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CSR-Supported Collaborative Governance for Environmental Health in Bulu Tellue Village, Pangkep Regency, Indonesia

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ABSTRACT

Environmental health service gaps in rural mainland communities are associated with limited infrastructure, fragmented institutional responsibilities, and uneven service capacity. This study examines the conditions for CSR-supported collaborative governance in Bulu Tellue Village, a rural mainland settlement in Pangkep Regency, Indonesia. A qualitative instrumental case study was conducted from April to June 2026 and involved 16 informants, two focus group discussions, structured observations, and document analysis. Data were analyzed through thematic coding, data condensation, and triangulation. The findings reveal interconnected infrastructure, service, and governance gaps that constrain sustainable waste management. Coordination among government institutions, village authorities, private-sector representatives, and communities remains insufficiently institutionalized. Corporate social responsibility (CSR/TJSL) could support infrastructure and capacity development, although no formal public-private partnership has been established. Community participation depends on reliable services, clearly defined responsibilities, affordable financing, and transparent decision-making. The study concludes that service credibility, institutional coordination, and public accountability are essential conditions for developing CSR-supported collaborative governance. These findings provide context-specific insights into environmental health governance in a rural mainland community rather than representing the geographically distinct island areas of Pangkep Regency.

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■ INTRODUCTION

Environmental health is an important component of sustainable development because it is closely connected to quality of life, disease prevention, and ecosystem sustainability. Sustainable Development Goal (SDG) 6 emphasizes universal access to safe and sustainable drinking water, sanitation, and hygiene services (United Nations, 2015). Despite improvements in global access, substantial gaps remain. In 2024, approximately 3.4 billion people worldwide still lacked safely managed sanitation services, while 1.7 billion lacked basic hygiene facilities at home (World Health Organization & United Nations Children's Fund, 2025). These conditions suggest that environmental health challenges cannot be addressed through infrastructure development alone; they also require stronger institutions and more effective service governance.

Remote areas face more complex challenges because of geographical constraints, limited accessibility, resource shortages, and uneven institutional capacity. Environmental problems involving multiple actors require mechanisms for collective action and coordination across organizational boundaries (Bodin, 2017). From a collaborative governance perspective, involving multiple actors allows the integration of resources, knowledge, interests, and capacities that no single organization can provide independently (Emerson et al., 2012). Recent research on health and sanitation projects likewise identifies leadership, governance, stakeholder engagement, and institutional capacity as important determinants of program sustainability (Kyambade et al., 2025).

This context is particularly relevant to Indonesia, an archipelagic country characterized by substantial differences in service capacity across regions. Research on water, sanitation, and pollution in Indonesia shows that water quality, sanitation, waste management, and environmental management continue to face institutional and capacity-related challenges that vary across locations (Wulandari et al., 2024). UNICEF Indonesia also highlights the importance of stakeholder coordination, capacity strengthening, and private-sector engagement in achieving safe and inclusive water, sanitation,

and hygiene (WASH) services (UNICEF Indonesia, 2024). These conditions indicate that environmental health is inherently cross-sectoral and requires integrating authority, resources, knowledge, and responsibilities across different actors.

Pangkajene and Kepulauan Regency (Pangkep), South Sulawesi, comprises mainland and island territories with distinct geographical characteristics and environmental service challenges. This study focuses specifically on Bulu Tellue Village, a rural mainland settlement characterized by hilly terrain and limited environmental service infrastructure. At the regency level, 88.00% of households had access to improved sanitation in 2023 (BPS-Statistics of Pangkajene dan Kepulauan Regency, 2024). In contrast, access to safely managed sanitation was reported at only 2.97% (Pangkajene and Islands Regency Government, 2024). These figures provide regional context rather than village-specific measurements. The Bulu Tellue case offers an opportunity to examine how geographical accessibility, limited service capacity, and fragmented institutional responsibilities influence environmental health governance in a rural mainland setting.

This gap points to a governance challenge as much as an infrastructure challenge. Environmental health problems are complex because they involve multiple sectors, interests, resources, and levels of authority. Head and Alford (2015) argue that wicked problems require approaches that can address complexity, competing interests, and uncertainty through collaboration and coordination. In the context of sustainable development, collaboration among government, the private sector, and communities is particularly important because the resources and capacities needed to address complex problems are rarely concentrated within a single institution (Vazquez-Brust et al., 2020).

Corporate social responsibility (CSR), implemented in Indonesia through corporate social and environmental responsibility programs (TJSL), represents a potential source of complementary resources for addressing environmental service limitations. Unlike formal public-private partnerships, which generally involve contractual arrangements concerning service responsibilities, risk allocation, and performance accountability, CSR/TJSL programs can support community development through infrastructure assistance, technical capacity building, and institutional facilitation. Niyommaneerat et al. (2023) demonstrate the relevance of sustainability-oriented CSR initiatives in environmental management and resource recovery. In rural environmental governance, however, corporate contributions require coordination with public authorities and community institutions to support service continuity. CSR/TJSL should therefore be examined as a supporting mechanism within collaborative governance rather than assumed to constitute an established public-private partnership.

Collaborative governance provides a theoretical framework for examining how government institutions, private-sector actors, and communities coordinate their resources and responsibilities to address shared environmental problems. Ansell and Gash (2008) identify starting conditions, institutional design, facilitative leadership, and collaborative processes as central elements of effective governance arrangements. Emerson et al. (2012) further conceptualize collaborative dynamics through principled engagement, shared motivation, and capacity for joint action. These perspectives enable the analysis of emerging forms of cooperation without assuming that collaboration has already been formally institutionalized. In the Bulu Tellue context, the framework is used to examine how public authority, potential CSR/TJSL support, and community participation interact, and which institutional conditions constrain their integration into sustainable environmental services.

Existing research has demonstrated the relevance of collaborative governance for environmental management and public service delivery. Hamilton et al. (2021) highlight persistent collaboration gaps among interdependent environmental governance actors, while Niyommaneerat et al. (2023) examine the contribution of CSR initiatives to environmental sustainability. However, less attention has been given to the institutional conditions through which potential CSR support can be connected to public service responsibilities and community participation in underserved rural mainland settings. This issue is particularly relevant where service infrastructure remains limited and collaborative arrangements have not yet been institutionalized.

The research gap addressed in this study concerns how fragmented authority, resources, and institutional relationships constrain the development of CSR-supported collaborative governance for environmental health. The novelty lies in identifying service credibility, institutional coordination, and financing accountability as interconnected conditions for converting potential corporate support and community willingness into sustained collective capacity. Through the Bulu Tellue case, the study contributes a context-specific explanation of collaborative governance development without

assuming the existence of a formal public-private partnership or generalizing findings to Pangkep's island communities.

This study examines the institutional conditions, collaborative processes, and resource arrangements that shape the potential development of CSR-supported collaborative governance for environmental health in Bulu Tellue Village, Pangkep Regency, Indonesia. Specifically, it analyses actor configurations, resource interdependence, coordination mechanisms, institutional responsibilities, financing arrangements, and community participation. The analysis focuses on how these elements facilitate or constrain the establishment of accountable, sustainable environmental health services in a rural mainland context.

