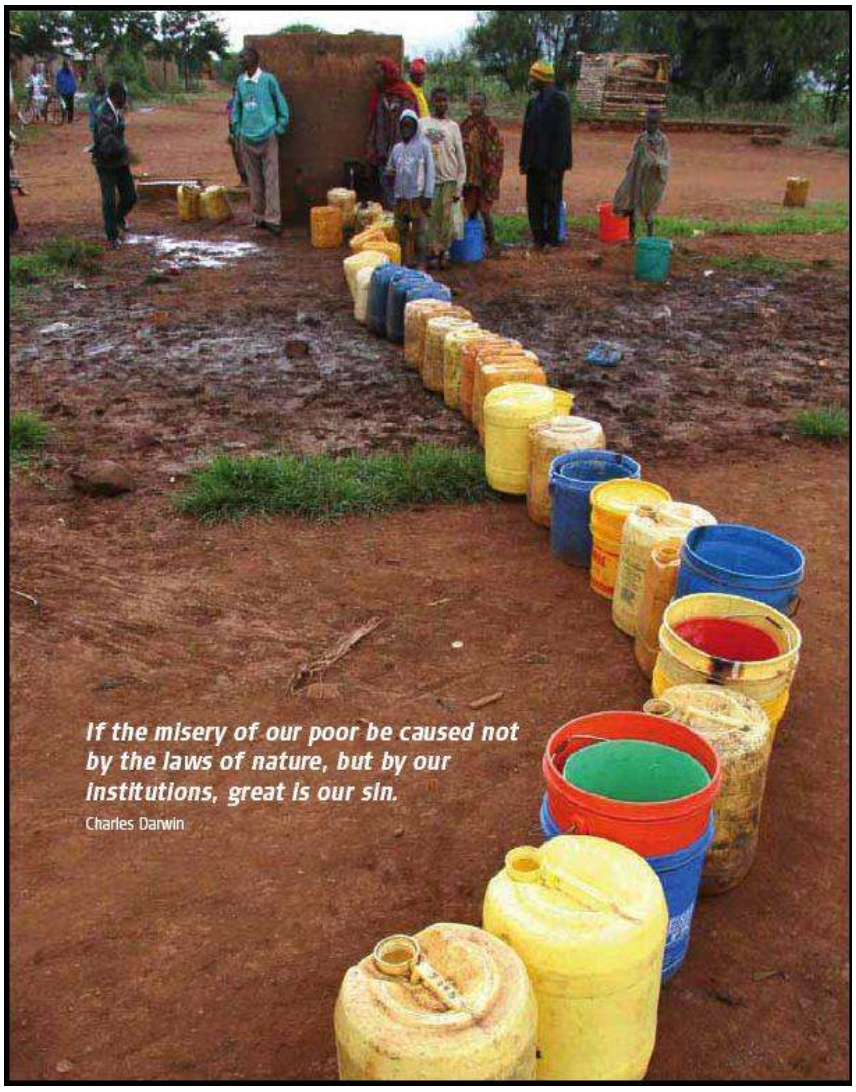
Water Point Mapping



The Experience of SNV Tanzania

Dar es Salaam, January 2010

SNV
Connecting People's Capacities

Water Point Mapping

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Cover Photo:

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1 Introduction

This report is the assignment completion report for the Water Point Mapping (WPM) initiative jointly carried out by SNV Tanzania during 2007 and 2008. WPM is divided into two stages: (i) physical mapping (of all public improved water points in 10 districts) and a Validation and Inquiry Process (VIP) in selected villages (to explore various governance aspects that have a direct impact on the functionality rate of water supply facilities. Analysis in this report is generated from: the raw data from the WPM survey; the validation inquiry exercise; as well as reports and case studies prepared by SNV Tanzania WASH advisors.

WPM is a survey tool originally designed and promoted by WaterAid in Malawi to collect data on water supply infrastructure. A handheld Global Positioning System (GPS) unit is used to record the precise location and approximate altitude of all water points visited. A digital camera is used to record each water point in order to present the reality of the physical conditions. At each water point a questionnaire is completed to document its characteristics, such as: location, status, type of schemes water supply source, water quality and quantity, management arrangements, ownership and water tariff payment.

WPM has to date been completed in 55 Districts. Unlike traditional data collection where the number of newly constructed water points is often over reported and the non-functional ones are often underreported, WPM produces an up-to-date and accurate database on the existence and functionality of all public water points in rural areas. WPM has provided an explanation to the discrepancies between the coverage reported by local government (based on the number of water points constructed, regardless of their functionality) and the coverage recorded by the National Bureau of Statistics (based on people's perception of their accessibility to a service).

WPM data can be analysed and presented as charts, graphs and maps that are easy to understand and which can be used at different levels and for different purposes. For example:

At Community/Users Level

- To provide genuine and convincing arguments about service delivery
- As a catalyst to rethink management systems and sustainability/equity challenges
- To raise awareness about the responsibilities for O&M at the community level

At Regional/District Level

- To prioritise financial and investment planning
- To promote equitable resources allocation
- To plan (new) water point distribution
- To support rehabilitation/replacement plans
- To provide (technical/human resources) support mechanisms where needed
- To provide realistic water coverage scenarios
- As a monitoring tool for sector performance
- As a means to determine the cost effectiveness of investment

At National Level

- To influence/adjust national policies and strategies
- As a realistic insight into sector performance
- As an opportunity to get governance issues on the table
- As an input for equitable resource allocation and informed decision-making
- To prioritise financial and investment planning
- To support national monitoring
- To track MKUKUTA/MDG achievements
- As a means to set sector priorities and targets
- As indicators for sector performance monitoring

Some limitations of Water Point Mapping would include:

- Water quality data collected by WPM is based on subjective judgement (colour, taste, smell or visibility of TSS) and not on laboratory analysis;
- Population figures are from the Population Census of 2002 whereas most WPM was was carried out in 2007 and 2008
- WPM only counts public water points. In areas with a high percentage of private connections the coverage reported by WPM can be misleading.

