



# Jambura Geoscience Review

p-ISSN 2623-0682 | e-ISSN 2656-0380

Department of Earth Science and Technology, Universitas Negeri Gorontalo



## Sustainability Evaluation of Rural Infrastructure Through The Participatory IMAP Approach: A Case Study of Ayula Selatan Village, Gorontalo

Fitryane Lihawa<sup>1</sup>, Ervan Harun<sup>2</sup>, Achmad N.F Machmud<sup>3</sup>, Marike Mahmud<sup>4</sup><sup>1</sup> *Geography Education, Universitas Negeri Gorontalo, Jl.Prof. Dr. Ing. B. J. Habibie, Bone Bolango, Gorontalo, 96119, Indonesia*<sup>2</sup> *Electrical Engineering, Universitas Negeri Gorontalo, Jl.Prof. Dr. Ing. B. J. Habibie, Bone Bolango, Gorontalo, 96119, Indonesia*<sup>3</sup> *Environmental Science, Universitas Negeri Gorontalo, Jl.Prof. Dr. Ing. B. J. Habibie, Bone Bolango, Gorontalo, 96119, Indonesia*<sup>4</sup> *Civil Engineering, Universitas Negeri Gorontalo, Jl.Prof. Dr. Ing. B. J. Habibie, Bone Bolango, Gorontalo, 96119, Indonesia*

### ARTICLE INFO

#### Article history:

Received: 12 October 2025

Accepted: 8 December 2025

Published: 15 January 2026

#### Keywords:

Ayula Selatan Village; Community-Based Infrastructure; IMAP Approach; Participatory Governance; Sustainability Evaluation

#### Corresponding author:

Fitryane Lihawa

Email: [fitryane.lihawa@ung.ac.id](mailto:fitryane.lihawa@ung.ac.id)

#### Read online:



Scan this QR code with your smart phone or mobile device to read online.

### ABSTRACT

Rural communities often face persistent challenges in achieving sustainable rural development due to limited technical capacity, low community participation, and weak institutional coordination in managing public infrastructure. This study evaluates the sustainability of community-based infrastructure in Ayula Selatan Village by integrating technical, social, and institutional dimensions within a participatory governance framework. A participatory qualitative approach—combining transect walks, interviews, and IMAP surveys was used to assess the performance of the community-based Drinking Water Supply System (SPAM), Domestic Wastewater Management System (SPAL), and the 3R Waste Management Facility (TPS 3R). Data were collected from 294 households to examine the system's functionality and community engagement. Findings show that 98% of households rely on bore wells, while only one communal wastewater treatment facility serves 50 households in limited coverage. The village operates a single TPS 3R with insufficient labor and transportation, resulting in inefficient waste processing. Strong links were observed between technical reliability, participatory governance, and sanitation sustainability, where greater community involvement fostered greater ownership, accountability, and long-term infrastructure performance. Institutional partnerships further enhanced operational resilience through collaborative management. Overall, the study highlights that sustainable rural development depends on synergy between technical robustness, social empowerment, and institutional collaboration. Strengthening participatory frameworks and local capacity is essential for improving the management and long-term sustainability of community-based rural infrastructure.

**How to cite:** Lihawa, F. (2026). Sustainability Evaluation of Rural Infrastructure Through the Participatory IMAP Approach: A Case Study of Ayula Selatan Village, Gorontalo. *Jambura Geoscience Review*, 8(1), 49-61. <https://doi.org/10.37905/jgeosrev.v8i1.34856>

## 1. INTRODUCTION

Community-based infrastructure development is a key approach to sustainable rural development. This approach emphasises the active involvement of local community stakeholders in planning, implementation, and management. These efforts ensure that infrastructure is inclusive, economically sustainable, and environmentally friendly (Ermawati et al., 2023; Mukhlisin &

Trimarstuti, 2023). Infrastructure sustainability is measured by its physical durability and ability to empower communities, enhance welfare, and strengthen social interaction. Studies have shown that community involvement produces more adaptive and effective outcomes, especially in core areas such as clean water, sanitation, and waste management (Kamulyan et al., 2018; Pratomo et al., 2023). This approach aligns with SDGs 6 and 11, which emphasise inclusive and resilient infrastructure and community empowerment.

In Indonesia, the Ministry of Public Works and Public Housing (PUPR) has increased support for community-based infrastructure (CBI) through programs such as the Thematic Community Service Program (KKN) on infrastructure. This program promotes university-community collaboration by integrating academic research with local development practices. The partnership between universities and PUPR aims to strengthen CBI by merging scientific knowledge with public policy (Widagdo, 2023; Pantiyasa & Semara 2019). This synergy enhances CBI's sustainability of CBI. It improves knowledge transfer and technical design and fosters collective maintenance responsibilities. Systems such as the Drinking Water Supply System (SPAM) and 3R Waste Management Site (TPS 3R) have provided tangible benefits to rural communities. These systems expand access to basic services and create a cleaner environment (Kamulyan et al., 2018; Pratomo et al., 2023).

However, managing and maintaining community-based infrastructure remains challenging. One major issue is the limited financial and technical resources at the village level, which hampers their long-term functionality. Many communities remain dependent on external assistance, resulting in a lack of ownership of the built infrastructure (Iwande et al., 2024; Raharjo et al., 2024). Additionally, low community participation in maintenance accelerates degradation, particularly in water and waste management systems (Srirejeki et al., 2020). These conditions underscore the need for models that not only build physical infrastructure but also integrate community participation into governance and operational frameworks.

Participatory approaches to infrastructure surveys and planning offer effective solutions to these challenges. Direct community involvement in problem identification and solution design enhances the accuracy. It also legitimises development policies. Community input ensures that infrastructure designs meet real needs (Kartinah et al., 2024; Hidayati et al., 2020). Studies have shown that participatory tools, such as transect walks and community mapping, foster collaboration. They also strengthen the accountability of stakeholders. These approaches enhance inclusivity by ensuring that vulnerable groups, such as women and low-income households, have a voice in decisions that affect their well-being.

National policies play an essential role in supporting sustainable infrastructure management. Government Regulation No. 122/2015 on Drinking Water Supply Systems (SPAM) provides legal and financial tools for community participation. The regulation emphasises local empowerment and transparent governance for equitable and efficient water services (Yusuf and Auliani, 2023). The SPAM framework aligns with global best practices that emphasise decentralisation and community ownership as the keys to sustainability. Experience shows that technical solutions require support from social frameworks. These frameworks promote shared responsibility and adaptive management.