■ METHOD

Research Design and Study Setting

This study employed a qualitative approach with an instrumental case study design. The case of Bulu Tellue Village was treated as an instrument for understanding a broader issue: CSR/TJSL-supported collaborative governance to strengthen sustainable environmental health services. The analysis focused on interactions among actors, the distribution of roles and resources, coordination mechanisms, financing arrangements, community participation, and factors influencing the sustainability of environmental health management (Stake, 1995).

The study was conducted from April to June 2026 in Bulu Tellue Village, a hilly rural mainland settlement in Pangkajene and Islands Regency (Pangkep), South Sulawesi, Indonesia. The site was purposively selected because environmental management challenges in the area involve government institutions, private-sector CSR/TJSL representatives, service providers, civil society organizations, and local communities. Kantisan, Libureng, and Bu'nea hamlets were included in the field observations to capture variations in service conditions, infrastructure needs, household waste-management practices, and community acceptance. As this case is situated on the mainland, the findings do not represent communities living on Pangkep Regency's outer islands.

Participants and Sampling

Participants were purposively selected based on their direct involvement, authority, experience, or knowledge of environmental management, waste services, financing, community empowerment, and partnership arrangements. This approach was adopted to obtain information-rich participants whose perspectives were directly relevant to the research focus (Palinkas et al., 2015).

The study involved 16 individual informants representing local government, village government, the private sector, a waste bank, sanitation workers, a civil society organization, community members, neighborhood representatives, and community leaders. The informants comprised the Head of the Environmental Agency, a BAPPEDA official, the Head of Bulu Tellue Village, two representatives of the TJSL program of PT Semen Tonasa, the head of the central waste bank, a sanitation worker, the head of a civil society organization, two community members, three neighborhood representatives, and three community leaders or hamlet heads. In addition, two FGDs, each involving eight participants, were conducted to broaden and corroborate perspectives on environmental health problems and collaborative processes. Information sufficiency was assessed by developing analytical categories and checking for information saturation during the analysis process (Hennink & Kaiser, 2022).

Table 1. Profile of research informants

Code	Affiliation	Brief Characteristics	Date	Analytical Relevance
DLH-01	Environmental Agency	Head of Agency; male; 51 years; Master's degree	12 April 2026	Policy, fleet capacity, technical guidance, financing, and partnerships
BAPPEDA-01	BAPPEDA	Government official; male; 49 years; Master's degree	13 April 2026	Planning, budgeting, replication, and cross-sector coordination

Code	Affiliation	Brief Characteristics	Date	Analytical Relevance
PD1-01	Bulu Tellue Village Government	Village Head; male; 50 years; Bachelor's degree	20 May 2026	Village-level services, facilities, technological readiness, and institutional legitimacy
CSR-ST-01	TJSL, PT Semen Tonasa	Senior CSR Manager; male; 45 years; Bachelor's degree	2 June 2026	Opportunities, limitations, and sustainability of CSR/TJSL support
CSR-ST-02	TJSL, PT Semen Tonasa	TJSL staff member; male; 39 years; Bachelor's degree	3 June 2026	Financing schemes, initial facilities, training, and pilot activities
BS-01	Central Waste Bank	Chairperson; female; 33 years; Bachelor's degree	12 May 2026	Waste-bank institutions, service coverage, and the economic value of waste
PK1-01	Sanitation worker/ operator	Worker; male; 50 years; Junior secondary education	13 May 2026	TPS capacity, containers, field coordination, and operational constraints
LSM-01	Civil Society Organization	Chairperson; female; 35 years; Senior secondary education	18 May 2026	Facilitation, community organizing, social oversight, transparency, and inclusion
MD1-01	Village/hamlet community	Household member/resident of Kantisan Hamlet	May–June 2026	Service experience, disposal practices, social acceptance, and contributions
MD1-02	Village/hamlet community	Household members/residents of Libureng and Bu'nea	May–June 2026	Service experience, household practices, and program acceptance
PM-01–PM-03	Neighborhood representatives	Community representatives from several hamlets	June 2026	Facility needs, household practices, contribution capacity, and accountability
TM-01–TM-03	Community leaders/hamlet heads	Local leaders from Kantisan,	May 2026	Local norms, mediation, success indicators, and

Code	Affiliation	Brief Characteristics	Date	Analytical Relevance
		Libureng, and Bu'nea		collaborative sustainability

Data Collection Techniques and Instruments

The study used both primary and secondary data. Primary data were collected through semi-structured interviews, FGDs, and structured observations, while secondary data were obtained through a review of policy documents and TJSL/CSR-related documents. Using multiple data sources and collection techniques enabled cross-checking of information and strengthened data triangulation (Carter et al., 2014).

Semi-structured interviews were conducted with the 16 individual informants using an interview guide covering actor roles and interests, resources, coordination, communication, leadership, trust, institutional arrangements, financing, accountability, community participation, and program sustainability. Follow-up questions were developed from participants' responses to explore relevant issues in greater depth.

Two FGDs were conducted to complement and corroborate the interview findings. FGD-01 involved eight participants representing the village government, Environmental Agency, BAPPEDA, CSR/TJSL, waste bank, sanitation workers, civil society, and community leaders. FGD-02 involved eight participants representing communities from the three hamlets, neighborhood representatives, households/ women, and youth or environmental cadres. The discussions addressed role distribution, financing, coordination, partnership risks, social acceptance, participation, equitable access, and service sustainability.

Structured observations were conducted to examine the condition of facilities, accessibility, human resources, temporary waste collection points (TPS), waste containers, and waste-management operations. Observation findings were compared with participants' accounts to identify areas of convergence and divergence. Document analysis covered planning documents, environmental regulations, service records, budgets, performance indicators, and TJSL/ CSR documents, including available proposals, cooperation documents, meeting minutes, assistance reports, training documentation, and program reports. These documents were examined to assess the policy basis, financing capacity, forms of private-sector support, the extent to which CSR/TJSL support involved formalized cooperation, and program continuity.

Research Procedures

Data collection was conducted between April and June 2026 in three stages. The first stage involved identifying environmental health conditions, service problems, and key actors through observations, document review, and interviews. The second stage examined relationships among actors, resource availability, coordination, financing, community participation, and barriers to environmental management. The third stage involved FGDs to corroborate the findings, bring together different stakeholder perspectives, and identify factors supporting or constraining collaborative governance for sustainable environmental health services. Interview guides, FGD protocols, observation sheets, and document-review matrices were used as supporting instruments. Interviews and FGDs were audio-recorded with participants' consent, transcribed, and supplemented with field notes. Personal identities were anonymized using participant codes.

Data Analysis

Data were analyzed interactively through data condensation, data display, and conclusion drawing and verification (Miles et al., 2014). Interview and FGD transcripts, observation notes, and documents were compiled and organized according to data source and stakeholder group. First-cycle coding combined deductive and inductive approaches. Deductive codes were derived from the research questions and collaborative governance concepts, including actor roles, resources, coordination, trust, institutional arrangements, financing, accountability, and participation. Inductive codes captured issues raised by informants, including the absence of collection facilities or schedules, needs-based CSR/TJSL support, unclear financing responsibilities, and community ownership. Relevant excerpts were linked to their respective source codes.

