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ARTICLE

How do Stakeholders Participate in Waste and Water Security Management? Insights from West Java Province, Indonesia

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ABSTRACT
In collaborative governance, participation is essential to encourage all stakeholders to participate in decision-making. This paper aims to explore the empirical state of stakeholder participation in waste and water security management. Using the qualitative method, the stakeholders are analysed based on the penta-helix criteria, their roles, and participation during the stages of the projects. Having conducted deep observations, interviews, and document reviews of various sources, the research findings reveal that one stakeholder, the government or public sector, plays a dominant role in waste and water security management. In contrast, the other four stakeholders, such as the business sector, academia, media, voluntary organizations, and the community demonstrate limited participation. This research suggests to emphasize the need for a multi-stakeholder approach by developing an inclusive and participatory governance structure in the form of advisory board, working groups or consultative forums, enhancing the stakeholder capacity through knowledge sharing, workshops, and technical support to strengthen stakeholder's competencies in strategic planning, project management, and evaluation methodologies, and strengthening policy framework that explicitly outlines the roles and responsibilities of each stakeholder.

A. INTRODUCTION

Sustainable environment is essential for the survival of human and other living beings. Environmental sustainability means trying to keep natural ecosystems working at their best to meet this generation's and future generations' needs. To achieve environmental sustainability, two critical issues must be addressed: water resilience and waste management. As is widely known, water resilience includes the ability of natural and human systems to face and overcome challenges related to the availability, quality, and management of water resources, as well as the ability to manage water-related risks such as floods and droughts through efficient water infrastructure and management.

The issue of waste is also one of the factors that can disrupt environmental sustainability, as indicated by climate change. Scattered waste degrades the aesthetic value and commerciality of an area. In the meantime, common practices of burning waste by the public can cause air pollution and produce toxic substances that harm human health. Poorly managed landfill waste

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in various major cities across Indonesia, particularly in West Java, has proven to cause disasters, such as the waste landslide at Leuwigajah landfill in Cimahi in 2005 and the massive fire at Sarimukti landfill in Cipatat District, West Bandung Regency in 2023 that wascaused by methane gas from decomposed organic waste.

Improper waste management directly impacts water resilience since it can deteriorate water quality and endanger water resources. Improperly disposed waste can contaminate water. In addition, hazardous chemicals and heavy metals from the waste can get absorbed into the ground, contaminating groundwater, a primary drinking water source for the community. Improper waste disposal can also cause sedimentation and clogs in drainage systems, leading to water overflow and flooding, as Bandung has experienced in recent years. The role of stakeholders in waste management and water resilience is deemed very important as they are key to creating sustainable and effective solutions. Collaborative governance can overcome climate change problems by involving all stakeholders in the public, private, and community sectors (Tando et al., 2020). Waste banks are a kind of valued organic waste management system in Indonesia. The success of waste bank management requires community participation (Indrawati, 2019; Rini et al., 2021). Therefore, this research aims to investigate stakeholder participation in waste management and water resilience as an effort to improve environmental sustainability.

B. LITERATURE REVIEW

Stakeholder participation in environmental management is very important. Stakeholder involvement is widely known as essential for successful environmental management and decision-making (Haddaway et al., 2017; Holifield & Williams, 2019). To support this process, a framework that prioritizes stakeholders has been proposed based on factors such as interest, influence, and impact (Sharpe et al., 2021). A meta-analysis of 305 case studies indicates that participatory decision-making, especially when authority is delegated, leads to stronger environmental governance outcomes (Newig et al., 2023).