Previous studies have shown that successful community-based infrastructure programs depend on community capacity and social capital. Effective implementation typically combines technical and managerial training with the physical infrastructure (Ermawati et al., 2023). Social capital, including networks, trust, and shared norms, has been identified as a critical determinant of local infrastructure resilience and sustainability (Mukhlisin & Trimarstuti, 2023). Programs that strategically leverage existing social structures tend to generate higher levels of participation and collective responsibility, thereby reducing reliance on external interventions (Mukhlisin & Trimarstuti, 2023).

Furthermore, previous research emphasises that social capital, trust, networks, participation, and local norms contribute significantly to the resilience of community-based infrastructure. Effective programs combine technical capacity building with strengthened community organisations, resulting in improved sustainability and reduced dependence on external actors (Ermawati et al., 2023; Mukhlisin & Trimarstuti, 2023). However, existing studies still lack integrated analyses that jointly examine the technical, social, and policy dimensions of rural

infrastructure systems. Recent research suggests that sustainable performance depends on the interaction between technical reliability, governance structures, and community engagement; however, comprehensive evaluations remain limited (Ndoluanak et al., 2023; Mustofa & Afifah, 2023). These gaps underscore the need for interdisciplinary studies that adopt an integrated, participatory evaluation approach, a claim supported by the current literature but still underexplored in the rural Indonesian context.

Building on these research gaps, this study evaluates the condition, challenges, and sustainability of community-based infrastructure in the Ayula Selatan Village. The Identification of Problems and Potential Analysis (IMAP) participatory framework was used. The objective of this study was to provide an integrated assessment of SPAM, SPAL, and TPS 3R. This includes combining technical, social, and institutional analyses to generate evidence-based recommendations for the sustainable development of rural areas.

## 2. METHOD

This study employed a participatory qualitative approach to assess community-based infrastructure in the Ayula Selatan Village. Transect walks, participatory interviews, and direct observations were combined to generate integrated technical and socio-cultural insights. The data collection involved 294 households and key informants, including village officials, community leaders, and infrastructure beneficiaries. These methods enabled researchers and community members to jointly identify infrastructure conditions and challenges related to the Drinking Water Supply System (SPAM), Domestic Wastewater Management System (SPAL), and the 3R Waste Management Facility (TPS 3R).

This research followed the IMAP (Identification of Problems and Potential Analysis) participatory framework, which facilitates the collaborative identification of local issues and potential improvements. Infrastructure assessment was guided by three core dimensions: functionality, accessibility, and sustainability, which served as the primary indicators for evaluating public facilities (Table 1). These indicators provide a structured basis for analysing operational performance, service coverage, and long-term maintenance capacity.

**Table 1.** Class slope

Dimension	Indicator	Description
Functionality	Operational status of SPAM, SPAL, and TPS 3R	Measures whether infrastructure operates effectively and reliably
Accessibility	Distance and ease of user access	Evaluates the extent to which facilities serve the community equitably
Sustainability	Maintenance and environmental compatibility	Assesses long-term resilience and ecological impact of infrastructure

Methodological triangulation was applied to ensure data validity. The findings from observations, interviews, and community discussions were cross-checked. Community members participated throughout the verification stage to enhance accuracy, strengthen their shared understanding, and support participatory decision-making. All the participants provided informed consent. This study adhered to the ethical principles of confidentiality, voluntary participation, and transparency in research objectives. Qualitative data were transcribed, coded, and thematically analysed to identify patterns linking technical performance, community engagement, and environmental conditions.

### 3. RESULTS AND DISCUSSION

#### 3.1. Results

##### 3.1.1. Drinking Water Suplay System (SPAM)

The IMAP findings indicate that the Ayula Selatan Village relies almost entirely on non-piped groundwater sources. Data were collected from 294 households to examine the system's functionality and community engagement. The findings show that 98% of households rely on bore wells, while only 2% depend on dug wells distributed across Dusun I–III. Transect walks and household interviews showed that the absence of a centralised SPAM network results in a fully self-managed water system in which water quality varies according to environmental conditions. Residents living near the former river channel reported frequent turbidity, especially during the rainy season, suggesting sedimentation and possible contamination of the water. However, as noted by Marisdayana et al. (2022), groundwater quality in rural areas is often influenced by the surrounding environmental conditions, including contamination from domestic wastewater and agricultural runoff. In Ayula Selatan, households near the old river channel reported turbid water, suggesting sedimentation and possible microbial contamination of the water.

Field observations also confirmed the absence of piped distribution networks or centralised treatment facilities. This condition increases the reliance on self-managed water sources, where storage and sanitation practices directly affect drinking water safety (Sapta et al., 2025). Although bore wells generally offer better microbiological quality than surface water, poor construction or irregular maintenance can result in contamination of the water. The importance of systematic groundwater quality monitoring has been emphasised, as regular testing can reduce the risk of microbial and chemical contamination (Febriwani et al., 2019). Figure 1 illustrates a dug well in Dusun I, where residents reported frequent turbidity during the rainy seasons. These findings align with those of previous studies showing that shallow groundwater in tropical lowlands is vulnerable to the infiltration of domestic wastewater (Marisdayana, 2022). Therefore, strengthening groundwater management through community education, improved well design, and routine monitoring is crucial in this region. Integrating household-level interventions, such as safe storage practices and low-cost filtration technologies, with village-level policy support is essential to ensure sustainable improvements in water quality (Hasyti, 2024).