During the second coding cycle, initial codes with overlapping meanings were compared and consolidated into focused categories. For example, references to the absence of a temporary waste collection point (TPS), an official disposal site, and a collection schedule were grouped under limited service access because they represented related constraints in the household waste-service chain. References to

initial facilities, capacity building, and technical assistance were grouped under complementary CSR/TJSL resource support. Codes representing analytically distinct dimensions, such as financing responsibilities and community ownership, were retained as separate categories. The focused categories were subsequently organized into broader analytical themes. Comparisons were made across stakeholder groups and against observation notes and documentary evidence, while divergent accounts were retained for interpretation. Table 2 presents an illustrative audit trail showing the progression from initial codes through focused categories to overarching themes, supported by Verbatim interview excerpts.

Table 2. Coding framework and illustrative audit trail of interview data

Informant	Illustrative Verbatim Interview Excerpt	Initial Codes	Focused Categories	Overarching Themes
PM-03 (June 4, 2026)	"People actually know that this way of disposing of waste is not good, but there is no TPS or clear disposal site, so they choose the quickest way to prevent the waste from piling up."	[I] Awareness of improper disposal; [I] absence of TPS; [I] absence of designated disposal site; [I] immediate disposal choices	Limited service access and household waste-management constraints	Environmental health service gaps
PM-01 (June 5, 2026)	"These practices occur because people do not yet have better service options. There is no official disposal site, collection schedule, or dedicated waste collector. When waste begins to accumulate and smell, burning or dumping it is seen as the quickest solution."	[I] Lack of service alternatives; [I] absence of collection schedule; [I] absence of dedicated waste collector; [I] burning and dumping as coping practices	Service-dependent household waste-management practices	Environmental health service gaps
CSR-ST-01 (June 2, 2026)	"We do not want TJSL programs simply to come from the company and then be given directly to the community. We try to ensure that the program emerges from	[D] Stakeholder participation; [D] collaborative decision-making; [I] needs-based program identification; [I] negotiated CSR/TJSL support	Participatory planning and needs-based CSR/TJSL support	Collaborative processes, trust, and institutional arrangements

Informant	Illustrative Verbatim Interview Excerpt	Initial Codes	Focused Categories	Overarching Themes
	the village's needs, is discussed together, and only then is the most feasible form of support decided."			
CSR-ST-01 (June 2, 2026)	"The opportunity is quite open… from providing initial facilities and strengthening community capacity to providing assistance and encouraging the village to develop its own initiatives and a waste [management] approach that can operate independently."	[D] Resource mobilization; [D] capacity building; [I] provision of initial facilities; [I] village self-reliance	Complementary CSR/TJSL resources and capacity strengthening	CSR/TJSL and financing sustainability
CSR-ST-02 (June 3, 2026)	"Partnerships are possible, and collaboration is possible, but the financing arrangements must not be unclear. It must be clear which responsibilities belong to the regional government, which belong to the village government, which are provided by the company, and which come from community contributions."	[D] Institutional responsibilities; [D] financing arrangements; [D] accountability; [I] unclear funding allocation; [I] distribution of community contributions	Allocation of financing responsibilities and institutional accountability	CSR/TJSL and financing sustainability
LSM-01 (May 18, 2026)	"Waste management in remote areas will	[D] Community participation; [D] shared	Community ownership and	Community participation and

Informant	Illustrative Verbatim Interview Excerpt	Initial Codes	Focused Categories	Overarching Themes
	not succeed if it relies only on the government or corporate assistance. The community must feel that the program belongs to them."	responsibility; [I] limitations of external assistance; [I] community ownership	collective responsibility	service sustainability

Note: [D] indicates deductive codes derived from the research questions and collaborative governance concepts, while [I] indicates inductive codes developed from empirical interview data. Interview excerpts are reproduced from the quotations presented in the Results and Discussion section. Participant identities are anonymized using the codes presented in Table 1.

Trustworthiness of the Data

Data trustworthiness was strengthened through source and method triangulation, involving comparisons across stakeholder groups and between interviews, FGDs, observations, and documentary evidence (Carter et al., 2014). Divergent accounts were not simply treated as inconsistencies but were examined to understand differences in experience, interests, responsibilities, and institutional positions among actors.

Findings were further subjected to member checking and stakeholder-based confirmation through FGDs. Key findings were reviewed to assess whether the interpretations were consistent with field conditions, particularly regarding role distribution, coordination mechanisms, financing, community participation, and service sustainability. This process strengthened the credibility of the interpretations before conclusions were drawn.

Research Ethics

Ethical clearance for this study was documented by the Ethics Committee of Universitas Negeri Makassar under reference number 3038/DST/UN36.12/TU/2026. The committee chair identified in the research documentation was Prof. Oslan Jumadi, S.Si., M.Phil., Ph.D. The study followed the principles of informed consent, confidentiality, voluntary participation, and participants' right to withdraw. Interviews and FGDs were audio-recorded with participants' consent. Participants' names were withheld, and identification codes were used to attribute interview excerpts and other qualitative findings. Interview, FGD, observation, and documentary data were used solely for research purposes.

■ RESULT AND DISCUSSION

Environmental Health Service Gaps and the Challenges of Remote Areas

Field data reveal a gap between the government's recognition of waste management as a policy priority and the availability of services at the village level. BAPPEDA has positioned waste management as part of the regional development agenda, yet this policy attention has not fully translated into routine, integrated services in Bulu Tellue Village. The village government reported that the village does not yet have a temporary waste collection point (TPS) or a system connecting households to waste transportation and treatment. BAPPEDA official, BAPPEDA-01, described the urgency of the issue:

> *"Waste management has become an important issue in Pangkep Regency's regional development planning. It can no longer be considered a minor problem because the situation is increasingly urgent and continues to develop over time." (BAPPEDA-01, interview, April 13, 2026)*

This statement indicates that waste management has gained legitimacy within the regional planning agenda. However, a gap remains between policy priorities and the experience of service provision at the village level. The Head of Bulu Tellue Village similarly explained that the absence of a TPS means household waste cannot yet be collected through a clear, organized system. The problem, therefore, is not limited to low community awareness but also reflects the absence of an adequate local service system.

The gap is also evident in waste service coverage across Pangkep Regency. Based on 2022 data from the National Waste

Management Information System (SIPSN), as reported by the Pangkep Environmental Agency, waste generation reached approximately 141.17 tons per day. However, the available waste-management facilities could handle only around 30% of the total generation, equivalent to approximately 40–50 tons per day. At the time of reporting, waste collection services covered eight mainland subdistricts but had not yet reached the island and highland areas. These conditions indicate that service limitations are closely related to geographical coverage, infrastructure availability, and operational capacity rather than household behavior alone (Dinas Lingkungan Hidup Kabupaten Pangkep, 2023). Limited service availability subsequently shapes how communities manage their waste. Resident PM-03 explained the implications of limited service availability:

> *"People actually know that this way of disposing of waste is not good, but there is no TPS or clear disposal site, so they choose the quickest way to prevent the waste from piling up." (PM-03, interview, June 4, 2026)*

This account suggests that practices such as open burning or disposal in open areas cannot be separated from the limited service options available to households. In remote communities, Salim et al. (2023) identify inadequate infrastructure, high collection costs, limited economies of scale, and resource constraints as important barriers to developing sustainable waste-management services. Zhang et al. (2024) similarly show that infrastructure limitations, financial constraints, and weak policy implementation can widen the gap between waste-management policies and on-the-ground practices.