2 Demonstration of Data Analysis and Presentation

This section demonstrates how WPM data can be analysed and utilised for different purposes.

The data collected by SNV from 10 districts (Table 1) shows that 2,620 water points (or 43%) are for various reasons not functional.

Table 1: Water Point Status in 10 Districts

District	Total WPs	Functional WPs		Non Functional WPs	
Mvomero	549	318	58%	42%	231
Maswa	540	367	68%	32%	173
Longido	229	147	64%	36%	82
Muleba	502	176	35%	65%	326
Morogoro	161	27	17%	83%	134
Bukoba	568	316	56%	44%	252
Karatu	631	517	82%	18%	114
Magu	1087	482	44%	58%	605
Missenyi	533	221	41%	59%	312
Mwanga	1,309	918	70%	30%	391
Total	**6,109**	**3,489**	**57%**	**43%**	**2,620**

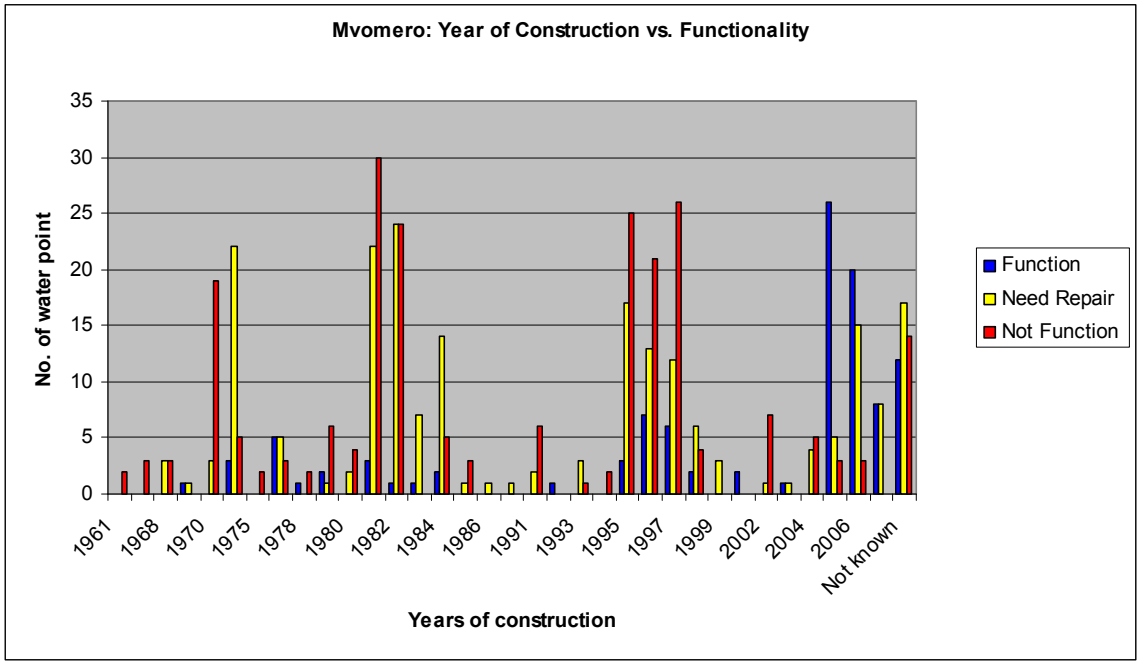
As per official criteria, one water point provides water to 250 people. Thus in the table above 655,000 (2,620 x 250) people are in practice not served due to non- functioning water points.

In addition to the overview of actual functionality information, the analysis of the data collected also highlights comparison or correlation between:

- Functionality – Ownership / Management
- Functionality – Year of construction
- Functionality – Type of water point or extraction method
- Functionality – Mode of payment
- Coverage – Functionality vs. Non functionality
- Distribution of water points between Districts or Wards

The analysis can be illustrated in the form of diagram, chart or map that allow highly visualised and easy to compare and contrast as shown in the following examples.

Figure 1: Functionality vs. Year of Construction



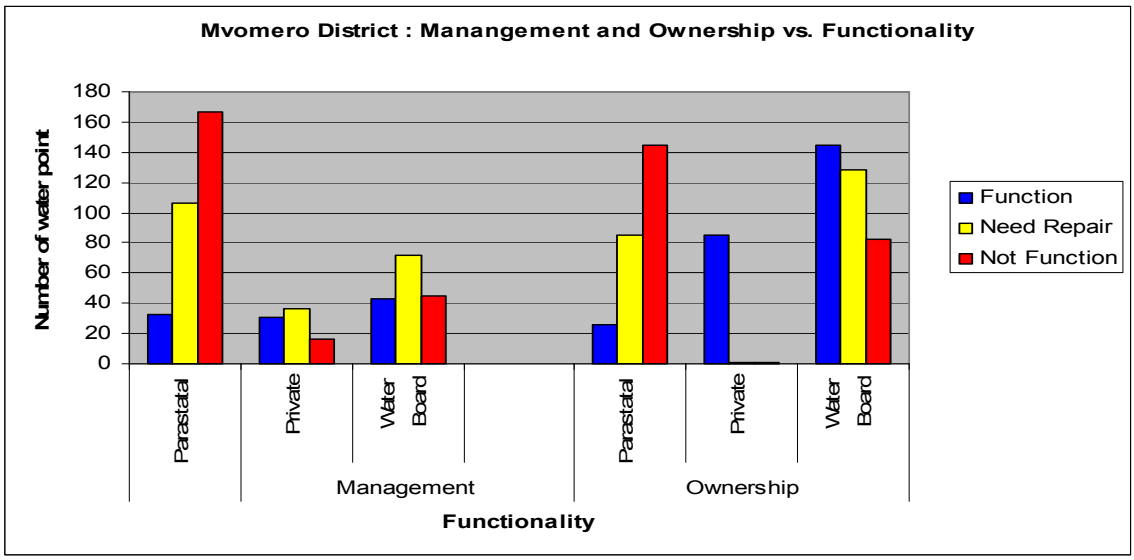
Observations:

1. Only a few water schemes were constructed during the period of 1986-1995

2. Most water schemes constructed prior to 2005 are not functional

3. The number of water schemes constructed prior to 1988 (already working beyond their design life of 20 years) and the number of non functional water points constructed after 1988, suggests that there is an urgent need for a rehabilitation/replacement plan.