**Figure 1.** Condition of community wells in Ayula Selatan Village.

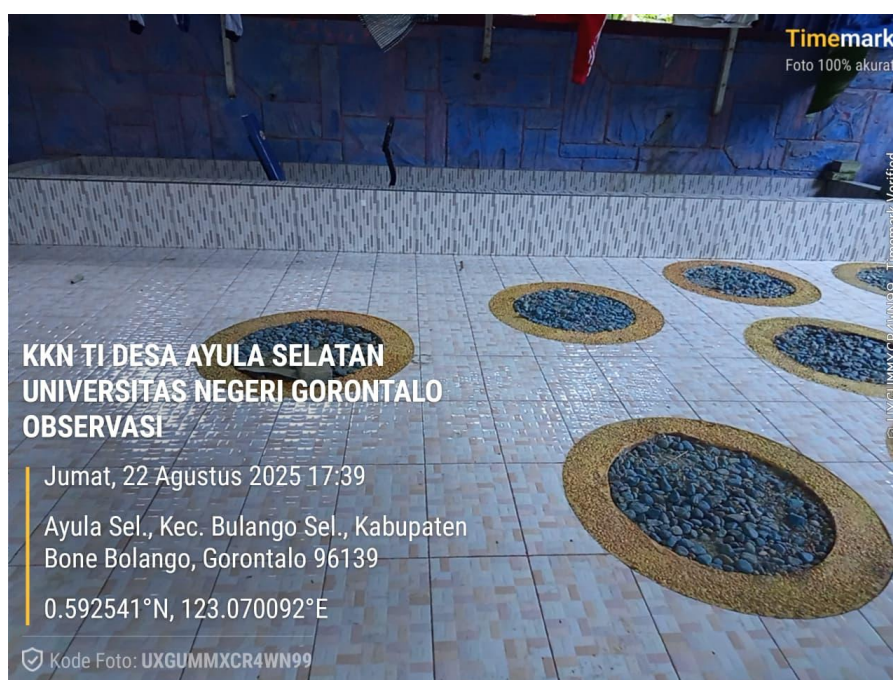
##### 3.1.2. Sanitation and Wastewater Management System (SPAL)

The survey identified one communal Wastewater Treatment Plant (IPAL) serving approximately 50 households in Dusun II (see Figure 2). This facility was found to operate efficiently without leakage, odour, or structural damage. These findings align with the community-

based sanitation model, in which active participation and local responsibility are critical to system sustainability (Ulfa et al., 2023). Community involvement in routine maintenance and cleaning activities has significantly contributed to the longevity of the system.

Nevertheless, most households still depend on individual septic tanks or unregulated disposal systems for wastewater disposal. Similar issues have been observed in other rural areas, where inadequate design, improper material selection, and lack of maintenance have led to system failure (Pangestu & Sitorus, 2021). Field interviews confirmed instances of clogged drainage and stagnant wastewater in unserved areas, highlighting the need to expand or replicate the existing model. External contamination from surrounding water sources can worsen public health risks if wastewater systems are not properly separated from groundwater (Zahtamal et al., 2021).

Community participation is a decisive factor in the performance of SPAL systems. Households engaged in regular maintenance showed higher awareness of environmental hygiene, consistent with previous studies demonstrating a strong link between community engagement and system sustainability (Rompas et al., 2023; Haryono et al., 2023). Conversely, low community involvement correlated with neglected drainage, emphasising that technical infrastructure alone is insufficient without social reinforcement.



**Figure 2.** Condition of Communal Wastewater Treatment Plant in Ayula Selatan Village.

### 3.1.3. Solid Waste Management

Ayula Selatan Village operates a single TPS 3R facility in Dusun II (Figure 3). This system aims to process household waste using the principles of Reduce, Reuse, and Recycle (3R). However, several operational challenges were identified, including labour shortages, the need for only one worker to manage the entire facility, and recurrent breakdowns of the transport vehicles. Consequently, waste collection and transportation have become inefficient, leading to waste accumulation and open burning practices.

These issues align with the findings of earlier studies, which emphasised that the success of TPS 3R largely depends on community participation and reliable logistics (Dewi et al., 2021; Maharja et al., 2022). Although the infrastructure is in place, behavioural and organizational gaps continue to hinder system effectiveness. The need for educational programs to promote household waste sorting and recycling has also been highlighted in recent research (Joleha et al., 2023; Aidha & Ayu, 2022). Figures 4 and 5 provide visual evidence of accumulated waste and open burning, underscoring the urgency of implementing behavioural interventions.

Institutional capacity and social support also play vital roles in effective WM. Strong local institutions can ensure operational sustainability by providing training, equipment, and consistent

service delivery (Kurniawati et al. 2024). Community-based organisations further enhance ownership and accountability in waste management programs (Nurchahya et al., 2022). In Ayula Selatan, insufficient human resources and weak institutional support hinder these outcomes. Training waste transport workers could improve technical efficiency, while scheduled waste collection could prevent accumulation (Ridayati & Yunastiawan, 2022; Mulya et al., 2024). Integrating policy with community-based education can encourage sustainable waste management practices (Utomo et al., 2024).



**Figure 3.** Condition of TPS 3R in Ayula Selatan Village.

#### 3.1.4. Housing and Settlement Infrastructure

The IMAP survey recorded only two houses classified as uninhabitable, both located in Dusun II (Figure 6), indicating generally adequate housing conditions across the Ayula Selatan village. However, both technical and social indicators revealed areas for improvement. Core housing indicators include structural safety, access to clean water, sanitation, and wastewater disposal systems (Harahap, 2021). Social indicators, such as community participation, satisfaction with public facilities, and levels of social interaction, reflect broader community well-being (Khatimah & Suparti, 2025).

Residents generally expressed satisfaction with their housing comfort, which is closely linked to the quality of basic infrastructure, such as water, sanitation, and roads. Adequate infrastructure has been shown to improve the overall quality of life (Anggraini & Kurniawan, 2021). Residents who are satisfied with public infrastructure also tend to exhibit better physical and psychological health (Yahya et al., 2020). However, poor ventilation and lighting in several homes were identified as risk factors for poor indoor air quality.

Adequate ventilation and natural lighting are essential in tropical climates, where high humidity promotes mould growth and increases the risk of respiratory disease. Proper ventilation has been shown to reduce the risk of tuberculosis and other respiratory illnesses (S et al. 2019; Aryani et al. 2022). In Ayula Selatan, some houses lacked sufficient window openings or airflow, potentially increasing health risks for the residents. A positive correlation between ventilation size and a reduced incidence of acute respiratory infections has been confirmed in recent studies (Rafaditya et al., 2022; Amelia et al., 2023).

