Water for Lakes State
Project Workshop – Rumbek

Programme for the Water Sector between South Sudan and the Netherlands

Water for Lakes Programme

Bart Goes - hydro(geo)logist, David Karari – WASH Expert, Mading Dorr – Rumbek Office Manager
Geert Jan Prins – Team Leader

July 25th, 2014
Lakes State and Water for Lakes Project Overview

9:15 - 9:45 – Bart (for Geert Jan)
South Sudan – White Nile
South Sudan – States
Lakes State - impressions

- Modest population: ~1.01 million (FAO, 2014) on a large area 40,000 km²
- ~1.3 million cattle (FAO, 2014)
- **Livelihood**: crops (33%), livestock (25%), casual labour (11%), salaried work (8%), natural resources (7%), alcohol (11%), others (5%) (FAO, 2014)
- High poverty
- Poor road network
- Limited water infrastructure (<2,000 public boreholes, ~100 latrines)
- Abundant rainfall: ~800 mm / year & abundant vertile lands
- Relatively peaceful compared to neighbouring states still there are cattle-rafts & internally displaced people – ‘idps’
- **Sustainability** - local Operation and Maintenance of projects is a major challenge
Water For Lakes Project

Aim: stimulate economic development in Lakes State using water as an entrance

Focus components:
1. People (WASH)
2. Livestock
3. Agriculture
4. Fish & habitats
5. Integrated Water Resources Management (IWRM)
**Water for Lakes Project – consortium, time & budget**

**Implementing consortium:** Mott Macdonald (lead) SNV & VNG International

During inception the focus is on areas accessible in wet-season

**Time** - 5 year programme: Dec 2013 – Dec 2018


Phase 2 (2 years): To Be Confirmed

**Project budget (Phase 1):** ~3 mln Euro

**Budget for programmes (Phase 1):** ~22 mln Euro

Budget for programmes (Phase 2): ~5 mln Euro
Water for Lakes Project – attributes

• Focus on beneficiaries
• Capacity building / working with counter-parts taking responsibility
• Sustainability (Operation & Maintenance of programs)
• Informed planning using existing & to be collected water data
• Integrated planning – working across sectors & taking into account hydrological boundaries
Project staff (July 2014)

- Geert Jan Prins – Team Leader
- Maryam Said - Programme Support / Water Health-Lab Expert
- Suha Abdel Aziz – Procurement Expert
- Mading Dorr – Rumbek Office Manager
- David Karari – Water & Sanitation Expert
- Bart Goes - hydro(geo)logist
- 3 drivers (Jozef, Mozes, Peter)

Counter part staff recruitment far advanced: a) Deputy Team Leader / livestock expert, b) Water & Sanitation Expert, c) Hydrologist

Short-term experts planned: livestock, community development, architect
Stakeholders

- Netherlands Embassy (donor)
- Ministry of Electricity Dam Irrigation and Water Resources (Juba)

Rumbek:
- Directorate Water, Sanitation and Hygiene (counter-part)
- Ministry of Agriculture, Forestry, Animal Resources and Fisheries
- Ministry of Health
- Ministry of Education
- Ministry of Social Development
Water For Lakes - Programme

Capacity Building and Skills Development

Integrated Approach

Component 1 Water for Livestock
Component 2 Water for Agriculture
Component 3 Water for Fish & Habitats
Component 4 Water for People
Component 5 IWRM-KCD

Cross Cutting Issues

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Water For Lakes Project

- **Objective 1** – water for live stock
- **Objective 2** – water for people
- **Objective 7** – Integrated Water Resources Management (IWRM)

Above objectives will be discussed in detail in separate workshop sessions
**Objective 3: Enhanced food security and diversification of diets.**

Result 3.1: Increased (rain-fed) staple food production of small-scale farmers;

Result 3.2: Increased availability and use of water for production of high value and yielding crops

**Specific Objective 4: Enhanced economic income from commercial crops.**

Result 4.1: Increased production of horticultural and commercial crops;

Result 4.2: Improved value chain of agricultural products.
Objective 5: Increased productivity and income from artisanal fishing of local communities.