Increasingly complex environmental management requires high stakeholder participation. Participation is considered an appropriate approach in natural resource management (Luyet et al., 2012), and stakeholder participation has become a relevant and significant paradigm for effective and inclusive environmental governance (Reed, 2008) as the world faces increasing environmental challenges (Newig et al., 2023). Luyet et al. (2012) mentions that participation poses some benefits such as better trust in decision, improving project design using local knowledge, better understanding on projects and issues, integration of various interests and opinions, optimizing implementation of planning and projects, public acceptance of the decisions, and fostering and developing social learning. Furthermore, participation is believed to be able to empower local stakeholders, including the grass-root community (Arnstein, 1969), to materialize shared-decision making, to formulate common goals, and to maintain the sustainability of governance (Salamanca-Cano & Durán-Díaz, 2023). In line with the Sustainable Development Goals 17, Partnerships for the Goals, the participation of stakeholders must be given much attention to create synergy by playing their respective roles in managing development programs (Roxas et al., 2020). Stakeholders as parties who influence or are influenced include individuals, communities, organizations, and institutions involved in the decision-making process that shapes environmental policies and practices (Cohen, 1980; Luyet et al., 2012; Salamanca-Cano & Durán-Díaz, 2023). In addition to the diverse aspects of stakeholder entities, stakeholder participation must also consider the level of interest, role, participation degree, participation method, stages, and forms of participation (Luyet et al., 2012; Wilker et al., 2016). Issues related to stakeholder participation are increasingly receiving widespread attention at the practice and research levels.

Previous research shows that stakeholders play a vital and central role in the sustainability of wetland use and conservation. In this way, the government is encouraged to invest in programs that involve various stakeholders in both policy formulation and implementation (Musasa et al., 2023). Even though the practice of stakeholder participation has been in place for a long time, improvements need to be made to account for the heterogeneity of stakeholders and the complexity of decision making. Therefore, it is necessary to develop a method to determine who should participate, how, and when (Luyet et al., 2012). The stakeholders are classified into five parties or the penta-helix structure, as outlined by Forss et al. (2021). The five parties are academia/higher education, the business sector, volunteer organizations, citizens, and the public sector/ government. Varvasovszky & Brugha (2000) also Identify stakeholders as actors who are interested in the issue being considered, impacted by the issue, or who—due to their position—have or can have an active or passive influence in the decision-making and implementation process. They can include individuals, organizations, different individuals within an organization, and networks of individuals and/or organizations, such as alliance groups.

Further research reveals that mapping the roles and participation of stakeholders in the management of tourist destination areas can provide collective benefits to stakeholders, accompanied by the issuance of regulations, maintenance activities, and job creation (Roxas et al., 2020). In another research, a meta-analysis using regression analysis of 305 cases of decision making related to the environment in 22 democratic Western countries illustrates that participatory design produces governance output that produces high environmental standards. Three dimensions of participation analysed include the intensity of communication among stakeholders, the level delegation of authority to make decisions, and the level of representation of stakeholders (Newig et al., 2023). In addition, by summarizing the results of various theoretical research and practical experiences related to stakeholder participation in the Nature-based Solutions (NbS) program, namely a solution that focuses on sustainable utilization of nature in solving social, economic and environmental problems, emphasizes the importance of the community involvement, especially the farming community as 'the main body' or the main actor for the success (Liu & Martens, 2023). The research recommends increasing farming community awareness of environmental protection, intensity of participation, and sense of ownership in environmental programs. This would improve ecological sustainability and the implementation of environmental values in their daily lives.

Participation in environmental management encounters various challenges, such as limited organizational capacity, unresolved fundamental issues, and difficulties in attracting and maintaining stakeholder engagement (Holifield & Williams, 2019). Both citizens and agencies face time constraints, while a lack of public awareness further obstructs meaningful involvement (AbouAssi & Wang, 2023). Additionally, the lack of dialogue and negotiation among stakeholders, along with top-down management practices that marginalize local communities, hinder effective participation (Méndez López & Pujadas Botey, 2020; Rollason et al., 2018). Nonetheless, studies indicate that fostering relational values, supportive social networks, and relationship-building efforts by practitioners can facilitate participation (Mould et al., 2020). To address these obstacles, it is recommended to involve decision-making in organizational processes, promote continuous interactions between government entities and stakeholders, and acknowledge relational values as fundamental activities (Ianniello et al., 2019).

In environmental management, especially waste management and water security, discussions about the impact of non-optimal waste management on the availability of clean water for the community and the destructive power of water, especially in developing countries, are ongoing. The Sustainable Development Goals Report 2023 states that 2.2 billion people in

the world still do not have access to adequate drinking water. With conditions like this, governments worldwide, including Indonesia, must follow up by improving water resource management, sustainable waste management, and environmental management, including waste management and water security. This requires cooperation and participation from various stakeholders, including government, private and private actors, community-based organizations, and society. Therefore, evaluating and exploring stakeholder participation in waste management and water security is important for sustainable environmental management.

