Capacity Building for Water Supply Projects in the Gash Barka Region of Eritrea

Gash Barka Zoba Administration & UNHCR Partnership

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1. Introduction

Since 2001 the Gash Barka Zoba Administration (GBZA) and UNHCR have jointly carried out both on-ground works and capacity building activities for the provision and long-term supply of water to Eritrean returnees and their host communities. To ensure communities sustainably operate these water supply projects, it is essential that capacity building and self-empowerment awareness creation activities also occur.

This paper presents the range the water supply projects and complementary capacity building activities implemented to date and those still needed for returnees in the Gash Barka region of Eritrea. The need for continued and increased capacity building activities at the local community, regional andnational levels is highlighted in order to achieve the sustainable operation of water supply projects and the responsible management of groundwater resources for all beneficiaries. Constraints and lessons learnt from implementing and observing the operation of village/community water supply projects are outlined along with recommendations to enhance and strengthen capacity building activities to maximise achieving ownership and sustainable operation of community water supply projects.

2. Objective

Identification and support for implementing capacity building activities can be designed to allow for the community and government to work in partnership to most effectively use finite resources for the protection and sustainable operation of water supply projects. By empowering village communities to take responsibility of their water supply arrangements, through awareness campaigns, training and technical support, the success of communities to be able to operate, maintain, and achieve long term sustainability (cost recovery and capital replacement) with their projects is enhanced. The objective of the capacity building programme devised and currently being implemented in the Gash Barka region at the village, sub-zoba and zoba level aims to achieve this outcome.

3. Background – Returnee Water/Sanitation Activities and Outstanding Needs

The Gash Barka region of Eritrea, know as the "country's food basket", is the principal location for settlement and reintegration by Eritrean returnees from Sudan (85% of returnees). Since 2001, UNHCR and the Government of the State of Eritrea have assisted with the repatriation of over 110,000 returnees to this region. To date over $USD 21.5 million has been invested by UNHCR to provide basic access to essential social services and sustainable livelihood activities for the returnee population. Within the water sector more than $USD 5 million has been used to begin to meet the water needs of the returnees. Approximately 25% of the returnee resettlement areas still require new water supply and distribution systems to ensure greater than 15 litres/person/day is provided. In addition, approximately 30% of returnee areas require rehabilitation and/or extension of existing water storage and distribution systems. Several schools and health stations still require water provisions. This increased demand on water resources also warrants the need to initiate and accelerate developing a Groundwater Resource Management Strategy, water harvesting and conservation interventions.

Almost all existing and newly established villages in the Gash Barka region that have/will receive returnees have very limited or no basic sanitation facilities. The national coverage of sanitation infrastructure for the rural community is estimated to be less than 5%. At present, individual

sanitation practice is primarily open field defecation. Expanding returnee and host community village populations have the potential to create environments in which personal hygiene and health standards could further decline unless extensive sanitation intervention infrastructure and education/training programmes are implemented. Hence, some UNHCR intervention has occurred with the construction of Ventilated Improved Personal (VIPs) latrines for families (1,400), schools and health centres and communal waste disposal facilities. However, to date this work has only managed to cover less than 10% of the returnee population. A limited number of villages and schools have also received personal hygiene and environmental sanitation education. The training also established community hygiene/health promoters.

Potable water, like food and shelter, is a basic necessity for returnees, hence great attention and effort has been made towards addressing this need. As a result of the investment and efforts made to date, approximately 70% of the returnees now have basic access to water through joint efforts of the GBZA, UNHCR and other implementing partners. However, significant water needs still remain for returnees – currently estimated at more than $USD 4.9 million.

4. Methodology and Activities for Water Supply Project Implementation

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Once resources for water projects are secured and water intervention locations/villages are identified and prioritised, the first task is to locate and secure an adequate and reliable water source. Hydrogeological and geophysical investigations are carried out to identify drilling/handdug well sites that will provide adequate sustainable water yields. Once a suitable and reliable yielding water source is located, an appropriate water supply extraction, storage and distribution system can be designed and implemented. Following this a village water committee is established and trained to operate and manage the system (water attendants/guards, money collection, generator operators, fuel and spare parts).