These limitations are further reflected in operational capacity. A sanitation worker reported that the two available containers, each with a capacity of approximately three tons, were insufficient even for areas that were already being served. In Bulu Tellue, extending a conventional collection-based service cannot simply rely on increasing collection frequency; it must also account for travel distance, waste volume, road accessibility, facility capacity, and operating costs. Salim et al. (2023) similarly identify high collection costs and limited economies of scale as distinctive challenges in remote communities compared with areas with greater population density and infrastructure capacity.

The service deficit also affects environmental quality and public health. When waste collection and treatment channels are unavailable or unreliable, open burning and disposal become more likely. Vinti et al. (2021) found that unsafe waste-management practices, including open dumping and burning, are associated with a range of health risks. However, the strength of evidence varies across exposure pathways and health outcomes. In Indonesia, Wulandari et al. (2024) likewise highlight continuing challenges related to sanitation facilities and environmental management, particularly in rural and geographically isolated areas.

The findings indicate that the environmental health gap in Bulu Tellue is multidimensional, encompassing infrastructure, service, and governance gaps. The problem extends beyond the absence of a TPS or limited transport capacity to the discontinuity of the service chain connecting households, collection, transportation, treatment, and residual waste management. Effective waste-management systems require an integrated combination of service provision, financing, institutional capacity, communication, and the involvement of multiple service providers (Rodić & Wilson, 2017). In Pangkep, remoteness intensifies the interaction among distance, logistics costs, service scale, infrastructure capacity, and institutional capacity. Consequently, policies established at the regency level do not automatically translate into effective services at the village level.

Actor Configuration, Resource Distribution, and Governance Fragmentation

The findings indicate that environmental health challenges in Bulu Tellue Village arise not from the absence of relevant actors, but from fragmented authority, resources, and operational capacities. The Pangkep Environmental Agency (DLH) holds regulatory and technical authority, BAPPEDA provides planning and coordination capacity, and the village government contributes local legitimacy and contextual knowledge. PT Semen Tonasa, through its TJSL program, provides complementary support through funding, facilities, and capacity building. Meanwhile, the central waste bank, sanitation workers, NGOs, RT/RW, community leaders, and residents contribute operational knowledge, social capital, and community participation. Despite these complementary resources, coordination between regional planning, technical services, village-level implementation, private-sector support, and community involvement remains limited. Figure 1 illustrates this actor configuration by mapping the resources, governance positions, and specific forms of fragmentation identified in the study.

As illustrated in Figure 1, each actor possesses resources and capacities that cannot

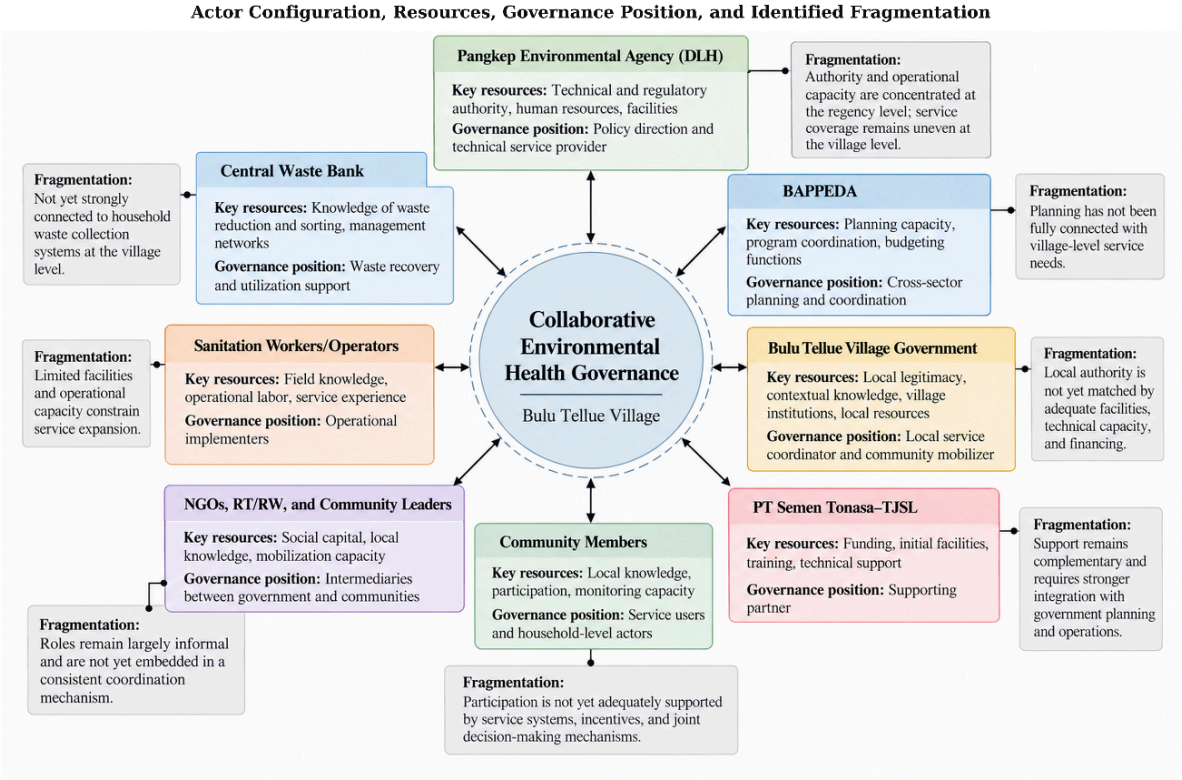


Figure 1. Actor configuration, resources, governance position, and identified fragmentation

easily be substituted by others. DLH provides regulatory authority and technical expertise but faces limitations in extending services to the village level. BAPPEDA supports regional planning, although its programs are not yet fully aligned with local service needs. The village government maintains close relationships with residents but lacks adequate facilities, technical capacity, and financing. PT Semen Tonasa contributes complementary resources through TJSL, while the central waste bank and sanitation workers support waste recovery and operational activities. NGOs, community leaders, and residents provide social networks, local knowledge, and participation, although their roles remain insufficiently integrated into formal coordination mechanisms. These findings demonstrate that governance fragmentation primarily reflects weak connections among existing institutional functions and resources. Strengthening collaborative governance therefore requires clearer responsibilities, coordinated planning, integrated resources, and sustained community involvement rather than shifting public service responsibilities to individual actors.