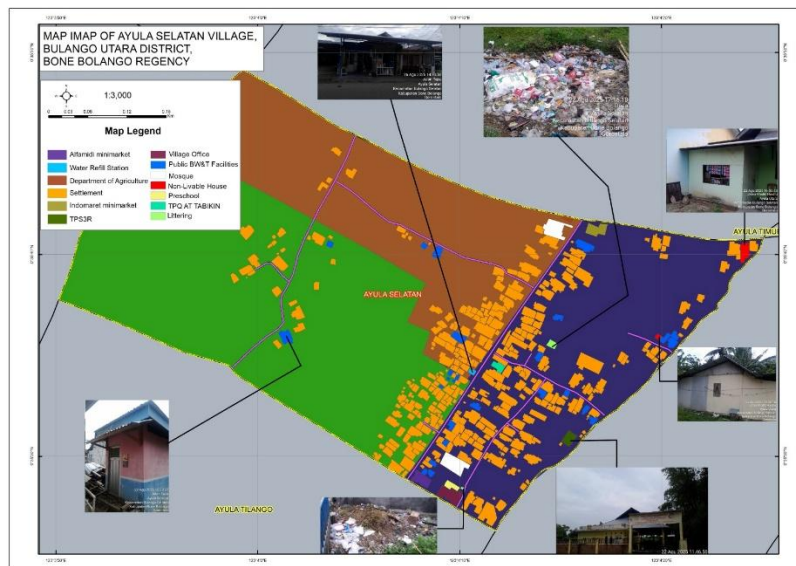
From a health perspective, implementing the WHO's healthy housing standards, including adequate lighting, ventilation, sanitation, and structural safety, is crucial (Fikri et al., 2021; Prasetyawati et al., 2022). However, many rural homes in Indonesia still fail to meet these standards (Setiyowati et al., 2022). IMAP data show that while Ayula Selatan meets some criteria, improvements in indoor air quality and moisture control are required. Environmental and behavioural factors, such as indoor smoking, biomass fuel use, and inefficient waste disposal, exacerbate air pollution (Syahbani & Lagiono, 2017; Amalia & Fadhlullah, 2024; Birawida et al., 2023). Moreover, inadequate drainage contributes to dampness and the accumulation of indoor pollutants (Sari et al., 2022; Raditya et al., 2018).

#### 3.1.5. Integrated Spatial Analysis

Figure 4 presents the IMAP spatial map of Ayula Selatan Village, showing the distribution of water sources, sanitation facilities, waste accumulation zones and uninhabitable houses. Spatial analysis confirms inter-hamlet disparities: Dusun II has the most complete facilities but generates

the highest volume of waste. Areas near rivers and lowlands are more environmentally vulnerable, particularly regarding water quality and drainage effectiveness. Integrating spatial findings with socioeconomic data can help prioritise interventions, emphasising the value of participatory mapping for infrastructure planning (Kartinah et al., 2024). [insert citation]

Overall, the findings reveal that while Ayula Selatan has developed significant community-based infrastructure assets, systemic gaps remain in management, maintenance, and social participation. Sustainable improvement requires a dual approach that combines technical interventions, such as expanding IPAL coverage and improving TPS 3R logistics, with social empowerment through education and institutional strengthening. These results are consistent with the integrated rural development framework, which asserts that infrastructure sustainability cannot be separated from community capacity and governance resilience (Mukhlisin and Trimarstuti, 2023).



**Figure 4.** IMAP Map of South Ayula Village.

### 3.2. Discussion

The integration of social and technical approaches is pivotal for improving the sustainability of community-based infrastructure in rural areas. This study demonstrates that success in villages like Ayula Selatan is determined not only by the design and construction quality but also by the level of community participation and ownership. Infrastructure sustainability requires the integration of local knowledge, community engagement, and sustainable governance (Mukhlisin & Trimarstuti, 2023). The findings revealed that when communities actively participate in planning, implementing, and maintaining infrastructure, they develop stronger ownership, which enhances the long-term system functionality for SPAM, SPAL, and TPS 3R. This integration fosters social trust and accountability, creating shared responsibility among stakeholders.

The experiences of ASEAN countries reinforce the importance of participatory development models. Programs in Thailand and Vietnam, for instance, have achieved measurable success by applying bottom-up approaches that merge local data with centralised support, thus improving their efficiency and sustainability. These cases affirm that effective rural infrastructure programs must align technical solutions with sociocultural contexts to accommodate community needs and behaviours (Hasyti, 2024). Applying similar models in Indonesia requires strengthening community capacity and promoting cross-sector collaboration among local governments, universities, and civil society. As seen in Ayula Selatan, limited institutional coordination and human resource constraints hinder infrastructure maintenance, indicating the need for holistic policy approaches.

Public awareness and behavioural change are equally vital for the optimal use of public facilities, such as TPS 3R and communal IPALs. Field observations show that areas exposed to sanitation and waste management education exhibit higher compliance and engagement in maintaining clean

environments. This finding aligns with research demonstrating that environmental education directly shapes sustainable behavioral patterns (Dewi et al., 2021; Maharja et al., 2022). Active community participation not only ensures the functionality of infrastructure but also enhances environmental awareness and reduces unsafe waste disposal practices. The relationship between technical infrastructure and behavioural adaptation is mutually reinforcing; facilities promote positive behaviour, and community participation sustains the system's performance.

Effective community empowerment models for post-construction infrastructure management emphasise participatory approaches and capacity-building. Community empowerment through organised local groups enhances the ability to manage, monitor, and maintain infrastructure using locally appropriate technology (Akbaridin et al., 2021). The Participatory Rural Appraisal (PRA) method has also proven effective in enabling villagers to identify their needs and potentials, ensuring that interventions are contextually grounded and sustainable. In Ayula Selatan, integrating PRA with ongoing IMAP assessments could provide a structured mechanism for adaptive management, where community feedback directly informs infrastructure improvement and policy planning.

Participatory evaluation is an essential tool for iterative infrastructure monitoring and planning. By involving residents in project evaluation and feedback collection, participatory assessments reveal operational weaknesses, maintenance needs, and opportunities for innovation. This process democratises decision-making and strengthens accountability, as community members actively determine the infrastructure priorities. Incorporating participatory monitoring into the IMAP framework ensures that infrastructure development remains dynamic, evidence-based, and responsive to local changes (Yunginger & Patuti 2025).

