Thai Environmental Engineering Journal Vol. 35 No. 1 (2021) : 85-94
www.eeat.or.th

Sustainability Assessment of Water, Sanitation, and Hygiene (WASH) Projects in Yesagyo Township, Magway Region, Myanmar

Cho Zin Win[1], Romanee Thongdara[1], Kritsanat Surakit[1], Nawatch Surinkul[1], Shabbir H. Gheewala[2,3] and Trakarn Prapaspongsa[1*]

[1]Department of Civil and Environmental Engineering, Faculty of Engineering, Mahidol University, Nakhon Pathom 73170, Thailand

[2]The Joint Graduate School of Energy and Environment (JGSEE), King Mongkut's University of Technology Thonburi, Bangkok 10140, Thailand

[3]Center of Excellence on Energy Technology and Environment, PERDO, Ministry of Higher Education, Science, Research and Innovation, Bangkok 10400, Thailand

[*]E-mail : trakarn.pra@mahidol.edu

Abstract

Determining the sustainability of Water, Sanitation, and Hygiene (WASH) projects is essential for developing countries that have struggled to maintain access to clean water and sanitation. Assessing the alignment with the National Strategy is also integral as it can monitor, control and guide WASH service providers not to deviate from the national objectives. This study aimed to assess the sustainability status of WASH projects in Yesagyo Township, Magway Region, Myanmar. The WASH projects were implemented by UN-HABITAT by using Participatory Hygiene and Sanitation Transformation (PHAST) approach. It was also intended to analyze the alignment with Myanmar National WASH Strategy. The sustainability status was measured by water, sanitation and hygiene indicators which were indicated as accessibility, functionality, reliability (continuity, reliability (seasonality), intra-village equity, water quality, catchment protection, maintenance of open defecation free status, use of sanitation facilities, handwashing facilities and handwashing practices. The sustainability status of water supply and sanitation and hygiene has not deteriorated since the end of project 2018. The number of households that used water from improved water sources increased from 92% to 95.4%. Latrine usage has increased from 90% to 97.1%. Handwashing practices have also increased and already met the national targets. Latrine usage status is exceeded the national target in 2025. As there were only six open defecation free villages in the surveyed villages, it can be concluded that the open defecation free target was still needed to meet the national target as of 92% in 2020. To sum up, the impacts of WASH projects in Yesagyo Township were sustainable and likely to meet the national targets by 2030 by combining the continuous community collective actions and sufficient government supports after the project implementation. However, much work still needs to be done to achieve the sustainability status of open defecation free communities.

Keywords : Sustainability; Water, Sanitation and Hygiene (WASH); Participatory, Hygiene and Sanitation Transformation (PHAST); National Strategy

Introduction

Safe water, sanitation, and hygiene are critical for human health and development [1]. Nonetheless, 1.8 billion global population are still using water contaminated by feces [2]. 2.3 billion people still lack access to basic sanitation facilities [3]. Every year, 829,000 people die from water, sanitation, and hygiene-related diarrheal diseases [1]. The United Nations affirmed the significance of clean water and sanitation by including it as one of the major areas in the Sustainable Development Goals (SDGs). By 2030, its targets are to make clean water and sanitation accessible to all and to end the practice of open defecation [4]. Myanmar Government is implementing National WASH Strategy in collaboration with other relevant government departments and international non-governmental organizations to achieve the SDG 6, clean water and sanitation, by 2030. According to the 2014 national census data, only 60.6% of people in rural areas had access to safe water and only 67.3% of people had access to safe sanitation [5]. In Yesagyo township, 11.6% of households use water from unimproved drinking water sources [7]. In the rural area of Yesagyo Township, 26.7% of households had no access to toilet facilities [6]. In 2016, UN-HABITAT intervened a WASH project, "a short step from improved WASH to healthier communities" by using the PHAST approach to fill water, sanitation, and hygiene gaps in 35 villages of Yesagyo Township [7]. This project aimed to promote the usage of water from safe drinking water sources, usage of improved sanitation through high-quality hygiene education, continuous community mobilization, and provision of WASH facilities [7]. PHAST approach encouraged the community members to make decisions about their WASH needs in their community, how to carry out to fulfill these needs and how to sustain in the future [8]. As the name implies, it promotes participation of all community members including men, women, children, and people with disabilities (PWD) to improve their environments and to manage their water and sanitation facilities to prevent from WASH-related diseases especially diarrhea [8]. Here in this study, the researchers endeavored to assess the sustainability of WASH projects in Myanmar and to analyze the alignment of the previous WASH project implementation with the National Strategy for WASH in Myanmar.

