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## **CASE STUDY**

# **“Scaling up Water and Sanitation Capacities in Sierra Leone” 2006 - 2009**

Implemented by: **SIERRA LEONE RED CROSS SOCIETY/ SPANISH RED CROSS**

Funded by: **EUROPEAN COMMISSION,**

Co-funded by: **Fundación Pelayo, Principado de Asturias**

October 2009



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Sierra Leone, October 2009

This document has been produced with the financial assistance of the European Union. The contents of this document are the sole responsibility of the Spanish Red Cross and can under no circumstances be regarded as reflecting the position of the European Union.

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## CASE STUDY

### Scaling up Water and Sanitation Capacities in Sierra Leone

#### I. GENERAL DATAS

**Locations:** KONO and KOINADUGU districts

**Organisations:** Sierra Leone Red Cross Society supported by Spanish Red Cross (SLRCS –SpRC)

**Funding:** European Commission

**Co- Funding:** Fundación Pelayo  
Principado de Asturias

**Final Budget:** 854.530€

**Execution time:** 18<sup>th</sup> of October 2006 until 17<sup>th</sup> of November 2009

**Final beneficiaries:** 38.652 people

#### II. GLOSSARY

<b>BHO</b>	Branch Health Officer
<b>CBHP</b>	Community Based Health Programme
<b>DMO</b>	District Medical Officer - Ministry of Health and Sanitation
<b>DWC</b>	District Water Coordinator
<b>EC</b>	European Commission - donor
<b>IFRC</b>	International Federation of the Red Cross and Red Crescent
<b>PHAST</b>	Participatory Hygiene and Sanitation Transformation
<b>RC</b>	Red Cross
<b>SLRCS</b>	Sierra Leone Red Cross Society – local partner
<b>SpRC</b>	Spanish Red Cross
<b>SALWACO</b>	Sierra Leone Water Company
<b>WatSan</b>	Water and Sanitation
<b>WF</b>	Water and Sanitation Facilities

#### III. METHODOLOGY OF THE CASE STUDY

The research of the information and the elaboration of this document is been done by the RC WatSan team. To get all the necessary information and points of views of most of the direct participants in this project during the identification and the 3 implementation years, it has been used 5 type of resources:

- a) Field visit to see the final results
- b) Final Basel Line Survey and Evaluation elaborated in August and September 2009
- c) Written reports of the project (monthly field reports, monthly SpRC delegates report, annual donor report,... etc.)
- d) Specific questionnaires with the main items deal in this report. These questionnaires were submitted to and filled by the former SpRC WatSan delegates, the CBHP coordinator of the SLRCS, the project

manager, the project supervisors of the branches and the BHOs of the branches.

e) Direct conversation with the people involved

## **IV. INTRODUCTION**

### **4.1. General context**

The eleven year conflict in Sierra Leone reversed a fairly good situation in the water and sanitation sector in 1990 by causing enormous physical damage to both the provincial water supply installations and the rural water supply schemes that were put in place during the International Drinking Water Supply and Sanitation Decade implemented in the 80s.

Nowadays, Sierra Leone is at position 180 of the 182 countries analyzed at the UN Human Development Report of 2009. The country still suffers an important lack of adequate safe-drinking water sources and sanitation facilities in all the areas of the country. Although percentage and figures disagree, water and sanitation is an obvious need of the country that communities demand explicitly to the local authorities, the Red Cross and to any aid or development agency.

The water sector in Sierra Leone falls principally under the Ministry of Energy and Water Resources, former Ministry of Energy and Power, together with the Ministry of Health and Sanitation.

It is responsible for formulating plans and policies, their co-ordination, monitoring and evaluation to achieve government's developments objectives in the water and sanitation sectors.

Under the Ministry of Energy and Water Resources there are two main agencies operating: the Guma Valley Water Company (GVWC, established in 1961) and the Sierra Leone Water Company (SALWACO, established in 2001). Both have power to control water abstraction and pollution in the catchment upstream its water sources. GVWC is responsible for the water supply in Freetown and its environs and SALWACO for the urban water supplies in the whole of Sierra Leone outside the jurisdiction of the GVWC.

The Water Supply Division (WSD) of the Ministry of Energy and Water Resources is also working as a technical body, covering urban and rural areas.

An important first step in the Water and Sanitation Sector Reform in Sierra Leone has been to develop the National Water Sector Policy Document by the Ministry of Energy and Water Resources and SALWACO. In addition to this, the Ministry of Energy and Water Resources and SALWACO have designed the Water Supply and Sanitation Sector National Investment Programme 2005-2010 in order to fulfil the objectives established in the Final Draft PRSP for Sierra Leone for the water and sanitation sector seeking to increase access to safe drinking water and improved sanitation (healthy environment) for all in both urban and rural areas.

In all the country, but mostly in the rural areas, the shortage of drinking water and sanitation is worrying low. The low level of coverage in water supply are due to several reasons, some of them are:

- big shortage during the dry season due to inadequate storage, absence of drilling capacity to reach deeper aquifers, absence of technical capacity to construct catchments at save sources, loss of water in the water supply transmission and distribution systems, inability to respond to climate change and control of pollution in the rivers,...etc.
- many installed systems are not functioning for lack of maintenance or vandalism
- lack of mechanism for setting tariffs to ensure affordability to pay and awareness of the need to make payments because water is perceived as a natural gift
- inadequate sanitation infrastructures to maximize the benefits from providing safe drinking water
- ...etc.

#### **4.2. Implementation partners**

Spanish Red Cross (SRC) and Sierra Leone Red Cross Society (SLRCS) are part of the movement of the Red Cross working on the seven principal principles: Humanity, Impartiality, Neutrality, Independence, Voluntary Service, Unity and Universality.

The SLRCS has activities and volunteers in all the districts within the country. Branch offices are located in all the district headquarter towns and the Western Area which are the focal points to collect and provide the needed information and to implement the planned works through their staff and volunteers.

