



Partners for Water and Sanitation

Note on project reports

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Partners for Water and Sanitation

**Anambra State Water Supply
Master Planning Assistance
Nigeria**

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September 2008

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Contents amendment record

This report has been issued and amended as follows:			
Revision	Description	Date	Signed
001	First draft	18 Sept 08	
002	Second draft	03 Nov. 08	

Anambra State Water Supply Master Planning Assistance Nigeria

1 Introduction

1.1 Partners for Water and Sanitation

Partners for Water and Sanitation works with developing countries providing unrivalled knowledge and expertise to help them supply clean water and adequate sanitation to their population. An innovative not-for-profit initiative, the partnership has members from three sectors: government, private enterprises ranging from water companies to engineering groups, and NGOs such as WaterAid, Tearfund and a trade union. This allows the partnership to draw from the widest possible range of expertise to rapidly respond to each unique challenge and to help local African partners develop and strengthen capacity and build truly sustainable solutions.

Each partner brings a unique set of skills and expertise. These are matched with a wide range of potential needs identified with partnering countries at a national or local level, working alongside their existing water and sanitation programmes. The emphasis of partner involvement is on-the-ground capacity building, such as knowledge transfer, to ensure the sustainability of each project and to encourage any lessons learned to be shared and used again throughout the region.

And it's not just about engineering: corporate, institutional and financial capacity building is also required. While the initiative does not itself provide funding, it often strengthens each locality's ability to identify and access available sources through the capacity building approach¹.

This report is part of an ongoing programme of support that PAWS is providing through Atkins Ltd to the Anambra state water sector as part of their reform programme. Previous support activities include:

- In June 2007 PAWS' support in the initial institutional scanning of the Water and Sanitation sector of Anambra state provided the information needed for a comprehensive institutional assessment exercise. The institutional assessment clearly showed the need for a sector restructuring.
- In November 2007 PAWS also supported the sector restructuring, through the development of a restructuring and change management plan, which helped the sector reform team to carry out key structural changes in the sector.
- In June 2008 PAWS again supported the Anambra sector reform team, through a Master Plan and Policy guidance workshop, to give direction to the team on the Master Plan and Policy development work.

¹ From the Partners for Water and Sanitation website: <http://www.partnersforwater.org/>

1.2 Terms of reference

This report builds on the masterplanning framework developed in the last support visit, with three key objectives:

1. To review the information gathered to date and identify data gaps for the completion of the masterplan
2. To provide a 'roadmap' for the completion of the masterplan
3. To review the masterplan consultant's Terms of Reference.

A workshop was undertaken as part of the visit on 21 August 2008. This was attended by the Water Commissioner, his Permanent Secretary, representatives of the Anambra State Water Corporation (ASWC), Rural Water Supply Agency (RUWASSA), Local Government Areas (LGAs) and Water, Sanitation and Hygiene Committees (WASH Comms). It was used as an opportunity to 'sensitise' the stakeholders, and also to consult with them to gain an understanding of their views on a number of the key issues. A copy of the presentation given by the PAWS team can be found in Appendix 1.

2 Water supply masterplan 'roadmap'

2.1 Suggested masterplan methodology

The previous PAWS support visit defined a structured approach to masterplanning. The methodology outlined below builds on the approach developed now that more baseline studies have been carried out.

Key features of the proposed approach include:

1. To enable masterplanning to be undertaken for the whole state, communities should be characterised by need and potential source availability. A number of priority and sample areas should then be examined in detail, costing up solutions.
2. The emphasis of the masterplan should be on delivering sustainable benefits. This will require assessment of the long-term funding requirements and how they will be met.
3. Robust costing is an essential element of a masterplan. To ensure consistent easy costing it would be useful to create a capital cost database and to build up reliable maintenance cost estimates for different scheme types.
4. It is likely that there will be significant budget constraints so it will be important to prioritise investments. Priority communities for investment are likely to be those identified as having relatively high rates of water-related illness; areas with particularly poor access to water (i.e. long distances from improved water source) and of the remaining communities, those with lowest cost (i.e. NPV) per person receiving a significantly improved service.

Ensuring sustainable benefits

*The asset inventory undertaken (ref 2) suggests that a large proportion of historic investments have failed within a relatively short period following construction because of a lack of maintenance. It is important to remember that the purpose of the masterplan is not merely to schedule capital investments in the near future. So that the investments can have a sustainable effect on the water supply situation in Anambra state, **the masterplan must examine how the investments can be operated and maintained in the long term** (in terms of both financing and institutional/community capacity).*

This will require assessment of and planning for:

- *Long term funding requirements*
- *Sources of funding for long term operation and maintenance*
- *Affordability and willingness to pay for these costs.*
- *Additional knowledge and skills required to operate and maintain the new systems*

The structured approach developed during the last visit set out four key steps:

Stage 1: Creating the Baseline

Stage 2: Identifying Drivers and Options

Stage 3: Options Appraisal and Scenario Development

Stage 4: Investment Appraisal

The proposed approach to carrying out each of these activities is summarised below:

2.1.1 Stage 1: Existing water supply situation

2.1.1.1 Baseline data gathering

Stage 1 involves establishment of the baseline water supply situation in the State. This will involve data gathering/collation for the following factors:

- Population by service type and level. This should include comparison with any pre-existing policies or targets (e.g. piped supply, private supplies, population with 250m of standpipes).
- The extent, condition and operational status of existing assets.
- Institutional arrangement.
- Reasons for 'failure' of past schemes, to ensure that lessons can be learned.
- Levels of water-related illness, ideally by community.
- Other known issues, such as groundwater depletion or poor water quality.

This information should be collected into a suitable data management system, preferably a Geographical Information System which will allow it to be summarised in map form. This system should be flexible enough to contain many different layers, to add other relevant information (such as the water resource assessment outputs) and to be readily useable as an ongoing data management tool throughout implementation and subsequent operation and maintenance.

2.1.1.2 Identification of Communities for Detailed Study

There are many communities in Anambra state and it will not be possible to look at each in detail during the masterplan. It is therefore necessary to identify priority communities for study as well as a selection of representative communities on which state wide investment requirements can be based. These detailed study communities will then be subject to further data gathering, water resource assessment, design, costing and option appraisal.

The key factors for identification of **priority communities** are likely to be (in this order):

- Communities identified as having relatively high rates of water-related illness;
- Areas with particularly poor access to water (i.e. long distances from improved water source);
- Communities where it seems likely that it will be possible to provide a significantly improved water service at a relatively low cost per person served;
- The largest communities should be included in the list of priority communities for detailed study.