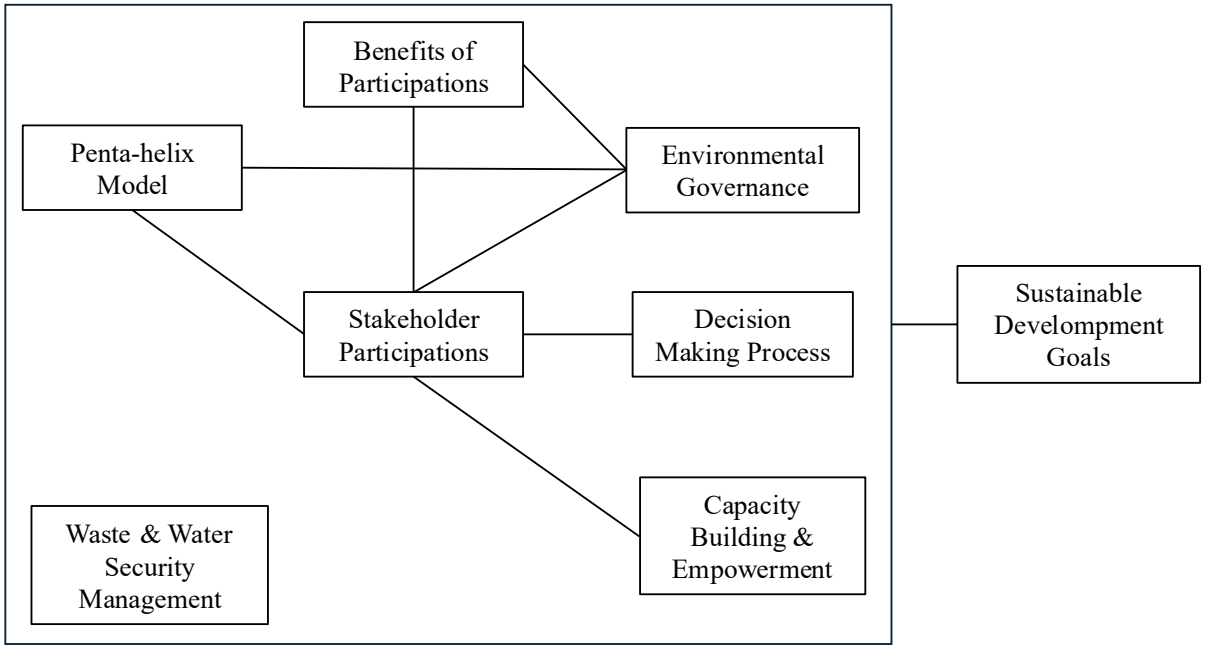

Figure 1. The Interrelation among Concepts Related to Stakeholder Participation in Waste and Water Security Management in Achieving the Sustainable Development Goals (SDGs)

Figure 1 displays the interaction among concepts based on the literature review. It identifies the interconnection through the central theme of stakeholder participation in environmental management, particularly in waste management and water security. At the core, stakeholder participation is the driving force that influences environmental governance, decision-making processes, and achieving sustainability goals.

The penta-helix model is the structural framework linking five key stakeholders—government, business sector, academia, civil society, and media—each contributing unique roles to environmental management. This model underscores that effective governance relies on the synergy and collaboration among these actors. Participation is essential at every stage, from policy formulation to implementation and evaluation, ensuring that environmental strategies are inclusive and adaptive.

Exploring participatory frameworks and stakeholder mapping further emphasizes the relationship between governance and decision-making. These tools help identify who should be involved, how, and at what level. This is particularly relevant in handling complex issues like waste and water security, in which the heterogeneity of stakeholders and the complexity of environmental challenges demand specific participation strategies.

Finally, the research connects these themes to broader global agendas, particularly the Sustainable Development Goals (SDGs). Stakeholder participation is a governance tool and a strategic approach to achieving SDG 6 (Clean Water and Sanitation) and SDG 17 (Partnerships for the Goals). This global perspective reinforces the need for multi-stakeholder collaboration

to tackle environmental issues effectively, particularly in the face of increasing pressures from climate change, resource depletion, and urbanization.