Red Cross as water and sanitation sector stakeholders in Sierra Leone support the Water and Sanitation Sector reform carried out by the Ministry of Energy and Water Resources and SALWACO, and consequently, both followed and respected the National Water Sector Policy Document during the implementation of the action. The project has been designed with the same objectives than the Water Supply and Sanitation Sector National Investment Programme 2005-2010. Trough the implementation of the action, SRC and SLRCS has tried to assist the Ministry of Energy and Water Resources and SALWACO to achieve the results proposed in the above mentioned Investment Programme 2005-2010, adopting a common approach with strong community mobilization and the use of appropriate and low cost technologies.

#### **4.3. Identification of beneficiaries**

In order to select the project targeted communities, a team comprised of SLRCS volunteers and SLRCS Branch personnel with technical assistance from SRC Delegate and two consultants carried out a baseline survey following a PHAST methodology.

Selection of surveyed villages was done with the involvement District Water and Sanitation Units and District Councils from Koinadugu and Kono due to

their first hand information about the situation of the villages in water supply and sanitation. SLRCS District Branches offices and their previous experience working with communities were also taken into consideration for selecting surveyed villages.

Therefore, from June 2005 to August 2005 a baseline survey was conducted on a total number of 102 communities in Koinadugu and Kono Districts. The conduction of the baseline survey brought various returns to the project. Firstly, it allowed the selection of the most vulnerable communities in terms of safe water and sanitation access. Secondly, it permitted to collect base information to monitor and final evaluate the impact of the project in the targeted communities. And finally, it increased community participation and involvement from the beginning of the project.

Based on the information gathered in the 102 communities finally 50 villages, 25 in each district, were selected. The information was gathered through two different base line survey questionnaires, one at community level and a second one at individual household level (see annex 5), which were designed to capture the key issues related to the project objectives and expected results (current situation in water supply sector, hygiene practices, general health status and community management with the surveyed communities) and based in the PHAST methodology. The final selection of project targeted communities was done following these priorities of action pre-defined by SLRCS-SpRC in water supply and sanitation:

Priority 1:

- Villages without water supply and sanitation facilities, with a population bigger than 300 persons and without the presence of any other agency or NGO.
- Villages with abandoned water supply and sanitation facilities, unable to use those facilities unless they are repaired and with a population bigger than 300 persons.

Priority 2:

- Villages with available water supply and sanitation facilities, but the facilities are not functioning perfectly and therefore those facilities are not enough for servicing the whole village. Not big investment needed for the rehabilitation of those water supply and sanitation facilities (re-deepening of well or cleaning of well). Population in the village bigger than 300 persons.

Priority 3:

- Villages with available water supply and sanitation facilities, but the facilities are not functioning perfectly and therefore those facilities are not enough for serving the whole village. Big investment needed for the rehabilitation of those water supply and sanitation facilities (rehabilitation of gravity systems or installation of new hand pump). Population in the village bigger than 300 persons.

Priority 4:

- Villages with a population below 300 persons and big investment needed in water supply and sanitation facilities.

## **V. PROJECT OBJECTIVES**

### **5.1. Overall Objective**

Improve the life conditions of the communities in Sierra Leone by raising the proportion of people with sustainable access to safe water and sanitation facilities. (see annex 1)

### **5.2. Specific Objective**

Reduced water and sanitation borne diseases through increased sustainable access to safe water, appropriate sanitation, application of good hygiene practices and community water management.

### **5.3. Expected results**

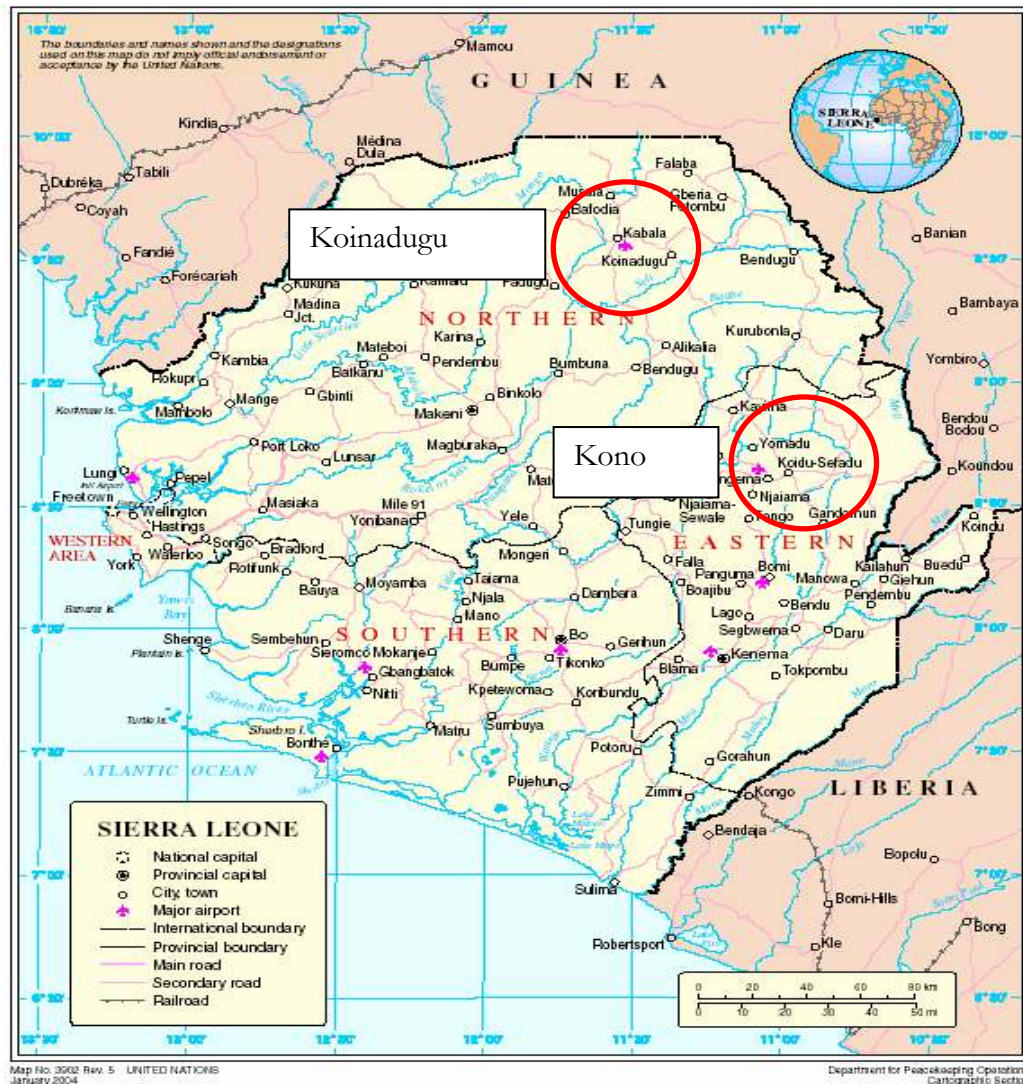
- R.1. Water and sanitation facilities are built or rehabilitated involving community
- R.2. Educational programmes in hygiene promotion are developed in the communities.
- R.3. Communities organized around the water and sanitation facilities.
- R.4. Bridges are built and coordination is improved between local communities, local authorities and water supply authorities.
- R.5. Advocacy through a case study publication system