Sample communities should be selected to be representative of the following parameters:

- Current water supply situation
- Potential water resource availability (e.g. in areas of groundwater/surface water availability)
- Population (e.g. small/medium large rural community, small town or city)

All communities in the State should then be characterised to fit into the main categories of community identified using these key parameters.

2.1.2 Stage 2: Define Drivers and Targets

It is understood that the definition of a State policy will be the subject of a separate piece of work. This will presumably complement and add to the National Water Supply and Sanitation Policy, which sets out the following consumption standards:

- *Rural water supply guaranteed minimum level of service 30 litres per capita per day within 250 meters of the community of 150 to 5,000 people, serving about 250-500 persons per water point.*
- *Semi-urban (small towns) water supply represent settlements with population of between 5,000-20,000 with a fair measure of social infrastructure and some level of economic activity with minimum supply standard of 60 litres per capita per day with reticulation and limited or full house connections as determined by the beneficiaries / Government.*
- *Urban water supply 120 litres per capita per day for urban areas with population greater than 20,000 inhabitants to be served by full reticulation and consumer premises connection.*

Targets are multi-faceted, however, and it will be important for the objectives of the masterplan to incorporate clearly defined Objectively Verifiable Indicators (i.e. measurable outputs, with specified time horizons and responsibilities) against which progress can be measured.

There is also likely to be significant iteration between the policy and masterplan studies, especially if the policy is a practical rather than aspirational document, tailored to take into account the financial and programme constraints identified by the masterplan.

It is therefore likely that the drivers and targets for this masterplan will be derived iteratively, based initially on the National Policy and then both informing and basing itself on the output of the State policy study.

2.1.3 Stage 3: Options Evaluation and Appraisal

This stage will involve identification and assessment of the water supply options for the priority and sample communities.

2.1.3.1 *Water demand forecast*

In order to identify the sufficiency of potential water sources, it is first necessary to estimate the volumes of water which will be required. This assessment should be carried out at the community level and should take account of the following factors:

- Current and projected population by community;
- Current and future per capita consumption;
- Non-household use (i.e. schools, shops, factories);
- Water losses (e.g. leakage, any treatment process losses and water taken illegally).

Demand estimates should be prepared for all communities in the State based on the community characterisation carried out in Stage 1.

2.1.3.2 *Water resource assessment*

Potential water sources should then be identified. Given that water resources usually cross community boundaries, it is not appropriate to carry this out entirely at the community level. Instead, the assessment should be carried out at two levels: the whole resource area for major sources (i.e. perennial river catchments, aquifer or large lake area) and at the community level for smaller local sources such as springs or small/seasonal rivers.

Potential sources should be assessed in terms of both quality and available quantity. Areas of existing over-abstraction should also be identified. The results of the assessment should be summarised in map form, identifying zones by groundwater and surface water potential.

2.1.3.3 *Options appraisal*

The key steps in the options appraisal stage are as follows:

1. Option identification

All potentially feasible options should be identified. These should include, where appropriate, regional supply options, boreholes, different scale of surface water abstraction, rehabilitation of existing schemes, rainwater harvesting and leakage reduction.

2. Screening

The list of options should be screened, removing any which are unlikely to have unacceptable impacts (e.g. abstracting a large proportion of river flow) or be technical infeasible (if, for example, chemicals required are unlikely to be available or O&M costs are likely to be unacceptably high).

3. Concept design

A concept design should be prepared sufficient to develop a robust cost estimate for the short list of options. The design should include technical details such as whether solar panels or a diesel power supply should be used.

4. Cost estimation

Costs should be identified for all screened options. These should include the following cost types:

- Capital cost (materials, labour, etc.);
- Operating costs (diesel, labour and other consumables such as chemicals);
- Maintenance costs- both pro-active and reactive;
- Training and mobilisation costs (initial and ongoing).

These costs should be assessed over a long period of time, for example 25 years, and should be summarised in the form of a net present value (NPV) taking all of these cost categories into account and discounting using the cost of capital (net of inflation) or similar.

It is suggested that a cost database should be developed to provide a consistent and efficient basis for deriving these cost estimate. Wherever possible the costs in the database should be based on recent costs for similar works.

2.1.3.4 Option selection

For communities where there is more than one option, the NPV of these options should be compared. In general the option with the lowest NPV should be selected. However, a number of additional factors should also be taken into account, for example:

- The quality and reliability of the water source;
- The impacts of the development on other communities, water users, or on the environment;
- The likely effectiveness of the institutional arrangement (e.g. if it is believed more likely that a local scheme will be effectively managed than a regional scheme);

Ideally the masterplan should be based on options which allow for the whole community concerned to be served. However, where the options are not the same in terms of people served (in towns or cities for example) the various options should be retained for investment prioritisation as detailed in 2.1.4.1 below.

2.1.4 Stage 4: Investment and Funding Plan

2.1.4.1 Investment prioritisation

We would suggest a multidimensional approach to investment prioritisation as indicated in Section 2.1.1.2. The suggested approach is to target the following communities by these factors (in this order):

- Communities identified as having relatively high rates of water-related illness;
- Areas with particularly poor access to water (i.e. long distances from improved water source);
- The remaining communities should be prioritised according to cost (i.e. NPV) per person receiving a significantly improved service.

Consideration should also be given to prioritising communities by the level of commitment shown and/or seeking to serve the poorest communities first. If necessary a Multi-Criteria Analysis scoring system could be developed, giving weightings to each of the factors outlined above. However, assigning weightings to these factors is particularly subjective.

2.1.4.2 Costs by year

The cost estimates developed in Stage 3 should be used to develop a year-by-year cost model. The costs of preferred options for priority communities should be added to the sample community costs applied to all communities in a stratified manner (i.e. apply the sample community unit costs to similar communities). This should take account of the results of the prioritisation exercise and any budgetary constraints (in conjunction with the funding model).

