



Operational Assessment of Small-Scale Water Supply Systems in Attapue, Sekong, and Saravane Provinces

"Enhancing Adaptive Capacity in Lao PDR Provinces, and Building Resilient Housing in Vulnerable Communities"

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Table of Contents

PROJECT BACKGROUND	1
OBJECTIVES OF THE ASSESSMENT	1
METHODOLOGY	2
FINDINGS	3
Overall Functionality	3
BOREHOLE-OVER-HEAD TANKS WATER SUPPLY SYSTEM	4
GRAVITY-FED SYSTEM (NAMLIN)	6
THE WATER SUPPLY SYSTEM MANAGED BY DISTRICT NAM PAPA STATE ENTERPRISE (NPSE)	8
ECONOMIC AND LIVELIHOOD ENHANCED BY WATER	9
EDUCATION ENHANCED BY WATER	. 10
SANITATION ENHANCED BY WATER.	. 11
Challenges	. 12
Conclusion	. 12
Annexes	. 13
Annex 1 Questionnaires	. 13
ANNEX 2 LIST OF VILLAGES AND PERSONS INTERVIEWED	. 17

Project Background

Lao People's Democratic Republic (PDR) is one of the most climate-vulnerable countries in the world. This is mainly due to its high dependence on climate-sensitive natural resources and its low adaptive capacity. The country has been increasingly affected by natural hazards. Floods, droughts, and storms, which often trigger secondary hazards such as landslides, fires, infestations and outbreaks of disease, cause each year loss of life and severe damage to livelihoods and infrastructure. Considering the expected impacts of climate change, with wet seasons getting wetter and dry seasons getting dryer, these hazards are likely to increase in frequency and intensity. The project's main objective is to enhance the climate and disaster resilience of the most vulnerable rural and emerging urban human settlements in Southern Lao PDR by increasing sustainable access to basic infrastructure systems and services, emphasising resilience to storms, floods, droughts, landslides and disease outbreaks.

The specific project objectives are:

- 1. Develop institutional capacities of the national government and local authorities to increase the resilience of human settlements and infrastructure systems.
- 2. Enable communities to improve their well-being/health conditions by developing local capacities and resilience strategies for their settlements and infrastructure systems.
- 3. Enhance climate and disaster-resilient infrastructure systems in human settlement.
- 4. Ensure project compliance with AF and UN-Habitat standards for Knowledge Management, Advocacy and Monitoring.

Objectives of the Assessment

Under Output 3.1, 'Number of physical infrastructures improved or newly constructed to withstand climate change and variability-induced stress' of the 'Enhancing Adaptive Capacity in Lao PDR Provinces, and Building Resilient Housing in Vulnerable Communities' project, NPSE in Attapue, Sekong, and Saravane has constructed and improved small-scale water supply systems in 189 settlements, benefiting 125,295 people, including 67,659 women.

This assessment aims to evaluate whether the built or improved small-scale water supply systems are still functioning properly or if there are any challenges or difficulties since being handed over to the villages for use. Additionally, the assessment seeks to review the broader impact in areas such as economic and livelihood improvements, education, and sanitation. Lessons learned from this assessment will be valuable for the implementation of similar projects in the future.

1

Methodology

Small-scale water supply systems have been improved and newly constructed for 189 settlements across three provinces: Attapeu, Sekong, and Saravane (covering a total of eight districts). Some systems were initially built as pilot projects in 2018, while the majority were constructed between 2019 and 2023. The type of system deployed in each community depends on its geographic conditions. For instance, villages in mountainous areas are typically suited for gravity-fed water systems, while others are more appropriate for boreholes with overhead tank systems.

The assessment team visited a total of 24 villages out of the 189 settlements across the three provinces, representing roughly 12.6% of all communities included in the project. The selection of these 24 villages was primarily based on the year of construction, with a focus on systems built in 2021 or earlier, as they have been in use for a longer period. Additionally, a few newer systems from 2022 were included to compare functionality and assess any issues with the more recently constructed systems. Factors such as the community's location, accessibility, and the type of water system were also considered to ensure the findings reflect a comprehensive understanding of the issues across the three provinces.