Figure 2: Functionality vs. Ownership and Management Models



Observations:

1. Ownership and management by government shows the highest non-functionality rates while private ownership/management show higher functionality.

2. There is very private investment (=ownership) in water services and very few local private companies have been hired to manage service provision.

3. Additional inquiry should be carried out to capture 'the success story' of the water boards ownership and management structure

Figure 3: Payment vs. Functionality

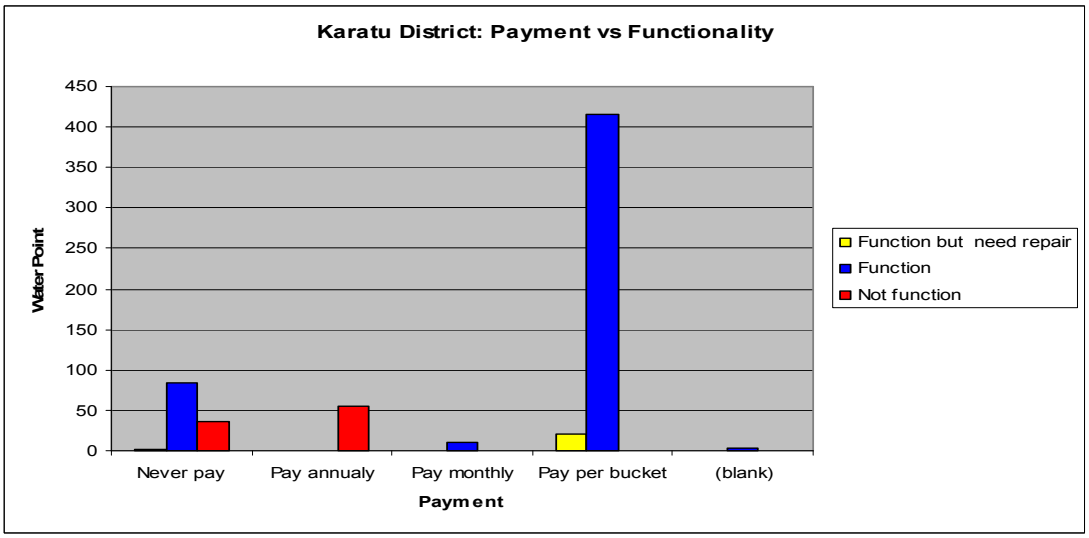
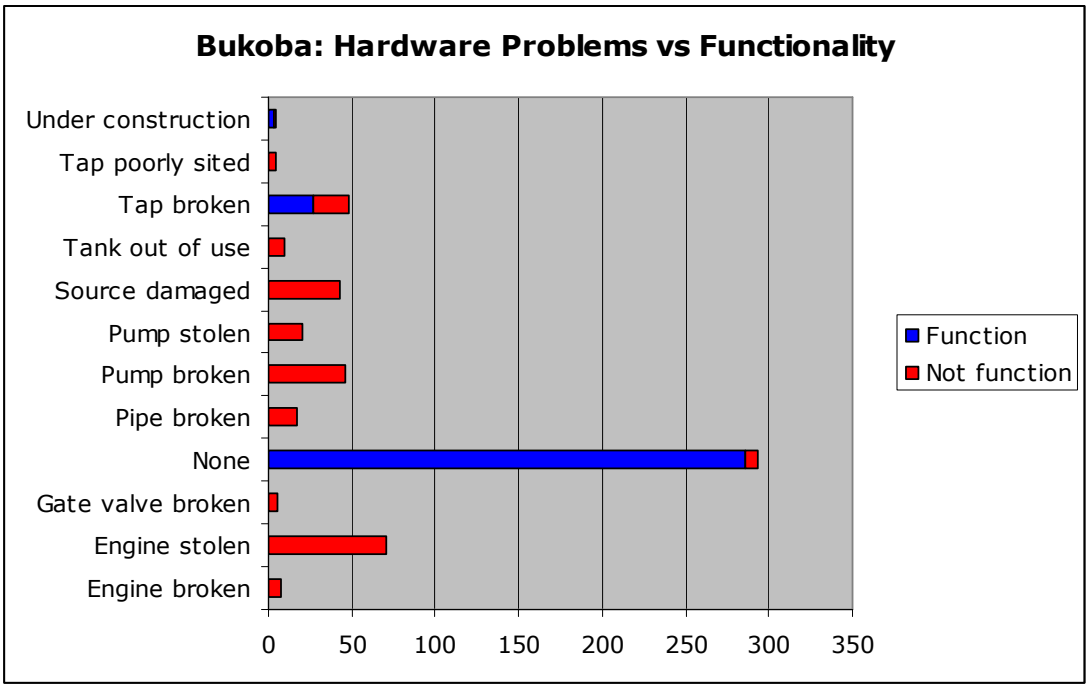


Figure 3 demonstrates that 100% of schemes where water users pay monthly or per bucket are functional while only 60% of schemes are functioning where people never pay (of which almost half were newly built or less than 10 years old). On the other hand none of the schemes that collect money annually are working.

Figure 4: Hardware Problems vs. Functionality



Data collected in each of the 10 districts shows that water schemes with hand-pumps have the lowest functionality rate. In the case of Bukoba above the leading causes of non-functionality are pumps and/or engines stolen or broken, followed by sources damaged and taps broken.