To support villages with their operation and maintenance activities, UNHCR and other implementing partners have recently invested in village, sub-zoba and zoba level capacity building activities. Specifically, training of water technicians at the sub-zoba administration and village level, provision of a range of water equipment, tools and spare parts and a mobile workshop for undertaking site repairs and maintenance activities have been put in place.

During 2002 UNHCR also prepared a framework for developing a Groundwater Resource Management Strategy for the administration. The strategy outlined the key resources and activities needed to facilitate monitoring and managing the sustainable use of groundwater across the region. Initial support provided to implement the strategy has been in the provision of field water monitoring equipment and development of a database to store essential information on village water systems and groundwater information.

5. Recent UNHCR Supported Water/Sanitation Projects – 2003/2004

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UNHCR supported water activities during 2003/4, a multi-year programme cycle, included:

- Borehole drilling and development in 33 villages; pump testing 11 boreholes; and rehabilitation of 2 handdug wells.
- Hydro geological and geophysical groundwater investigations in 30 villages.
- Installation of 10 handpumps and the repair/replacement of another 22.

- Construction of 2 new (Gursub and Koferenko) and 2 extensively rehabilitated water supply projects (Alebu and Gerset).
- Water provisions for schools (6), health centres (3) and kindergartens (2).
- Training (and retraining) of more than 60 village water committees.
- Establishment of a groundwater monitoring programme in 28 returnee villages.

UNHCR also supported a range of sanitation awareness, education and infrastructure projects targeted mainly at schools that incorporated constructing 12 school VIP latrine blocks (6 male and 6 female) and one (1) teacher's block. The latrine construction programme also included student/teacher personal hygiene and environmental sanitation training. A village sanitation needs assessment for eight returnee villages was also completed.

6. Water Projects for 2005 and Beyond

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For 2005 and beyond, UNHCR and the GBZA Water Department have identified over $USD 4.9 M of outstanding water intervention needs for returnees and their host communities. The currently planned activities include:

- Drilling and development of boreholes for 20 villages (including hydrogeological investigation, pump testing and fit out with a handpump).
- Constructions of 13 new village water supply projects (Adi Omer, Wedi Kyar, Bultubiyay, Haykota, Barentu, Shiglet, Kieru, Setimo, Forto, Areda/Tambara, Camp 10, Camp 11, Adi Shegalla).
- Upgrading 7 village water storage facilities (Tebeldia, Fanko, Forto, Adi Shegalla, Hademdemi, Grasha, Goluj).
- Water system extensions for 7 villages (Mengula, Sabunait, Gerghef, Fanko, Tesseney, Hantrefesko, Adi Shegalla).
- Provision of water supply to 7 schools (Gerset, Tebeldia, Haykota, Fanko, Hantrefesko, Almestekbel, Adulis).
- Technical training for a 100 village/sub-zoba water technicians / O&M staff training.
- Water committee training for 60 villages.
- Capacity building and support - office and field monitoring equipment, water management training for managers/ technicians in 14 sub-zoba administrations, water system cost recovery strategy, and spar parts/ tools.

The outstanding sanitation needs for the returnees and their host communities are also great and are currently estimated at over $USD 3.8 M. The range of sanitation programmes and activities identified for intervention in the immediate to medium term time frame are:

- Personal Hygiene and Environmental Training - 25 villages.
- Awareness campaign on VIP latrine use and construction - 25 villages.
- Provision of sanitation tools - spade, rakes for 25 villages.
- Pilot Family VIP latrine construction programme - 500 VIPs.
- VIP Latrine Slab production and distribution - 35,000 units.
- PHAST Training - 6 training sessions for Ministry of Health officers.
- Medical Waste Disposal Facilities for 25 health facilities.
- NUEYs [1] Village Water and Sanitation Awareness Campaign.
- NUEYs Water provision for female headed households - 3 sites.