Methodology

The study area was the WASH project areas in Yesagyo Township where UN-HABITAT implemented the WASH project from 2016 to 2018. As a part of the evaluation strategy, UN-HABITAT conducted an end-line survey to measure the impacts of the project in 14 villages. The sustainability status of water supply, sanitation, and hygiene was determined by comparing with the study results and the end-line survey results. In this study, the sample sizes were 280 households (out of 6561 households) and 14 villages (out of 35 villages). The survey was carried out for 20 households in each village. One key informant interview in each village (a total of 14 key informant interviews) was conducted to get the overview data such as socio-demographic data and the total number of WASH facilities in each village. The instrument of the study was questionnaires developed by referencing sustainability check (SC) [9]. The sustainability status was measured according to the suggested indicators of sustainability check. Contribution to the National WASH Strategy will be determined by comparing with National targets [2].

Results and Discussions

Socio-demographic data of the villages

There was a total of 3,436 households in surveyed villages with a total population of 13,510. The mean population in one household

was 4 people. The minimum time to reach the nearest town was 15 minutes and the maximum time to reach the nearest town was1 hour. More than half of respondents (n=177, 63.2%) were female and (n=103, 36.8%) were male. Age of respondents were between 31-59 years (n=184, 65.7%), followed by 60 years & over (n=52, 18.6%) and 18-30years (n=44, 15.7%). The religion of all the respondents was Buddhist, and the race was Burmese. The education levels of most of the respondents were primary schools (including monastic schools) (n=176, 62.9%). The main source of income for households was agriculture (n=88, 31.4%). The other livelihood activities were casual labor (n=43, 15.4%), making joss stick (n=41, 14.6%), shopkeeper (n=31, 11.1%), weaving (n=30, 10.7%), and other business (n=47, 16.8%). Annual income of (n=153, 54.6%) of households was 1,000,000 to 2,000,000 MMK (800-1600 USD), followed by less than 1,000,000 MMK (<800 USD) (n=69, 24.6%) and followed by 2,000,000 MMK (>1600 USD) (n=58, 20.7%). (n=85, 30.4%) of households had under 5-year children and (n=25, 8.9%) had disabled persons. Total 279 (162 deep tube wells, 30 shallow tube wells, 55 hand-dug wells, and 32 ponds) were located in the surveyed villages.

Sustainability Status of Water Supply

In **table 1**, the sustainability status of the water supply is provided. The sustainability status of the water supply were measured by seven parameters, i.e., accessibility, functionality, reliability (continuity), reliability (seasonality), intra-village equity, and catchment protection. However, when comparing with the end-line survey results, only the data for the accessibility to the improved water supply were available [1]. The organization provided the community with a safe drinking water supply; thus, they measured the accessibility to the improved water supply at the end of the project to see the improvements after two years project [1]. Accessibility was measured by the percentage of water points within 30 minutes round-trip (including queuing) from households to collect water and the percentage of households that have access to improved water supply with users per water points ratio that complies with national standards. According to WHO, improved drinking water sources mean “water sources which have adequate protection from outside contamination especially from fecal matter”. Piped household water connection, public standpipe, borehole or deep tube well, protected spring, and rainwater collection are examples of improved water sources [10]. According to the results, the number of people who used improved water sources was not decreased and 95.4% of households were using water from the improved water sources. The rest 4.6% of households obtained water from other unimproved water sources such as a river, dam, and ponds. The national standards for users per water points were “one deep tube wells with motorized pump can be used for 500 people, one protected dug well can be used for 250 people, one shallow tube well can be used for 50 people” [2]. As the total population was 13,510 and the functional deep tube wells were 157, user per one deep tube well was 86 and it complied with the national standards. As the water fetching times were 0-5 minutes (58.9%), 6-15 minutes (30%), and 16-30 minutes (11.1%), there were no households that needed to take time to fetch water more than 30 minutes. That was not varied from the end-line results. Thus, accessibility to the improved water supply was sustainable. Functionality was measured by the percentage of water points that were functioning at the time of the visit. 157 (97%) of deep tube wells, 25 (83%) of shallow tube wells, 50 (91%) of hand-dug wells, and 17 (53%) of ponds were functioning at the time of visit. Reliability (continuity) was measured by the "average number of mechanical breakdowns per year and reliability (seasonality) was measured by the