Strengthening the synergy among local governments, universities, and communities is a strategic necessity for sustainable infrastructure governance. Multi-stakeholder partnerships create platforms for collaborative research, knowledge transfer, and innovation tailored to local challenges (Baineo, 2022; Baihati et al., 2021). Joint training initiatives led by academics and local officials covering topics such as financial management, participatory decision-making, and technical maintenance can empower communities to take a leading role in sustaining the infrastructure. Transparency in financial management and inclusive decision-making further enhance trust, building a collaborative environment in which infrastructure is viewed as a shared asset that requires collective stewardship. Through this integrated approach, the long-term sustainability of community-based infrastructure can be achieved by aligning technical resilience, social empowerment and institutional collaboration.

#### 4. CONCLUSIONS

This study concludes that the sustainability of community-based infrastructure in Ayula Selatan Village depends on integrating technical robustness, social participation, and institutional collaboration. The findings revealed that systems such as the Drinking Water Supply System (SPAM), Domestic Wastewater Management System (SPAL), and 3R Waste Management Facility (TPS 3R) function effectively only when communities are actively involved in their planning, operation, and maintenance. The participatory approach strengthens community ownership, trust, and accountability, thereby enhancing the resilience and performance of the infrastructure systems. Furthermore, awareness and education significantly influence behavioural adaptation, promoting sound sanitation and waste management practices. The IMAP participatory evaluation framework has proven capable of ensuring that infrastructure systems remain adaptive, data-driven, and responsive to local needs.

Institutional support and multi-stakeholder collaboration, particularly among local governments, universities, and communities, are essential for bridging resource and knowledge gaps. The success of similar programs in ASEAN countries underscores the necessity of bottom-up models that align technical interventions with sociocultural dynamics. This study advances the knowledge of sustainable rural infrastructure by demonstrating that social empowerment and technical capacity must evolve together to achieve long-term resilience. Future studies should explore the scalability of participatory models across diverse rural contexts and integrate digital

monitoring tools to enhance accountability and data transparency in community-managed infrastructure systems.

## 5. ACKNOWLEDGMENTS

We would like to thank the Ministry of Public Works and Public Housing (PUPR) and the Research and Community Empowerment Institute (LPPM) of Gorontalo State University for funding this study. We also thank the Head of Ayula Selatan Village for agreeing to serve as the survey location.

## 6. REFERENCES

- Agustian, A., Achmad, D., Widyawati, R., & Sarkowib, M. (2022). Analisis dan target capaian air minum Kabupaten Way Kanan. *Seminar Nasional Insinyur Profesional (SNIP)*, 2(2). <https://doi.org/10.23960/snip.v2i2.324>
- Ahlan, A., Rindengan, Y. D., & Jacobus, A. (2022). Sistem informasi geografis penyebaran Covid-19 di Kota Manado berbasis mobile. *Jurnal Teknik Elektro dan Komputer*, 11(3), 121. <https://doi.org/10.35793/jtek.v11i3.43140>
- Aidha, Z., & Ayu, D. (2022). Kontribusi kinerja kelompok swadaya masyarakat (KSM) dengan kepuasan masyarakat dalam pengelolaan sampah. *Journal of Telenursing (JOTING)*, 4(2), 594–605. <https://doi.org/10.31539/joting.v4i2.4250>
- Akbardin, J., Permana, A. Y., Anggoro, D., & Hutajulu, D. T. P. (2021). Pemberdayaan masyarakat pedesaan dalam pemeliharaan infrastruktur jalan berdasarkan struktur kelompok masyarakat penyelenggara. *LeKaEdu*, 1(3), 139–146. <https://doi.org/10.17509/lekaedu.v1i3.43443>
- Amalia, A., & Fadhlullah, F. (2024). Faktor-faktor yang berhubungan dengan kejadian ISPA pada balita (1–4 tahun) di wilayah kerja Puskesmas Bandar Kecamatan Bandar Kabupaten Bener Meriah tahun 2023. *Jurnal Bidang Ilmu Kesehatan*, 14(1), 72–81. <https://doi.org/10.52643/jbik.v14i1.4116>
- Amelia, A., Agustina, E., Azmiyannoor, M., & Rifaldi, R. (2023). Asosiasi lingkungan fisik rumah sebagai faktor risiko kejadian TB paru di Indonesia. *Jurnal Kesehatan Tambusai*, 4(3), 2314–2322. <https://doi.org/10.31004/jkt.v4i3.15481>
- Anggraini, B. L., & Kurniawan, B. (2021). Evaluasi program rehabilitasi rumah tidak layak huni (RTLH) di Kabupaten Tuban. *Publika*, 309–322. <https://doi.org/10.26740/publika.v9n2.p309-322>
- Aryani, A. A., Wardani, F. L. K., & Rahardjo, S. (2022). Lingkungan fisik rumah sebagai faktor risiko kejadian tuberkulosis paru di Kecamatan Kebasen, Kabupaten Banyumas. *Jurnal Ilmiah Kesehatan Masyarakat Media Komunikasi Komunitas Kesehatan Masyarakat*, 14(2), 56–62. <https://doi.org/10.52022/jikm.v14i2.333>
- Aryanto, P., Hendarmawan, H., Hadian, M. S. D., Novianti, E., & Faramitha, S. (2022). Geowisata dan potensi penguatan komunitas pada wisata pasca-tambang open pit Nam Salu di Belitung Timur. *Jurnal Kawistara*, 12(3), 368. <https://doi.org/10.22146/kawistara.73729>
- Baihati, L. N., Atmojo, M. E., & Pratiwi, V. P. (2021). Partisipasi masyarakat dalam pembangunan desa di Desa Raji Kecamatan Demak Kabupaten Demak tahun 2017. *Jurnal Administrasi Pemerintahan Desa*, 2(1), 1–10. <https://doi.org/10.47134/villages.v2i1.12>
- Baineo, A. (2022). Partisipasi masyarakat dalam pembangunan infrastruktur di Desa Bulangkulon Kecamatan Benjeng Kabupaten Gresik. *JISP*, 1(1), 1–20. <https://doi.org/10.38156/jisp.v1i1.2>
- Birawida, A. B., Daud, A., Ibrahim, E., Sila, N., & Khaer, A. (2023). Faktor risiko kejadian infeksi saluran pernapasan akut ditinjau dari kondisi lingkungan fisik pada masyarakat di Kepulauan Spermonde: Penelitian observasional. *Health Information Jurnal Penelitian*, 15(1). <https://doi.org/10.36990/hijp.v15i1.820>