[1] National Union of Eritrean Youths (NUEYs)

- School Hygiene/Environmental Sanitation Training - 25 villages
- Family / Community Waste Disposal Systems - 25 villages

These projects will be implemented progressively from 2005 onwards but are contingent on funding support from existing and new donor sources, with a priority for water supply and related projects to be implemented first.

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7. The Need for Capacity Building

Following on from the establishment of water supply, storage and distribution infrastructure, the sustainable operation and functioning of water systems is dependant on mobilising the community and government to take on ownership and operational management responsibility. Without this partnership, communities (including government) will not develop and acquirer the skills, resources and capacities to sustainably operate and maintain water supply projects.

The need for ongoing capacity building at all levels for water supply projects is crucial to:

- Protecting the investment in water projects.
- Transferring ownership and operational/management responsibility to community and/or local government as appropriate.
- Monitoring and managing water supply assets.
- Recovering operational and maintenance costs.
- Sustainable use of water resources for all beneficiaries.

UNHCR, the GBZA Water Department and other implementing partners (Oxfam, GTZ, CESVI, COSV) quickly observed and identified capacity shortfalls at the community, sub-Zoba, Zoba levels that hindered village/community water supply projects achieving a significant degrees of sustainability. Typical issues identified were:

- Problems with collecting and financially managing/controlling water sale revenue.
- Inability to cover fuel and/or basic equipment repair and maintenance costs for operating generators, handpumps, submersible and solar pumping systems.
- Limited number of villages, following being trained in water system management, able to take on this new level of management responsibility.
- Lack of ownership and responsibility of water supply projects.
- Limited availability and/or skills of technicians to maintain and repair equipment.
- Inadequate inventory levels for spare parts and equipment – village, sub-zoba or zoba levels.
- Limited support/monitoring/resources with either the sub-zoba or Zoba to provide support (water committees) or technical assistance (O&M) to villages.

<u>Capacity Building at the Village/Community Level</u>

To address identified shortcomings in capacity, UNHCR initiated and supported the GBZA Water Department with implementing a range of programmes to significantly accelerate capacity building at the village/community level. Village Water Committee (VWC) training for returnee villages were carried out in 2003 (42) and 2004 (60) to mobilise and train communities to responsibly manage their water projects. This was complemented with the training of village water technicians to carry out day to day operation and maintenance activities. In a theoretical and practical "hands on" course, the technicians were trained to operate, maintain and repair hand-pumps, solar-pumps submersible pumps and generators and to undertake minor plumbing

and pipeline extension tasks. The inclusion of the village community in the water system design phase and via direct employment during construction was also encouraged and supported as a means to achieve a greater amount of community participation, ownership and sense of responsibility.

Groundwater Resource Management Capacity Building

The devastating effects of the current four consecutive years of drought (2001-2004) across Eritrea and increased water demand to meet the overwhelming recovery and development needs, has resulted in over-exploitation and depletion of groundwater resources across the entire country. In the areas of Eritrean refugee return throughout the Gash Barka region, groundwater levels have dropped to all time lows and a number of water sources have dried up completely. The need to put in place measures to begin to manage this precious resource and ensure it is utilised in a sustainable and equitable for all beneficiaries, called for action.

UNHCR introduced and supported a range of local and regional scale groundwater monitoring and management activities in order to initiate both medium and longer term groundwater management procedures to protect water supplies for returnees and their host communities. A groundwater monitoring programme was introduced in 28 returnee villages, where groundwater levels and basic water quality measurements are taken and recorded. The information gathered will be used to better manage village water supplies during drought periods and monitor changes in water quality. Water level and quality measurement equipment was provided to the GBZA Water Department to facilitate monitoring (dip meters, GPSs, water bailers and water quality measurement probes, eg., for EC, pH and NTU readings).

The groundwater monitoring programme forms an integral part of the development and implementation a Groundwater Resource Management Strategy. UNHCR prepared a general framework for this strategy along with a database (see Annex A – Groundwater Field Data) for the systematic recording and management of this essential data.