Province	District	Number of settlements visited
Attapeu	Xanxai	4
	Samakkhyxai	3
	Phouvong	1
	Xaysettha	2
Sekong	Dakcheung	5
Saravane	Ta-Oy	6
	Samuay	3
	Total	24

Table 1: Villages, District and Province where the assessment team visited

Notes: Some water supply system covers a few settlements

Interview questions have been designed to gather information from local communities who use the water supply systems. Interviews can be conducted with both village authorities and villagers who are familiar with the language and the water systems, allowing them to share their experiences, including any conveniences or challenges they encounter. The questionnaire is included in Annex 1. The period of this assessment trip was between 18 February to 26 February 2024.

Findings

Overall Functionality

In Attapue Province, all systems across 10 settlements are operating well. In Sekong Province, five systems across five settlements were assessed, with four working well and one working but with minor issues - water source challenges (frequent pump breakdown). In Saravane Province, nine systems across nine settlements were reviewed, with eight operating well and one working but not optimally utilised. Overall, out of 24 settlements, overall, the water supply systems are operating well. At the same time, there are minor issues: one is water source challenges (frequent pump breakdown), and the other is that the system is not optimally utilised.

Two specific cases presented challenges. The first case is in Sekong Province, where the water source becomes insufficient during the dry season, resulting in shortages. The water source could not be located close to the village, creating a significant elevation difference between the village and the source. This disparity causes the water pump to work harder, leading to frequent breakdowns. To address this, villagers have installed additional pumps to access more distant water sources. While this solution has improved access for some households, others continue to experience shortages during the dry season. The second case occurred in Saravane Province, where the construction of a paved road has driven increased development. With more financial resources, many residents have built private water systems, leaving only a few households still reliant on the communal water system.

Province	Number of Settlements	Findings
Attapue	10	All systems in 10 settlements are working well.
Sekong	5	4 are working well; 1 is working - with water source challenges (frequent pump breakdowns)
Saravane	9	8 are working well, and 1 is working but not optimally utilised
Total	24	Overall working well. 2 minor issues, as mentioned above.

Table 2: Number of settlements and systems in the target province where the assessment team visited

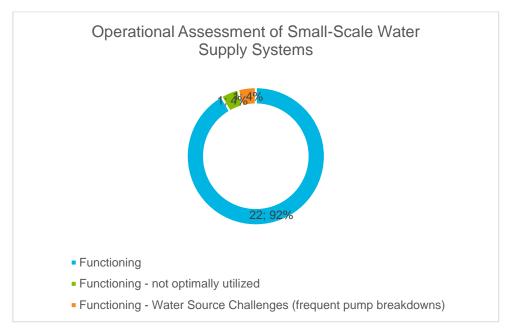


Figure 1: Operational Assessment of Small-Scale Water Supply Systems

Borehole-Over-head tanks water supply system

Some of the borehole tank water supply systems were originally operated with dual solar panels and electricity. However, when the pump failed and was replaced, some of the solar panels could no longer be used and were replaced with new pumps. For this case, when replacing the water pump, villagers always need support from NPSE, which was provided.

Villagers typically collect 1,000 to 2,000 kips (USD 0.05-0.1) per cubic meter of water (with some villages collecting 10,000 kips (USD 0.5) monthly) to cover electricity costs. In cases of pipe or pump damage, additional money must be collected, and significant damage can become a serious concern for villagers. In one village in Attapue and another in Saravane, electricity was cut off due to the inability to pay on time, although both were later reconnected.

In Attapue, water pump failure has become a recurring issue as the demand for water has increased, but the tank capacity remains unchanged as it is adequate. For example, in one village in Attapue, initially, the system was connected to 25-30 taps, but now 105 households are connected, and 126 households use the water. In Sekong, the pump struggles with increased demand when the distance and elevation between the tanks and households are significant.



Figure 2: Operational Assessment - **Borehole-Over-head tanks water supply system in Hom** village, Samakhyxai, Attapue Province



Figure 3: Operational Assessment - Borehole-Over-head tanks (with solar panel) water supply system in Sanyayon village, Ta-oy, Saravane Province

Gravity-Fed system (Namlin)

The Namlin gravity-fed water systems have performed well, with 100% of the system still operational. However, there are increasing concerns surrounding the sustainability of this system due to a combination of factors. Forest degradation, driven by land conversion for agriculture, has been a significant issue, particularly as more forested areas are turned into cassava plantations to meet growing market demands. This has contributed to increasing pressure on local water sources, particularly during the dry season. Villages have reported noticeable water shortages between March and May, when demand spikes and water resources become scarcer. The expansion of cassava farming in the region exacerbates this issue; villagers cut more trees, turning forest areas into cassava plantations.