In brief, the literature review forms an integrated system where stakeholder participation is the linchpin connecting governance models, decision-making frameworks, sustainability goals, and practical environmental management strategies. This research explores the degree, form, and method of stakeholder participation in waste and water security management.

C. METHOD

Locus of Research

This research focuses on the West Java Province because throughout the period from 2021 to 2022, environmental sustainability records showed a negative trend. This is attributed to development activities that neglect environmental sustainability, characterized by the conversion of productive land, deforestation, and conflicts with land-related communities. Moreover, the land use conversion is not accompanied by equivalent land replacement. Development activities started from national strategic projects, such as the construction of toll roads, railway lines, ports, and power plants, and local development projects. This situation will likely worsen if the industrial zone development plans at the four cardinal points of West Java Province are realized. The environmental exploitation for these development activities undoubtedly has repercussions on the degradation of environmental quality.

From a demographic perspective, the Central Statistics Agency (BPS) recorded the population of West Java Province as of 2022 to be 49,405,810 individuals. This figure makes the province one of the most populous in Indonesia. The population density in 2022 was 1334 people per square kilometre. With the population growth rate of 1.33% per year, the demand for housing will inevitably continue to rise, leading to unavoidable land use changes.

Furthermore, West Java Province is home to numerous higher education institutions, both public and private, that are renowned for their high credibility compared to other provinces. Institutions such as Bandung Institute of Technology (Institut Teknologi Bandung), Padjadjaran University (Universitas Padjadjaran), Indonesian University of Education (Universitas Pendidikan Indonesia), and Telkom University are among them. This condition undoubtedly attracts students from various parts of the country to pursue their education in this province, thereby increasing the population and intensifying the demand for housing.

The abundance of tourist attractions and culinary spots, particularly in the capital of West Java Province, Bandung City, contributes to attracting many tourists. Almost every weekend, the streets in and around the Bandung area experience heavy traffic congestion. It is not uncommon for tourists to eventually acquire property in this region, as it is more economical than staying in hotels. This, in turn, impacts the increasing demand for housing.

Demographic factors and economic activities in the West Java Province region exacerbate previously mentioned issues, including providing clean water and waste management. The high population and intense economic activities contribute significantly to the heightened demand for spotless water. Consequently, this situation leads to a decline in groundwater levels. The substantial population and increased economic activities also contribute to increased waste generation, especially in urban areas. Moreover, the low public awareness of cleanliness is directly proportional to the prevalence of careless littering habits. Improperly discarded waste ultimately obstructs waterways and river siltation, leading to flooding during the rainy season. To date, waste management practices in the area predominantly involve open dumping or accumulation. The region currently lacks waste management and processing capabilities to address the waste issue effectively. Consequently, open dumping gives rise to additional

disasters, such as explosions due to methane gas, and contamination of river water and groundwater from leachate emanating from the refuse piles.

This research was conducted in one city and two regencies in the province of West Java such as Bandung City, Bandung Regency, and Ciamis Regency. The selection of these locations was based on the city of Bandung's position as the capital of West Java, serving as the center for education and economic activities, and concurrently experiencing various dynamics related to waste and water security issues. The following location is Bandung Regency, situated close to Bandung City, which exerts some influence on and is influenced by the socio-economic conditions of Bandung City. Additionally, Ciamis Regency, with its geographic location relatively distant from Bandung City, was also included in the study.

Data Collection Method

This research employs a qualitative research method with a case study approach concerning waste and water security management in the city of Bandung, Bandung Regency, and Ciamis Regency. Data were gathered through oral interviews, written interviews, field observations, and document analysis. Written and oral interviews were conducted with officials from government agencies responsible for water security and waste management. Written interview questions included both open-ended and closed-ended questions. Additionally, interviews were conducted with community figures possessing information relevant to the research topic. The research informants in this article are listed in Table 1.