The cross-sector focus group discussion (FGD-01) further highlighted the challenges of distributing responsibilities in environmental health management in Bulu Tellue Village. During the discussion, local government representatives emphasized the need for policy support and technical assistance from relevant agencies. This perspective was complemented by the village government, which highlighted limitations in facilities, operational personnel, and local financing. Meanwhile, the CSR/TJSL representatives viewed corporate support as an opportunity to provide initial facilities and strengthen community capacity, while emphasizing that long-term operational sustainability requires clearly defined responsibilities among the actors involved. These discussions illustrate that although stakeholders possess complementary resources and institutional capacities, the mechanisms for coordination and the integration of responsibilities remain insufficiently developed.

This finding is consistent with the collaborative governance perspective, which views interdependence among actors as an important condition for collective action. Ansell and Gash (2008) argue that collaboration becomes particularly relevant when no single actor possesses sufficient authority and resources to address a public problem independently. Emerson et al. (2012) further conceptualize collaborative capacity as the ability of actors to combine resources, knowledge, leadership, and institutional arrangements to pursue objectives that cannot be achieved individually.

In Pangkep, however, the central issue is the lack of connection among these resources. BAPPEDA can place waste management on the regional planning agenda, DLH has technical responsibilities, the village government understands local needs, and TJSL provides complementary resources. However, these capacities have not been consistently connected from planning through to service delivery. This finding is important because governance fragmentation does not necessarily arise simply from the number of institutions involved. It can also emerge when interdependent actors lack mechanisms for connecting their respective authority, resources, and capacities.

Hamilton et al. (2021) similarly show that interdependence does not automatically produce collaboration. Collaboration gaps may persist when authority is dispersed, and interorganizational relationships lack adequate coordination mechanisms. In this study, this pattern is evident in the relationship between regional planning, technical services, village capacity, private-sector support, and community participation. Each actor possesses a particular capacity, but these capacities have not yet been sufficiently consolidated to sustain continuous environmental health services.

The findings also indicate that actors with greater material resources are not necessarily the actors that determine the success of collaboration. The roles of the village government, field workers, community leaders, and residents remain important because they are directly connected to everyday environmental conditions. Zambrano-Gutiérrez et al. (2023) demonstrate that actors' positions, roles, and capacities within organizations can influence the development and continuity of collaborative processes, particularly when they connect organizations and interests that would otherwise remain separate.

At the same time, private-sector involvement creates an opportunity to expand system capacity. The support provided by PT Semen Tonasa through TJSL is positioned not as a substitute for government responsibility, but as a complementary resource that can strengthen facilities, technical capacity, and initial implementation. This is consistent with Li et al. (2025), who show that sustainable PPP arrangements depend on a combination of contractual and relational governance. Formal mechanisms help clarify coordination and responsibilities, while interorganizational relationships support cooperation and continuity.

Overall, the central finding is that governance fragmentation in Bulu Tellue is primarily characterized by fragmentation of functions and resources. Government provides authority, the private sector contributes complementary resources, and communities possess local knowledge and occupy the dual position of service users and environmental actors. The challenge, therefore, is not to transfer responsibility from one actor to another, but to connect these distributed capacities through clear working relationships, information exchange, shared responsibilities, and durable coordination mechanisms.

Collaborative Processes, Trust, and Institutional Arrangements

Field data show that relationships among actors in Bulu Tellue Village have not yet developed into an institutionalized collaborative process. BAPPEDA, DLH, the village government, TJSL PT Semen Tonasa, the waste bank, NGOs, and community members have interconnected roles and interests. However, their interactions still tend to occur in response to specific needs or problems. There is no regular collaborative forum, secretariat, joint decision-making mechanism, standard operating procedure (SOP), joint complaint channel, or shared reporting system that formally binds the parties together. The FGDs also showed that actors recognize the importance of role sharing, coordination, and accountability, but institutional arrangements to ensure these processes are implemented consistently remain limited.

This condition directly affects trust development. In this case, trust cannot yet be understood as an established relationship because the actors have had limited experience working together through repeated, structured processes. Vihma and Toikka (2021) similarly found that collaboration can weaken when actors lack a shared understanding of objectives, interaction rules, and decision-making processes. Conversely, Li et al. (2025) found that trust is positively associated with collaborative performance, particularly when relationships are supported by reliable communication and working processes.

Importantly, low trust does not mean that actors are unwilling to collaborate. TJSL PT Semen Tonasa, for example, expressed openness to an approach in which village needs are identified and discussed collectively before determining the form of support. TJSL representative CSR-ST-01 explained:

> *"We do not want TJSL programs simply to come from the company and then be given directly to the community. We try to ensure that the program emerges from the village's needs, is discussed together, and only then is the most feasible form of support decided." (CSR-ST-01, interview, June 2, 2026)*

This statement suggests that trust is better understood as something developed through interaction rather than assumed to exist from the outset. Jointly identifying problems, agreeing on forms of support, and clarifying each actor's contribution provides an initial basis for building more stable working relationships. Ansell and Gash (2008) place face-to-face dialogue, trust building, commitment, and shared understanding at the core of collaborative processes. The Pangkep findings support this perspective while also showing that these processes require repeated interaction and clear institutional rules before they can become sustained collaborative practices.

The next issue concerns institutional arrangements. The findings indicate that actor roles can already be identified in substantive terms: the village government serves as the local coordinator, DLH provides technical guidance, BAPPEDA connects the initiative with regional planning, TJSL acts as a supporting partner, NGOs provide facilitation, and communities function both as service users and environmental actors. However, these roles are not yet fully supported by binding institutional arrangements. Formalization therefore needs to occur at different levels, including a village head decision to establish a collaborative group or forum, village regulations or village head regulations governing local services, and an MoU or cooperation agreement governing TJSL support, contributions, assets, indicators, duration, and joint evaluation.

This finding is consistent with Christensen (2024), who argues that institutional design and leadership in collaborative governance must align with the public goals and values being pursued. Ortiz-Riomalo et al. (2023) likewise show that participation can strengthen collective action when collaborative processes generate appropriate institutional arrangements, legitimacy, follow-up mechanisms, and means for resolving conflict. A collaborative forum, therefore, should not be established merely as an administrative structure; it needs a clear mandate, interaction rules, shared information, accountability mechanisms, and space to manage differences in interests.

Overall, the findings indicate that the main obstacle to collaboration in Bulu Tellue Village is not a lack of willingness to cooperate, but the absence of mechanisms that can turn that willingness into repeated, trusted, and institutionalized working relationships. From a collaborative governance perspective, dialogue, trust, and institutional design need to develop together. Strengthening governance consequently requires more than adding actors to the process; it requires clear rules, facilitative leadership, information sharing, defined responsibilities, and joint evaluation.

Public–Private Partnerships, CSR/TJSL, and Financing Sustainability

The findings indicate that private-sector involvement in Bulu Tellue Village has the potential to strengthen environmental health services, but cannot yet be classified as a formal public–private partnership (PPP). The support provided by PT Semen Tonasa is more appropriately understood as CSR/TJSL that complements government capacity. TJSL representative CSR-ST-01 explained that feasible forms of support include initial facilities, capacity building, technical assistance, and pilot projects. At the same time, the financing of routine services remains the responsibility of government and local institutions.