### **5.4. Locations**

The project has been implemented in two districts of the Northern and Eastern territory of Sierra Leone: Koinadugu and Kono districts.

In Koinadugu the 25 beneficiated villages were distributed inside six chiefdoms: Sengbeh, Wara Wara Yagala, Wara Wara Bafodia, Diang, Folosaba Dembelia and Kasonko.

In Kono district 25 villages worked in are located in 3 different chiefdoms: Gbane, Soa and Tonkoro.



## 5.5. Description about the implementation methodology

To implement this project it has been divided into two key components: software and hardware.

The hardware defines the technical implementation of the WF: construction and rehabilitation of hand pump wells, spring boxes, gravity systems and latrines, but with a community approach in the decision making and the implementation.

The software is related to all the other actions that accompanied the construction. The key activity of the project is to teach and sensitize through workshops the community members in correct basic health and sanitation practices, based on the PHAST tools developed by the IFRC.

The establishment of WatSan committees inside the villages and their constant training and support, has been also a main issue during the Project. To ensure the good formation and continuity of these committees is essential for the sustainability of the intervention.

Other complementally activities were to set up links with the district health and WatSan authorities or to share the information trough the case study.

## 5.6. Implemented activities

Locations and implemented facility in Koinadugu District

Chiefdom	Village	Facility 1	Facility 2	Facility 3	Facility 4	Facility 5	WatSan	PHAST
		new well	rehab well	spr. box	gravity syt.	latrines	comittee	Training+ Refreshm
<b>Sengbeh</b>								
1	Sangbamba	1				5	1	1
2	Kamadu Sokurilla		1				1	1
3	Farandugu	1				5	1	1
4	Ismaia		1			5	1	1
5	Dankawallie		1				1	1
6	Yiraya	1				5	1	1
7	Moria		2				1	1
8	Sankerania		2				1	1
9	Konkoya		2				1	1
<b>Wara Wara Yagala</b>								
10	Gbawuria I			1			1	1
11	Gbawuria II			1			1	1
12	One Mile				1		1	1
13	Bankolia			1			1	1
14	Kanunka					5	1	1
15	Karako Sokurilla			1		5	1	1
16	Yataya			1			1	1
17	Kathawoya		1			5	1	1
<b>Wara Wara Bafodia</b>								
18	Kadanso	1				5	1	1
19	Kaponpoh					5	1	1
20	Kadanka	1				5	1	1
21	Semamaya		1				1	1
<b>Diang</b>								
22	Kondembaia		4				1	1
23	Badala		1				1	1
<b>Folosaba Dembelia</b>								
24	Musaia Town		2				1	1
<b>Kasonko</b>								
25	Kasassie		1				1	1
		<b>5</b>	<b>19</b>	<b>5</b>	<b>1</b>	<b>50</b>	<b>25</b>	<b>25</b>

Locations and implemented WF in Kono District (see table below)

Chiefdom	Village	Facility 1	Facility 2	Facility 3	Facility 4	Facility 5	WatSan	PHAST
		new well	rehab well	spr. box	gravity syt.	latrines	comittee	Training + Refreshm.
<b>Gbane</b>								
1	Foindu Gbane				1		1	1
2	Kanekor	1				5	1	1
3	Waiyor	1				5	1	1
4	Komendeh				1		1	1
5	Mbaoma				1		1	1
6	Kwangor				1	3	1	1
7	Ngeihun	1				2	1	1
8	Sawolla				1	5	1	1
9	Sunga	1				2	1	1
10	Tumbekor	1				2	1	1
11	Vasuma	1				1	1	1
12	Wugbadu				1		1	1
13	Yumbelu	1					1	1
14	Yituma			1			1	1
15	Kangahun				1		1	1
<b>Soa</b>								
16	Bambaa	1				3	1	1
17	Foidu Mongo		2				1	1
18	Kongowor	1				3	1	1
19	Konoma	1				3	1	1
20	Nyamoh	1				2	1	1
21	Sengemawa			1		2	1	1
22	Sukudu	1				5	1	1
<b>Tankoro</b>								
23	Baiama	2	1			5	1	1
24	Kapeteh	1					1	1
25	Senehun					2	1	1
		<b>15</b>	<b>3</b>	<b>2</b>	<b>7</b>	<b>50</b>	<b>25</b>	<b>25</b>

Total facilities implemented:

New Wells: 20  
 Rehab Wells: 22  
 Spring Boxes: 7  
 Gravity Systems: 8  
 Latrines: 100

Phast trainings done in 50 villages.