Despite these challenges, the gravity-fed system remains a low-cost option for water supply, which is one of its most significant advantages to remote and poor communities. Villages usually collect funds once a year to cover basic maintenance costs or whenever repairs are necessary. In cases where the collected funds are insufficient to cover the expenses, villagers either contribute additional money or draw from village funds to ensure the continued operation of the system. While the system remains viable for now, the growing demand for water and environmental degradation will need to be addressed to maintain its long-term sustainability.



Figure 4: Operational Assessment – Namlin (Gravity-Fed water supply system) in Thongkatai village, Ta-oy, Saravane Province



Figure 5: Operational Assessment – Namlin (Gravity-Fed water supply system) in Dakchang village, Dakcheung, Sekong Province

The water supply system is managed by District Nam Papa State Enterprise (NPSE)

In the villages of Vangxai, Dakhiat, and Phouxay, located in Xanxai district, Attapeu province, the water supply system is managed by the District Nam Papa State Enterprise (NPSE), a branch of the Attapeu provincial office. This system serves all three villages and is better maintained and managed by NPSE Attapeu, largely due to the villages' proximity to the urban areas of Xanxai district. This close location allows the district to provide efficient oversight and support, making it a strong example of a sustainable water supply system. The cost of water is set at 3,500 kips per cubic meter, generating monthly revenue of 17 to 20 million kips. Out of this, 4 to 5 million kips is used to cover electricity expenses, while the remaining funds are allocated for hiring two staff members and performing maintenance.



Figure 6: Operational Assessment – Expansion/improvement of the existing system in Xanxai District, Sekong Province

Economic and livelihood benefits from water

The water supply has improved their livelihoods in many ways. Firstly, they no longer need to travel 30 minutes to an hour to collect water from the river. It is now much more convenient, as they no longer have to carry heavy water over such long distances. 'We have more time to do other activities,' said Mr. Bounhin, a resident of Pok village, Xaysetha, Attapeu Province.

Apart from daily uses such as drinking, cooking, and sanitation, villagers now maintain small kitchen gardens near their homes for family consumption. This has been made possible and more convenient thanks to the improved water supply,' said Mr. Khamboun Chanthamat, a resident of Dakvor village, Dakcheung District, Sekong Province.



Figure 7: Operational Assessment – The village uses water from the new water supply system to water the vegetables in their kitchen garden.

Education benefits from water.

In villages with schools, the water supply is typically connected to the school for use. Among the villages visited by the assessment team, water from the small water supply system of the "Enhancing Adaptive Capacity in Lao PDR Provinces and Building Resilient Housing in Vulnerable Communities" project is connected to 14 schools, representing 58%. In other villages, 5 schools (21%) already have their own water systems, while another 5 villages (21%) either do not have water connections due to the distance or lack a school altogether.

"Connecting water to the school allows students to practice proper hygiene, which is part of the school program, such as teaching them how to wash their hands and brush their teeth correctly," said Mr. Bounson, Village Chief of Namkong Village, Phouvong District, Attapeu Province.



Figure 8: Operational Assessment – Students practice hygiene in Namkong Village, Phouvong district, Attapue province.

Sanitation benefits from water.

The water supply provided through this project, primarily serving remote areas of the country, allows villagers to more easily access one of the most essential basic services: clean water. This facilitates the construction of toilets by enabling direct water connections, eliminating the need to spend 30 to 60 minutes collecting water from distant sources. The assessment of 24 villages also shows that all villages with water connections have seen an increase in the percentage of households with toilets. In 22 villages, or 92%, at least 50% of households now have toilets.

"Before the project, no one in our village had a toilet. With access to water now, 20 households have toilets, and some households are currently building theirs. We expect that every household will have a toilet by 2024," said Mr. Bouangern Sunyyapeung, Village Chief of Sanyayon Village, Ta-Oy District, Saravane Province.

"When we can access water easily, every household now has a toilet. Before having a toilet was a challenge, it was too difficult to carry water from the river for the toilet"

— Mr Bounka, Kamuan Village Chief — Ta-Oy district, Saravance Province.