The key components of the strategy to put in place are:

- Human and field resources
- Budget/finances
- Monitoring (groundwater levels, quality, yield)
- Groundwater knowledge and database
- Reporting
- Operation and maintenance
- Future works proposals
- Asset management
- Training
- Communications and awareness

To assist the ZGBA with their understanding and management of water supply for villages in the region, two additional databases, that collect information on water supply projects and their management details, were also prepared by UNHCR – refer to Annex B and C respectively. The information recorded can be used as input to critically assess such issues as water quality decline, maintenance and repair schedules, capital replacement, village water committee effectiveness and cost recovery.

Capacity Building at the Regional and Central Government Level

Other UNHCR support to the regional administration to immediately assist with activities to improve the sustainable operation and maintenance of village water supply systems have included: donation of vehicles for monitoring activities, provision of emergency water equipment and spare parts; assistance with project proposal preparation/design and water management advice.

At the central government level, UNHCR has also played a role to strengthen capacity jointly with other UN agencies and the international community. To enhance the success rate of identify suitably yielding groundwater sources, UNHCR donated geophysical equipment to the Hydrogeological Investigations Unit of the Water Resource Department. During national workshops, seminars, and on Government/UN technical committees and task groups, UNHCR water sector advocates for ensuring sustainable water supply is achieved for returnees and their host communities. UNHCR also introduced and trialed new water system components and management procedures in order to improve efficiency and cost effectiveness (eg., Ferro-cement reservoir construction methods).

8. Constraints on Building Capacity

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With the capacity building support activities and programmes supported by UNHCR and other partners to date, there are still a number of constraints to implementation that need to be overcome to reach a successful level of sustainable operation of water supply projects. One of the major constraints in Eritrea is the limited number of skilled professionals and technicians, both national and international, to train, educate and transfer knowledge and experience to village communities and support personnel. A shortage of skilled and experienced managers, technicians, supervisors and field monitoring staff is significantly hindering reaching and assisting many rural communities. The mobility and effectiveness of various government partners is also inadequate to meet the demands for assistance. A shortage of essential field equipment for monitoring/extension activities (vehicles, radios, GPs, water level/quality measurement equipment) along with a lack of funds for fuel, vehicle maintenance and travel allowances places further constraints on carrying out essential capacity building activities.

9. Capacity Building - Lessons Learnt

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With the range of capacity building activities UNHCR has supported and those of other implementing partners, the follow lessons have been learnt to strengthen the process:

- Tailor training for your audience – ensure training the programme and supporting material you use takes into consideration cultural behaviour and literacy levels of the beneficiaries.
- Determine implementation capacity - plan capacity building activities accordingly.
- Identify joint or complementary programmes to share resources – this will bring about cost savings and wider capacity building spin off effects.
- Regularly assess/evaluate effectiveness of capacity building activities – then modify or adapt accordingly to maximise their effectiveness.

10. Recommendations

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To maximise achieving sustainable operation of community scale water supply systems, it is essential to invest and support a range of capacity building activities targeted at all beneficiaries. Capacity building activities at the village/community scale need to be focused on empowering beneficiaries to gain a sense of ownership and responsibility for operating and managing their water supply projects. The capacity of government and institutions also needs to be supported and extended in order for these actors to perform their extension activities and management functions to protect the investment in water supply infrastructure and the sustainable and equitable use of water resources.

For the Gash Barka Zoba Administration recommendations are made to both protect the investment in water supply projects made to date and to achieve sustainability through continuing to support capacity building activities. In addition, groundwater resource management activities need to also occur in parallel, ensuring the administration responsibly plays its part in national water conservation and management programmes.

The immediate water supply project capacity building recommendations for 2005 and beyond for the Gash Barka Zoba Administration are:

- Undertake recurrent training of village water committees – until responsible ownership and sustainable operation of water supply systems is demonstrated.
- Carry out periodic water technician/managers training – to refresh skills with the operation and maintenance of existing and new water equipment.
- Maintain appropriate inventories of water equipment and spare parts – to facilitate timely response for repair and maintenance requirements to minimise water supply project down times.
- Groundwater resource monitoring (levels and quality) – to monitor standards and indicate needs for intervention due to over depletion and/or contamination.
- Monitor, manage and distribute water supply/quality data and information for regional and national groundwater resource management activities.
- Develop and implement a cost recovery strategy - cost/burden sharing.