- Ermawati, E. A., Hanggraito, A. A., Cahyaningtyas, I., & Yustita, A. D. (2023). A community-based agriculture development model in Kluncing Village, Banyuwangi. *Jurnal Manajemen Perhotelan dan Pariwisata*, 6(1), 149–157. <https://doi.org/10.23887/jmpp.v6i1.59568>
- Febriwani, F. W., Elliyanti, A., & Reza, M. (2019). Analisis kadar timbal (Pb) air minum isi ulang pada depot air minum (DAM) di Kecamatan Padang Timur Kota Padang tahun 2017. *Jurnal Kesehatan Andalas*, 8(3), 668. <https://doi.org/10.25077/jka.v8i3.1056>
- Fikri, Z., Samudra, W. B. S., Kurnia, A. D., Masruroh, N. L., & Melizza, N. (2021). Hubungan status rumah sehat dengan kejadian tuberkulosis di wilayah Kecamatan Campurdarat. *Indonesian Health Science Journal*, 1(2). <https://doi.org/10.52298/ihsj.v1i2.14>
- Gunadi, B., Kostini, N., & Alexandri, M. B. (2023). Evaluasi kebijakan perbaikan rumah tidak layak huni di Kota Cimahi tahun 2020. *Responsive*, 5(4), 321. <https://doi.org/10.24198/responsive.v5i4.34750>
- Harahap, T. (2021). Komparasi indikator rumah layak huni dan permukiman kumuh Indonesia. *Journal of Science and Applicative Technology*, 5(1), 163. <https://doi.org/10.35472/jsat.v5i1.426>
- Haryono, I., Soesilo, T. E. B., & Agustina, H. (2023). Pengaruh perilaku dan kondisi permukiman masyarakat terhadap kualitas air di Sungai Jangkok, Kota Mataram. *Jurnal Kesehatan Lingkungan Indonesia*, 23(1), 73–83. <https://doi.org/10.14710/jkli.23.1.73-83>
- Hasyti, Y. D. (2024). Perencanaan sistem jaringan distribusi utama (JDU) air minum wilayah pelayanan Kelurahan Rancabolang Kota Bandung. *Geoplanart*, 7(1), 25–37. <https://doi.org/10.35138/geoplanart.v7i1.875>
- Hidayati, N., Majid, A., & Selfia, Y. (2020). Peran komunitas kerajinan daur ulang sampah (KerDUS) sebagai promotor edukasi zero waste di Kabupaten Kendal. *Dialogue: Jurnal Ilmu Administrasi Publik*, 2(1), 81–95. <https://doi.org/10.14710/dialogue.v2i1.8240>
- Iwande, F. P., Rizal, M. F., & Ariffin, M. (2024). Penguatan infrastruktur dan edukasi masyarakat Desa Pungur Kecil menuju masyarakat yang berpendidikan, kreatif, dan inovatif. *Dianmas Bhakti*, 1(1), 24–29. <https://doi.org/10.54035/dianmas.v1i1.483>
- Joleha, J., Yenie, E., Elianora, E., Suprayogi, I., & Handayani, Y. L. (2023). Menumbuhkan kesadaran warga mengurangi limbah plastik dengan ecobrick. *Batobo: Jurnal Pengabdian Kepada Masyarakat*, 1(2), 82–92. <https://doi.org/10.31258/batobo.1.2.82-92>
- Kamulyan, P., Wiguna, I. P. A., & Slamet, A. (2018). Penilaian keberlanjutan pengelolaan sistem penyediaan air minum berbasis masyarakat di Kota Blitar. *Journal of Civil Engineering*, 32(2), 60. <https://doi.org/10.12962/j20861206.v32i2.4559>
- Kartinah, K., Suroño, U. B., & Hutomo, S. G. (2024). Pemberdayaan kelompok difabel pada usaha pengolahan singkong di Kalurahan Bangunkerto. *Archive: Jurnal Pengabdian Kepada Masyarakat*, 3(2), 377–387. <https://doi.org/10.55506/arch.v3i2.116>
- Khatimah, H., & Suparti, H. (2025). Implementasi rehabilitasi rumah tidak layak huni Desa Teratau Kecamatan Jaro Kabupaten Tabalong. *JAPB*, 8(1), 205–218. <https://doi.org/10.35722/japb.v8i1.1159>
- Kurniawati, R. D., Fauziah, D. A., Stellata, A. G., et al. (2024). Kemandirian Gerakan Cinta Sonik (sampah organik) mengelola sampah dari sumber rumah tangga Desa Lengkong Kecamatan Bojongsoang Kabupaten Bandung. *Jurnal Pepadu*, 5(1), 1–13. <https://doi.org/10.29303/pepadu.v5i1.3911>
- Kuswandhie, R., & Primadasa, Y. (2019). Penggabungan metode MEC dan AHP dalam penentuan bantuan rumah tidak layak huni. *Techno Com*, 18(2), 134–144. <https://doi.org/10.33633/tc.v18i2.2268>
- Lambelanova, R. (2017). Implementasi kebijakan otonomi daerah bidang pendidikan, kesehatan dan perekonomian di Kabupaten Bandung Barat. *Sosiohumaniora*, 19(2). <https://doi.org/10.24198/sosiohumaniora.v19i2.12137>
- Maharja, R., Latief, A. W. L., Bahar, S. N., Gani, H., & Rahmansyah, S. F. (2022). Pengenalan pengolahan sampah berbasis 3R pada masyarakat pedesaan sebagai upaya pengurangan timbulan sampah rumah tangga. *Jurnal Abdimas Berdaya: Jurnal Pembelajaran Pemberdayaan dan Pengabdian Masyarakat*, 5(1), 62. <https://doi.org/10.30736/jab.v5i01.213>