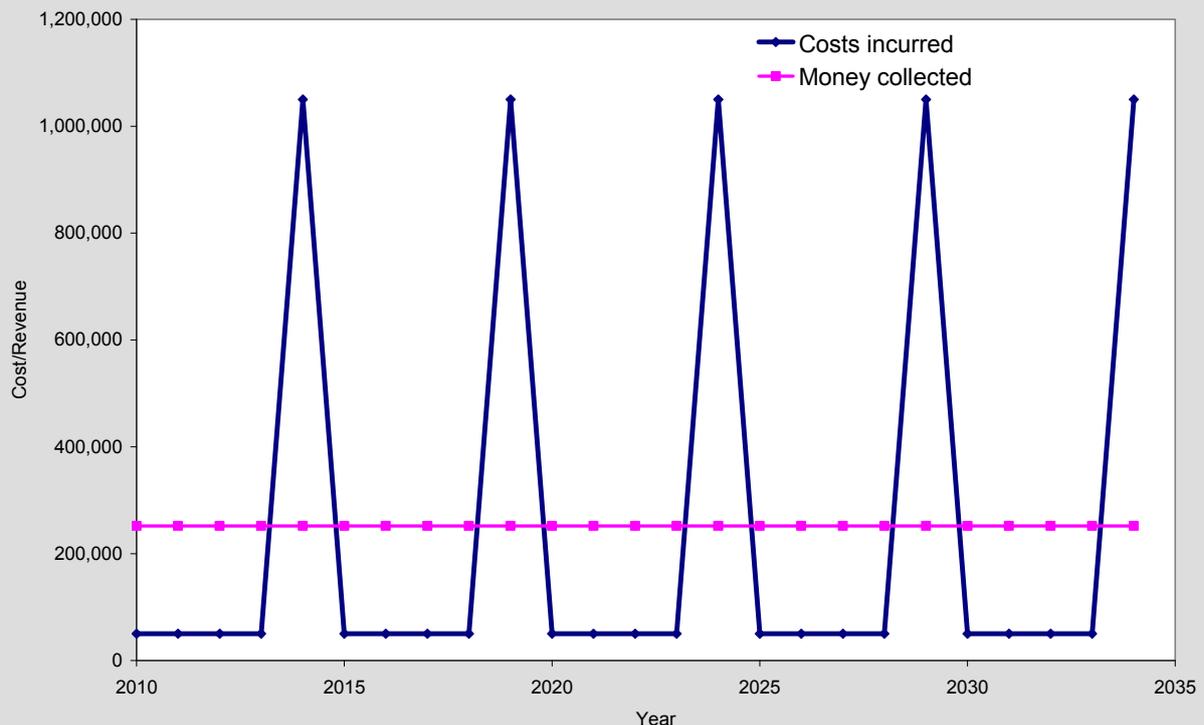
2.1.4.3 Sources of funding

For the financial sustainability of the proposed investments and for budgeting purposes, it is essential that the likely sources of funding are identified and quantified for all of the cost categories. These funding estimates should be **as realistic as possible** and the results of the funding model should match the final cost model. This means that where budget constraints exist these should be identified rather than simply relying on the cost sharing envisaged by the National Policy.

Funding maintenance

Maintenance expenditure requirements for water supply systems are typically 'lumpy' and can vary significantly from one year to the next. One option for funding maintenance is to collect the estimated maintenance costs in advance and set up an escrow account or similar to manage these advance funds and make them transparent. This would avoid the need to raise relatively large amounts of money to avoid the supply failing when maintenance is required.

In this way, beneficiaries pay more than is required simply to operate the system most years. As a simplified example the money collected is higher than the operating costs in most years but lower in years when significant maintenance is required:



If an escrow account is used, it will be important to carefully select the account signatories. This decision should be based on the principles of accountability, trustworthiness and reduced opportunity for corruption.

2.1.4.4 Responsibilities

It will be important to highlight key responsibilities, especially relating to the ongoing operation and maintenance of water supply schemes. These will need to be consistent with the State Policy being developed as well as the funding model.

2.1.4.5 Affordability and willingness to pay

Having identified the available funds and responsibilities, an assessment should be made of the affordability of and willingness to pay (WTP) for the proposed community contributions, both initial and ongoing operation and maintenance.

This assessment should ideally be based on an assessment of potential beneficiaries' WTP, elicited via surveys and validated by examining both the proportion of household income this would represent and the cost of the current service where appropriate (e.g. payments made to water vendors). A number of different WTPs should be derived relating to key factors such as income or community type (i.e. small rural settlement versus a city) and current water supply situation as WTP can vary significantly.

Although this task sits within Stage 4, these surveys will need to be carried out at an early stage of the project to allow time for survey development, analysis and interpretation.

2.1.4.6 Uncertainty assessment

It will be important to assess the robustness of the masterplan in the face of uncertainty in the key variables. It is suggested that sensitivity analysis should be undertaken for factors such as:

- Amount of funding available
- Capital and maintenance costs
- Willingness to pay
- The cost of capital

This will give an indication of the factors to which the masterplan is most sensitive (and to which effort should therefore be directed) but also the potential prioritisation of investments under different funding scenarios.

2.2 Review of masterplan consultancy terms of reference

We would recommend making a number of scope items clear for the masterplan consultant:

- Explicit reference should be made to tariff assessment, including long term maintenance costs. This will require assessment of community's ability and willingness to pay.
- Clarify whether funding of maintenance should be dealt with in the State Policy study or Masterplan (i.e. whether it will be a state-wide or community-level decision).
- It will be important to involve potential funders in the masterplan process. This will also help to identify potential budget constraints.
- Uncertainty assessment will be required, including identification of the masterplan investments proposed under different funding scenarios.
- Any data management system created (i.e. a GIS system) should be readily updateable and training should be provided so that it can be handed over effectively after the consultancy ends.
- The need for consultation with stakeholders, including LGAs and WASH Com members, should be stressed.

2.3 Masterplan contents

The key elements of a masterplan document include:

- Assessment of existing situation: the baseline
- Identification of targets and objectives
- Identification of technical and institutional options to meet these targets
- Appraisal of these options leading to preferred option selection
- A fully costed long term investment plan, setting out all costs (capex, opex, capital maintenance) at a suitable scale.

It is suggested that the table of contents should be structured in a manner similar to that below:

- 1. Introduction**
- 2. Stage 1: Existing water supply situation**
 - a. Population by service type and level: *comparison with targets (e.g. piped supply, private supplies, standpipes within 250m)*
 - b. Extent and condition of existing assets
 - c. Institutional arrangement
 - d. Water-related illness: *outline what is known about rates and locations of illness*
 - e. Other known issues: *map of known issues and underserved areas*
- 3. Stage 2: Define Drivers and Targets**
- 4. Stage 3: Options Evaluation and Appraisal**
 - f. Water demand forecast
 - i. Current and projected population by community
 - ii. Current and future PCC
 - iii. Non-household use
 - iv. Water losses
 - g. Water resource assessment
 - i. Surface water resources: *quantity, quality, location*
 - ii. Groundwater sources: *quantity, quality, location (including depth)*
 - iii. Water resource characterisation: *map groundwater and surface water potential areas.*
 - h. Options appraisal and prioritisation:
 - i. Unconstrained list: *include regional supply options and boreholes, rehabilitation of existing and new build.*
 - ii. Screening: *include assessment of feasibility issues: e.g. availability of chemicals, high O&M costs. Map issues and potential sources*
 - iii. Concept design
 - iv. Costs:
 - v. Capital
 - vi. Operating
 - vii. Capital maintenance
 - viii. Scheme ranking (where multiple choices)
- 5. Stage 4: Investment and Funding Plan:**
 - i. Investment prioritisation (on basis of health, focus areas)
 - j. Costs by year: *use 'characterisation' and generic costs to derive for whole state.*
 - k. Sources of funding: *include assessment of customer revenues.*
 - l. Responsibilities: *(Including O&M)*
 - m. Affordability and willingness to pay
 - n. Uncertainty assessment
- 6. Conclusions and recommendations**