> *"The opportunity is quite open… from providing initial facilities and strengthening community capacity to providing assistance and encouraging the village to develop its own initiatives and a waste management approach that can operate independently." (CSR-ST-01, interview, June 2, 2026)*

This finding highlights an important distinction between CSR/TJSL and PPP. CSR generally functions as programmatic support whose scope and duration depend on corporate priorities, whereas PPP involves more formal arrangements for allocating responsibilities, risks, performance, and accountability. Previous research indicates that private-sector involvement can improve environmental service provision, but its effectiveness depends heavily on institutional design, payment mechanisms, and clearly defined responsibilities among partners (Tang et al., 2021). In waste management, partnership outcomes are also influenced by stakeholder engagement, transparency, and the early identification of critical success factors during the planning process (Ngullie et al., 2021).

CSR/TJSL should therefore be positioned in this study as enabling support rather than a substitute for public responsibility. Corporate support can address initial investment needs that are difficult for the village to meet independently, including collection facilities, sorting equipment, training, technical assistance, and organizational strengthening. However, recurring costs, such as waste collection, fuel, worker incentives, maintenance, personal protective equipment, public education, and administration, require predictable and sustained financing. Research on CSR suggests that environmental benefits are more likely to be sustained when corporate

programs are linked to measurable sustainability objectives rather than limited to one-off physical assistance (Niyommaneerat et al., 2023).

The distinction between initial investment and recurrent financing was also evident in the interview with the TJSL representative. CSR-ST-02. The informant emphasized that financing responsibilities need to be explicitly defined to avoid excessive dependence on the company:

> *"Partnerships are possible, and collaboration is possible, but the financing arrangements must not be unclear. It must be clear which responsibilities belong to the regional government, which belong to the village government, which are provided by the company, and which come from community contributions." (CSR-ST-02, interview, June 3, 2026)*

Based on the synthesis of interviews, FGDs, observations, and document analysis, the most realistic financing arrangement is not reliance on a single source, but allocating financing sources according to their respective functions and institutional responsibilities. The regional budget (APBD) is needed for regulatory functions, technical supervision, monitoring, and integration with the regency-level service system; the village budget (APBDes) can support local services and routine village-level activities; CSR/TJSL can provide initial investment and capacity building; community contributions may be introduced once services are available and collectively agreed upon; while revenues generated through waste banks and material recovery can serve as supplementary income. This arrangement aligns with the principle of sustainable cost recovery, which emphasizes a mix of financing sources, predictable public investment, and a balance between user affordability and service-provider sustainability (Carrard et al., 2024).

This financing structure shows that financing sustainability is not simply a matter of having multiple funding sources, but of ensuring clarity of function, continuity, and accountability for each source. Field findings indicate that there is not yet a dedicated budget sufficient to cover all routine waste-management costs at the village level. Residents have also not been required to pay regular fees because a formal service system has not yet been established. One community informant indicated that residents would be willing to contribute financially once the service provides clear benefits and the use of funds is transparent. This supports the principle that user contributions should follow the availability of a functioning service rather than precede it.

Table 3. Financing sources and allocation of responsibilities

Financing Source	Primary Function	Form of Support	Sustainability Boundaries and Requirements
APBD/DLH	Public and technical functions	Technical guidance, technical standards, supervision, monitoring, and integration with the regency service system	Does not replace day-to-day village-level operations
APBDes	Village-level services	Institutional arrangements, operations, maintenance, education, and local needs	Allocated gradually and integrated into village planning
CSR/TJSL	Initial investment and capacity strengthening	Initial facilities, training, technical assistance, group strengthening, and pilot projects	Time-bound and should not become the sole source of recurrent financing

Community Contributions	Supporting service sustainability	User fees after services become	Contributions should be affordable, agreed through community
Financing Source	Primary Function	Form of Support	Sustainability Boundaries and Requirements
		available and in-kind contributions	deliberation, and transparently reported
Waste Bank/Material Recovery Revenue	Supplementary revenue	Sales of plastics, cardboard, metals, compost, and other economically valuable materials	Should not be assumed to cover the full cost of service provision

Carrard et al. (2024) similarly emphasize that sustainable service provision cannot rely solely on tariffs or user contributions. Predictable public financing remains important because sanitation and environmental services have characteristics of public goods, while user contributions need to reflect household affordability. Revenue generated from waste-related economic activities is likewise better treated as a supplementary source rather than the primary basis for financing the entire service system.

The community-based focus group discussion (FGD-02) provided further insights into household waste-management practices and residents' willingness to participate in a more organized service system. Participants generally recognized the importance of maintaining environmental cleanliness; however, the absence of designated disposal facilities and regular waste collection schedules continued to constrain household waste-management practices. The discussion also highlighted that residents would consider contributing financially if regular waste collection services were available and they could directly experience the benefits. Nevertheless, the proposed contribution amount needed to reflect household economic capacity and be determined through community deliberation. These findings reinforce the individual interview results by showing that community participation is closely linked to service availability, affordable financing, and transparency in financial management.

Analytically, the study finds that the central challenge of the partnership is not whether private-sector support is available. However, the challenge is how to connect such support to the long-term sustainability of public services. CSR/TJSL can provide an entry point for initial investment, capacity transfer, and network development. However, sustained service delivery requires a clear transition toward recurrent financing by government and local institutions. Public–private engagement therefore needs explicit allocation of responsibilities and risks, while CSR/TJSL should function as complementary support that strengthens rather than substitutes for government obligations. The finding extends the application of collaborative governance by showing that cross-sector collaboration can be sustained only when institutional relationships are supported by a clear, measurable, and accountable financing architecture.

Community Participation and the Sustainability of Environmental Health Services

The findings show that community participation in environmental health management in Bulu Tellue Village is influenced by awareness, service availability, socioeconomic conditions, and trust in service providers. Based on the 2025 Bulu Tellue Village Profile, the socioeconomic conditions of residents in Kantisan, Libureng, and Bu'nea are characterized by diverse livelihoods, primarily agriculture, livestock farming, trading, informal employment, and service-related activities. Available socioeconomic information further indicates that residents' monthly income ranges from approximately IDR 500,000 to IDR 1,000,000. This income range provides an important indication of the economic circumstances that need to be considered when developing a household waste-management contribution scheme. It also
suggests that additional recurring payments may place financial pressure

Table 4. Socioeconomic profile of residents and implications for household waste-management contributions

Socioeconomic Aspect	Description
Study locations	Kantisan, Libureng, and Bu'nea hamlets, Bulu Tellue Village
Main livelihoods	Agriculture, livestock farming, trading, informal employment, and service-related activities
Reported monthly income range	Approximately IDR 500,000–1,000,000
Social characteristics	Mutual assistance, solidarity, and participation in communal activities
Implications for contribution affordability	Household contributions need to consider differences in economic capacity, income stability, and affordability
Requirements for a feasible contribution scheme	Reliable waste collection services, community deliberation, clearly defined financing responsibilities, and transparent financial reporting

on some households, particularly those with limited and irregular incomes. Therefore, the proposed household waste-management fee should be determined through community deliberation, taking into account household economic capacity, affordability, and the benefits provided by reliable waste services. Social relations within these communities are also characterized by traditions of mutual assistance, solidarity, and participation in communal activities. Interviews revealed residents' willingness to sort waste, participate in communal clean-up activities, and support village-based waste management. Accordingly, any contribution scheme should be introduced only after reliable services are available, with clear financing arrangements and transparent reporting to maintain community trust and participation.