Result 5.1: Improved functioning of ecosystems for fish habitats;

Result 5.2: Improved marketing of fisheries products.
Objective 8: At the end of the project Communities, Private sector, Public sector and Academic/Knowledge institutions have the capacity, knowledge and skills to establish sustainable water and sanitation projects and manage and administer natural resources in at least four counties in Lakes State.
Achieved so far

- Logistical set-up (office, vehicles, project manuals, procedures, procurement)
- Staff recruitment (see above)
- Technical missions on Water & Sanitation (David) and Water Management (Bart) – to be discussed during this workshop
- Drilling supervision training: Deputy Director Rural Water, Assistant Water Commissioner Rumbek North & Rumbek East
- Preparation technical missions livestock & community experts
- This workshop & a participative inter-ministerial meeting on early implementation projects
2 Water Management

9:45 - 10:30 – Bart
Objective 7: Planning of sustainable water management interventions consistent with basin development plans.

Result 7.1: Operational hydrological and meteorological data collection and assessment system in place;

Result 7.2: River basin studies carried out and accepted as development framework;

Result 7.3: Land and Water management policies, strategies and master plans for outfall of rivers/streams and floodplain areas formulated.
Basic principles:

- Water for basic needs is a human right
- Water has social, economic and ecological value
- Manage water according to hydrological boundaries
- Less top-down approach more stakeholder involvement

Question for workshop participants:

What does above mean for developing and managing new water points in Lakes State?
Objectives:

• Improved access to safe drinking water & basic sanitation

• Recovery of small proportion of costs through fees for specific services such as delivery of irrigation water and issuing abstraction permits

• Beyond subsistence agriculture

• Development new dry-season livestock watering points
The Lakes State Water Policy builds upon the National Water Policy
Focus is on guidelines for community use water points covering:

1. Stakeholder responsibilities (e.g. filling data forms for new water points)
2. User fees are paramount for sustainability
3. Maintenance and repair – communities responsible
4. Management of misuse – human consumption has priority
5. Water Management Committees – role & support
6. Role public institutions
Watershed (purple) and state (black) boundaries
Watershed (purple) and state (black) boundaries
River flow monitoring planned

Stageboard installation & employing readers:

- Gel River
- Na’am River
- Pjei River

Managed by Lakes State Water Directorate, supported (training, resources) by Water for Lakes Project

Calibration measurements to convert river levels into flows possibly in collaboration with Water Ministry (Juba)
Examples of stageboards
3
Water for People
11:00 - 12:00 – David
Objective 6: Safe water and improved sanitation in 5 (out of 8) selected counties made available in a participatory and sustained manner.

Result 6.1: Safe domestic water and sanitation infrastructure constructed or rehabilitated in selected counties;

Result 6.2: Sanitation facilities constructed for public areas;

Result 6.3: Local Government Administration (LGA) staff’s, private sector and communities have knowledge and capacity for planning, and O&M to achieve a sustained supply of safe water and sustained improved sanitation.
Global Objective of WASH Programmes

- The global objective of WASH programmes is to improve the health of the beneficiaries through the eradication or minimizing of the water borne and water based diseases and diseases transmitted through the faecal oral routes (see below).

- To succeed, WASH programmes ought to implement the various aspects of WASH in an integrated manner thus:
  - Safe drinking water
  - Improved sanitation
  - Behavioral changes in health and hygiene practices

Query: What in your opinion contributes the most in the success or failure of a WASH programme?
The F Diagram

Fig 1

Feces

Fluids

Feet

Flies

Fingers

Food/Water

New Host
Morbidity
Mortality

LATRINE CONSTRUCTION

SANITATION/HYGIENE

FOOD HYGIENE/SAFE WATER

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Water for Lakes WASH Programme

• The Water for Lakes WASH programme is rural based has its objective as:

**Objective 6: Safe water and improved sanitation in 5 (out of 8) selected counties made available in a participatory and sustained manner**
Water for Lakes WASH Programme

The above objective will be achieved through several interventions namely:

Result 6.1 a: Safe domestic water

- This will be achieved by:
  1. Rehabilitation and repair of broken down boreholes/pumps
  2. Drilling of new boreholes and installation of handpumps - ideal for small communities of upto 500 people.
Water for Lakes WASH Programme

3. Improved handdug wells fitted with handpumps - for pop upto 500

Query: When and where do you think a handdug well is an appropriate intervention?
Query: Apart from population, what other factors do you think makes a community eligible for provision of a small water distribution system?
Water for Lakes WASH Programme

5. Stimulate the traditional ways of water provision by either improvement (for safety/quality) or scale up. Such systems could include:

1. Traditional wells with windlass water drawing systems
2. Traditional haffirs (dug manually by communities) with in-house filtration systems + boiling of water
3. Simple pumping systems that can be locally made e.g. rope and washer and bucket and blair handpumps.
4. Hand (manually) drilled boreholes

Query: What traditional methods of water supply do you think can be improved on or scaled up in Lakes State?
Water for Lakes WASH Programme

6.1 b sanitation infrastructure constructed or rehabilitated in selected counties;

This will be achieved by:

1. For communities, sanitation infrastructures will be achieved through stimulation of communities to construct household latrines. This will be achieved through such means as CLTS.

   The programme will not provide individual house latrines but may do demonstration latrines if necessary.

Query: Apart from CLTS, which other means do you think can be used to trigger communities to construct household latrines?
Examples of household latrines.

- Query: What do you think is the major challenge in the construction of such latrines?
Water for Lakes WASH Programme

• 2. Institutional latrines

This will be provided for:

a. Schools

b. Health Centres

Queries

1. What other institutions do you think should be included?

2. What criteria should be used to allocate institutional latrines?

3. What type of latrines would you recommend for institutions and why?
Water for Lakes WASH Programme

• Result 6.2: Sanitation facilities constructed for public areas;

This will be achieved through construction of public latrines
Queries

• What criteria should be used to select areas to benefit from such facilities?

• What designs would you recommend and why?

a. Pit latrines

b. Pour flush latrine- use of water bucket for flushing with septic

c. High volume cistern latrines with septic tanks, soakaway and drain fields

d. Ecosan latrines.
Result 6.3: Local Government Administration (LGA) staff’s, private sector and communities have knowledge and capacity for planning, and O&M to achieve a sustained supply of safe water and sustained improved sanitation.

This will be achieved through

- On the job training, through secondments etc
- Practical implementation- for private sector
- Training and capacity building programmes
- Queries- What other areas of capacity building means do you suggest?
The spare parts challenge

A key challenge in WASH in Lakes and South Sudan in general is availability and reliable supply of spare parts in WASH particularly for handpumps.

Query: What in your opinion is the best strategy to address this problem?
Health and hygiene promotion campaigns.

This are proposed to be achieved through
1. CLTS and ODF campaigns
2. Hygiene and sanitation promotion activities
3. Schools WASH
4. Media campaigns.

Queries:

a. Should all villages in five counties be beneficiaries and if not what criteria should be used to select villages?

b. What other methods apart from the above can you think of?
Water for Lakes WASH Programme

• Database development and Ground Water knowledge

The Programme would develop on these knowledge by:

1. Mapping of failed boreholes.

Queries: Do you have in your counties information on failed boreholes i.e. where drilling didn’t strike water?. How can our knowledge in this area be strengthened?

2. Updating of WIMS database.

3. Query: What in your opinion is the best strategy to achieve this?
3. Improved ground water knowledge through collation and archiving of existing hydrogeology maps and geophysical investigations of each borehole drilled.

Query: Do you think it is important to insist on geophysical investigations on each borehole being drilled?
Water for Lakes WASH Programme

- Identification, planning, procurement, implementation, supervision, monitoring and evaluation

Each of the above interventions will follow the cycles mentioned above:

a. **Identification** - Should be participatory involving stakeholders.