With regard to Figures 6A and 6B on the following pages highlighting the situation in Mwanga district, the absolute number of water points (regardless of status) suggests that in most areas of Mwanga coverage meets and even exceeds the national standard of 250 people per water point (Figure 6A), however when functionality is taken into account the same data produces quite a different picture (figure 6B). This type of visualisation helps guide planners or decision-makers to plan for prioritised and/or most cost effective investments (whether to invest in new schemes or to give priority to rehabilitation of non functional schemes in certain area).

Figure 6A: Mwanga District - Water coverage: Non-functionality vs Functionality

Figure II

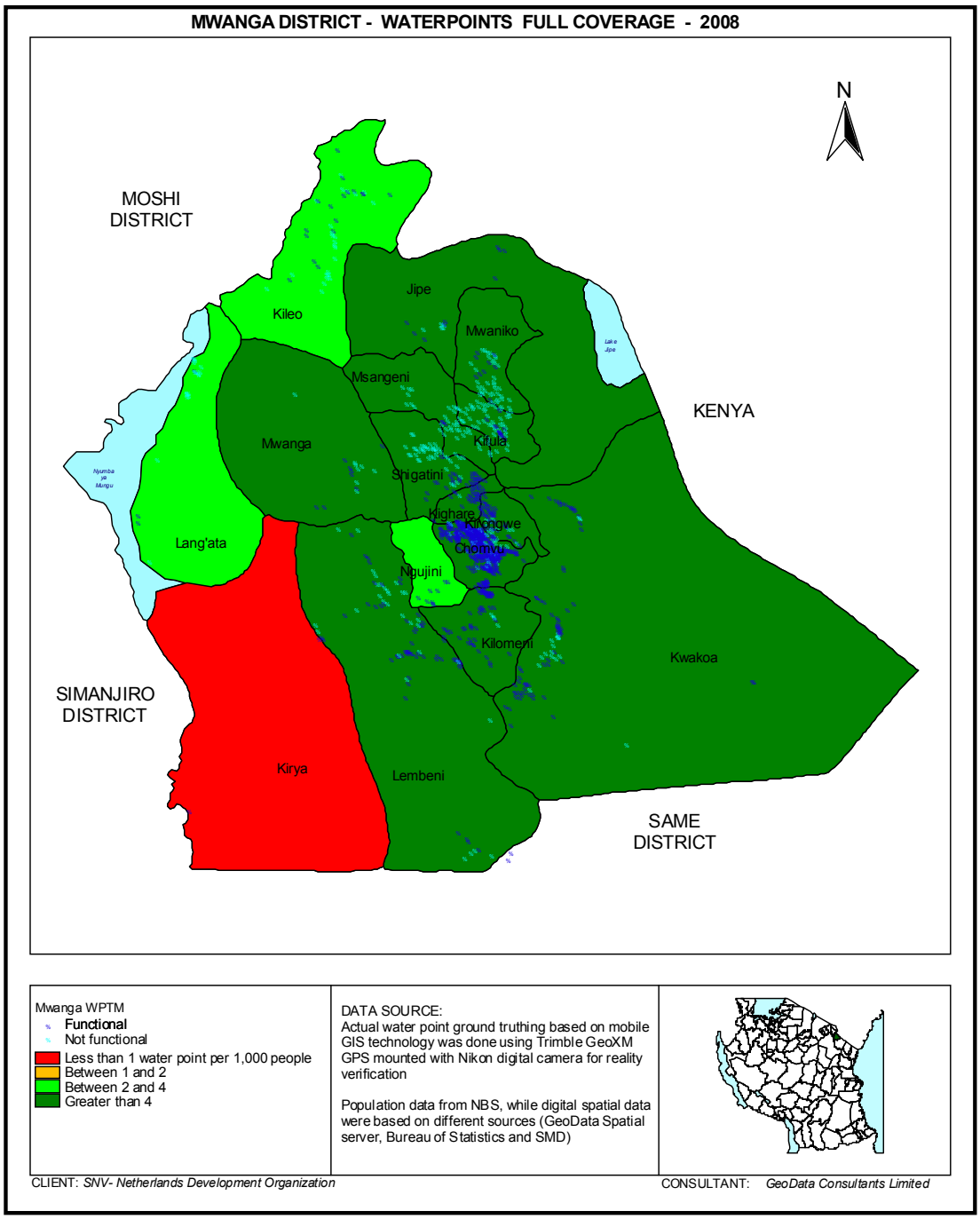