3 Data coverage

A masterplan is only as good as the data which it relies on. This section examines the data required to create a robust masterplan, summarises the existing data sets and sets out the priorities for future data collection.

3.1 What data are required?

The key data sets required to create a robust water supply masterplan are summarised in Table 1 below.

Table 1: Key data sets required for water supply masterplan

Ref	Data Type	What For?
1	Existing facilities and condition assessment	To know where we are starting from
2	Current "improved" water service coverage	
3	Existing drinking water quality	
4	Existing and future populations and water demand by community	To know what we will need to be able to supply
5	UFW/non revenue water	
6	Hydrogeological data	To identify available water sources
7	Hydrological data	
8	Topography	Water availability and need for pumping
9	Existing source protection and location of latrines	Water quality risks and investment needs
10	Future WQ risks	
11	Cost data (capex, opex, maintenance)	Appraise options and identify funding needs
12	Socio-economic data (income, WTP)	To ensure that the plan is financially viable and desirable
13	Water-related illnesses	To prioritise investments

3.2 What data do we have?

The data currently available, based on the reviews carried out during the August 2008 visit, are summarised in Table 2 below:

Table 2: Summary of existing data sets

Ref	Data	Coverage	Sits where?
1	Existing facilities and condition assessment	Water Corporation assets RUWASSA has carried out recent assessment for motorised and handpump.	"Urban inventory report" for Water Corp RUWASSA
2	Current "improved" water service coverage	5 focus LGAs Awka City RUWASSA can provide inventory all their assets and locations so can look at distance to standpipes.	LGA Sector Development Report (ref 4) and Global Assessment (ref 3) PSP report (ref 6) RUWASSA
3	Existing drinking water quality	WC and RUWASSA have laboratories. State wide random tests RUWASSA has some analyses for scheme completion.	Data scattered- not in a database.
4	Existing and future populations and water demand by community	Populations: -2006 population by LGA not communities. -1991 population by communities Demands: WC not supplied for some yrs. Have old production data. Rural: pump run times: could be collected anecdotally	State Government. Community household register for focus areas: LGA and RUWSSA have some (Baseline Rpt). Baseline Study Presentation includes demand assessments.
5	UFW/non revenue water	No (confirmed by Sam, W.Corp).	
6	Hydrogeological data	Quantities for 5 focal LGAs. BH logs exist for some (not all) RUWASSA boreholes. No significant water quality data	"Global assessment" report (ref 3) Borehole logs: <ul style="list-style-type: none"> ▪ Some in ministry (incl some private boreholes) ▪ RUWASSA has some, possibly for all their BHs ▪ Not collected centrally (trying to) Note: Global Assessment Report contains map of boreholes in 5 focus LGAs
7	Hydrological data	Rainfall- monthly totals 2004 River flow. Unsure. Some high level assessment in "Global Assessment" (e.g. rapid flow) Sector investment plans give some indication of location of rivers in the 5 focal LGAs.	Anambra State Statistical Year Book Global assessment (ref 3) Ref 4.
8	Topography	None found during visit	

Ref	Data	Coverage	Sits where?
9	Existing source protection and location of latrines	RUWASSA has records (GPS co-ordinates) for all existing latrines in the 5 focus LGA	RUWASSA
10	Future WQ risks	No information found during visit	
11	Cost data (capex, opex, maintenance)	RUWASSA recent schemes has schedule of prices (BoQ) (solar powered BHs, overhead tank & group of standpipes). Only v.short pipe lengths Water Corporation has schedule of pipeline rates for recent schemes (Sam, Water Corporation) WASHCOM: no labour cost: subsidised water.	RUWASSA/Water Corporation
12	Socio-economic data (income, WTP)	Some income data.	Baseline survey (ref 1)
13	Water-related illnesses	Statistical Handbook records diarrhoea out-patient attendances by LGA (although looks patchy, with only 5 LGAs filled in). No cholera for several years apparently.	Anambra State Statistical Year Book Worth asking Ministry of Health, RUWASSA, LGA WASH units, Hospitals (anecdotal).

3.3 Priorities for data collection

We highlight below a number of data sets which we believe it would be useful to prioritise for masterplan preparation:

- Water supply coverage outside of the 5 focal LGAs. Consideration could be given to doing this by sampling of 'representative' communities and consultation with community/LGA representatives who know the area well.
- Incidence of water-related illness, at a sufficient level of detail to allow priority communities to be identified.
- The full costs of maintaining similar water supply systems (e.g. typical asset replacement frequency).
- Current populations by community. Again, this could be undertaken by assessment of a sample of 'representative' communities and consultation with community/LGA representatives. This need not be an extremely accurate survey but rather a classification by appropriate size band.
- Hydrological data (river flows, rainfall) especially in areas of poor groundwater supply.
- Groundwater quality risk assessment / analysis.
- Community willingness to pay for water supply (initial contributions and ongoing operation/maintenance).

4 Literature review

The results of the literature review are summarised briefly in Table 3 below.