number of water points which have been dried up for at least 1 month. The dysfunctional water points were found at the time of visit as the results of mechanical breakdowns once per year in eight villages, four times per year in one village, once per month in one village, and dried up water points. 25 out of 279 water points (9%) were dried up at the time of visit. Intra-village equity was measured by the percentage of households that have at least one functional water point within 200 meters. The results showed that the maximum distance between household and nearest water point was 200 meters as 60.7% of households had the water sources within 0-50 meters, 14.3% had within 51-100 meters, 11.8% had within101-150 meters, and 13.2% had within151-200 meters. Water quality was measured by the percentage of households that obtained quality water that complied with national standards [2]. The national standard for water quality was "colorless, odorless and turbidity < 5 NTU (nephelometric turbidity unit)". In this study, turbidity could not be assessed because of lack of equipment and inadequate project time. The percentage of households that used colorless water was 88.2% and the households that used odorless water was 93.2%. Catchment protection was measured by the percentage of protected water points from contamination (ponds with fencing and jetting, hand-dug wells with apron and roof, and shallow tube wells were constructed at least 30 meters or 50 feet away from latrine pits). 100% of functioning shallow tube wells, 70% of functioning hand-dug wells, and 82% of functioning ponds were protected from contamination.

Table 1 Sustainability Status of Water Supply in Yesagyo Township

Sustainable Parameters	Indicators	Study Results	End-line Survey Results [7]
Accessibility (SW1)	Percentage of water points within 30 minutes round-trip (including queuing) from households to collect water	280 (100%)	280 (100%)
Accessibility (SW1)	Percentage of households that have access to improved water supply with users per water points ratio that complies with national standards	267 (95.4%)	258 (92%)
Functionality (SW2)	Percentage of water points functioning at the time of visit	Deep tube well - 157 (97%) Shallow tube well - 25 (83%) Hand-dug tube well - 50 (91%) Ponds - 17 (53%)	No data
Reliability (continuity) (SW3)	Average number of mechanical breakdowns per year	No mechanical breakdown - 4 villages (28.6%) Once per year - 8 villages (57.1%) Four times per year - 1 village (7.2%) Once per month - 1 village (7.1%)	No data
Reliability (seasonality) (SW4)	Percentage of water points that have been dried up for at least 1 month	25 (9%)	No data

Table 1 Sustainability Status of Water Supply in Yesagyo Township (Cont.)

Sustainable Parameters	Indicators	Study Results	End-line Survey Results [7]
Intra-village equity (SW5)	Percentage of households that have at least one functional water point within 200 meters	280 (100%)	No data
Water Quality (SW6)	Percentage of households that obtain quality water complies with national standards	Colorless water - 247 (88.2%) Odorless water - 261 (93.2%)	No data
Catchment Protection (SW7)	Percentage of protected water points from contamination	Shallow tube well - 25 (100%) Hand-dug well - 35 (70%) Ponds - 14 (80%)	No data

Sustainable Factors on Water Supply Status

The researchers found the following factors supported the sustainability status of the water supply.

Preliminary studies: hydrogeological assessment was carried out in 9 villages (64.2%) where reference check was not available and provided a realistic design with groundwater levels [1]. The engineers from the organizations planned and sat the water points together with WASH committee in all 14 villages (100%). That supported the functionality (SW2), reliability (continuity) (SW3), and water quality (SW6) of water points.

Quality of design and construction: The water points in all 14 villages (100%) were constructed by professional constructors and supervised all the time during construction to get a good quality of design and construction. The good quality water points supported the functionality (SW2), and reliability (continuity) (SW3) of water points.

Alignment with users' preference: This factor was measured by number of households that used water from improved water sources. The number of 265 households (94.6%) that used water from improved water sources was important for the operation and maintenance (O&M) of water points because the O&M fund was derived from users' water tariff. Thus, users' preference (94.6%) supported the functionality (SW2) and reliability (continuity) (SW3) of water points by following effective usage of water tariff for the O&M purpose.