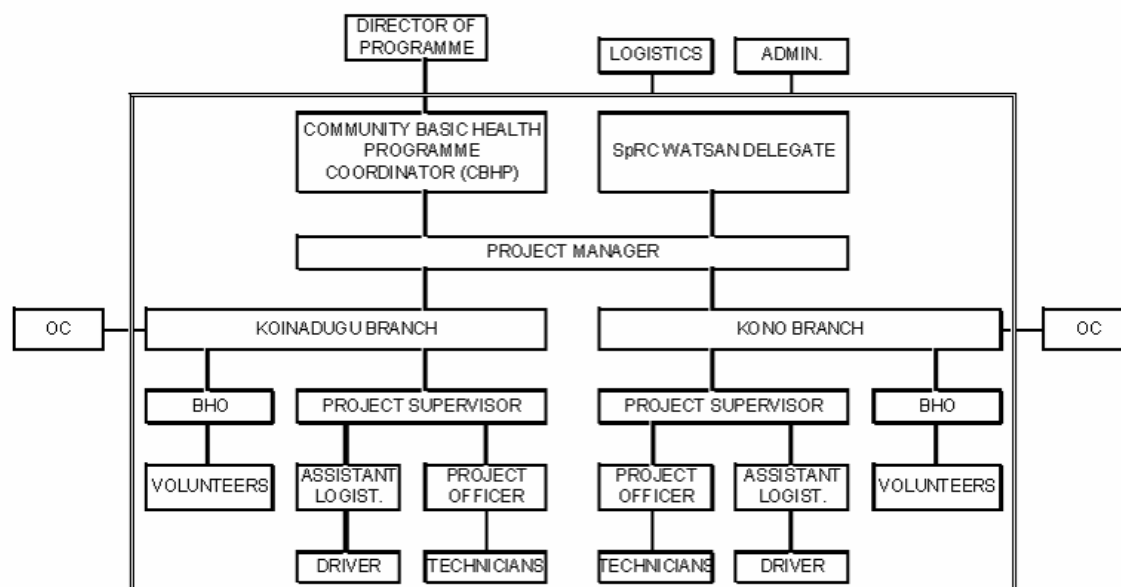
WatSan Committees established and trained in 50 villages.

## VI. IMPLEMENTATION

### 6.1. Organisation chart

The project was implemented by SLRCS staff with the support of one SpRC delegate as link between the SLRCS, the SpRC and the donor.

The organisation chart for this project was established as follows:



### 6.2. Stakeholders: participation of beneficiaries and authorities

As being explained in the previous point about the identification of the beneficiaries, a base line survey has being conducted during the year 2005 given an important role to the own communities to have a clear view about the felt needs. The future beneficiaries collaborated with the RC volunteers who were doing this activity.

After being established the 50 beneficiary communities, MoUs were signed with them in which was established the following contributions of the beneficiaries:

- helping to identify the project sites
- provision of local materials
- accommodation of the project staff
- storage facilities
- provide local labour (ex. men broke stone, women carried sand or water)
- select people of the community for the WatSan committee
- select people of the community for internal PHAST animators

The number of beneficiaries forecasted was 46.741, but in the final base line survey carried out the number of beneficiaries reach only 38.652 people. This is due to two main facts: the project has been implemented completely in the rural area and nowadays a lot of Sierra Leonean are

moving to bigger towns where the opportunity to find a job is higher, reducing the population of the rural villages. The second main point is the change during the project of some beneficiary communities, as between the identification and the starting of the implementation activities some chosen villages got already support from other organisations altering the total number of people working with.

The contribution of the local authorities (District Council Chairman, DMO, and DWC) was focused in the identification providing the necessary information at district level. During the implementation of the project the participation was principally during the District WatSan meetings where the main water and sanitation activities are discussed. DMO and DWO participated also in the refreshment PHAST trainings held in each district aimed to the community WatSan committees and representatives.

### **6.3. Activities done in the field**

The establishments of the WatSan Committees inside the communities and the Participatory Hygiene and Sanitation Transformation (Phast) at community base have been the keystones in the project and they have been implemented during the entire project in different steps. These works were done by the BHO of the SLRCS and the trained volunteers in the communities.

The hardware, or construction of the water and sanitation facilities were implemented during the first year mainly in Koinadugu district, and during the second year focused in Kono district. These actions were conducted by the project Supervisors and project Officers of the SLRC, contracting for each work technicians. The beneficiaries contributed also to these activities as signed in the MoU. The concrete activities can be summarized as follows:

#### 6.3.1. Setting up WatSan committees in each community

Since the beginning there have been established WatSan committees in each community. These committees consists of three members chosen by the own community. They have been trained by the SLRC technical staff to be responsible for the good use and the maintenance of the WatSan facilities in several workshops.

By the end of the project there has been delivered tool boxes to the committees that will be useful to maintain the water facilities implemented and to do easy repairs. (see annex 6)



Technical trainings with the WatSan committees

### 6.3.2. Phast trainings

After setting up the Water and Sanitation Committees in each community, it was organized several trainings in Participatory Hygiene and Sanitation Transformation (Phast). 150 volunteers (3 members of each community) were trained in a 10 days training in order that afterwards these community members can transmit their knowledge to all the community and who also supported the WatSan Project staff in the proper monitoring.

The PHAST wants to achieve the prevention of the diarrhea diseases by improving health through better hygiene behavior. The objectives are:

- Helping the community to understand the relationship between sanitation and health.
- Helping the community members to improve their self esteem.
- Helping to improve communities by giving them the confidence to plan environmental improvements and to own and operate water and sanitation facilities.

The used method is divided into seven easy steps that are worked in a participatory way with the beneficiaries. These steps are:

1. problem identification
2. problem analysis
3. planning for solutions
4. selecting options
5. planning for new facilities and behaviors
6. planning for monitoring and evaluation
7. participatory evaluation

The principal lessons were focused on: hand wash before and after eating or manipulating food, hand washing with soap after use of toilet, correct storage of food and water, clean the environment, body hygiene, correct drying of the clothes, use of mosquito net, use of the latrine avoiding open defecation and periodical cleaning of the Wat-San facilities, trying to prevent diarrhoea, malaria, cholera and HIV/AIDs.

The entire sessions were facilitated by the Branch Health Officers (BHO) of the SLRC. The trainings were conducted using the participatory approach through brain storming, questions and answers and lecture methods. This was followed by practical sessions such as demonstrations, discussion and guided practices, role plays, group work and presentations. Participants learnt from one another and developed respect for each others skills and views. At the end of the workshop one example work plan of the implementation of the Phast per community was done with the participants. The aim was to give them the facilities to start this process as soon as they arrive to their communities. Finally, one complete set of Phast-tool was given to each community. (see *annex 2*)



PHAST training sessions



Hygiene promotion campaign in schools

Hygiene promotion campaign in the community

During the third year of implementation refreshment trainings were held to the volunteers. These new trainings try to reinforce the knowledge after all the previous months of experience and also to train new people inside the community as it was noticed that some of the prior volunteers left the villages for work reasons.