**Query** - How can we best use participatory techniques

B. **Planning** - Will follow a half year or yearly planning cycle. For works, implementation durations will mostly be timed to merge with dry seasons.
C. **procurement**- The Programme will follow strict procurement procedures that respect donor requirements and that are based on key pillars of procurement:

**Query: Can you think of these principles?**

The Programme will develop a procurement manual largely based on world bank procurement guidelines.
Water for Lakes WASH Programme

• **Supervision:**

Due to the myriad works, goods and services contracts envisaged, supervision will be key in this programme. In this regard programme will undertake of this by:

1. Hiring resident engineers at county level.
2. Facilitating government staff at county level for effective supervision
3. Performing on the job training for supervisors and where neccesary external trainings.

**Query:** What in your opinion would be the best supervision set up to be used by the programme?
Water for Lakes WASH Programme

• Monitoring

Monitoring of the programme will be done by:

1. TAT
2. PCC
3. PSC
Evaluation

Evaluation of the programme will be done by external evaluators and auditors.
Proposed early implementation boreholes – Rumbek Centre & East (to be updated)
3 Water for Livestock

12:00 - 13:00 - Bart
Objective 1: Reduced conflicts potential by improving livestock access to water sources in the dry season.

Result 1.1: Increased number of decentralized water supply facilities for livestock in the dry season

Result 1.2: Improved availability of water in existing (downstream) lakes, marshes and natural depressions.

Objective 2: Enhanced economic value of tending livestock for subsistence and commerce.

Result 2.1: Increased productive husbandry at community level;

Result 2.2: Improved value chain for commercial use of livestock and livestock products
Options dry-season water points for livestock

1. Hafirs in floodplain areas
2. Water yards (borehole, solar pump & overhead tank)
3. Uncontrolled watering holes in floodplain areas (similar to road side construction holes)
4. Hand dug boreholes & animal power to abstract water
5. Other?
1) Hafirs in Lakes State:
Cueibet (Abiriu), Rumbek Centre (Nayang Kot), Rumbek North 2x
2) Livestock water yards in Lakes State:
Cueibet (Tiap Tiap’ - Citcok’), Rumbek North (Meng?)

Note: picture shows an agriculture water yard
3) Open uncontrolled water holes in Lakes State: for example along roads towards Rumbek North and Yirol West
4) Use of hand dug well and animal power example from Northern Nigeria
Group exercise for participants

• Split-up in four groups and each group to discuss one type of dry-season livestock watering point

• Summarise what you think is good about it for Lakes

• Summarise what you think is not good about it for Lakes

• Keep in mind: design advise, costs, operation & maintenance, social / community aspects, number of livestock served, environmental impact (pollution, erosion), health (e.g. water borne diseases)

• A representative of each group to present the conclusions
4 Use of GPS

14:00 - 15:00 - Bart
### GPS – coordinates from Lakes State database

<table>
<thead>
<tr>
<th>Latitude E</th>
<th>Longitude N</th>
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<tbody>
<tr>
<td>E 30°12'21.4''</td>
<td>N 6°67'12.5''</td>
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<td>E 30°11'21.8''</td>
<td>N 6°67'15.9''</td>
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<td>E 30°00'21.9''</td>
<td>N 6°69'00.1''</td>
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<td>E 30°13'22.4''</td>
<td>N 6°47'12.6''</td>
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<td>E 30°27'26.5''</td>
<td>N 6°64'10.7''</td>
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<td>E 30°12'21.4''</td>
<td>N 6°27'32.5''</td>
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<tr>
<td>E 30°15'21.4''</td>
<td>N 6°47'52.4''</td>
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<td>E 30°14'21.4''</td>
<td>N 6°67'80.2''</td>
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<td>E 30°13'21.4''</td>
<td>N 6°27'14.0''</td>
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<tr>
<td>E 30°12'22.4''</td>
<td>N 6°87'17.4''</td>
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**Question for participants:** Do you observe anything strange about the coordinates?
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Always check:
- Degrees (°)
- Minutes (‘)
- Seconds (”)  

They are like a clock they cannot exceed 59
Question for participants: Do you observe anything strange about the coordinates?