Annex 1 Groundwater Database – Fields

Groundwater Database - Fields	
Core Details:	
Well No. -	adopted national g/w bore numbering system
Alias -	alternative drilling/monitoring program g/w bore No.
Village -	village in which bore is locate in/near
Sub Zoba -	Sub Zoba in which bore is locate in
Zoba -	Sub Zoba in which bore is locate in
Latitude -	Geographical Position Coordinate
Longnitude -	Geographical Position Coordinate
Construction Details:	
Drillers Name -	name of drilling company completing borehole/well
Construction Date -	dd/mm/yy
Well Depth -	(m)
Well Diameter -	(m)
Casing Length -	(m)
Casing Diameter -	(m)
Casing Postion(s) -	depth from and to - below the top of casing (m)
Casing type -	steel, PVC, Galvinised Iron
Screen Length -	(m)
Screen diameter -	(m)
Screen Postion(s) -	depth from and to - below the top of casing (m)
Screen type -	material type (PVC, Steel) slots (No. and size per metre)
Static Water Level (m) TOC -	depth of water below the top of casing (m)
R educed Natural Surface -	surveyed reduced natural surfce at borehole (m - to Eritrean Survey Height Datum)
Field EC -	salinity reading following bore development (EC)
Field Temp C° -	water temperature following bore development (degrees celcius)
Field pH -	water pH level following bore development (pH)
Pump Test Yield (l/s) -	l/s
Operational Status:	
status -	operating, capped, decommissioned
type -	production, recharge or monitoring
purpose -	domestic, stock, irrigation, agriculture, industry
installed pump type -	submersible, surface mounted motorised, handpump, bucket system
Temporal Data:	
Water Level -	date and measurement (depth below from top of cassing (m))
Water Quality -	date sampled and EC, Temp (C°), Turbidity (NTU), pH values
Spatial Data:	
Stratigraphy -	Log of soil/rock descriptions with depth (m). Eg., 0-1.5m sandy loam, 1.5-2m loam, 2-3.5m stiff clay, 3.5-7m weathered mudstone, 7-12m fresh mudstone.
Down Hole Geophysical Survey:	
Gamma-ray log -	Undertaken Yes/No. Logged geophysical response with depth - recorded on paper chart or digitally
Electric log -	Undertaken Yes/No. Logged geophysical response with depth - recorded on paper chart or digitally
Self potential log -	Undertaken Yes/No. Logged geophysical response with depth - recorded on paper chart or digitally
Salinometer -	Undertaken Yes/No. Logged geophysical response with depth - recorded on paper chart or digitally
Temperature -	Undertaken Yes/No. Logged geophysical response with depth - recorded on paper chart or digitally
Flowmeter -	Undertaken Yes/No. Logged geophysical response with depth - recorded on paper chart or digitally