A total number of around seven hundred fifty (750) homes were visited for health talks and sixteen thousand seven hundred forty (16,740) beneficiaries were directly reached through sensitization and hygiene promotion campaigns since the inception of the project.

### 6.3.3. Construction wells:

20 new wells were constructed and installed with hand pumps model Kardia 2000 manufactured by Boese Pumpen or India Mark two. Kardia is

three times more expensive than India Mark two, but the quality is also much better, doesn't need a lot of maintenance and it has a warranty of 10 years. This model was chosen mainly for remote villages where spare parts or technicians are more difficult to find. The India Mark two is extensively used in Sierra Leone and therefore easy to find spare parts. It was installed in villages closer to urban areas, but trying to give a very good technical training as this pump breaks easily.

Steps for the construction of wells:

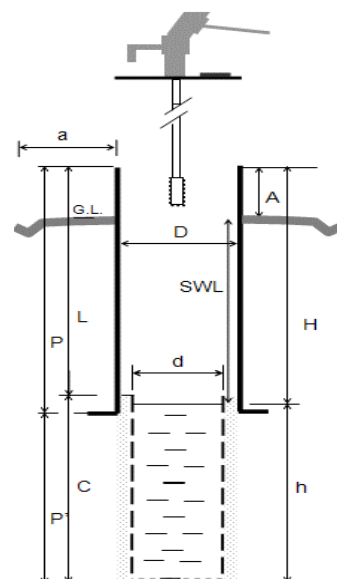
- *Assessment of the selected area:*  
Before the construction starts a technical assessment team visits the selected area and agrees with the community members on a point where the well is to be dug.
- *Getting the construction materials*  
During the excavation period the community members start the collection of local material so they can be used for the construction of the well rings, drainage or floor. Especially this activity is allocated to the women and mid age girls. The materials collected are: sand, granite, and water.  
The materials that could not be found in the villages, such as pipes, handpumps, tools,...etc. were purchased in the district capital or Freetown and transport them to the locations. Once in the site, the beneficiaries help to store them and keep care of them until they are used.
- *Selection of capable technician for the construction of the structure*  
After the selection of all areas local technicians are searched through the district branches: plumber, mason, carpenter, still bender,...etc. These technicians implemented the works in the villages under the supervision of the Red Cross technical staff that works at the branches.
- *First digging and water table observation*  
The technicians go to the community and demarcate the selected area which will be dug by the community under the supervision of the project supervisor. During this digging the first water table should be observed at least for a period of two months. This allows the technician to know if they have reached a good and sustainable aquifer before sinking the catchment culvert that serves as reservoir inside the water well.
- *Excavation of the well shaft in vertical position*  
The excavation of the well is done in a vertical position by respecting a radius of 1800mm. This is done manually by the beneficiaries according to the MoU signed with them.

- *Lining of the well shaft;*  
The well shaft is protected by a culvert wall of diameter 1600mm precast in segment called lining, with a concrete mixture of 1:2:3. This action is been repeated daily up to level of water table found in a vertical position. These culverts protects the soil not reap.
- *Sinking of water well:*  
Sinking of the well is done by precasting 1400mm diameter culverts rings with a concrete mixture of 1:2:3 also repeated action daily. The sinking culverts can be at five in number or less. These culverts are exposed for two weeks at the water this allows them to cure before sinking. The sinking of these culverts is done in a way of diving them into the aquifer to serve as catchments or intake.
- *Installation of the hand pump*  
The Installation of the handpump is done by a trained WatSan technician. The steps are:
  1. install the basement of the pump.
  2. install the riser pipe and the cylinder.
  3. install the brackets of the frame
  4. install the cathement/or reservoir
  5. install the handle and try
- *Conducting of water test quality*  
Once the well is concluded a water test should be done to confirm that the water is completely safe to drink. The water examples have to be taken carefully with sterilized tubes and take it before 24 hours in constant temperature conditions to the laboratory to be tested bacteriological, chemical and physical (ph, hydrogen, chloride, potassium, nitrate, nitride, ammonium, iron, arsenic, chromate, coliforms, salmonella, escherichia coli,...etc.). These test results were delivered to the WatSan community committees and district authorities.

The average technical data are as follows (measured july'08, see annex 4):

- A. head wall high= 0,45m
- a. outside platform= 0,85m
- D. internal lining diameter= 1,60m
- d. external caisson diameter= 1,40m.
- H. top head wall to water table= 9,58m
- h. water table to well base= 3,1m
- L. top head wall to caisson= 7,9m
- C. caisson length + cutting ring= 4,6m
- P. lining + head wall length= 9,3m
- P'. bottom of lining + well base= 3,1m
- P+P' total depth= 12,72m
- SWL. Static water level= 6,48m

Lowest deep= 17,45m  
Highest deep= 8,00m



The average cost for the construction of one well is around Le 15,000,000. (3.700€)

Steps for the construction of water wells:





#### 6.3.4. Rehabilitation of wells:

The rehabilitation works of the 22 wells involved different activities like: cleaning, re-deeping, re-elaborating the filter bed, changing pipes, fixing or changing hand pumps, screeding of worn out concrete facial, check and patch the lining,...etc. The collaboration of the beneficiaries in these works have been also important, providing local materials and helping with the non-skilled works. (see annex 4)

Steps for the rehabilitation of wells:

- Identification of the non functional water wells by the WatSan team.
- Exploration of the existing aquifer and water level in the wells and examination of the working of the equipment and condition of the construction.
- Conduction of an enquiry to the community to know the history of the well, especially the use during the war trying to know if any human corps has ever been deposited inside.
- Dewater the existing aquifer in the well with a heavy duty motor pump
- Remove all dirty particles and elements inside the well as it was abandon for the past years.
- Clean all the walls with help of a steel brush
- A second dewatering has to be done to assure that the well is completed clean and no dirt is left inside.
- Rinse the walls with a proper mixture of chlorine to disinfect the water well.
- Observe the yield of the water table for two days and dewater again.
- Replace filtering bed by using 30mm size gravel and 30mm thick bedding.
- Do some repairs in the outside caisson, drainage or fence.
- Replace the hand pump if it was worn out or fix/replace the broken parts. The most common hanpumps model found has been India Mark (2) used all over the country in the past for a long time. The quality of its elements is not very durable as they are manufactured with galvanised materials and corrode quickly. When it was possible, the pumps have been repaired, but in other cases they have been replaced by Kardia pumps or India Mark two, both models were introduced in Sierra Leone some years ago and their use has become very frequent all over the country. This is essential to guarantee the easy possibility to find spare parts or specialized technicians to fix these installations.

