

Progress Brief:

Functionality of Rural Water Supply Services Programme Assessing Rural Water Supply Levels of Service in Cambodia: Findings and Lessons Learned From a Baseline Assessment

SNV Progress Brief

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SNV Cambodia is working with local partners in Chum Kiri District, Kampot Province to address water supply functionality issues and improve Levels of Service (LoS) as defined by four criteria: quality; quantity; accessibility; and reliability.

A baseline survey conducted in late 2013 revealed that rainwater harvesting and surface water are the two most common primary household water supplies for the wet and dry seasons, respectively. Tube wells are also relatively common, but are typically utilised for personal hygiene and domestic uses as the water is commonly regarded as having a poor taste.

Overall water supply LoS in the district is low due to minimal use of improved water supplies - especially in the dry season. Additionally, lack of water in the dry season is an issue as ponds and dug wells become dry.

SNV is working to address these issues through developing and connecting the capacities of government, water supply operators, and private/public implementers. We strive towards better management of water issues; informing decision-making and planning; and improving post-construction support mechanisms. The programme will also seek to address local inequalities in service levels for different socio-economic groups.



Figure 1. SNV's FRWS approach

Background: Functional Rural Water Supply Services (FRWS)

Since 2009, SNV has been providing capacity building and technical assistance to local government agencies in Cambodia to implement rural sanitation and hygiene programs. In 2013, SNV began a new regional programme to improve the functionality of rural water supply services in Cambodia, Laos and Nepal.

Coverage figures for rural water supply make us hopeful, as Cambodia's MDG target for rural water supply has been met as of 2010. However, as the Joint Monitoring Programme (JMP) acknowledges, these figures can hide the reality of often unreliable, unsafe water supply and large differences in Levels of Service (LoS) and costs between socio-economic groups. Achieving truly functional water services is a big challenge, going far beyond just coverage at a given point in time. The core components of SNV's Functionality of Rural Water Supply Services (FRWS) Programme are summarized in Figure 1 above.

SNV in Cambodia is working closely with the Provincial Department of Rural Development (PDRD) in Kampot Province to implement the FRWS programme in one district with approximately 50,000 residents. The aim is to improve the health and quality of life of residents by increasing the number of people using drinking water supplies that meet at least a basic LoS.

What are Levels of Service (LoS) for Water Supply?

LoS is an emerging concept that can be used to measure and monitor the performance and use of water supplies. In recent decades, water supply provision has been commonly assessed through categorization as either 'improved' or 'unimproved' based on the likelihood of the water to be contaminated with microbiological pollution (UNICEF/WHO JMP).

For example, tube wells (boreholes) that extract water from deep under the ground are more likely to be safe, and thus are considered 'improved'. Surface water is susceptible to contamination from nearby human and animal wastes and other sources, and is therefore considered 'unimproved'.

There is no internationally accepted or standardised way to measure water supply LoS. SNV in Asia has defined household LoS using four indicators: water quality, water quantity, water supply accessibility, and water supply reliability - with each of the three FRWS programme countries adapting their methodology for measuring these criteria to suit country context.

Once the definitions for each LoS criteria are agreed, the next step is to set thresholds or values for different service levels. SNV's FRWS programme defines five levels, namely: no service; sub-standard service; basic service, intermediate service, and high service.

The cut-off point between sub-standard and basic service is an important one, the values and thresholds for which have been selected based on Cambodian government policies and guidelines, or in their absence, international research and literature. For example, according to current World Health Organization (WHO) standards, an individual needs at least 20 litres/day (this definition is inclusive of personal hygiene as well as actual consumption). If a household uses less than 20 litres/day/person, then their LoS for quantity does not achieve the basic service.

Levels of Service (LoS) indicators

Quality of water can be thought of in terms of its safety (microbial and chemical quality) and user perceptions of aesthetic quality (i.e. taste, smell, and appearance). SNV in Cambodia's LoS for quality uses the JMP definitions for improved and unimproved water supplies combined with household perception of the aesthetic quality.

The **quantity** LoS is simply calculated using the amount of water collected and used for 'drinking*' per person in the household every day.

The **accessibility** LoS is calculated using a combination of the time spent and distance travelled to collect water per person and per day.

And finally, the **reliability** LoS is determined based on whether water can be consistently collected from a supply during the seasons and times of expected use. For example, if rainwater is harvested and stored so that it is always available during the wet season, then its reliability during this time of expected use is high.

* Note that the definition of 'drinking' in recent water and sanitation literature and dialogue commonly refers to both consumption (drinking and cooking) and personal hygiene (bathing, cleaning, hand washing, and sanitation)



Figure 2: Location of Chum Kiri district in Kampong Spea province, Cambodia (via Google Maps)

To demonstrate how the final LoS calculation works, the definition and thresholds for accessibility are presented as an example in Figure 3 (right).