Annex 2 Village Water Equipment – Form Fields

Village Water Equipment - Form Fields

Village	Example A		
Groundwater Wells:	**Details**	**Construction Date**	**Condition**
Borehole -	well No., depth (m), static water levels (m), screen depth (m), yield (l/s)	dd - mmm - yy	new, good, fair, poor, replace
Hand-dug -	well No., depth (m), static water levels (m), yield (l/s), construction method (stone, steel, concrete, timber)	dd - mmm - yy	new, good, fair, poor, replace
River-well -	well No., depth (m), static water levels (m), yield (l/s), construction method (stone, steel, concrete, timber)	dd - mmm - yy	new, good, fair, poor, replace
Pumps:			
Solar Powered Submersible pump -	type, specifications, capacity (m^3/h) , power consumption (w)	dd - mmm - yy	new, good, fair, poor, replace
Motorised Submersible pump -	type, specifications, capacity (m^3/h) , power consumption (w)	dd - mmm - yy	new, good, fair, poor, replace
Surface Mounted Motorised pump -	type, specifications, capacity (m^3/h) , power consumption (w)	dd - mmm - yy	new, good, fair, poor, replace
Hand pump -	type, specifications, capacity (m^3/h)	dd - mmm - yy	new, good, fair, poor, replace
Bucket System -	lifting height (m), capacity per bucket (litres)	dd - mmm - yy	new, good, fair, poor, replace
Power Generation:			
Diesel Powered Generator -	type, specifications, capacity (KVA), power output (V, Hz, RPM)	dd - mmm - yy	new, good, fair, poor, replace
Solar Power Supply Unit -	type, specifications, capacity (KVA), power output (V, Hz, RPM)	dd - mmm - yy	new, good, fair, poor, replace
Mains Supply -	location details (Geographic coordinates)	dd - mmm - yy	new, good, fair, poor, replace
Water Storage:			
Steel Tank -	storage capacity (m^3), diameter (m), heigth (m), make (brand)	dd - mmm - yy	new, good, fair, poor, replace
Fibre Glass Tank -	storage capacity (m^3), diameter (m), heigth (m), make (brand)	dd - mmm - yy	new, good, fair, poor, replace
Ferro-cement Reservior -	storage capacity (m^3), diameter (m), heigth (m), make (brand)	dd - mmm - yy	new, good, fair, poor, replace
Water Bladder -	storage capacity (m^3), make (brand)	dd - mmm - yy	new, good, fair, poor, replace
Aquifer -	storage capacity (m^3), recharge method (sand filter, dyke fault intercepter), protection (fencing, filters)	dd - mmm - yy	new, good, fair, poor, replace
Water Tower -	construction material(s) (steel, timber, masonary), height (m),	dd - mmm - yy	new, good, fair, poor, replace
Distribution Mains:			
Pipes -	Type (GI, PVC, PE), length (m)	dd - mmm - yy	new, good, fair, poor, replace
Reticulation Mains:			
Pipes -	Type (GI, PVC, PE), length (m)	dd - mmm - yy	new, good, fair, poor, replace
Fittings -	Type (union, tee, reducers, cross, elbows) and No.	dd - mmm - yy	new, good, fair, poor, replace
Water Points:			
Tap Stand -	type (GI pipe, Oxfam water collection point) multiple/single, discharge capacity (l/s)	dd - mmm - yy	new, good, fair, poor, replace
Stock Trough -	construction material (conctrete, earthern) water source, discharge capacity (l/s)	dd - mmm - yy	new, good, fair, poor, replace

Annex 3 Village Management – Form Fields

VillAGE Water Management - Form Fields

Village:	Example A
Village Water Coordinator:	Name, Title, Address, Phone, Email
Village Water Committee:	Names
Water Pump Technician:	Name(s)
Generator Technician:	Name(s)
Water Distribution (Pipes) Technician:	Name(s)
Water Use & Hygiene Education :	Yes/No - Dates and Attendee No's
Spare Parts Inventory:	
Pump -	Yes/No - parts held
Generator -	Yes/No - parts held
Water Supply Reports:	
Quality Tests -	Qualitative (users opinion) Quantitative (field and/or laboratory tests)
Flow Rates and Water Levels -	Qualitative (users opinion) Quantitative (field test)
Demand Requirements -	Qualitative (users opinion)
Repairs and Maintenance -	Usual items, repair time
Capital upgrade requirements -	Component/item replacement type and date required
Water Committee Reports -	Compiled (Yes/No)
Water borne disease incidents -	Yes/No - details (type, people affected)
Water Charges and Annual Cost:	Yes/No
Nacfa per 20/l -	- Nacfa
Generator Fuel Costs p.a. -	- Nacfa
Spare Parts and Repairs -	- Nacfa
Water Administrator/Technician Salaries -	- Nacfa

UNHCR
The UN Refugee Agency

Eritrea - Returnee Locations in Gash Barka

As of August 2004

RSAL
UNHCR Regional Spatial Analysis Lab
Nairobi, Kenya