Table 3: Literature review summary

Ref	Document	Contains
1	<p>“Baseline Survey” Report on WCA formation, Baseline Survey, Safe Excreta Disposal Survey and user’s choice survey in Ten Selected Small Towns for the Small Town Water Supply and Sanitation Programme, Omas Engineering and Environmental Services, October 2007.</p>	<ul style="list-style-type: none"> ○ Existing water supply and sanitation situation. ○ Some income data.
2	<p>“Urban Inventory” Inventory Report on Urban Water Supply Facilities in Anambra State, Prepared by Counterpart Staff, State Programme Implementation Unit, October 2007</p>	<ul style="list-style-type: none"> ▪ Description of existing facilities (pipe materials, sizes, condition) ▪ Operational status and ▪ Reasons that no longer operating
3	<p>“Global Assessment Report” Assessment of Water Resources and Sanitation in Small Towns in Anambra State of Nigeria, Dr. Okechukwu Anike, Nnamdi Azikiwe University, September 2007.</p>	<ul style="list-style-type: none"> ▪ High level review of surface water sources currently used by selected small towns in 5 focal LGAs. Does not look at potential resources for future development. ▪ Geological/hydrogeological review (including groundwater depths) and location of existing boreholes in 5 focal LGAs.
4	<p>“LGA Sector Investment Plans” Local Government Area Water Supply & Sanitation Sector Local Development Plan,</p>	<p>For 5 focal LGAs</p> <ul style="list-style-type: none"> ▪ Current coverage of water supply and sanitation access. ▪ Location of rivers in LGA area ▪ Villages with and without access to safe water
5	<p>“Institutional Assessment Report” Anambra State Water Supply and Sanitation Sector Institutional Assessment Report, Mrs Nnena Egwuatu, August 2007.</p>	<ul style="list-style-type: none"> ▪ Roles, functions and activities of the WSSS Institutions in the State ▪ Recommendations for policies and structural reforms

Ref	Document	Contains
6	<p>“PSP Report” Report of Survey of PSPs in Water Supply in Awka town, DIYOKES Consultants Limited, September 2007.</p>	<p>For Awka:</p> <ul style="list-style-type: none"> ▪ Inventory of all water supply points operating in Awka ▪ Survey of water supply operators (charges, customers, etc.).
7	<p>“National Policy” National Water Supply and Sanitation Policy, Department of Water Supply and Quality Control, January 2000.</p>	<ul style="list-style-type: none"> ▪ Cost sharing arrangements and consumption standards for rural, small town and urban schemes ▪ National policy objectives and targets to 2011. ▪ “Policy strategies” such as drinking water standards.
8	<p>“PAWS Institutional Scanning Report” Anambra State Water and Sanitation Sector Institutional Scanning, Nigeria, PAWS (Doug Hunt and Gabriel Ekanem), June 2007.</p>	<ul style="list-style-type: none"> ▪ Overview assessment of the water and sanitation sector ▪ ‘Roadmap’ of ‘quick wins’, guidance and questions they should consider when they are carrying out their institutional reform programme
9	<p>“PAWS Sector Restructuring Report” Anambra State Water and Sanitation Sector Institutional Reform Project, Nigeria. Technical Report. PAWS (Doug Hunt and Gabriel Ekanem), January 2008.</p>	<ul style="list-style-type: none"> ▪ Water and sanitation sector restructuring plan ▪ Recommend a trigger/activation strategy and change management plan
10	<p>“PAWS Masterplanning Guidance Report” Anambra State Water Supply Rapid Master Planning Guidance, Nigeria. PAWS (Doug Hunt and Gabriel Ekanem), June 2008.</p>	<ul style="list-style-type: none"> ▪ Guidance on masterplanning: key steps and activities.
11	<p>“Year Book” Anambra State Statistical Year Book, State Statistical Agency, 2006 Edition (not prepared for 2007)</p>	<ul style="list-style-type: none"> ▪ Monthly rainfall and temperature data (2004 only) ▪ Population figures (projections) to 2005 by LGA ▪ In-patient and out-patient attendances, including diarrhea (only filled in for 5 LGAs).

Ref	Document	Contains
12	Presentation 16 March 2007: Water and Sanitation Baseline Survey for South East States, Obiukwu Okek Associates Ltd (National Urban Water Sector Reform Project).	<ul style="list-style-type: none"> ▪ Hydrogeological review (incl aquifer characteristics) ▪ Lists perennial and seasonal rivers ▪ 2005 and 2015 Population data and water demands by LGA ▪ Numbers of functional and non-functional urban systems. ▪ Current outputs for urban schemes ▪ Costed investment requirements and revenue
13	Presentation: "Urban Water Sector Investment Plans" No further details (given to PAWS team by Sir Sam, Water Corporation)	<ul style="list-style-type: none"> ▪ ANSWC structure ▪ Urban water supply challenges ▪ Investment plan 2008-2010 (capex required and current/projected incomes) for 7 water schemes

5 Conclusions

This report represents the output of a visit to Anambra State, Nigeria, undertaken by Gabriel Ekanem and Graydon Jeal in August 2008 on behalf of Partners for Water and Sanitation. The purpose of the visit was to support the Anambra sector reform team and to provide guidance to help to steer the masterplanning work about to commence.

Proposed approach

An approach to masterplanning has been proposed, which includes the following key features

1. To enable masterplanning to be undertaken for the whole state, communities should be characterised by need and potential source availability. A number of priority and sample areas should then be examined in detail, costing up solutions.
2. The emphasis of the masterplan should be on delivering sustainable benefits. This will require assessment of the long-term funding requirements and how they will be met.
3. Robust costing is an essential element of a masterplan. To ensure consistent easy costing it would be useful to create a capital cost database and to build up reliable maintenance cost estimates for different scheme types.
4. It is likely that there will be significant budget constraints so it will be important to prioritise investments. Priority communities for investment are likely to be those identified as having relatively high rates of water-related illness; areas with particularly poor access to water (i.e. long distances from improved water source) and of the remaining communities, those with lowest cost (i.e. NPV) per person receiving a significantly improved service.

The report also sets out the steps to be undertaken in more detail.

Consultancy terms of reference

We would recommend making a number of scope items clear for the masterplan consultant:

- Explicit reference should be made to tariff assessment, including long term maintenance costs. This will require assessment of community's ability and willingness to pay.
- Clarify whether funding of maintenance should be dealt with in the State Policy study or Masterplan (i.e. whether it will be a state-wide or community-level decision).
- It will be important to involve potential funders in the masterplan process. This will also help to identify potential budget constraints.
- Uncertainty assessment will be required, including identification of the masterplan investments proposed under different funding scenarios.
- Any data management system created (i.e. a GIS system) should be readily updateable and training should be provided so that it can be handed over effectively after the consultancy ends.
- The need for consultation with stakeholders, including LGAs and WASH Com members, should be stressed.

Data gathering

A review of the existing data sets suggests that priority should be given to gathering the following information:

- Water supply coverage outside of the 5 focal LGAs. Consideration could be given to doing this by sampling of 'representative' communities and consultation with community/LGA representatives who know the area well.
- Incidence of water-related illness, at a sufficient level of detail to allow priority communities to be identified.
- The full costs of maintaining similar water supply systems (e.g. typical asset replacement frequency).
- Current populations by community. Again, this could be undertaken by assessment of a sample of 'representative' communities and consultation with community/LGA representatives. This need not be an extremely accurate survey but rather a classification by appropriate size band.
- Hydrological data (river flows, rainfall) especially in areas of poor groundwater supply.
- Groundwater quality risk assessment / analysis.
- Community willingness to pay for water supply (initial contributions and ongoing operation/maintenance).