Table 1. Informants

Positions and Agencies	Number of Informants
Local Secretariat of West Java Province	1
Head of Division and Planners at the Regional Planning and Development Agency (Bappeda) of West Java Province	3
Staff at the Office of Public Works and Spatial Planning (PUPR) of West Java Province	2
Head and staff of the Housing and Settlement Agency (Disperkim) of West Java Province	7
Head of Section at the Environment Agency (DLH) of West Java Province	1
Head and staff at the Water Resources and Highways Office (DSDABM) of Bandung City	3
Secretary and Head of Division at the Office of Spatial Planning, Residential Areas, and Environment (DPRKPLH) of Ciamis Regency	2
Head of division and functional officers at the Public Works and Spatial Planning Office (DPUTR) of Bandung Regency	3
Head of Division at the Environment Office (DLH) of Bandung Regency	2
Community leader in Cisurupan Bandung City	1
Head of Main Waste Bank of Ciamis Regency	1
Head of Badega Environment Voluntary Organization of Bandung Regency	1
Community of Sekejati Urban Village of Bandung City	1
Maggot and Quail Activist Ciamis Regency	1
PR FM Radio	1
Tribun Jabar News	1

Field observations were conducted to gather data that could support the research. The observations involved visiting locations related to water security, such as the Wetlands in the city of Bandung, sites associated with waste management, like the Final Processing Site (TPA)

and the waste pool at the market in Ciamis Regency, and locations where community self-help initiatives were undertaken, both in water security in the Sudi Village in Bandung Regency and the Proklim Village in the city of Bandung.

Meanwhile, the documents reviewed were government agencies' publications outlining various water security and waste management activities.

Data and Analysis

The data in this research consists of both primary and secondary data. Primary data includes interview results, both oral and written, as well as data from field observations. Secondary data in this study comprises government regulations at both central and local levels, document reports, profiles, and various relevant internet sources.

Based on the formulation by Creswell & Creswell (2018) the data analysis stages in this research are as follows: Firstly, the data must be organized and prepared. In this case, documents, field observation notes, and interview data transcriptions are examined. This step also involves sorting and organizing data types based on various information sources (informants). Secondly, reading through all collected data from document studies, interviews, and observations. This is done to gain a general understanding and subsequently provide broad meaning to the acquired information. In this context, various informants provide information about stakeholder involvement in waste management and improving water security at the studied site. Thirdly, the researcher conducts the coding process, which involves organizing data or information according to its analytical units. This step includes selecting text data from interview transcriptions or document studies, categorizing sentences or excerpts into themes, and labelling categories according to the conceptual framework on stakeholder participation in waste management and water security enhancement. Next, describing data conveys comprehensive information about individuals, locations, or events integrated into one context. In this research, the level of importance, roles, degree of participation, methods, stages, and forms of stakeholder participation are discussed in detail. After that, it will determine how the qualitative narrative will present the analysis results. To do this, the qualitative narrative thoroughly discusses several interrelated themes related to stakeholder participation in waste management and water security improvement. In this study, the narrative is also supplemented with table descriptions. Finally, interpreting or understanding the previously discussed data. This is conducted by comparing the research findings with the theories or literature used in the study on stakeholder involvement in waste management and water security improvement. Thus, the research results can be concluded by determining whether the findings confirm or differ from previous research. To assure the validity of this research, source and method triangulation techniques were employed by comparing information from various sources and utilizing multiple data collection methods.

D. RESULT AND DISCUSSION

Identification of Stakeholders

Based on the penta-helix model, the stakeholders' names and roles are presented in Table 2.

Table 2. Penta-Helix Stakeholders

Type of Stakeholders	Names of Stakeholders	Role of stakeholders
Academia	Universities & Research Institutes: Telkom University, ITB, STPDN, Galuh University	Mentoring, facility providers
Business Sector	Bank BJB, Bank BRI, Duitin, recycle industry, PT Unilever, PT Telkom,	CSR programs, development of assisted villages, capital

	BUMDes, PD Cleanliness, World Bank, PDAM, PT Nestle Indonesia, PT Indocement	acceleration, technology infrastructure and business networks
Media	PR FM Radio, Pikiran Rakyat, Tribun Jabar, other local and national news agencies	Information publication and dissemination, public campaign
Public Sector	Public Works and Spatial Planning Office, Environment Agency, Public Settlement & Housing Office, Water Resources Office, DPRD, River Basin Great Hall, Citarum Harum Task Force, Subdistrict, Village Government	Regulators, movers, infrastructure providers, public facilities, public service providers
Voluntary Organizations & Community	Assistants, Badega (Environment voluntary organization), environmental activists, extension workers, maggot groups, waste banks, Self-help groups Public figures, individuals	Accelerator, education, active engagement, beneficiaries,