Local community participation in the decision-making process: As the community in all 14 villages (100%) involved in allocating budgets and monitoring throughout the construction process, their sense of ownership was increased and led to the proper maintenance of water facilities. That supported the functionality (SW2), reliability (continuity) (SW3), and intra-village equity (SW5) of water points.

Services are reliable, affordable, and available when needed: 264 households (94.3%) reported that services were reliable, and water was available all the year around. Reliable services increased the number of users obtained water from improved water sources. Increasement in users led to the multiplication of water tariffs. The multiplication of water tariffs led to proper operation and maintenance and improved functionality (SW2), reliability (continuity) (SW3), and water quality (SW6).

Local Water Sources are properly managed: The presence of responsible persons either the WASH committee or village administrators to allocate the water points in all 14 villages (100%) made the water points evenly distributed and led to the intra-village equity (SW5) and increased accessibility (SW1).

Unforeseen changes in demography: Increasing the population could affect the users per water points ratio and water availability. The status of no sudden population changes in all surveyed areas (100%) supported the sustainability of water services in terms of accessibility (SW1).

Post-implementation support from local authorities: Government support in terms of financial or technical can increase the accessibility (SW1), functionality (SW2), reliability (continuity) (SW3), water quality (SW4), and catchment protection (SW5). In this study, 9 villages (64.2%) reported that they received financial or technical support from the local authorities. Less support from the local authorities was covered by the presence of a water tariff system to operate and maintain the water points in each community.

Effective and accountable Financing Mechanism: The presence of a water tariff system in all 14 villages (100%) was important for regular operation and maintenance of water points in the community. Providing information about income and expenditure of water tariff to users was also important because it encouraged users to pay the water tariff regularly and increased the cooperation with the WASH committee. That supported functionality (SW2) and reliability (continuity) (SW3) of the water supply.

Safety of water from pollution and contamination: Presence of water safety plan in 9 villages (64.2%) and verification of water safety plan in 3 villages (21.4%) supported to have the good quality of water (SW6), reliability (seasonality) (SW4) as it prevented from contamination and to ensure the availability against climate variations and extreme weathers by doing the proper catchment protection [10].

Effective and capacity of the water management committee to perform its task: WASH committee members received operation and maintenance training from the organizations. WASH committee was the main responsible body to collect and manage water tariffs for the operation and maintenance of water points in the community. Thus, the functioning of the WASH committee in all 14 villages (100%) supported the accessibility (SW1), functionality (SW2) and reliability (continuity) (SW3) of water points.

Accessibility and quality of inputs and technicians when needed: To maintain the functionality (SW2) and reliability (continuity) (SW3) of water points, technicians and spare parts were needed to be available within a short time. In the study areas, only two villages (14.3%) were facing rare technicians, thus, they couldn't access the technician within 48 hours.

Sustainability Status of Sanitation

In **table 2**, the sustainability status of hygiene and sanitation was provided. Sustainability status was measured by maintenance of open defecation free status, use of sanitation facilities, presence of handwashing facilities, and handwashing practice. Handwashing practice data was not obtained from the end-line data as the organization assessed the knowledge of people on handwashing during the end-line survey. Maintenance of open defecation free status was measured by the number of certified open defecation villages. The number of certified open defecation free villages was 6 (42.9%) while there were 7 (50%) open defecation free villages at the end of the project. The use of sanitation facilities was measured by households that have access to their latrines. The construction of own latrine was risen from 252 (90%) to 272 (97.1%) because of the new latrine construction after the project. Handwashing facilities were measured by households that have soap and water in the vicinity of a latrine. The presence of handwashing facilities was slightly increased from 240 (86%) to 246 (88%). Handwashing practice was measured by household respondents that reported they washed their hands at critical times. The reported handwashing practice at critical times

was after defecation 271 (96.8%), before eating 272 (97.1%), before preparing for cooking 238 (85%), before feeding babies 85 (30.4%) and after cleaning children's feces 85 (30.4%). The national target for maintenance of open defecation free status was 92% in 2020, 97% in 2025, 100% in 2030. National target for latrine coverage was 80% in 2020, 90% in 2025, 100%. Although the 2020 latrine coverage target was met, open defecation status still did not meet the national targets. Livelihood activities of people in the community may be one of the reasons. The main livelihood activity of most of the households was agriculture. In Myanmar, open defecation in fields was rooted. Though people use latrines at their houses, people practice open defecation when they are in the field. The presence of handwashing facilities and handwashing practices already met the national targets in 2030.