Figure 6B: Mwanga District - Water coverage: Non-functionality vs Functionality

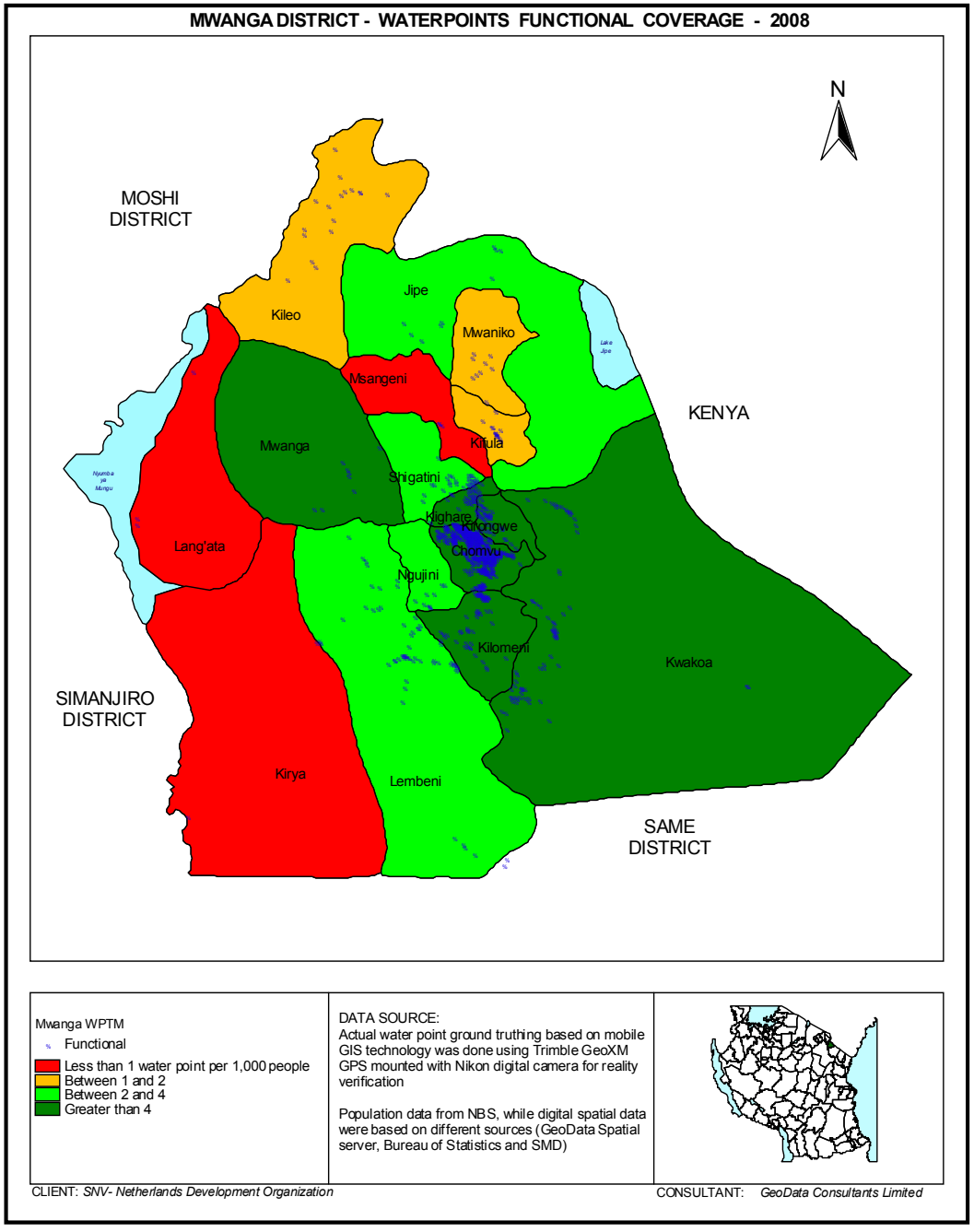


Figure 7: Equity in Water Point Distribution

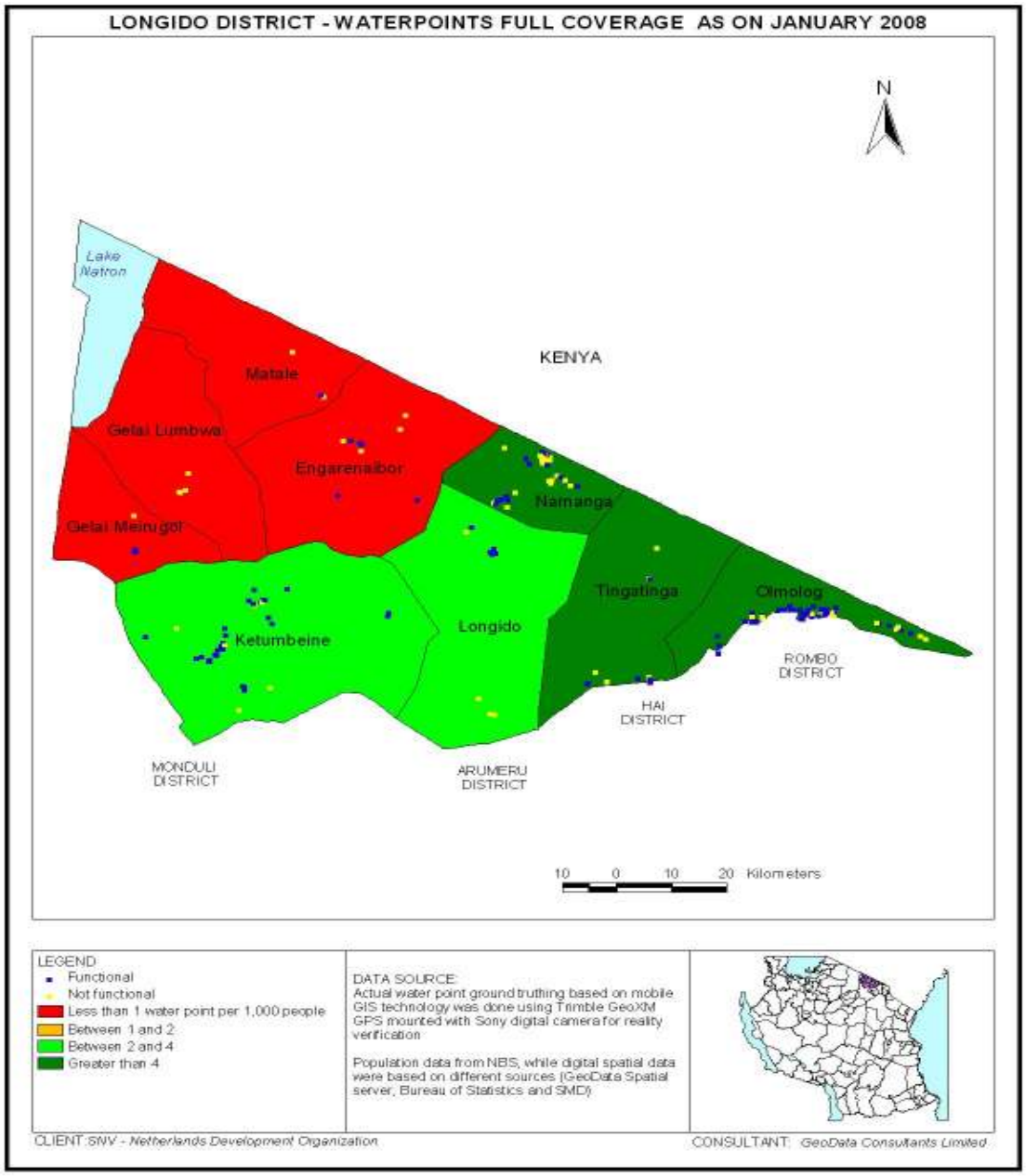


Figure 7 illustrates how water points are unevenly distributed in Longido district. Some wards meet and even exceed the national coverage standard while others are left far behind. It will be possible to make similar comparisons between districts or regions once the collection of data is completed nationwide. This information will provide planners and decision-makers with evidence-based reference on resources allocation (that is resources can be directed to where the needs are greatest or the cost effectiveness is the highest).