Figure 9: Operational Assessment – water connection to the toilet in Dakchang Village, Dakcheung district, Sekong province.



Figure 10: Operational Assessment – a newly built toilet with water connection to the toilet in Daksa Village, Dakcheung district, Sekong province.

Challenges

Many villages are located far from the district center, and difficult road access makes reaching them time-consuming. Due to these logistical constraints, the assessment team was only able to cover 24 villages within the planned timeframe. Another significant challenge is the language barrier, as many villages speak ethnic languages that differ greatly from Lao. Typically, only the village chief can understand and speak Lao. In cases where the village chief was absent, the team could only conduct observations and were unable to carry out interviews. This occurred in two of the villages visited.

Conclusion

In conclusion, the small-scale water supply systems implemented across Attapeu, Sekong, and Saravane Provinces have significantly improved the quality of life for residents in these remote areas. The systems have enhanced access to clean water, benefiting livelihoods, education, and sanitation. Villages have been able to establish toilets and maintain kitchen gardens, leading to better hygiene practices and improved food security. Despite these successes, challenges such as system maintenance, pump failures, and environmental pressures on gravity-fed systems remain. The lessons learned from this assessment will provide valuable insights for future water infrastructure projects, ensuring greater sustainability and resilience in these vulnerable communities.

Annexes

Annex 1 Questionnaires

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- 1 ບໍ່ສາມາດເຮັດວຽກໄດ້
- 2 ຍັງເຮັດວຽກໄດ້ ແຕ່ເປເພບາງຈຸດ ຫລື ມີຄວາມສ່ຽງ ໃນອານາຄົດ
- 3 ສະພາບດີ ໃຊ້ງານໄດ້ ປົກກະຕິ
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19	ປະຊາຊົນໄດ້ປະກອບອາຊີບທຳມາຫາກິນໃນບ້ານແນວໃດ?	yn Dear + Non
20	ລາບຮັບຂອງປະຊາຊົນໂດຍລວມ ແມ່ນເປັນແນວໃດ ຫຼັງຈາກ ມີນ້ຳໃຊ້ທີ່ ສະດວກຂຶ້ນ ?	พี่ปุ่าอันอบอัง (อีง ราวีร ใอกังเรือ
21	ປະຊາຊົນໄດ້ນຳໃຊ້ນ້ຳໃນການຕະລິດ ປຸກຕັກສວນຄົວ ເພື່ອຫາລາຍໄດ້ ເພີ່ມເຕີມບໍ?	אקלים משונים בל בל מין דור ומים שונים בל אונים ומים של אונים ול אין לי מים וחון מים לין לים ומים של אין לים ומים ומים ומים ומים ומים ומים ומים ומ
22	ຜົນກະທົບອື່ນໆ ກ່ຽວກັບເສດຖະກິດ ທາງບວກ ແລະ ທາງລົບ ຖ້າມີ?	43
ลำนา.	ມທີ່ກ່ຽວຂ້ອງກັບການສຶກສາ	
23	ລຸກຫຼານປະຊາຊິນແມ່ນເຂົ້າໂຮງຮຽນຢູ່ໃສ?	N:201-2012-2020 .
24	ຖ້າໂຮງຮຽນ ຢູ່ໝາຍໃນຍ້ານ ຫຼື ໃກ້ດ້ຽງ ໄດ້ຕໍ່ນຳກັບລະຍົບນ້ຳຍ້ານເຮົາຍໍ?	かんでんろうのかいいか.
25	ມີຂໍ້ດີ ຫຼື ຂໍ້ເສຍ ອື່ນໆ ກ່ຽວຮ້ອງກັບການສຶກສາບໍ?	
อำนา.	ມທີ່ກ່ຽວຂ້ອງກັບບິດບາດຍິງຊາຍ	
25	ປະຊາຊົນ ມີການແບ່ງວຽກເຮືອນ ຫຼື ວຽກອື່ນ ລະຫວ່າງຜິວເມຍແນວໃດ?	है। कि के कि के कि कि कि कि कि कि के कि
26	ການເຮັດເຮືອນ ຂອງເພດຍິງເປັນແນວໃດ ຫຼັງຈາກ ມີນ້ຳໃຊ້ ສະດວກຂຶ້ນ ?	י תושועל עפש ל הנופול ליוך ביו עביו ליון
27	ມີຂໍ້ດີ ຫຼື ຂໍ້ເສຍ ອື່ນໆ ກ່ຽວຂ້ອງບົດບາດບິງຊາຍອີກບໍ?	
ลำຖາ.	ມທີ່ກ່ຽວຂ້ອງກັບບຸລິມະສິດ	
28	ເມື່ອມີນ້ຳແລ້ວ ບ້ານເຮົາມີບຸລະມະສິດອື່ນໆ ບໍ ໃນການພັດທະນາບ້ານ ທີ່ທ່ານ ຕ້ອງການ ການຊ່ວຍເຫຼືອ?	of the so good in to to
29	ຄຳຖາມອື່ນໆ	lar of parison. Josepher of In So poto. elusial Por Inwested il
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ໃບລົງທະບຽນ