Table 2 Sustainability Status of Sanitation and Hygiene in Yesagyo Township

Sustainable Parameters	Indicators	Study Results	End Line Results [7]
Maintenance of open defecation free status (SS1)	Number of certified open defecation free villages	6 (42.9%)	7 (50%)
Use of sanitation facilities (SS2)	Households that have access to their latrines	272 (97.1%).	252 (90%)
Handwashing facility (SS3)	Households that have soap and water in the vicinity of the latrine	246 (88%)	240 (86%)
Handwashing practices (SS4)	Household respondents that report they wash their hands at critical times	After defecation - 271 (96.8%) Before preparing for cooking - 238 (85%) Before eating - 272 (97.1%) Before feeding babies - 85 (30.4%) After cleaning children's feces - 89 (31.8%)	No data

Sustainability Factors on Sanitation Status

The sustainability status of sanitation was supported by the following factors.

Presence of water to build, repair or clean the latrine: The availability of enough water for domestic purposes was important to carry out the sanitation and hygiene tasks. If the community did not even have enough water, they would not be able to use sanitary latrines and wash their hands. In the study areas, 256 households (91.1%) reported that they had enough water to clean the latrines and we found high latrine usage (SS2).

Resilient construction of latrine: In the study areas, household latrines were constructed to be resilient to natural disasters. Only 15 latrines out of 272 latrines had been damaged in the last year and 12 out of 15 damaged latrines were rebuilt within 1 month after collapsed. Thus, we found that (264, 94.3%) of latrines were still in good condition. This supported the maintenance of open defecation free status (SS1) by using the existing sanitation facilities (SS2).

Willingness to pay prioritization of sanitation: 274 households reported that sanitation was very important and important to their households. The 272 households (97.1%) out of the (274, 97.5%) that showed their willingness to pay prioritization of sanitation constructed own latrines. Thus, willingness to pay prioritization of sanitation supported the use of sanitation facilities (SS2).

Existence of community-based body that supports sanitation status: The activeness of community mattered to become the certified open defecation free community (SS1). In the study areas, 166 households (59.3%) reported that they met regularly with the existing WASH committee members to discuss the improvement of sanitation in the community. Thus, we found that only six villages (42.9%) were certified as open defecation free villages.

Affordability of household latrine: Economic factor plays an important role in the sanitation status. In the study areas, 271 households (96.8%) that reported they afforded to construct own latrines had already occupied latrines at their houses. Thus, affordability supported the use of sanitation facilities (SS2).

Adequate operation and maintenance: Proper operation and maintenance were necessary for both water and sanitation facilities. That included resilient latrine construction in the first place and upgrading or repairing the latrines when needed. 264 households (94.3%) that had the latrines which were in still good condition reported that they repaired the latrines whenever necessary. This supported the open defecation free status (SS1) and use of sanitation facilities (SS2).

Existence of social norms: 278 (99.3%) of households reported that there were social norms in the communities such as the belief that people should use latrines, people response to those who practice open defecation such as encouraging to use latrines, explaining them about impacts on human health and environments. These social norms steered the communities to prevent the backsliding to open defecation (SS1).

Quality of triggering process: Meanwhile the high percentage of community participation (271 households, 96.8%) in the triggering process (including men, women, children, people with disabilities, people from poorest households, decision-makers, and elders, etc.) was discovered in the study areas, the high usage of latrines was found. Thus, the quality of the triggering process contributed to the use of sanitation facilities (SS2).

Existence of post triggering follow-up activities: Post-triggering activities such as updating the community map, technical training of community members or masons on construction techniques, cross-visits and learning, training of sanitation committees, sanitation/ WASH marketing visits of external stakeholders, additional sanitation & hygiene related messages supported to become the ODF community. The researchers found that only the 6 villages (42.9%) which had the post-triggering activities achieved open defecation free status (SS1).