3 Findings from the Validation and Inquiry Process

The VIP was carried out by SNV in selected villages after the physical mapping in each district was completed. The VIP uses participatory techniques (focus group discussions, interviewing key informants, stakeholders meetings and analysis) and positive inquiry in an attempt to acquire an in-depth understanding of the reasons behind success stories; the underlying causes of non-functionality and low coverage in some districts.

Data collected from WPM in 10 districts showed that 43% of water points are not functioning and some water points are no longer functioning less than two years after construction. The causes of non-functionality identified during in-depth inquiries with different target groups, are:

Ownership and Participation of Water Users

Although the National Water Policy (NAWAPO 2002) clearly indicates that "communities take the lead in developing their water supply facilities and be fully responsible for the O&M of their schemes", findings from the VIP exercise however showed that communities had very little knowledge about this change and the majority of people interviewed still strongly believed that water schemes belonged to the government and it was the government's responsibility to provide water services to its citizens. People often associated names of the water points with the names of the funding agencies and did not perceive that the schemes were under their ownership. Water at public water points is generally free for all and is often used wastefully and irresponsibly, there is no rules or regulations that impose fines or sanction on wrong-doing, as a result, there is high incidence of water pumps being stolen or water points being vandalised.

In most villages visited, communities were not fully involved in and/or informed of the planning process of the water point development. Water points are often constructed and handed over to the community either by the government or donor organisations without a clear plan or arrangement of how the water points would be managed or maintained. Many water users do not understand their roles and responsibilities and that of other key stakeholders (for example district water engineers and village water committee members) in water services delivery. When a water point breaks down, communities do not know what to do or where to seek support and these water points are often subsequently abandoned.

Although the burden of fetching water falls on women and children, decision-making at village meetings is taken by men who attend the meetings and more often than not, investment for water point development or rehabilitation is not a priority. At Kilago ward in a group discussion around a non-functional water point, one man pointed out "I did not know the water point is not functioning due to such a small problem because I never fetch water, that's women's business".

Financial Issues

Findings from the VIP survey showed that water users' willingness to pay for water services depends on various factors, including:

- Habitual Reliance on Government: contrary to the national policy of 2002, that clearly states the Government is a regulator/facilitator and no longer the service provider, the mindset of "water is free" or "the government is responsible for the provision of water services" still exist in many villages and people refuse to pay for water services and are still waiting passively for the government to come and resolve their problems. Politicians often worsened the situation with promises to provide free water for all.

- Unwillingness to pay for water services if alternative water sources (from river, dam or streams) are available even though they are unprotected or unsafe for drinking. People do not see a link between safe water and health. The village chairman in Dakama ward (Mawsa District) was adamant that the water was safe if it looked clean and he explained "you see what enters into our body through the mouth; the stomach has a mechanism to process it. All the good stuff will be retained and all dirt will be ejected through the normal channel. So there is no problem. This is how our ancestors lived and survived''.

- Unwilling to pay for non-reliable services. Villagers complained that they had paid the water tariff but did not get the services promised and decided to stop paying. This often ran in a vicious circle: services deteriorated and people were less willing to pay, as the result, there was no fund for O&M and the water service collapses.

- In some villages, where there was no service and no alternative water source; people simply did not have any choice but to pay very expensively for (any) water.

Rational Tariff Setting

There were many different levels of water tariff at the villages/water points visited. At some the water tariff has never been collected (in Bukoba District at 536 out of 568 water points people never pay for water). Water is free but when water points breakdown, they are abandoned since there are no funds to repair or replace spare parts and nobody is responsible for this task. At water points where a water tariff is applicable, there is generally no rationale for water tariff setting and water tariff and payment arrangements vary from village to village ranging from a fixed amount per month or year per person or per household. In other cases the tariff is fixed per jerry can. In some instances, the water tariff is set just enough to cover operational costs (fuel and minor repairs) with no excess set aside for major repairs or replacement. In others, people pay expensively and still do not get a proper service as the money collected is often used for other purposes or simply for private gain. None of the village visited was able to show a rough estimation of O&M costs for their water points and there is no correlation between actual O&M costs and the water tariff.

Cash Availability

In villages where the water tariff is collected irregularly (annually/when schemes fail), it was reported that many rural households do not always have cash available in their home, the bill collectors have to visit the same households many times for a very small amount of money. Villages that apply pre-paid models do not experience this problem.

Transparency and Accountability

Many water users commented that although the water tariff was collected, they had no idea how the money was spent. For example, at Tunapende water point in Kilago Ward in Kahama, the community complained "we made contributions over several months and when we asked the Treasurer to open a bank account, he left for town on the pretext of opening the account. When he came back after two months he had a new bicycle and he never said anything about our money". The community has therefore decided not to make further contributions. Water users in many villages emphasised the need to ensure transparency and accountability of money collected through the regular village meetings and/or financial reports to be published on the village notice board on the incomes and expenditures of water services. More specifically water users interviewed reiterated that they would be more willing to pay if they:

- Understand why funds are required
- Are consulted/involved in the selection of operators and treasurers
- Are consulted/involved in setting water tariff and fund raising
- Agree on fine or sanction with defaulters or violators
- Have confidence in the people entrusted to handle money
- Are issued with receipts each time they pay
- Get regular reports on how money was collected/spent and for what purpose
- Know money is banked as soon as it is collected
- Can examine all financial records and these are kept open to public inspection

Family and Social Pressure

An issue raised by bill collectors was that due to social/family pressure, they cannot collect money from their own relatives and cannot disconnect them from the service either. There was a suggestion that the bill collectors should come from outside the village to avoid this problem.