Source: Field Data Processed

From Table 2 above, it is evident that there are five types of stakeholders with their respective roles in waste and water security management in West Java Province. Academia plays a role in providing guidance in waste management, conducting education, implementing simple green infrastructure such as bio pores and kitchen waste holes (loseda), and providing various facilities such as waste shredding machines and waste bins based on waste categories. The business sector contributes by establishing business networks and through various CSR programs, providing facilities such as three-wheeled vehicles for waste transportation, maggot nests/houses, park development, and tiny alleys/lanes. Additionally, banking institutions provide financial assistance. Volunteer organizations/community groups play a significant role in accelerating various government programs and educating the public regarding waste sorting and utilization, as shown by Kang Pisman. Furthermore, they also assist the government in various environmental conservation activities through green initiatives and river cleaning campaigns. Meanwhile, the role of the media is to disseminate information and campaign to stakeholders and the general public regarding various waste and water security management activities.

The government sector, in this context, includes both provincial and district/city governments. Local governments play a role in creating regulations related to waste management and water security that align with overarching policies, constructing various waste management and water security infrastructure and facilities such as waste disposal sites (TPS), final processing sites (TPSA), 3R waste management centres (TPS3R), as well as flood control infrastructure such as Wetlands, retention ponds, floodway, and water tunnels. In this case, the general public benefits from various development activities. It is expected to contribute to environmental sustainability by refraining from indiscriminate waste disposal and actively maintaining the built environmental facilities. Nevertheless, not all grassroots communities are involved in various waste management and water security activities.

Degree of Participation

Referring to Arnstein's perspective that the most ideal degree of participation is at the level of citizen control, in this condition, the government's role should be subordinate to the roles of stakeholders and the community. In reality, the research findings are presented in the table 3.

Table 3. Degree of Stakeholder Participation

Stakeholders	Degree of Participation Low → High
Public Sector	
Business Sector	
Media	
Academia	
Community & Voluntary Organizations	

Source: Field Data Processed

From Table 3 above, it is evident that the government's role remains dominant in waste and water security management in the West Java Province. This situation is far from the ideal condition articulated by Arnstein through the ladder of participation, specifically citizen control. The government sector still holds the leading sector in waste and water security management in West Java. Nevertheless, businesses with their Corporate Social Responsibility programs, including banking credit schemes, and the media support the government in implementing its programs. Furthermore, participation from other stakeholders such as the community and academia, remains relatively low. According to Eidt et al. (2020), the low level of community participation indicates that community participation is at the level of tokenistic participation. Referring to a community leader, people tend to be less concerned about development programs related to waste and water security management. The habit of indiscriminate waste disposal by the community leads to flood disasters and environmental squalor. The destruction of various facilities and green infrastructure built by the government is also a result of community actions. Some green infrastructure, such as wetlands and flood control in Bandung City, is not well understood by the residents, and many citizens force themselves to sell goods in the surrounding area, resulting in unmanaged waste and reducing the functionality of the infrastructure. The findings of this research align with the results of Liu & Martens (2023), which states that there is a low level of awareness and understanding among the public about sustainable environmental revitalization in China. Similar results occurred in a study by Newig et al. (2023), where the community opposed environmental project development due to its low understanding of its benefits to their lives.

Meanwhile, the degree of participation of volunteer organizations, according to government officials' assessments, is categorized as higher than that of the community and academia. This is because these communities exhibit higher commitment, love, and ownership than other stakeholders. For example, waste bank management communities significantly contribute to waste management in the area, ranging from sorting and distribution to waste processing, especially recyclable waste. In well-established waste banks, the workers receive a fairly adequate wage. Nevertheless, some continue to perform their duties without sufficient financial compensation. Their passion for the environment is more valued than the monetary compensation they receive. Another example is environmental volunteers who willingly participate in government programs for environmental conservation, such as reforestation activities. Communities like these have close relationships with the government sector and receive various benefits provided by the government, such as knowledge and skill development through various training programs and their involvement in field activities.