Availability of sanitation materials and products: Easily accessibility to the sanitation materials facilitated the construction of own latrines (SS2). Distance to the nearest town and mode of transportation influenced the sanitation materials availability. As the surveyed villages were close to the town and people used motorbikes, buses, and trucks to transport sanitation products, 274 (97.9%) of households reported that they could easily access to the sanitation materials and the high percentage of latrine construction was found in the study areas.

The functional monitoring system in place: Collecting, analyzing, and reporting sanitation data of the community were needed for local authorities to decide for the sanitation improvement of the community. It can help local authorities to perform the appropriate measures to achieve open defecation free township and to prevent backsliding to open defecation. The researcher found that a functional monitoring system was in place only in five villages (35.7%) that have been achieved ODF status (SS1).

Conclusions

The sustainability status of water supply and sanitation and hygiene has not deteriorated since the end of project 2018. The number of households that used water from improved water sources increased from 92% to 95.4% because of the supporting sustainable factors on water supply including local water sources are properly managed; unforeseen changes in demography; post-implementation support from local authorities; and effective and capacity of the water management committee to perform its task. Latrine usage has increased from 90% to 97.1% and handwashing practice has also increased and already met the national targets. The rural water supply status has already exceeded the National Target in 2025. The nationwide latrine coverage target has also already exceeded the National Target in 2025. As there were only six open defecation villages (42.9%) in the surveyed villages, it can be concluded that the open defecation free (ODF) target was still needed to meet the national target of 92% in 2020 [2]. To sum up, the impacts of water, sanitation and hygiene projects in Yesagyo Township were sustainable and likely to meet the national targets by 2030 by combining with continuous community collective actions and sufficient government supports after the project implementation. However, much work still needs to be done to achieve the status of open defecation free communities. This study was conducted only after two years of implementation period. As the life span of the infrastructures can affect the sustainability, further follow-up can be carried out when necessary and the sustainability status over time can be assessed.

Acknowledgement

We would like to express our gratitude to the responsible person of UN-HABITAT who allowed us to use the end-line survey report data for reference. We would like to thank all the persons and enumerators who devoted their time to collect all the required data.

References

[1] Weber, N., Rajasingham, A., Patrick, M., Martinsen, A., & Handzel, T. 2018. Water, Sanitation, and Hygiene (WASH). Health in Humanitarian Emergencies. https://www.who.int/health-topics/water-sanitation-and-hygiene-wash (accessed 15 January 2021).

[2] United Nations. 2017. Clean water and sanitation: Why it matters. United Nations. https://www.un.org/sustainabledevelopment/ wp-content/ uploads/ 2016/ 08/ 6_Why-it-Matters_Sanitation_2p.pdf (accessed 15 January 2021).

[3] UNICEF. 2020. Water and Sanitation/ UNICEF Supply Division. https://www.unicef.org/supply/water-and-sanitation (accessed 15 January 2021).

[4] Voituriez, T., Morita, K., Giordano, T., Bakkour, N., & Shimizu, N. 2017. Financing the 2030 agenda for sustainable development. Governing Through Goals: Sustainable Development Goals as Governance Innovation, 16301(10): 259-273.

[5] Government of Myanmar. 2016. National Strategy for Rural Water Supply, Sanitation and Hygiene (WASH), WASH in Schools and WASH in Health Facilities 2016 - 2030.

[6] Ministry of Labour, Immigration and Population. 2017. The 2014 Myanmar Population and Housing Census Magway Region, Minbu District, Minbu Township Report.

[7] UN-HABITAT. 2018. End-line Survey Report, A Short Step From Improved WASH to Healthier Communities.

[8] Sawyer, R., Simpson-Herbert, M., & Wood, S. 1998. PHAST Step by Step Guide: A participatory approach for the control of the diarrhoeal disease. 1998, 134.

[9] UNICEF and the UNDP-SIWI Water Governance Facility. 2017. Sustainability Checks: Guidance To Design and Implement Sustainability Monitoring in WASH. https://www.unicef.org/media/91406/file/WASH-Guidance-for-Sustainability-Checks.pdf (accessed 15 January 2021).

[10] WHO.2017. Guidelines for Drinking Water Quality, 4th edition, incorporating the 1st addendum. https://www.who.int/publications/i/item/9789241549950 (accessed 15 January 2021).