Topic/ໝີລຂໍ້:	
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Date/ວັນທີ: 11.01. ແລະ 4 ສະຖານທີ່:	12059 / Jun 17/200-5

ລດ	ຊື່ ແລະ ນາມສະກຸນ	ພາກສ່ວນ	ເປີໂທ	ລາຍເຊັນ	ຍິນຍອມ ໃຫ້ຖ່າຍຮູເ
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Annex 2 List of villages (settlements) and persons interviewed

Provinc	Year	District	Village	Name of	Position	Date of
е	Built	District	Village	Interviewee	1 Collion	data collection
Attapue	2021	Samakkhyx ai	Halang	Mr. Khon	Village Chief	19.02.202 4
Attapue	2019	Samakkhyx ai	Hom	Mr. Bounlop Phetasar	Village Authorit y	19.02.202 4
Attapue	2019	Xaysettha	Kaengyai	Mr. Inteung Chiankunya	Village Chief	20.02.202
Attapue	2019	Phouvong	Namkong	Mr. Bounsoun	Village Chief	20.02.202
Attapue	2019	Xanxai	Phiakeo	Mr. Khamsaen Philavan	Village Chief	20.02.202
Attapue	2021	Xaysettha	Pok	Mr. Bounhin + Mae nom	Village Chief + wife	19.02.202 4
Attapue	2019 Phoux ai (2021)	Xanxai	Vangxai, Dakhiat, Phouxai (2021)	Mr. Tingvan + Thipphasone	District NPSE Xanxai staff	20.02.202
Attapue	2021	Samakkhyx	Xok	Ms. Dathong	Villager	19.02.202 4

Sekong	2019	Dakcheung	Dakden	Mr. Vongkham	Village Chief	22.02.202
Sekong	2021	Dakcheung	Dakjang	Mr. Khamdaophone	Village Chief	22.02.202 4
Sekong	2021	Dakcheung	Daksa	Mr. Phoutsavanh	Villager	22.02.202
Sekong	2021	Dakcheung	Daktiam	Mr. Bounpheum Phongyousord	Village Chief	21.02.202
Sekong	2022	Dakcheung	Dakvor	Mr. Khamboun chanthamat	Villager	22.02.202
Saravan e	2019	Ta-Oy	Kamuan	Mr. Bounka	Village chief	24.02.202
Saravan e	2021	Ta-Oy	Kape	Mr. Amyik Seethatkeosomph ou	Village chief	24.02.202
Saravan e	2020	Та-Оу	Padou	Mr. Keungmany + Mae Ting (his wife)	Villager s	24.02.202
Saravan e	2020	Ta-Oy	Sanyayon	Mr. Bouangern Sunyyapeung	Village Chief	24.02.202

Saravan e	2021	Smuay	Taloungkan g	Mr. Merng soulivanh	Villager	25.02.202 4
Saravan e	2022	Ta-Oy	Thongkatai	Mr. Kham-on + Mr. Khamsai	Village Chief + Senior Village Authorit y	24.02.202
Saravan e	2021	Smuay	Xe	Mr. Lin	Villager	25.02.202 4
Saravan e	2019	Ta-Oy	Bongnam	Overvation - no one speak Lao	NA	24.02.202 4
Saravan e	2020	Smuay	Tan-you	Overvation - no one speak Lao	NA	25.02.202 4