- Marisdayana, R. (2022). Faktor yang berhubungan dengan kualitas air minum rumah tangga di Kota Jambi. *Galenic: Jurnal Kedokteran dan Kesehatan Mahasiswa Malikussaleh*, 1(2), 1. <https://doi.org/10.29103/jkmm.v1i2.8108>
- Mukhlisin, I., & Trimarstuti, J. (2023). Analisis keberlanjutan desa wisata Petingsari menggunakan metode multidimensional scaling (MDS) dengan pendekatan Rap-Tour. *Jurnal Perencanaan Wilayah dan Kota*, 18(1), 26–38. <https://doi.org/10.29313/jpwk.v18i1.1626>
- Mulya, A. P., Susanti, R. D., & Rahman, E. R. (2024). Optimalisasi pengetahuan masyarakat dalam pengelolaan sampah rumah tangga di Kelurahan Kebon Jayanti Kota Bandung. *Jurnal Kreativitas Pengabdian Kepada Masyarakat (PKM)*, 7(1), 62–73. <https://doi.org/10.33024/jkpm.v7i1.12410>
- Mustofa, A., & Afifah, F. A. N. (2023). Akuntabilitas pengelolaan dana desa dalam pembangunan infrastruktur Desa Semambung Kabupaten Sidoarjo. *JAKPP (Jurnal Analisis Kebijakan & Pelayanan Publik)*, 46–62. <https://doi.org/10.31947/jakpp.v9i1.28508>
- Ndoluanak, R. M. A., Stefanus, K. Y., & Lamataro, C. W. T. (2023). Pengaturan penggunaan dana desa dan kesejahteraan masyarakat. *Comserva: Jurnal Penelitian dan Pengabdian Masyarakat*, 3(2), 779–797. <https://doi.org/10.59141/comserva.v3i02.826>
- Dewi, N. P. A. P., Madrini, I. A. G. B., & Tika, I. W. (2021). Efektivitas sistem pengelolaan sampah berbasis masyarakat (studi kasus: Desa Sanur Kaja Kota Denpasar). *Jurnal Beta (Biosistem dan Teknik Pertanian)*, 9(2), 280. <https://doi.org/10.24843/jbeta.2021.v09.i02.p15>
- Ningsih, R., Basri, B., & Rahim, A. (2022). Persepsi masyarakat tentang amal usaha Muhammadiyah Desa Mola Nelayan Bakti Kecamatan Wangi-Wangi Selatan Kabupaten Wakatobi. *JWS*, 1(2), 71–78. <https://doi.org/10.35326/juwara.v1i2.3186>
- Nurchaya, W., Novia, F., & Febrion, C. (2022). Efektivitas program bank sampah dalam pengelolaan sampah (studi kasus: Bank Sampah Senyum Mandiri, Kelurahan Neglasari, Kota Bandung). *Sustainable Environmental and Optimizing Industry Journal*, 2(2), 68–75. <https://doi.org/10.36441/seoi.v2i2.1008>
- Pangestu, S., & Sitorus, J. R. H. (2021). Penyusunan indeks sanitasi provinsi-provinsi di Indonesia. *Seminar Nasional Official Statistics 2021*, (1), 363–372. <https://doi.org/10.34123/semnasoffstat.v2021i1.873>
- Pantiyasa, I. W., & Semara, I. M. T. (2019). Percepatan pengembangan desa wisata berbasis pendampingan melalui pelatihan homestay dan pramuwisata di Desa Pakseballi. *Prosiding Konferensi Nasional Pengabdian Kepada Masyarakat dan Corporate Social Responsibility (PKM-CSR)*, 2, 1034–1040. <https://doi.org/10.37695/pkmcsr.v2i0.421>
- Prasetyawati, R., Nasution, F. Z., & Lubis, N. (2022). Mewujudkan rumah sehat melalui penyuluhan kesehatan lingkungan membentuk masyarakat sehat jiwa dan raga. *To Maega: Jurnal Pengabdian Masyarakat*, 5(3), 523–532. <https://doi.org/10.35914/tomaega.v5i3.1223>
- Prasetyowati, S. H., & Indrawati, R. (2021). Perencanaan desain dan rencana anggaran biaya sistem penyediaan air minum di Dusun Karangasem, Desa Muntuk, Kecamatan Dlingo, Kabupaten Bantul. *Jurnal Rekayasa Lingkungan*, 21(1). <https://doi.org/10.37412/jrl.v21i1.92>
- Pratomo, A. B., Nurina, L., Wahyudi, E., et al. (2023). Sosialisasi transformasi lingkungan dan kesadaran dalam mendorong praktik pengelolaan sampah yang berkelanjutan. *Eastasouth Journal of Impactive Community Services*, 2(1), 45–56. <https://doi.org/10.58812/ejimcs.v2i01.163>
- Putra, K. W., & Mursyidah, L. (2023). Perencanaan pembangunan infrastruktur Desa Kalidawir Kecamatan Tanggulangin Kabupaten Sidoarjo. *Journal of Governance and Local Politics (JGLP)*, 5(2), 245–253. <https://doi.org/10.47650/jglp.v5i2.958>
- Raditya, C., Subagiyo, A., & Hilal, N. (2018). Hubungan faktor manusia dan lingkungan fisik rumah dengan kejadian penyakit tuberkulosis paru di wilayah kerja Puskesmas Cilongok I tahun 2016. *Buletin Keslingmas*, 37(1), 1. <https://doi.org/10.31983/keslingmas.v37i1.3784>
- Rafaditya, S. A., Saptanto, A., & Ratnaningrum, K. (2022). Ventilasi dan pencahayaan rumah berhubungan dengan infeksi saluran pernapasan akut (ISPA) pada balita: Analisis faktor lingkungan fisik. *Medica Arteriana (Med-Art)*, 3(2), 115. <https://doi.org/10.26714/medart.3.2.2021.115-121>