Appendix 1: Workshop presentation



**ASWSSRP
Masterplanning
Support**

**Gabriel Ekanem
Graydon Jeal**



Presentation Structure

1. PAWS work in Anambra
 2. Objectives for the visit
 3. Masterplanning refresher
 4. What will the masterplan look like?
 5. Data requirements
 6. Key issues
 7. Where are we?
 8. What next?
 9. Questions for you
- 



**1) PAWS work in
Anambra**



PAWS: The Partnership

- Global
 - Nigeria
 - Anambra
- 

Activities to date

1. **Initial Institutional Framework
Assessment Support Visit**
 - Reviewed documents relating to Anambra State WSS institutions
 - Spoken to all ministries, bureaus, departments and agencies directly involved in water supply and sanitation
 - Liased with WSSSRP and SRIP teams
- 

2. Institutional Reform Plan Support Visit

- Provided advice on the required WSS Sector structure in Anambra
 - Provided advice on policy direction and policy framework
 - Provided a plan for reform, including:
 - Planning required
 - Change process and timelines
 - Triggers and leadership for change
- 

3. Rapid Masterplanning and Policy advice

- Explained what masterplanning is
- Showed the process of masterplanning
- Discussed links with investment plan
- Explained what a policy is
- Showed the process of policy development
- Overview of National policy
- Key issues in policy development

Why do we come back?

- Enthusiasm and Ownership
- Political commitment
- Progress made after every visit
 - Detailed Institutional assessment
 - Sector Restructuring and Reform Plan
 - Further studies and assessment
 - Collaboration and Change management

Forward Look



2) Objectives for the visit

Objectives for the visit

1. Identify data gaps for the masterplan
2. Suggest a roadmap for the way forward
3. Review the Masterplan consultant's ToR

3) Masterplanning refresher

Objectives



- Identify solutions (technical and institutional) to meet targets
- Identify costs and how these will be funded
- Not just investments in next few years - how will costs be met in the long term?

Key tasks



1. Current level of coverage
2. Project future water demand
3. Identify available water sources
4. Appraise potential options for supply:
 - Identify whole life costs
 - e.g. rehabilitation or new build bore holes, train operators, reduce leakage
5. Identify how costs (including operation and maintenance) will be met and by whom
6. Prioritise investments

4) What will the masterplan look like?



Potential Table of Contents



- Introduction
- Stage 1: Existing water supply situation
- Stage 2: Define Targets
- Stage 3: Options Identification and Appraisal
- Stage 4: Investment and Funding Plan
- Conclusions and recommendations

5) Data requirements



Data requirements



#	Data To get	What For?
1	Existing level of service and coverage	To know where we are today
2	Current level of water service coverage	To know where we are today
3	Existing water supply	To know what we are doing today
4	Existing and future population and water demand by community	To know what we will need to be able to supply
5	Existing water supply	To know what we are doing today
6	Existing water supply	To know what we are doing today
7	Existing water supply	To know what we are doing today
8	Existing water supply	To know what we are doing today
9	Existing water supply	To know what we are doing today
10	Existing water supply	To know what we are doing today
11	Existing water supply	To know what we are doing today
12	Existing water supply	To know what we are doing today
13	Existing water supply	To know what we are doing today
14	Existing water supply	To know what we are doing today

Data availability

Ref	Data Type	What For?
1	Availability of water supply	To know what you will need to be able to demand the investment
2	Cost of water supply	
3	Quality of water supply	
4	Quantity and quality of water demanded by community	To know what you will need to be able to demand the investment
5	Willingness to pay for water	To know what you will need to be able to demand the investment
6	Willingness to pay for water	
7	Willingness to pay for water	To know what you will need to be able to demand the investment
8	Willingness to pay for water	To know what you will need to be able to demand the investment
9	Willingness to pay for water	To know what you will need to be able to demand the investment
10	Willingness to pay for water	To know what you will need to be able to demand the investment
11	Willingness to pay for water	To know what you will need to be able to demand the investment
12	Willingness to pay for water	To know what you will need to be able to demand the investment
13	Willingness to pay for water	To know what you will need to be able to demand the investment
14	Willingness to pay for water	To know what you will need to be able to demand the investment

6) Key issues

- ### Key issues
- Funding the masterplan (especially maintenance)
 - How to prioritise investments?
 - How to supply areas where groundwater is not easily available?
 - How prevent vandalism?
 - Local or regional schemes?
 - 'Software' is necessary!

Funding the Masterplan

- ### Finances
- Important to make **REALISTIC** estimates and assumptions
 - *For e.g. if you think you won't receive money from Federal Govt, don't include it.*
 - Consider collecting money for maintenance in advance. *Escrow accounts could be used*
 - Map out costs and funding on a scheme by scheme basis

National Policy Cost Sharing

- **Capital Costs**

Agency	Rural Supply	water small Towns Water Supply	Urban Supply
Fed Govt	50%	50%	30%
State Govt	25%	30%	60%
Local Govt	20%	10%	10%
Community	5%	5%	0%

- **Operation and maintenance**

Agency	Rural Supply	Small Towns	Urban	Urban RWD
Fed Govt	0%	0%	0%	0%
State Govt	0%	0%	0%	100% (not)
Local Govt	20%	0%	0%	0%
Community	20%	100%	0%	0%