The cost of the rehabilitation of a water well is between Le 6,000,000 (1.500€) and Le 12,000,000 (3.000€) depending on the type of pumps used and the works undertaken.



Previous situation



Fixing of handpump



Installing new handpump



Rehabilitation with India Mark II handpump



Rehabilitation with Kardia handpump

### 6.3.5. Construction spring boxes:

Seven (07) spring boxes have been built in the two districts following the same scheme as the wells: beneficiaries helping as non-skilled labour and with local materials, and contracted technicians doing the skill work supervised by the RC technical team.

The technical characteristics of the constructed spring boxes are as followed:

- The box or storage tank was embedded straight into the emerging water source, trying to avoid an extend catchment area. The water access into the box was managed via 2" PVC tubes.
- Two small concrete wing walls in the underground were constructed to ensure all adequate water is driven into the structure, deflecting surface water.



- A filtration system was made before the storage of water into the reservoir. The filtration consists of three layers: on the bottom big stones, then one foot of  $\frac{3}{8}$  gravel size, and finally a bed of refined sand is spread on top of the gravel for two feet high.
- Double overflow 4" PVC outlet for increased drainage capacity unified by T junction into another single 4" pvc pipe. Overflow tube dewateres approx 10m away from structure to avoid water accumulating by structure.
- Double 2" PVC outlet pipes leading to supply line for reinforced water pressure.
- Supply line runs approx 50 m to concreted tap stands, on the other side of the swamp, closer to village.
- Tap stands constructed on a square, walled platform with drainage via a 3/4" PVC pipe for easy, clean and safe collection of water by the villagers located away from the swamp area.
- Box sealed with lock on concrete manhole.





The cost of a spring box is estimated in around Le 12,000,000 (3.000€).

### 6.3.6. Rehabilitation and enlargement of gravity systems

The project has facilitated the works on 8 complete gravity systems: rehabilitating the water catchments, the pipe network, the tap stands and enlarging them with new stand posts inside the villages and in public buildings such as schools or health centers. (see annex 3)

district-chieftdom	village	rehab of taps	new taps	school	health centre	TOTAL TAPS	others
<b>KONO</b>							
<b>Gbane</b>							
	Foindu Gbane	9	6			<b>15</b>	rehab catchment
	Komendeh	8	6			<b>14</b>	rehab catchment, change pipes
	Mbaoma	6	5			<b>11</b>	rehab catchment
	Kwangor	7	5	1	1	<b>14</b>	rehab catchment
	Sawolla	11	10	1		<b>22</b>	rehab catchment, 2.4km extension
	Wugdadu	13		2		<b>15</b>	rehab catchment
	Kangahun	6	5			<b>11</b>	rehab catchment, change pipes
<b>KOINADUGU</b>							
<b>Wara Wara Yagala</b>							
	One Mile	1	3			<b>4</b>	modify catchment, 280m extension

This construction works have involved in general the following activities:

- Concreting works: maintenance of the catchments and reservoir by plastering and repairing leaks found in the concrete, plastering and repairing stand posts and aprons
- There has been no specific filtration system added to the catchments. The gravity flow from the hills has been not treated because during the previous assessments it was realized that the natural source is coming clean underneath the rocks. The remote and small rural areas where these systems are located do not provoke to think that in near future the water will be contaminated.
- Supply line: pipes have been painted and supports have been fixed/re-concreted to avoid further damage
- Replacement of old underground network piping for 1" PVC piping
- Replacement of old materials: damaged pipe lines, tap stands and valves have been replaced/fixed
- There have been new connections dug and laid, new distribution pipe lines, and new tap stands and aprons have been casted. Examples of this:
  - New line stretching from Wugbadu network to the school compound with 2 taps
  - New line feeding the health centre in Kwangor
- In One Mile the planned new spring box has been converted into a gravity system due to the serious hygiene problems found after the implementation (see point "difficulties found and their solution").

The average cost to rehabilitate a gravity system is around Le 25,000,000 (6.000€).

Previous situation:



Previous situation: Wugbadu tank



Kwangor tank



Kwangor stand post.



Community work:



Community work

Catchments:



Kwangor catchment



Wugbadu catchment

Gravity tank:



Kwangor gravity tank



Komendeh gravity tank

Pipelines - Network:



Wugbadu



Kwankor



Wugbadu



Kwangor – new pipelines

Tap stands:



Mbaoma standpost



Kwangor standpost.

### 6.3.7. Construction of latrines:

It has been constructed 100 VIP latrines, two in each beneficiary village, so they can use them per male/female sex. Meetings were held between the SLRCS WatSan staff and the water committee in order to decide the best location for the structure. Relying heavily on community participation, and based on the direct responsibility of the water committee agreed in a MoU, the latrines were dug with local labor provided by the community. This labour was also used to produce the bricks. One or two technicians were hired for each latrine, which technically guided the workers, and was in turn supervised by the SLRCS WatSan staff which visited the sites regularly. (see annex 3)

The cost of a double seat VIP latrine is around Le 3,000,000 (750€).

Construction steps:





Latrines in Kono district concluded 2008-2009



Latrine in Koinadugu district after 2 years of use

### 6.3.8. Build bridges between the local authorities and the communities

Since the beginning of the project the SLRCS WatSan project staff in Kono and Koinadugu has been assisting monthly to the District WatSan Unit Coordination Meetings. At the District level, the Ministry of Health and

Sanitation maintain inter agency co-operation meetings in order to be updated about the WatSan activities that are developing in the region and also to provide working guidelines in the sector. Later on, this information is submitted to the District Development Coordinating and Evaluation Forum where the entire information of the several development sectors are collected and analyzed for better coordination.