The reported monthly income range of IDR 500,000–1,000,000 highlights the importance of affordability in designing a community-based waste-management financing scheme. Rather than imposing a uniform contribution, the amount should be established through participatory deliberation and adjusted to household economic circumstances. More importantly, community contributions should be introduced only when waste collection services are operational and provide tangible benefits. Transparent financial management and clear reporting of collected contributions are also essential to maintaining public trust and ensuring the sustainability of community participation.

Community representative PM-01 explained that current waste management practices are closely related to the limited service alternatives available:

> *"These practices occur because people do not yet have better service options. There is no official disposal site, collection schedule, or dedicated waste collector. When waste begins to accumulate and smell, burning or dumping it is seen as the quickest solution." (PM-01, interview, June 5, 2026)*

This statement indicates that community behavior is shaped by the interaction between knowledge, established practices, and service conditions. Kushwah et al. (2023) found that environmental concern and awareness of waste-related impacts can increase intentions to sort waste, while limited infrastructure, information, and service convenience can constrain such intentions. Thakur and Onwubu (2024) likewise identified access to facilities and services as an important factor influencing waste management behavior in communities with limited infrastructure. These findings support the evidence from Bulu Tellue that education alone is unlikely to produce sustained behavioral change when residents lack the facilities and services needed to translate awareness into practice.

Community participation is also closely related to a sense of ownership and opportunities to participate in decision-making. FGD findings highlighted the importance of involving RT/RW representatives, community leaders, women, youth, and environmental cadres from needs identification

through service monitoring. NGO representative LSM-01 emphasized that
sustainable environmental management requires communities not merely to receive assistance but to take an active role in implementing and overseeing the program:

> *"Waste management in remote areas will not succeed if it relies only on the government or corporate assistance. The community must feel that the program belongs to them." (LSM-01, interview, May 18, 2026)*

This finding is consistent with Ortiz-Riomalo et al. (2023), who show that participation can strengthen collective action when communities are involved in developing appropriate institutional arrangements, share an understanding of common goals, and have clear follow-up mechanisms. From Emerson et al.'s perspective, such involvement forms part of capacity for joint action, as collaboration requires shared knowledge, resources, leadership, and commitment. In Bulu Tellue, therefore, the community's role should extend beyond waste sorting to include articulating local needs, monitoring service delivery, and assessing service providers' accountability.

The sustainability of participation is also influenced by affordability and the perceived benefits of the service. Community informants indicated a willingness to pay a modest service fee if a reliable service is available, the amount is agreed upon collectively, and its use is reported transparently (PM-03, interview, June 4, 2026). Cecilia et al. (2024) found that community preferences and willingness to pay for community-based sanitation services are associated with the benefits perceived from improved facility quality and maintenance. Asih et al. (2026) further showed that household responses to environmental education, service costs, and incentives vary by socioeconomic conditions, suggesting that uniform interventions may not produce equitable participation.

The central finding is that community participation is conditional on service credibility (service-dependent participation). Residents' willingness to sort waste, contribute financially, and participate in monitoring should not yet be interpreted as evidence of fully established participation. Rather, it represents a potential for collective action that requires institutional support. Sustaining environmental health services in remote areas depends not only on increasing community awareness but also on functioning facilities, predictable service schedules, clearly assigned responsibilities, affordable financing, and accountable service management. Within this context, collaborative governance provides a mechanism for connecting government capacity, private-sector support, and community engagement so that participation can move beyond individual willingness and become a sustained collective practice of environmental management.

Synthesis of Collaborative Governance for Strengthening Sustainable Environmental Health

The findings reveal a governance paradox in environmental health management in Bulu Tellue Village: the need for collaboration is substantial, yet the mechanisms to sustain it remain underdeveloped. Local government holds regulatory and planning authority, the village government has a close understanding of local needs, the private sector can provide additional resources, and community members have expressed their willingness to participate. However, the presence of these actors has not yet translated into an integrated waste management service system. This suggests that resource interdependence alone does not automatically generate collective action. Hedlund et al. (2023) found that actors dealing with interconnected environmental problems may still avoid collaboration when the relationships among problems are perceived as difficult to manage. In Bulu Tellue, the central challenge is therefore not the absence of relevant actors, but the lack of mechanisms to connect their interests, authority, and resources into sustained collective action.

The findings also show that service gaps and governance weaknesses reinforce one another. The absence of a reliable collection system limits residents' options for managing household waste, while poorly organized community participation makes it difficult to develop a locally managed service system. Unclear financing arrangements and responsibilities further constrain operational continuity. De la Riva Agüero (2022) found that government administrative capacity remains important in delivering complex waste management services, while community organizations cannot necessarily compensate for weak public-sector capacity. This finding clarifies that collaboration should not be treated as a substitute for effective public service provision. In remote areas, community participation requires adequate technical, organizational, and financial support to contribute to sustainable service delivery.

Trust emerges as an important link between institutional capacity and community participation. Interviews indicate that residents' willingness to sort waste, support environmental activities, and

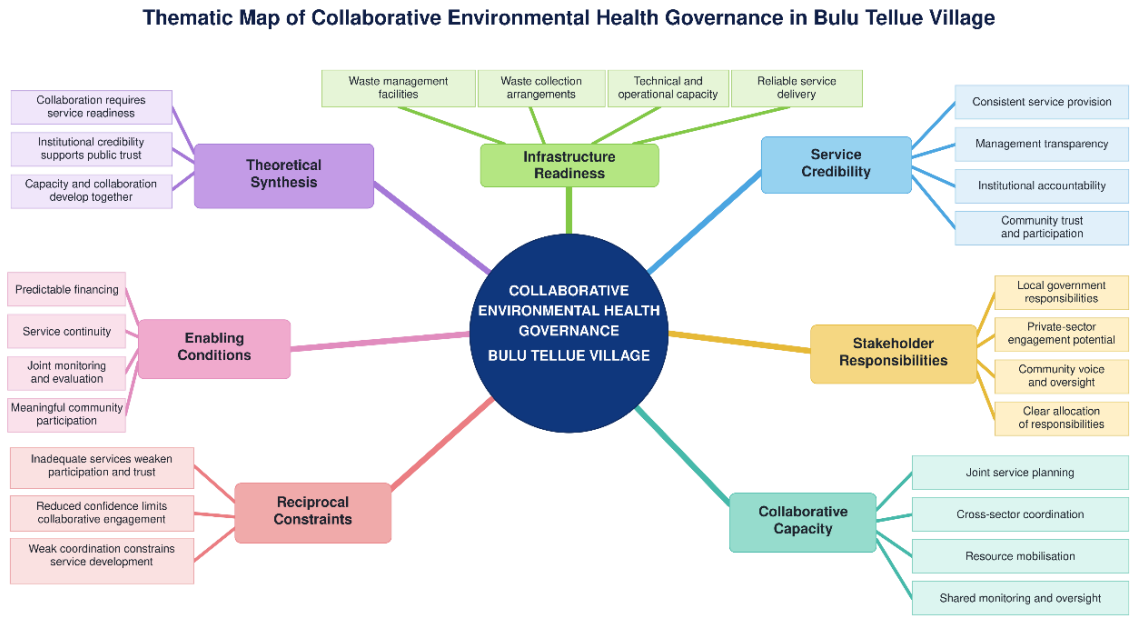


Figure 2. Thematic map: collaborative environmental health governance in bulu tellue village