Access to Banking Services

In many villages, there is expressed demand for the safe-keeping of the money collected. Surveys in Maswa and Kahama districts, especially from rural/remote areas revealed that the community do not have easy access to a bank and it is too costly to operate a bank account at the district or regional headquarters - the bank is simply too far away from the villages; the services are not "for the poor", the procedures are too complicated, people have to pay commission to deposit the money in the bank (in effect reducing the amount collected from water users). Some villages have resorted to an informal financing system called "ifogongh'o" (a traditional local revolving fund). This system is reported to work well for the purpose, but it is not formalised/recognised as a financing institution.

Investment Priority

Currently, resource allocation from central government to local government has not been designed to reward good performers in maintaining high rates of functionality. At district level, there is a general tendency (as has been observed in all 10 districts) to invest mainly (if not only) on construction of new water points and little attention is paid to rehabilitation or repairing of non-functioning water points.

Technical Issues

Reported technical reasons behind non-functional water points include:

- No concept of routine and preventive maintenance: during visits to non-functional water points, SNV advisors helped fix problems on the spot at over 500 water points that only required minor repairs such as fixing taps/valves or clearing the intake that had been blocked by dead leaves/garbage

- Top down/supply driven planning resulting in technologies/services that are often too complicated or not suitable to local context or what people want and/or can afford.

- Inappropriate or disproportionate distribution of water points: some areas have more water points than needed, therefore if a water point breaks down, people do not need to repair it, they just move to use another one. Meanwhile in some other areas, water points are located so far away from residential areas that people never get there to fetch water - these water points are often recorded as functional but have never been used.

- Most people assigned to be responsible for O&M do not have the right skills or technical expertise or incentives to perform well. Qualified/trained staff tend to look for jobs elsewhere. Villages with high functionality usually have strong/active leadership.

- Spare-parts for hand-pumps: analysis indicates that water points with hand pumps showed the lowest functionality rate however most hand-pump spare-parts are not available locally and even if they are they are very expensive.

- With fast population growth and changing lifestyles that place greater demands on water consumption, many boreholes become dry due to overexploitation

- It was reported that although funding was channelled from central government to local government for construction of deep boreholes, some LGAs opted for shallow wells so 'that they can make money' (the average cost for a shallow well is approximately TZS 2 to 4 million while it costs about TZS 14 to 20 million for a deep borehole). On the other hand many LGAs reasoned that funding from central government often arrived late and under pressure to spend money quickly, most water schemes are constructed during the rainy season (October- December) when the water table is high and there was no need for deep boreholes: "we do not see any value from deep wells – when we most need water in the dry season, they are equally dry so why should we invest our energy on them", quipped one villager in Isagaha ward, Kahama.

- Some schemes and water points are financed by private sources (including politicians in their run-up for elections). These schemes do not follow any technical design or standard and often break down soon after being constructed.

The case study of Lalago on the following page is a good example of how investments can be wasted if the correct technology is not taken into consideration in the design of a water scheme.

Management Issues

Data collected from the 10 districts indicated that Village Water Committee are still by far the most popular management model for operating rural water schemes and/or water points. The same data also showed however a strong correlation between various management models and the functionality of water points - water points owned and managed by private operators tend to have much higher functionality rates than those owned and operated by VWCs.

Under time constraints and the limited scope of the VIP exercise, this correlation was however not fully investigated and deserves to be explored further.

Case Study: Lalago Piped Water Scheme (Maswa District)

1. The Water Tank is Full

2. But the Engine is Broken

3. So Villagers Use Unsafe Water

4. And Water Vendors Do Good Business

4 Conclusions

WPM is a useful survey tool to collect accurate data on the existence and functionality of water points. The information obtained from WPM can be analysed and utilised at different levels for different purposes. WPM has a huge potential as an effective planning, monitoring and management tool that can facilitate evidence-based planning and decision-making processes. However this potential can only be realised if mechanisms are in place to collect and regularly update the data and if there is willingness from the Government to use WPM as a tool for more transparent and equitable resource allocation.

Data collected from WPM and evidence from the VIP showed that the main underlying cause of water point non functionality in the 10 districts where SNV worked is anchored in the fact that most rural water supply projects are still top down/supply-driven with little or no consultation or involvement of the water users in their planning, design and implementation. As a result, there is no sense of ownership amongst the community; the services provided do not reflect what people want or are willing to pay for. The vast majority of the community is not aware of the changing role of government, water users and other key stakeholders. The community has not been formally recognised as the owner and managers of water supply schemes and services. Water services are still largely treated as a public good with no economic value; there is no rational to water tariff setting to ensure cost recovery. People in charge of rural water supply infrastructure management do not have the right skills/expertise or incentive to perform well. Finally there is no accountability system where people can track funding allocated by central government and/or the funding contributed by water users for rural water supply services.

Although it has been already seven years since the National Water Policy came into effect, there is still an enormous gap between policy and implementation. Unless the underlying causes of non-functionality are addressed and the key principles of the national water policy are strongly adhered to, the number of schemes that fail/become non-functional will soon exceed the number of new schemes being constructed and the sustainability of rural water supply services in Tanzania will be seriously threatened. Indeed there are already indications that coverage is actually going backwards in spite of billions of investment in the rural water sector.

To contribute to the improvement of the sustainability of rural water supply services in general and to improve the water point functionality in particular, SNV Tanzania will follow-up the WPM exercise through the following activities:

- Working with LGAs to support the process of legally registering COWSOs to become legal entities to own and manage rural water supply schemes.

