of broken-down water yards it is time that the State Water Authorities, local and international donor agencies and Humanitarian organisations stopped any drilling and installation of new water yards except in situations of absolute need and concentrated on the rehabilitation and upgrading of the old ones including building local management capacities to ensure the sustainability of the developed WES services.

4) Regarding the management of the water yards, it is recommended:

- That the communities through the public committee should be involved in the management of the water yards. They should monitor the operations of the water yards and be responsible for the day to day supervision of the staff of the state water corporations working at the water yards.
- That the state water corporations continue to collect and manage the tariff and that part of this tariff is deposited in a water fund account operated jointly by the state Water Corporation at the provincial water level and the community through the public committee. This fund shall only be used for purchasing major spare parts needed for major rehabilitation of the water yards and for system replacement. Funds required for day today running of the installation and the staff salaries should be handled by the state water corporations
- A system of collection of tariff that is more transparent with the necessary checks and balances should be introduced at the water yards. A receipted or metered system or a combination of the two is recommended.
- Unicef should continue to assist in building capacity of the water yard staff particularly in the areas of hygiene and monitoring.
- The water tariff should be reviewed to reflect the actual cost of producing water together with the element of system replacement.

5) Regarding the management of the hand pump installations, it is recommended:

- that the responsibility of monitoring the operations and the management of hand pump installations is extended to the State Rural Water Corporations at the Provincial level.
- that the WES unit is established as a structure within the Mahalias with a responsible person and with a clear line of responsibility. The present mandate for WES units is sufficient.
- that all the re-structured WES units receive similar training to that which has been given under ECHO/ Unicef Project.
- that new VHCs in all installation where they have dis-integrated are formed and trained.
- that all the inactive VHCs are re-activated by way of re-training.
- that the Management Committees of hand pump installations are left free to decide on the tariff structure including the mode of payment. The WES units will need to facilitate these decisions especially as regards water charges, which should be based on operation and maintenance and system replacement, costs.
- That the management of hand pump installations are encouraged to invest their money in stocks of hand pump spares instead of accumulating large sums of money that lose value and can also become a source of conflicts amongst the users which may lead to the disintegration of the tariff systems.

6) There is need to build on and replicate the achievements made under the ECHO/Unicef project. The VHCs and Water Yard Operators should be given refresher courses on regular basis and the good ones used to train others in the nearby villages. This type of training should be extended to all villages where WES facilities exist.

7) A considerable percentage of the people of Sudan will continue to depend on hand pumps for their water supply for a long time to come. In view of this, it is it is therefore necessary that the issue of hand pump spare parts supply is addressed not only at the project level but also at the National level. Private entrepreneurs should be identified, encouraged and assisted to import hand pump spare parts which will be made available to users at sales centres to be established in the local trading centres within the vicinity of the villages.

8) Locally Unicef should consider piloting private sector involvement in supplying spare parts in Kordofan Region. This will entail the identification of a private firm that will be supported to develop a system of supplying spare parts to the villages through outlets that are linked to other business concerns in trading centres within the vicinity of the villages. Such support could be in the form of initial stocks that the private firm can pay for gradually as business picks up.

9) Future projects on rehabilitation of Water yards should explore the possibility of using Solar power, a natural resource that is available free of charge and in abundance in Sudan. The installation costs are high but quite cheap to run.

10) In west Kordofan, herders have already started moving the animals to areas with water facilities, as the rains did not replenish the surface water sources adequately. The Director General of State Water Corporation has sent out an urgent appeal to the Federal Government and donors for assistance in rehabilitating ten bore holes in the northern and southern parts of the State. This request together with others from other areas that may be in the pipeline should be looked at favourably.