contribute to services depends on service reliability, tangible benefits, and transparent management. Gorris and Koch (2024) show that trust in environmental governance develops through relationships and social interaction rather than simply from shared interests among actors. In Bulu Tellue, the credibility of service delivery therefore provides an important foundation for public trust in collaborative arrangements. Without tangible and consistent services, participation may remain largely normative; reliable services, in contrast, can strengthen trust, engagement, and community oversight.

Institutional strengthening also requires mechanisms that connect decision-making across levels of government and provide a clear legal basis for collaborative action. Wiechman et al. (2024) demonstrate that collaborative forums facilitate information exchange and strengthen relationships among actors within multilevel environmental governance systems. In Bulu Tellue Village, the absence of a routine coordination forum involving the village government, the Environmental Agency (DLH), the Regional Development Planning Agency (BAPPEDA), the private sector, and community representatives indicates the need for a more formal institutional arrangement. Such a forum could be established through a Village Head Decree defining its membership, responsibilities, coordination procedures, and evaluation mechanisms. Broader provisions governing waste management, institutional responsibilities, and community participation could be formalized through a Village Regulation, consistent with Law No. 6 of 2014 on Villages, as amended by Law No. 3 of 2024, and Minister of Home Affairs Regulation No. 111 of 2014. Operational funding should be incorporated into village development planning and allocated through the Village Revenue and Expenditure Budget in accordance with Minister of Home Affairs Regulation No. 20 of 2018. These arrangements would provide a legal and administrative foundation for coordinated decision-making, service delivery, and accountability. As Avoyan (2023) emphasizes, effective environmental collaboration depends on institutional capacity and governance arrangements, not merely on establishing forums or increasing stakeholder representation.

Private-sector involvement through CSR/TJSL offers opportunities to strengthen this institutional framework while highlighting the need for clearly defined public responsibilities. PT Semen Tonasa has the experience and potential to support initial infrastructure, training, and community assistance. However, the findings do not establish a formal public-private partnership (PPP) arrangement in Bulu Tellue. Accordingly, CSR/TJSL contributions could be coordinated through the proposed village forum and aligned with priorities established in village development planning. Sun et al. (2024) identify dispersed settlements, limited economic returns from recyclable materials, and complex management chains as persistent challenges in rural waste

management. In Pangkep, these conditions reinforce the need to integrate private-sector support with locally authorized governance arrangements, predictable operational financing, and clearly assigned service responsibilities. A Village Regulation could establish the basic waste management framework, while a Village Head Decree could designate the coordinating body and its operational responsibilities. Together with appropriate budget allocations through the Village Revenue and Expenditure Budget, these instruments could strengthen service continuity, financial accountability, and institutional sustainability beyond individual CSR/TJSL assistance programs.

The theoretical contribution of this study is to demonstrate that collaborative environmental health governance in remote areas is shaped by three interconnected conditions: infrastructure readiness, service credibility, and clearly defined stakeholder responsibilities. Findings from Bulu Tellue Village indicate that adequate waste management facilities, technical and operational capacity, and reliable service delivery provide an essential foundation for collaboration. Service consistency, transparency, and institutional accountability influence public trust and community participation. In contrast, clearer responsibilities among government institutions, private-sector actors, and communities can support coordination, resource mobilization, and collective oversight. These conditions are mutually reinforcing. Inadequate services can weaken community confidence and participation, whereas limited institutional coordination can constrain improvements in service provision. This relationship suggests that service readiness and collaborative capacity need to develop together, not independently. Figure 2 presents a thematic map organized into seven interconnected themes: infrastructure readiness, service credibility, stakeholder responsibilities, collaborative capacity, reciprocal constraints, enabling conditions, and theoretical synthesis. The map illustrates how these themes interact to shape the institutional and operational conditions necessary for sustainable environmental health governance in Bulu Tellue Village.

Figure 2 illustrates the thematic relationships underlying collaborative environmental health governance in Bulu Tellue Village. At the center of the map, collaborative environmental health governance connects to seven themes that represent the main findings and their theoretical implications. Infrastructure readiness concerns the availability of waste management facilities, collection arrangements, technical capacity, and reliable service delivery. Service credibility reflects institutional accountability, transparency, service consistency, and their relationship with community trust. Stakeholder responsibilities emphasize the allocation of government duties, potential private-sector involvement, and community participation in decision-making and oversight. Collaborative capacity concerns joint planning, cross-sector coordination, resource mobilization, and shared monitoring, while enabling conditions include predictable financing, service continuity, and meaningful public participation. The theme of reciprocal constraints captures the relationship between service limitations and weak collaboration. Inadequate services can reduce public confidence and participation, while insufficient coordination can hinder service development and reinforce existing operational problems. The theoretical synthesis brings these relationships together by highlighting the interdependence of service readiness, institutional credibility, and collaborative capacity. Accordingly, the thematic map provides an interpretive framework for understanding the institutional and operational conditions required to strengthen environmental health governance in remote communities. It does not imply that formal partnerships have been established or that improvements in environmental health outcomes have already been demonstrated.

■ CONCLUSION

Strengthening sustainable environmental health in remote areas requires more than providing infrastructure and involving multiple stakeholders. Its success depends on integrating the authority, resources, and responsibilities of different actors into a coordinated, accountable, and sustainable public service capacity. The scientific contribution of this study lies in demonstrating that collaborative governance does not emerge automatically from a willingness to cooperate. Rather, it requires service credibility, clear institutional arrangements, and predictable financing to build trust and encourage meaningful community participation. This perspective contributes to the collaborative governance literature by positioning effective service delivery as both a prerequisite for and a reinforcing factor in sustaining collaboration in remote-area contexts.

From a practical perspective, governance strengthening should focus on integrating planning and service delivery between local government and village government, clarifying each actor's responsibilities, and positioning CSR/TJSL as a means of strengthening capacity rather than replacing public-sector responsibilities. Community participation should be supported through reliable services and transparent decision-making mechanisms. As this study focuses on a single village and does

not evaluate the implementation of a formal partnership, future research should examine the effectiveness of collaborative arrangements in improving equitable access, service continuity, and environmental health outcomes across different types of remote areas.

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