- Carrying out a comprehensive and in-depth study on various rural water supply schemes management models to explore what works, what does not work and why and subsequently develop a framework that propose various management models for different types of water schemes that overcome the problems/short-comings of the previous models.

Appendix 1: Glossary of Terms

Term	**Description**
Water Point	The point at which water is intended to emerge from a public improved water supply, such as a tap
Functional	A WP is functional if it yields water for at least six months of the year and is being used by people as a water source on a day to day basis
Non Functionality	A WP is non-functional if it does not yield water for more than six months of the year for any reason whether due to a hardware problem, to the source being dry, to water quality for (for example too salty or too much fluoride), or due to management (WP closed because it is not economic to place tariff collector at WP due to under use). Non-functional also includes those WPs that are under construction but not yet operational. Functionality therefore should be imminent, and this must be reflected in planning decisions
Functionality Rate	The percentage of water points that are functioning. Calculation = (No of functioning water points/Total no. of water points)*100%
Water Point Coverage	The number of water points par 1000 people. Calculation: (No of water points/Population)*1000
Equity in Distribution	This indicator captures the difference in WP coverage between areas. It is an expression of the average deviation from the mean WP coverage of the area being considered. The greater the average deviation, the greater the inequity in distribution of water points. Zero represents perfect equity, meaning that all areas have the same lever of service. Calculation: 1. Calculate the water point density for each of the area under consideration 2. Calculate the average water point density for these areas. 3. Calculate the difference between the average density and the density for each area. 4. Make sure all results from three are positive numbers 5. Calculate the average of the deviations from the mean. This gives the equity in distribution figure
Full Coverage	According to the Tanzania National Water Policy, full coverage equates to 1 WP per 250 people. This equates to WP coverage of 4 WP per1000 people

Appendix 2: Interpretation of Data

Data Unit	Interpretation
Location	The location of the water point is shown on a map, the total set of depicted water points provide an insight in the geographical distribution
Water quality and quantity	Can be considered as a sub-indicator of status
Funder, Installer	Gives insight in i.e. private sector or Government involvement
Year of construction	Under normal circumstances the lifespan of a water point is on average 20 years, knowing the construction year plans can be made for rehabilitation or replacement
Source type	Provides information about pollution risks, i.e. surface water - high, groundwater - low and long term reliability, i.e. the trend of dwindling water of springs
Kind of water point	Gives insight in the sustainability and community ability of financial managing their supply, i.e. a gravity scheme is more likely to be sustainable than a pumped scheme
Extraction method	By knowing the extraction method, i.e. hand pump, standpipe spare-part scenarios can be developed
Status	The status provide an insight in the real water coverage and may lead to further inquiry
Year of breakdown	The year of breakdown is a good indication about the capacity to repair a water point and may be a reason for further inquiry
Hardware problem	This can be linked with the extraction method and inform the procurement of spare parts
Ownership/Management	Looking at a whole set of water points the information tells whether a particular ownership/management model is successful and worthwhile to replicate
Mode of payment	The information about payment and status can provide an insight whether there is a direct relation between the two

Appendix 3: WPM Data Entry Form

Water Point Mapping - Data Entry Form

Date of record _____ Recording organisation _____

Region _____ Village Longitude _____ Dec °
District _____ Village Latitude _____ Dec °
Ward _____ Village registration no _____
Village _____ Village phtoto ID _____
Sub village _____

WP name _____ GPS waypoint no _____
Scheme name _____ WP Longitude _____ Dec °
Funder _____ WP Latitude _____ Dec °
Installer _____ Elevation _____
Year const'd _____ WP photo ID _____

Source type
- ○ Shallow well
- ○ Hand-drilled tube well
- ○ Machine-drilled borehole
- ○ Dam
- ○ River/Lake
- ○ Spring
- ○ Rainwater harvesting
- ○ Other…

_____

Extraction system
- ○ None
- ○ Mono
- ○ Cemo
- ○ Climax
- ○ KSB
- ○ Submersible
- ○ Gravity
- ○ Afridev
- ○ Nira/Tanira
- ○ SWN 80
- ○ India mark II
- ○ Walimi
- ○ Windmill
- ○ Other…

_____

Water point type
- ○ Hand pump
- ○ Communal standpipe
- ○ Communal standpipe multiple
- ○ Cattle trough
- ○ Dam
- ○ Improved spring
- ○ Windmill
- ○ Other…

_____

Status
- ○ Functional
- ○ Not functional

Main hardware problem
- ○ None
- ○ Source damaged
- ○ Pump broken
- ○ Pump stolen
- ○ Engine broken
- ○ Engine stolen
- ○ Tank out of use
- ○ Pipe broken
- ○ Tap poorly sited
- ○ Tap broken
- ○ Under construction

Water quantity
- ○ Enough
- ○ Insufficient
- ○ Seasonal
- ○ Dry

Water quality
- ○ Soft
- ○ Milky
- ○ Coloured
- ○ Salty
- ○ Salty abandoned
- ○ Fluoride
- ○ Fluoride abandoned
- ○ Abandoned other …

Breakdown year _____

Other reason WP not functional … _____

Scheme Ownership
- ○ VWC
- ○ WUG
- ○ WUA
- ○ Company
- ○ Trust
- ○ Water Board
- ○ Parastatal
- ○ Private individual
- ○ Other…

_____

WP Management
- ○ VWC
- ○ WUG
- ○ WUA
- ○ Company
- ○ Trust
- ○ Water Board
- ○ Parastatal
- ○ Private operator
- ○ Other…

_____

Water payment
- ○ Pay per bucket
- ○ Pay monthly
- ○ Pay annualy
- ○ Pay when scheme fails
- ○ Never pay
- ○ Other…

_____

Public meeting about income & expenditure ?
- ○ Yes
- ○ No
- ○ Don't know

Comments _____

Appendix 4: Water Point Mapping Data Sheet