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GPS – coordinates from Lakes database

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</tbody>
</table>

This is correct decimal minutes (and degrees and seconds) can be larger than 59
Coordinates possible (1)

Degrees – minutes – seconds to prevent confusion better write:

- 06d40m05.6s (instead of 06°40’05.6’’)
- Always check that degrees, minutes and second do not exceed 59
Degrees – minutes – decimal minutes to prevent confusion better write:

- 06d40.853m (instead of 06°40.853’)
- Always check that degrees, minutes do not exceed 59
Coordinates possible (3)

Degrees – decimal degrees
to prevent confusion better write:

- 06.674565d (instead of 06.674565°)
- Always check that degrees do not exceed 59
On GPS: (1) Setup, (2) Units
On GPS: (3) select what you want
Only option on the example GPS .... degrees – minutes – decimal minutes
Other important set-up (never change)

Map datum: WGS84
Units: metric
Angle: degrees
Group exercise for participants

- Split up in groups
- Take a GPS
- Check if set-up is correct
- Go outside and note down the four corner points of compound fencing in degrees-minutes-decimal minutes
- Compare the outcome between groups
Conclusions on use of GPS

It does not matter what you use (d-m-s, d-m or degrees) as long as you note it clearly down on your water point form.

Make sure set-up is on: *WGS84*, *metric* and *degrees*.
5

Groundwater

15:30 - 16:00 - Bart
Groundwater database development and analyses

Type of data:

- Water point data (GPS coordinates & attributes such as depth, type of water point, water quality parameters, etc.)
- Geophysical data
- Geological and hydrogeological maps

Question to participants why do we need above?

1. Better planning new water points (in relation to existing boreholes)
2. Increase success rate of new boreholes
3. Identify areas with water quality issues (e.g. regions with contamination)
Current status – groundwater data

- National database (WIMS) but not updated (~900 boreholes for Lakes)
- Lakes State Water Directorate excel database (~1750 boreholes) – GPS coordinates issues (discussed later)
- Water quality data – partially available in excel but not in agreed format and no GPS coordinates
- No data on failed boreholes
- No geophysical data
- Difficult for Water Directorate to retain a staff for this so not yet a counter-part for Project to train
Proposed project supported work on groundwater

- Integration existing water point databases into one and presentation on maps (as far as coordinates correct)
- Train lab staff on upgrading water quality database
- Train Water Directorate Staff (who?) on use and expansion of water point database
- Support field survey of (some of the?) existing boreholes
- Train Water Directorate staff on supervision of geophysical surveys and use of geophysical data
- Develop database for geophysical data
Maps obtained by Lakes Project

- Geological Map of Sudan (GMRD, 1981)
- Hydrogeological Map of Sudan (TNO, 1989)

In hardcopy and computer (Geographical Information System)
Hydro-geological Map – zoomed into Lakes State

TNO (1989) Hydrogeological Map

Brown (C2) – rocks which are generally non-water bearing
Blue (A2) – aquifers of local to regional extend
Contour lines – estimated depth of the generally non-water bearing rock (C2)
Lines showing estimated depth of rock

Question to participants:

How can this be used for planning the boreholes?
Geophysics – for new borehole locations

Question to participants: what is geophysics?

Definition: a non-invasive method for getting a rough impression of depth of contrasting geological layers (clay-sand-rock) through putting electrical current into the ground.

Note: the results are an interpretation and it is not as accurate as a drilling (but much cheaper)
Question to participants: when is geophysics required?

- When hard-rock is expected to be shallow (<~50 mbs)
- In areas where there are relatively many failed boreholes
Principles of geo-electrical survey—current (I) and potential (V) electrodes on surface

$P_1 \text{ and } P_2$: geological layers with contrasting electrical resistivity
Plenary discussion

16:00 - 17:00 – Director WASH – Barnaba, Bart, David
Potential discussion topics

1. Comments / suggestions on Project Programme?

2. Comments / suggestions on making the programmes sustainable (Operation and Maintenance beyond lifetime of Project) – roles Government, community & project

3. Suggestions on improving output of rain-fed agriculture? (FAO distributed ~14,000 hand tools and ~123 tonnes staple crop seeds in Lakes)

4. Suggestions / needs for Fisheries project component?