In the context of rural Cambodia, defining LoS for each household is complicated by the fact that it is common practice to utilise multiple drinking water supplies throughout the year and there are significant behavioural differences between the wet and dry seasons. Behaviours are influenced by seasonal variations in rainfall, availability of rain-fed surface water, and rain-charged shallow groundwater supplies.

To calculate service levels for each indicator at a particular household, LoS scores were first individually calculated for primary, secondary, and tertiary water supplies across the wet* and dry† seasons and then averaged to produce a single LoS for each FRWS indicator for each household. An overall household LoS is then calculated by selecting the lowest LoS score amongst the household's four LoS indicators.

This methodology for evaluating water supply LoS was used by SNV Cambodia to measure baseline conditions in Chum Kiri District in September 2013. A household survey was administered at 386 households, statistically representative of the entire district, and including a subset of poor households as identified using the National ID Poor registration system.‡

The findings from the baseline assessment presented in this learning brief were used to inform the design of the FRWS programme implementation plan and serve as performance monitoring data for the evaluation of the programme.

* May to October

† November to April

‡ Administered by the Ministry of Planning and conducted in Chum Kiri in 2011 [Ministry of Planning, RGC, (2012) IDPoor Atlas]

Figure 3: LoS for accessibility

No Service
Water supply > 1km
And >60 minutes per person per day
Sub-standard service
Water supply > 1km
And >31-60 minutes per person per day
Basic service
Water supply < 1km
And ≤30 minutes per person per day
Intermediate service
Water supply < 100m
And ≤30 minutes per person per day
High service
Water supply in the household
And ≤30 minutes per person per day



Ta Reach Village, Chum Kiri district. Rin Ren, 30, collects water from her dug well. This is her main source for potable water, but it's only available during the wet season. Photo: Thomas Cristofolletti / Ruom for SNV

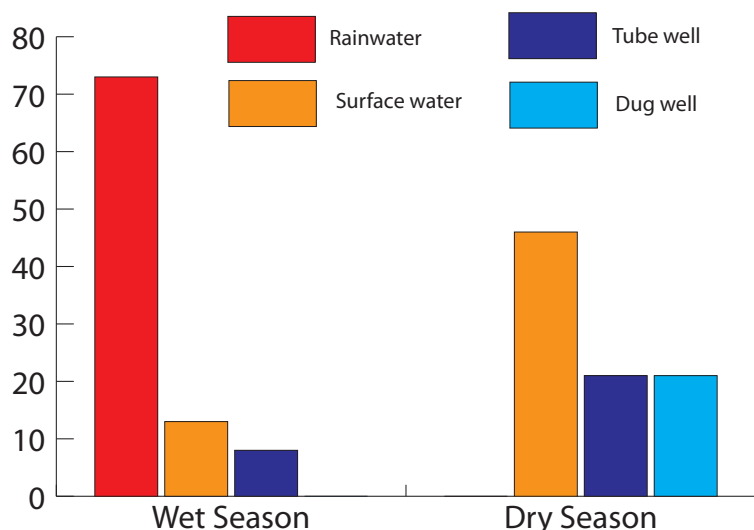


Figure 4: Top three primary water supplies

Results - Water Supply Use

The primary (most frequently used) water supplies in Chum Kiri are presented in Figure 4 (above).

The most common water supply used in the wet season was rainwater, while surface water was most common in the dry season. After surface water, tube wells and dug wells were each used as primary supplies in the dry season by approximately a fifth of households. However, a large proportion of households that used a tube well only did so for personal hygiene and not for drinking (43%).

Government authorities record that there are between 500 and 1,000 tube wells in the district. However, of those households that use tube wells as a primary supply, only 26% and 57% report using it for drinking in the wet and dry seasons respectively.

This equates to only 2% and 12% of the total district population drinking tube well water as a primary supply in the wet and dry seasons respectively, despite so many already existing wells. This low preference for tube wells was primarily noted as due to taste concerns and hardness.

Unexpectedly, the poor were found to be more likely to use a tube well and less likely to use surface water than the non-poor. The reasons for this will be further explored throughout the programme. Poor households also appear to be less likely to have sufficient rainwater storage that would enable use of rainwater in the dry season months.



Doung village, Chum Kiri district. A woman collects water from a tube well. Photo: Thomas Cristofolletti / Ruom for SNV

Results - Water Supply Levels of Service

Water quality LoS

Only 24% of households met at least a basic LoS for water quality. This was primarily due to the large proportion of households that relied on unimproved water supplies (such as surface water and unimproved dug wells). Additionally, it was also found that only 21% of households always treat their water prior to consumption while 55% and 24% sometimes and never treat, respectively. However, water treatment is not considered when assessing quality LoS.