No outside contribution except for rural schemes

Costs- an example

COMMUNITY WATER SCHEMES

Year	Water Treatment	Operating Costs	Administration
2010	100,000	100,000	100,000
2011	100,000	100,000	100,000
2012	100,000	100,000	100,000
2013	100,000	100,000	100,000
2014	100,000	100,000	100,000
2015	100,000	100,000	100,000
2016	100,000	100,000	100,000
2017	100,000	100,000	100,000
2018	100,000	100,000	100,000
2019	100,000	100,000	100,000
2020	100,000	100,000	100,000
2021	100,000	100,000	100,000
2022	100,000	100,000	100,000
2023	100,000	100,000	100,000
2024	100,000	100,000	100,000
2025	100,000	100,000	100,000
2026	100,000	100,000	100,000
2027	100,000	100,000	100,000
2028	100,000	100,000	100,000
2029	100,000	100,000	100,000
2030	100,000	100,000	100,000
2031	100,000	100,000	100,000
2032	100,000	100,000	100,000
2033	100,000	100,000	100,000
2034	100,000	100,000	100,000
2035	100,000	100,000	100,000
2036	100,000	100,000	100,000
2037	100,000	100,000	100,000
2038	100,000	100,000	100,000
2039	100,000	100,000	100,000
2040	100,000	100,000	100,000
2041	100,000	100,000	100,000
2042	100,000	100,000	100,000
2043	100,000	100,000	100,000
2044	100,000	100,000	100,000
2045	100,000	100,000	100,000
2046	100,000	100,000	100,000
2047	100,000	100,000	100,000
2048	100,000	100,000	100,000
2049	100,000	100,000	100,000
2050	100,000	100,000	100,000
2051	100,000	100,000	100,000
2052	100,000	100,000	100,000
2053	100,000	100,000	100,000
2054	100,000	100,000	100,000
2055	100,000	100,000	100,000
2056	100,000	100,000	100,000
2057	100,000	100,000	100,000
2058	100,000	100,000	100,000
2059	100,000	100,000	100,000
2060	100,000	100,000	100,000
2061	100,000	100,000	100,000
2062	100,000	100,000	100,000
2063	100,000	100,000	100,000
2064	100,000	100,000	100,000
2065	100,000	100,000	100,000
2066	100,000	100,000	100,000
2067	100,000	100,000	100,000
2068	100,000	100,000	100,000
2069	100,000	100,000	100,000
2070	100,000	100,000	100,000
2071	100,000	100,000	100,000
2072	100,000	100,000	100,000
2073	100,000	100,000	100,000
2074	100,000	100,000	100,000
2075	100,000	100,000	100,000
2076	100,000	100,000	100,000
2077	100,000	100,000	100,000
2078	100,000	100,000	100,000
2079	100,000	100,000	100,000
2080	100,000	100,000	100,000
2081	100,000	100,000	100,000
2082	100,000	100,000	100,000
2083	100,000	100,000	100,000
2084	100,000	100,000	100,000
2085	100,000	100,000	100,000
2086	100,000	100,000	100,000
2087	100,000	100,000	100,000
2088	100,000	100,000	100,000
2089	100,000	100,000	100,000
2090	100,000	100,000	100,000
2091	100,000	100,000	100,000
2092	100,000	100,000	100,000
2093	100,000	100,000	100,000
2094	100,000	100,000	100,000
2095	100,000	100,000	100,000
2096	100,000	100,000	100,000
2097	100,000	100,000	100,000
2098	100,000	100,000	100,000
2099	100,000	100,000	100,000
2100	100,000	100,000	100,000

Funding- example contd

(Based on National Policy cost sharing)

COMMUNITY WATER SCHEME FUNDING

Year	Water Treatment	Operating Costs	Administration	Investment
2010	100,000	100,000	100,000	100,000
2011	100,000	100,000	100,000	100,000
2012	100,000	100,000	100,000	100,000
2013	100,000	100,000	100,000	100,000
2014	100,000	100,000	100,000	100,000
2015	100,000	100,000	100,000	100,000
2016	100,000	100,000	100,000	100,000
2017	100,000	100,000	100,000	100,000
2018	100,000	100,000	100,000	100,000
2019	100,000	100,000	100,000	100,000
2020	100,000	100,000	100,000	100,000
2021	100,000	100,000	100,000	100,000
2022	100,000	100,000	100,000	100,000
2023	100,000	100,000	100,000	100,000
2024	100,000	100,000	100,000	100,000
2025	100,000	100,000	100,000	100,000
2026	100,000	100,000	100,000	100,000
2027	100,000	100,000	100,000	100,000
2028	100,000	100,000	100,000	100,000
2029	100,000	100,000	100,000	100,000
2030	100,000	100,000	100,000	100,000
2031	100,000	100,000	100,000	100,000
2032	100,000	100,000	100,000	100,000
2033	100,000	100,000	100,000	100,000
2034	100,000	100,000	100,000	100,000
2035	100,000	100,000	100,000	100,000
2036	100,000	100,000	100,000	100,000
2037	100,000	100,000	100,000	100,000
2038	100,000	100,000	100,000	100,000
2039	100,000	100,000	100,000	100,000
2040	100,000	100,000	100,000	100,000
2041	100,000	100,000	100,000	100,000
2042	100,000	100,000	100,000	100,000
2043	100,000	100,000	100,000	100,000
2044	100,000	100,000	100,000	100,000
2045	100,000	100,000	100,000	100,000
2046	100,000	100,000	100,000	100,000
2047	100,000	100,000	100,000	100,000
2048	100,000	100,000	100,000	100,000
2049	100,000	100,000	100,000	100,000
2050	100,000	100,000	100,000	100,000
2051	100,000	100,000	100,000	100,000
2052	100,000	100,000	100,000	100,000
2053	100,000	100,000	100,000	100,000
2054	100,000	100,000	100,000	100,000
2055	100,000	100,000	100,000	100,000
2056	100,000	100,000	100,000	100,000
2057	100,000	100,000	100,000	100,000
2058	100,000	100,000	100,000	100,000
2059	100,000	100,000	100,000	100,000
2060	100,000	100,000	100,000	100,000
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2063	100,000	100,000	100,000	100,000
2064	100,000	100,000	100,000	100,000
2065	100,000	100,000	100,000	100,000
2066	100,000	100,000	100,000	100,000
2067	100,000	100,000	100,000	100,000
2068	100,000	100,000	100,000	100,000
2069	100,000	100,000	100,000	100,000
2070	100,000	100,000	100,000	100,000
2071	100,000	100,000	100,000	100,000
2072	100,000	100,000	100,000	100,000
2073	100,000	100,000	100,000	100,000
2074	100,000	100,000	100,000	100,000
2075	100,000	100,000	100,000	100,000
2076	100,000	100,000	100,000	100,000
2077	100,000	100,000	100,000	100,000
2078	100,000	100,000	100,000	100,000
2079	100,000	100,000	100,000	100,000
2080	100,000	100,000	100,000	100,000
2081	100,000	100,000	100,000	100,000
2082	100,000	100,000	100,000	100,000
2083	100,000	100,000	100,000	100,000
2084	100,000	100,000	100,000	100,000
2085	100,000	100,000	100,000	100,000
2086	100,000	100,000	100,000	100,000
2087	100,000	100,000	100,000	100,000
2088	100,000	100,000	100,000	100,000
2089	100,000	100,000	100,000	100,000
2090	100,000	100,000	100,000	100,000
2091	100,000	100,000	100,000	100,000
2092	100,000	100,000	100,000	100,000
2093	100,000	100,000	100,000	100,000
2094	100,000	100,000	100,000	100,000
2095	100,000	100,000	100,000	100,000
2096	100,000	100,000	100,000	100,000
2097	100,000	100,000	100,000	100,000
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2100	100,000	100,000	100,000	100,000