#### 6.4. Difficulties found and their solutions

**D**= Difficulty found

**S**= Solution taken

##### 6.4.1. During implementation:

**D:** very difficult access and bad road conditions in the entire rural road network, especially in rainy season, covering a large implementation area.

**S:** using motorbikes when possible to access to the communities and sensitize the community to maintain the roads when possible.



**D:** difficulties to reach the water table as occasionally it is very deep or sometimes run into a rock. (Sunga, Kono)

**S:** in average we found the water table at 9,58m deep. Some previous inspections were made with the technicians and the own community to find the proper place to start manual excavating. The metamorphose rocks were broken manually. When the rock was impenetrable we had to change several times the location of the well as the tools were no proper to pierce the rocks. In Sunga concrete rings were prefabricated and introduced until reach the rock, trying to capture directly the water.

**D:** during the first implementation year the choice of the location of some spring boxes were not correct done and they were constructed in inadequate areas, were it was easy to catch water, but after some months it was be seen that it is a swampy and flood place. Beneficiaries were going there only to wash clothes.

**S:** The drainage was improved. In other cases the spring box has been converted into a small gravity system, with a standpost some meters away from the swamp area, in order to avoid people taking water directly from the box. In One Mile, Koinadugu, the catchment has

been moved upstream and pipelines have been constructed until the village. Nowadays beneficiaries can take the water from safe stand post closer to their houses, keeping the environment close to the catchment clean.



One Mile swamp area



One Mile improved new catchment upstream



Yagala spring box, swamp area



One Mile new standpost



Bawuria swamp area



Bawuria new water point

D: Preliminary bad technical design of the spring boxes was putting the water quality at risk. The catchments were designed with big open basins to accumulate the water before filtering to the closed reservoir. As the surface of this clean natural water was exposed to high temperatures, outside living organism (mosquitoes), inside living organism (weeds, small amphibians,...), human waste and other smaller sediments this contribute to contaminate the water.

- S: it was decided to clean the catchments, to construct a small stone wall to delimit the area, to refill the basins with gravel of different sizes and sand to work as filter and close them completely to not be exposed to the different sources of contamination.



Gbwaria II open basin



Gbwaria II after improvement



Gravity system Kono correct done

- D: the local material supplied by the communities in some cases were of bad quality
- S: it has been used materials of neighbour villages bartering it for other necessary materials or items. The bad quality material could also be used for small secondary works.
- D: lack of good qualified technical local manpower to supervise and construct the WF in the remote rural areas.
- S: The supervision of the works were reinforced by the headquarter technicians that made numerous supervision trips each month to ensure the good work.
- D: Even the community members were participating in great level and enthusiastically, it was sometimes hard work to sensitize them on the importance of the PHAST training and community participation in simple works or cleaning, especially in villages close to the urban areas.
- S: The health monitors, including people trained inside the community, try to make constant following up trying to adapt all meetings and workshops on the best daily timetable (very early in the morning or in the evening) and the heavy farming activities. When there was communal work to do during the farming season shifts were established by the own community.

#### 6.4.2 After the implementation:

- D: handpumps were stolen from some communities.
- S: the team has tried to fix the handpumps on a safe and strong way, but beside that it was more important to make the beneficiaries understand that this is their property and that they have to take care of it. In some cases the handpump was recovered by the own community after some weeks. The team accompanied the beneficiaries to make police reports.
- D: At the beginning some latrines were not use by all the community members, only the chief and some important visits could use them because they look at them as a luxury item.
- S: It was done a continue refreshment training and sensitization to make them conscious that it is a community good and that the proper use will benefit the health situation of all their members.
- D: At a first stage, some WF were not proper clean and surrounded with garbage.
- S: Also here the refreshment training and periodical monitoring was very important to make the beneficiaries understand the significance of keeping the water points and latrines clean of waste. But to change habits takes time.
- D: Some volunteers of the beneficiary communities that have been trained in PHAST method after some month emigrate to the town, leaving the villages without a reference health animator.
- S: Refreshment trainings were held to teach new volunteers about the care in health and sanitation in their communities.

#### **6.5. Social Impacts and habit changes**

It is very difficult to change habits. Therefore continuous monitoring and refreshment has been frequently. The hygiene and sanitation sensitization and teaching of good practices are always the key stone to ensure the sustainability of the facilities provided. (see annex 5)

- 96% collect drinking water from a protected water source, compared to the 44,76% of the year 2005. **(increased 114%)**
- The distance to walk to catch water has been reduced, saving time for other activities. From 18,27% in 2005 that walk less then 100m to take water, the number has increased in 2009 to 41%. **(decreased 72%)**
- Before starting the project the change of the season affected 64,63% of the beneficiaries for searching drinking water, now only 4% still have problems to get safe drinking water during the dry season. **(increased 50%)**
- The water consumption (litres x capita x day) has increased in the worked communities from 5,17 lcd to 20 lcd. Even though it has not been reached the target level of 35 lcd, the increment is considerable **(increased 286%)** and the implemented water facilities are a safe complement to the traditional water sources.

- Beneficiaries start to understand the relation between hygiene and health. 90,9% wash there hands in different key times like: before cooking, before eating, after defecation or after wiping children bottoms, compared to the 47,3% in 2005.
- In 2005 90% of the beneficiaries used to dry clothes on the ground and bushes before the commencement of the project. 50% of community members in the operational communities now demonstrate simple hygiene habits such as construction of plate racks (91%), cloth lines (75%), use slipsalp to go defecate, cleaning of surroundings(44,90%), storing drinking water separately (92%) and using refuse pits (34%).
- 30 % reduction of water and sanitation related diseases (diarrhoea, cholera, malaria)in operational communities indicated by morbidity statistics from the Ministry of Health and Sanitation
- Almost 100% identify now that malaria is due to mosquito and are doing different practices to prevent them. 52% have mosquito net at home and 45% clear the stagnant water or grass/scrub. The priority to use mosquito net are pregnant women or nursing mothers.
- Even the percentage of children under 16 years responsible to collect water has been reduced from 76% to 16%, it has been observed that now women sometimes send their children to take water to the water point middle in the villages, as there is less privacy and they don't like to use this activity anymore as a socialization place with other women.
- Even people are aware of the importance to chlorine or use soap for the hand washing, sometimes they omit these products because they have to pay for them. Sometimes they use ash instead.
- Even beneficiaries know the importance of keeping the animals in a separate place to reduce diseases, in many cases they don't follow arguing that it is more difficult to steal them if they can move freely.
- It has been observed that latrines add prestige to the community and makes the members of the village increase their self esteem, and therefore keep them clean.
- WatSan operational communities are now empowered to identify disease transmission routes in their communities. Their able to identify the causes of their major health problems and can prevent them
- Beneficiaries have the sense of ownership and the knowledge of taking care and maintain the WF. Communities are motivated to implement water and sanitation projects.
- PHAST volunteers continue to disseminate key health messages in the communities.