Water quantity LoS

The median amount of water used for 'drinking' was found to be approximately 60 litres/person/day, but with a high level of variability between households. It should be noted that the assessment of household water quantity was valid for the time period when the survey was conducted – which in this case was representative of wet season conditions. All households achieved at least a basic service level for water quantity.

In addition to the water quantity assessment, we also asked households about their perceptions of using sufficient water in the wet, dry and very dry* seasons. These perception questions were not included in the LoS calculation for water quantity. In the wet season, 96% of households felt that they had enough water and this matched the findings from the water quantity assessment.

However, in the dry and very dry seasons, only 75% and 49% respectively of households considered their water quantity to be sufficient. Additionally, the poor were more likely than the non-poor to report insufficient quantities of water during these months.

Water supply accessibility LoS

Approximately 99% of households met at least a basic service level for water supply accessibility. The mean time spent for travelling to the supply, queuing (where applicable), filling all containers, and travelling back home was 7 and 12 minutes/person/day for the wet and dry seasons respectively. By water supply, the average distance from the home was 200 metres and 60 metres for surface water and tubewells, respectively.

For the average household size of five people, a basic LoS is achieved if less than 2.5 hours is spent collecting water (average of 30 minutes/person/day). A basic LoS is also achieved if the water supply is less than 1km away. These LoS limits appear to be too low for the Cambodian context and may need to be re-evaluated in future water supply LoS evaluations.

Water supply reliability LoS

A total of 83%, 87%, and 61% of water supplies used were reported to always have water available during seasons of expected use, for wet, dry, and very dry seasons respectively. A slightly lower reliability was reported in the wet season compared to the dry season.

This difference is likely attributable to households who had a small rainwater storage capacity and were unable to maintain rainwater supplies consistently throughout the wet season. The much lower reliability service level in the very dry season is likely attributable to ponds and dug wells becoming dry.

Overall, 100% of households had a service level of basic or higher, but it should be noted that this is an average of all water supplies used during wet, dry, and very dry seasons. LoS for individual supplies and at certain times of the year may be below the basic level – especially in the very dry months.



Ta Reach Village (Kampot). Mr. Oun (right), District Office of Rural Development, inspects a broken well. Photo: Thomas Cristofolletti / Ruom for SNV

* Very dry season is a subset of the dry season – during February, March, and April

Overall LoS Findings and Lessons Learned

Using the lowest of the four LoS scores to determine each household's overall LoS, only 24% of households reached at least a basic service level. This was primarily the result of low usage of improved water supplies (Quality LoS).

Reliance on unimproved water supplies (such as ponds and other surface water sources) may cause higher rates of diarrhoeal and intestinal illnesses – especially because our survey found that household water treatment practices are not consistently practiced.

Additionally, difficulties securing water in the very dry season may result in more time and energy spent collecting water and potentially less water being used for personal hygiene – resulting in poorer sanitation and health conditions. The poor appear to be particularly susceptible to water scarcity in the dry season.

The LoS thresholds for basic service levels as currently agreed for Cambodia's Accessibility and Reliability LoS indicators should be reviewed to better reflect inconvenience and service dissatisfaction in the Cambodian context.

All of the four service level indicators represent averages across primary, secondary, and tertiary supplies and across the wet and dry seasons. These averages can hide important differences in service levels. Users of the LoS data should be aware of the limitations of the LoS approach and disaggregated analysis by season, water supply, and socio-economic status should be presented alongside the overall LoS results.

Collecting the data and information required for LoS calculations can be resource-intensive and challenging in the rural context as the depth of required information is high and the quality of the responses depend on the recollection of interviewees, the accuracy of their estimations and perceptions, and the ability of the interviewers to probe and find the most accurate answer. It is critical that training of field surveyors and enumerators be conducted thoroughly and gradually with sufficient time allocated to practice under field conditions and explanation of the background and rationale for the various questions being asked.

Next Steps

The findings from this baseline assessment will be disseminated to national government and WASH sector stakeholders to inform current policies and guidelines on rural water supply and on-going water safety planning initiatives. They will also be used to inform the design of the implementation plan for the FRWS programme in collaboration with PDRD-Kampot.

The programme will employ concepts such as functionality planning, social accountability, water supply benchmarking, and enhancement of post-construction support to improve service levels throughout the district.



Ta Reach village, Chum Kiri district. Mr. Kong Phorn stores water from a pond at his house. Photo: Thomas Cristofolletti / Ruom for SNV

For more information

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About SNV worldwide

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