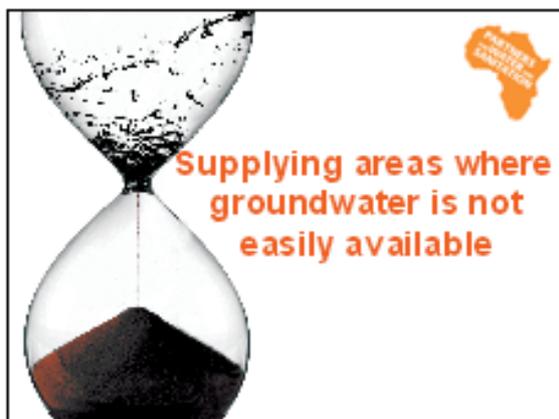
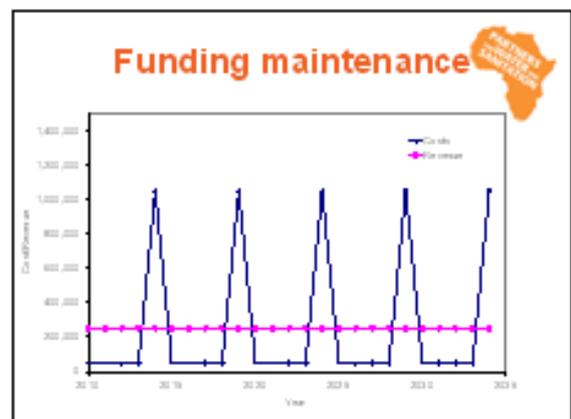
Maintenance

We need a Maintenance Culture

- Otherwise schemes will not be working in a few years

We need to allow for two types of maintenance:

1. Reactive- when things break.
2. Pro-active- to prevent things from breaking.



Background

- Majority of existing schemes rely on groundwater
- However, there are areas where groundwater is deep
- There may also be areas where groundwater quality is poor (*little information available*).

Options



1. Deep, expensive boreholes (where feasible)
 2. Surface water schemes (perhaps regional)
- Choice should generally be made on lowest whole life cost. Also, should take account of water quality and reliability and likely maintenance requirements.
 - Deep boreholes are likely to be appropriate where there is no good quality surface water within a reasonable distance (3km?) or significant pumping is likely to be required (e.g. community is uphill of surface water)



Prioritising Investments

Prioritisation



- Masterplan will come up with a prioritised, long term year-by-year investment and funding plan
- Prioritisation needs to be methodical
- Reduces potential for outside interference
- We need to justify why choose to invest in one location before another

Potential Methods



- Cost per person served
- Water-related illness
- Poor communities first
- Community commitment?
- WHAT DO YOU THINK?



Preventing vandalism



Suggestions

- Rural areas and small towns: strong community involvement
- Urban: community involvement and protection methods such as strong fencing (maintenance)



Local or regional?

Local

- Managed by communities
- Limited distribution pipework

Regional

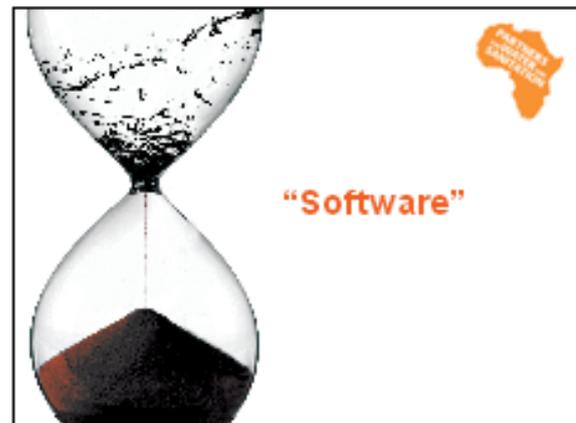
- Supplies several communities
- Pipelines required between communities

Partners for Water and Sanitation

Local or regional?

- Pipes can be expensive, require maintenance and often pumping is required
- Communities may be less interested in looking after regional schemes
- Our suggestion: regional schemes are potentially suitable where groundwater supply is limited

Partners for Water and Sanitation



“Software”

Skills required particularly for:

- Maintenance
- Budgeting and planning

Masterplan should include for training of community representatives and/or urban system operators.

This should not be just at the start; needs to be repeated. People forget things.

Partners for Water and Sanitation



Progress



Good progress made in 5 focal LGAs:

- Surveying water supply coverage
- Hydrogeology and details of existing surface water sources
- Inventory of existing schemes
- Costing for some schemes



8) What next?

Key activities



WATER RESOURCES

- Characterise whole State into areas by quantity and quality of:
 - Groundwater;
 - Springs;
 - Potential surface water (rivers, lakes).
- For areas without good potential for any of the above:
 - assess feasibility of capturing seasonal surface water sources (e.g. dam construction)

Key activities



FUTURE WATER DEMAND

- Future populations and water demand at a community level
- May be best to do this for all priority communities and a sample of others

Key activities



SCHEME COSTS

- Create capital cost database
- Estimate maintenance and operating costs
- Decide on approach to funding maintenance (escrow accounts?)
- Concept design and costings for
 - specific schemes (in priority communities) and
 - generic schemes (based on sampling)

Key activities



OPTION APPRAISAL

- Assess long term costs of options where there is more than one possibility for water supply
- Generally select option with lowest whole life cost, but also take account of water quality and reliability.

Data gathering priorities



- Water supply coverage outside of 5 LGAs. Consider doing this by sampling or consulting with community/LGA representatives.
- Current populations by community
- Hydrological data (river flows, rainfall) in areas of poor ground water supply
- Groundwater quality risk assessment/analysis
- Community willingness to pay for water supply



9) Questions for you?

How should locations be prioritised?



- Cost per person served? *E.g. scheme in Community 'A' costing 1000N/person would be prioritised over scheme in Community 'B' costing 5000N/person*
- Where there is high rate of water-related illness?
- Poorest communities first?
- Areas with highest community commitment?
- Other?

How should maintenance be funded?



- Pay in advance?
- Pay more when maintenance needed?

What kind of scheme would work best in rural areas and small towns in your LGA?



- Local scheme (run by community)
- Regional scheme serving a group of communities



Thank you