- Raharjo, K. M., Sucipto, S., Ishom, M., & Fatihin, M. K. (2024). Peningkatan kapasitas pengelola Bumdes dalam mengembangkan produk unggulan desa. *Jurnal Pengabdian Masyarakat Indonesia*, 4(1), 115–121. <https://doi.org/10.52436/1.jpmi.2000>
- Rendra, M. I. (2023). Penyusunan peta informasi bidang tanah pajak bumi dan bangunan perdesaan-perkotaan (PBB-P2) dengan pemetaan partisipatif. *Indonesian Journal of Spatial Planning*, 4(1), 40–45. <https://doi.org/10.26623/ijsp.v4i1.6754>
- Ridayati, & Yunastiawan, A. (2022). Penggunaan PLUM model dalam analisis pengaruh faktor pengetahuan terhadap attitude dan praktek pengolahan sampah berbasis 3R. *Kurvatek*, 7(2), 127–132. <https://doi.org/10.33579/krvtk.v7i2.3572>
- Rizal, C., Zen, M., & Hendry. (2023). Optimalisasi promosi dalam pengembangan desa wisata berbasis partisipasi masyarakat Desa Sei Limbat. *Juribmas*, 2(2), 176–181. <https://doi.org/10.62712/juribmas.v2i2.118>
- Rompas, H., Jumakil, & Irma. (2023). Hubungan sanitasi lingkungan dengan kejadian diare pada balita di wilayah kerja Puskesmas Abeli Kota Kendari. *Jurnal Kesehatan Lingkungan Universitas Halu Oleo*, 2(4). <https://doi.org/10.37887/jkl-uho.v2i4.35448>
- Sachrul, S. R., Haidah, N., & Hermiyanti, P. (2019). Hubungan kondisi fisik rumah dengan kejadian tuberkulosis paru di wilayah kerja Puskesmas Babana Kabupaten Mamuju Tengah. *An-Nadaa Jurnal Kesehatan Masyarakat*, 6(2). <https://doi.org/10.31602/ann.v6i2.2680>
- Sahrin, L. A., & Oktariyanda, T. A. (2022). Inovasi sistem informasi pendataan rumah tidak layak huni (SIGAP-RTLH) oleh Dinas Perumahan dan Kawasan Permukiman Kabupaten Gresik. *Publika*, 725–738. <https://doi.org/10.26740/publika.v10n3.p725-738>
- Sapta, W. A., Adetia, S. V., & Rosita, Y. (2025). Analisis pengaruh penyediaan air minum rumah tangga pada keluarga balita stunting di wilayah kerja UPTD Puskesmas Adiluwih tahun 2024. *Jurnal Kesehatan Tambusai*, 6(1), 831–840. <https://doi.org/10.31004/jkt.v6i1.41655>
- Sari, M. L. N., Fikri, A., Murwanto, B., & Yushananta, P. (2022). Analisis faktor lingkungan fisik dan kejadian tuberkulosis di wilayah kerja Puskesmas Kedaton Kota Bandar Lampung. *Ruwa Jurai: Jurnal Kesehatan Lingkungan*, 16(3), 152. <https://doi.org/10.26630/rj.v16i3.3629>
- Setiyowati, E., Mulyadi, M., Wardani, E. M., & Winoto, P. M. P. (2022). Health education pengendalian penularan penyakit tuberkulosis paru di Kelurahan Kebonsari Surabaya. *Swarna: Jurnal Pengabdian Kepada Masyarakat*, 1(4), 443–450. <https://doi.org/10.55681/swarna.v1i4.180>
- Srirejeki, K., Faturahman, A., Warsidi, Warsidi, Ulfah, P., & Herwiyanti, E. (2020). Pemetaan potensi desa untuk penguatan badan usaha milik desa dengan pendekatan asset based community-driven development. *Warta LPM*, 23(1), 24–34. <https://doi.org/10.23917/warta.v23i1.8974>
- Syahbani, & Lagiono. (2017). Analisis hubungan kondisi fisik rumah dengan kejadian penyakit TB paru di wilayah Puskesmas II Ajibarang Kabupaten Banyumas tahun 2016. *Buletin Keslingmas*, 36(4), 411–419. <https://doi.org/10.31983/keslingmas.v36i4.3121>
- Ulfa, Juslan, & Toto, S. S. (2023). Faktor-faktor yang berhubungan dengan kepemilikan sarana pembuangan air limbah rumah tangga di wilayah pesisir Desa Korihi Kec. Lohia Kab. Muna. *JTSI*, 2(1), 6–15. <https://doi.org/10.54883/jtsi.v2i1.419>
- Utomo, E. T., Ekayani, M., & Abidin, Z. (2024). Evaluasi indeks kinerja pengelolaan sampah (IKPS) dan strategi efektif pengelolaan sampah Kota Depok. *Risalah Kebijakan Pertanian dan Lingkungan: Rumusan Kajian Strategis Bidang Pertanian dan Lingkungan*, 11(2), 74–82. <https://doi.org/10.29244/jkebijakan.v11i2.57133>
- Widagdo, Y. M. (2023). Tata kelola homestay berbasis masyarakat di Desa Dayu Kecamatan Gondangrejo Kabupaten Karanganyar Jawa Tengah. *Jurnal Bengawan*, 3(2), 16–26. [https://doi.org/10.46808/jurnal\\_bengawan.v3i2.95](https://doi.org/10.46808/jurnal_bengawan.v3i2.95)
- Yahya, F., Prabawa, S. E., Mahardianti, M. A., & Alina, A. N. (2020). Pemetaan kawasan wilayah permukiman rumah tidak layak huni di perdesaan (studi kasus: Kecamatan Palengaan dan Kecamatan Batumarmar, Kabupaten Pamekasan). *Elipsoida: Jurnal Geodesi dan Geomatika*, 3(2), 206–216. <https://doi.org/10.14710/elipsoida.2020.9205>

- Yudhistirani, S. A., Syaufina, L., & Mulatsih, S. (2016). Desain sistem pengelolaan sampah melalui pemilahan sampah organik dan anorganik berdasarkan persepsi ibu-ibu rumah tangga. *Jurnal Konversi*, 4(2), 29. <https://doi.org/10.24853/konversi.4.2.29-42>
- Yunginger, R., & Patuti, I. M. (2025). Pendampingan partisipasi masyarakat dalam pemetaan IMAP untuk peningkatan kualitas infrastruktur permukiman berkelanjutan. *Reswara: Jurnal Pengabdian Kepada Masyarakat*, 6(1), 371–380. <https://doi.org/10.46576/rjpkm.v6i1.5213>
- Yusuf, R., & Auliani, R. (2023). Peran perencanaan kota berkelanjutan dalam mengatasi krisis air perkotaan: Integrasi infrastruktur hijau, teknologi pemantauan, dan kebijakan publik. *Jurnal Multidisiplin West Science*, 2(9), 770–779. <https://doi.org/10.58812/jmws.v2i09.628>
- Zahtamal, Restila, R., Restuastuti, T., Anggraini, Y. E., & Yurdiana. (2021). Analisis hubungan sanitasi lingkungan terhadap keluhan penyakit kulit. *Jurnal Kesehatan Lingkungan Indonesia*, 21(1), 9–17. <https://doi.org/10.14710/jkli.21.1.9-17>