Habit before the intervention



After the intervention: cloth lines and dish racks

## VII. CONCLUSIONS

### 7.1. Lessons learned and basic recommendations

#### 7.1.1 working with the beneficiaries

- a) It is very important to do participatory approach of the project to be sure that the project is a feel of the community so that they will be helping to get it and to be involve during all the implementation.
- b) Make a good preliminary study of the communities and beneficiaries (anthropological and cultural) to get to know very well what are their labour loads (ages, sex, farming/no farming, religious or cultural events,...) defining very well what activities are required from them and in what periods, so they can organize themselves.
- c) Make a previous study of the sources the community can provide (local materials) to be combined with the materials of the neighbour villages and define their contribution together.
- d) In the identification is important to do a good research about the local materials and technologies available in the country in order to define possible and realistic indicators.
- e) The villages that are far away from the towns will have a better community approach and will participate better than the beneficiaries in urban areas, therefore it's important to find alternative ways to make beneficiaries contribute.
- f) It is very important to motivate and accompany with continuous monitoring the community during the whole project to follow up the correct implementation of the learned behaviours/habits, as this is a very difficult thing to change. Also to get more quality in the results a better motivation and sense of ownership.
- g) Start always with the software before the hardware, but not leave a lot of time between them so people forget what they have learned.
- h) It is recommended to define well the activities proposed for the community work from the beginning and also the activities for the software training (not only the technical construction) as these are key points that have to be done with a good approach.
- i) Emphasize in the sensitization trainings the use the latrines for everybody in the community, not only the chief and important people. Also important is to sensitize about the proper cleaning of the latrines as they are not used to them.
- j) Provide to the WatSan committees and the communities the necessary tools to do an easy understandable, equal and transparent procedures and administration of the provided facilities.

### 7.1.2. working with the local authorities

- a) Design specific tools inside the project to involve the local authorities into the WatSan facilities implemented and the beneficiaries' community precisely and constantly. They have to get involved in the previous decisions, the monitoring, hygiene trainings (PHAST),...etc. to afterwards help also to maintain them. ("Guidelines" for NGO Kabala, suggest including a budget for monitoring trips for the authorities).
- b) Keep informed the authorities of the activities and also provide afterwards all the technical information so they can have a centralized data base of the WatSan points in case in future they should need to be repaired or improved. Information should not stay with the NGO, at least give it to the community committee.

### 7.1.3. implementing the water facilities

- a) Take care about the logistics problems in the country, as the villages are far away and the roads are very bad, especially in the rainy season.
- b) Develop a good action plan according to the locations, distances and seasons to optimize the resources and efforts, trying to unify places and locations.
- c) Chose correctly the location of the water points (watching rainy and dry season), as it is important to catch water but also it should not be a swamp area.
- d) It is not recommended to do big catchments at the spring boxes (ex. One Mile) as it is always a source of contamination as the water is exposed to the environment.
- e) It is recommended to avoid open catchments because they can be contaminated (biological).
- f) It is more sustainable to rehabilitate, enlarge or construct gravity systems, calculating it to last for long, as this solution can reach more people and different communities in a safe way.
- g) Calculate the capacity of the technicians when planning the activities. It is better to have a permanent technical staff that can learn and improve with each work, than hiring local technicians for short term contracts. The same happens with the software.
- h) It is important to establish agreements and safety protocols with the technical workers, especially when they are digging, as they are committing a lot of imprudence's.

- i) To avoid hand pump thieves it is important to do a good installation having all well secured and also to sensitize the community to take care of this facilities.
- j) Take care about the selection of the staff baring in mind not only technical issues, but also cultural and ethnic, as this might create uncomfortable atmosphere in some cases.

## **7.2 Final conclusions**

The communities have been involved from the conceptualization of the project in order to help to the success of the implementation. The involvement of the community in project conceptualization, implementation and monitoring enable the communities to generate and sustain their own solutions and enhance development of local initiatives.

SLRCS has already big experience in PHAST training methodology, which wants to teach and sensitize on an easy way the relevant hygiene habits. The change of the habits is not always easy, but the open participation of the beneficiaries made it possible to observe during the whole implementation time significant changes.

The formation and training of the community WatSan committees will help to increase the sustainability of the project and to create an ownership feeling inside the village. We should provide them with the necessary tools and transparent administration procedures in order to have later a good management.

The scaling up water and sanitation systems in the far rural areas of Koinadugu and Kono is a big step in the improvement of the living quality of these communities. Most of these areas use to track water from miles away and not always with good quality, mainly in the dry season. Even the water points constructed or rehabilitated are not enough to be used as unique water source (to be combined between traditional water points for washing and use the wells for drinking); they can at least be a safe alternative in the dry season when the shortage of water is critical.

There are plenty of abandoned wells, spring boxes or gravity systems schemes which are relatively easy to rehabilitate helping to improve the value of the WF that already exists, without the need of constructing new ones. The main issue here is to train correctly the committees to maintain them in a proper way.

The implementation of handpump wells is relatively easy and has a very high impact in Sierra Leone where the safe water resources and the lack of water in the dry seasons is an important problem all over the country. But in order to have better sustainable water source the gravity systems are a very valid solution, as it is more reliable in terms of water supply and quality, and it can reach a bigger number of people and communities.

## **VIII. APPENDIX**

1. Logical framework
2. PHAST trainings
3. Sketches and drawings
4. Technical information
5. Survey documents
6. Handover documents