Stakeholder Participation Matrix

This participation matrix aims to illustrate the involvement of all stakeholders in the entire sequence of activities related to waste and water security management in the West Java Province, spanning from planning, implementation, to monitoring and evaluation. Additionally, this matrix also sheds light on the level of stakeholder participation, whether it is at the informed, consulted, collaborated, or monitoring and evaluation stages. The following

matrix provides an overview of the levels of stakeholder participation in waste and water security management in the West Java Province.

Table 4. Level of Stakeholder Participation

Stages of Activities	Level of Stakeholder Participation			
	Be informed	Consult	Collaborate	Monitor & Evaluate
Planning	• Local Council • Local government agencies • Badega (voluntary environment organization) • Environmental Activist/Community • Colleges and Research Institutes • Village Government • Community/Cadre • Media	• Local Council • Local government agencies • Colleges and Research Institutes	• Local government agencies • Environmental Activist/Community • Colleges and Research Institutes • Village Government • Community/Cadre	• Local government agencies • Badega (voluntary environment organization) • Colleges and Research Institutes • Village Government • Media
Implementation	• Local government agencies • Badega (voluntary environment organization) • Activist/Community • Colleges and Research Institutes • Village Government • Community/Cadre • Media	• Local government agencies • Colleges and Research Institutes	• Local government agencies • Badega (voluntary environment organization) • Activist/Community • River Basin Great Hall • Colleges and Research Institutes • Village Government • Community/Cadre	• Local government agencies • Badega (voluntary environment organization) • Environmental Activist/Community • Colleges and Research Institutes • Village Government • Community/ Cadre • Media
Monitoring and Evaluation/ Supervision	• Local Council • Local government agencies • Badega (voluntary environment organization) • Activist/Community • Colleges and Research Institutes • Village Head and Village Government • Community/Cadre • Media	• Local government agencies • Colleges and Research Institutes • Village Government	• Local government agencies • Badega (voluntary environment organization) • Activist/Community • Colleges and Research Institutes • Village Government • Community/Cadre	• Badega (voluntary environment organization) • Environmental Activist/Community • Colleges and Research Institutes • Related Regional Devices • Village Government • Community/Cadre • Media

Source: Field Data Processed

From Table 4 above, it is obvious that, fundamentally, stakeholders are involved in waste and water security management in the West Java Province. Despite stakeholders in the matrix above participating according to their levels, ranging from being informed to engaging in monitoring and evaluation, the government, through various local agencies, tends to have the most dominant involvement compared to other stakeholders. In this context, the government remains the leading sector in various waste and water security management activities. This is apparently because the government is the primary source of financing for projects and activities compared to other stakeholders. It is not that other stakeholders do not contribute to funding or material provision, but their contributions are significantly less than the budget allocated by the government. Moreover, various ideas for developing green infrastructure appear to originate from the government sector, which is then consulted with universities or relevant consultants. In implementing projects and activities, coordination among local government organizations is more intensive than with other stakeholders. There is a tendency for stakeholders outside local government agencies to refine the development concepts initiated by the government. The findings of this research align with what was presented by Eidt et al. (2020), emphasizing that empowering minority groups, such as the community, and providing them with legitimate power is essential for their meaningful participation in raising awareness and instigating change.

Forms of Participation

As known, the development process, which involves various projects and activities with various stages, requires diverse resources. These resources encompass intellectual, financial, human, and material resources. The following table provides an overview of the stakeholders' participation in waste and water security management in West Java Province across various stages of the activities.

Table 5. Forms of Stakeholder Participation

Stages of Activities	Forms of Stakeholder Participation			
	Thought	Finance	Human Resource	Material
Socialization (program introductory phase	• Local Council • Local government agencies • Colleges and Research Institutes • Village government • Voluntary organizations • Community • Media	• Local government agencies • Village government	• Local government agencies • Village government • Voluntary organizations • Community	• Local government agencies • Village government
Planning	• Local Council • Local government agencies • Colleges and Research Institutes • Village government • Voluntary organizations • Media	• Local government agencies	• Local government agencies	• Local government agencies
Implementation	• Local government agencies • Village government	• Local government agencies	• Local government agencies • Village government	• Local government agencies

	• Voluntary organizations • Community • Media	• Village government • Voluntary organizations • Community	• Voluntary organizations • Community	• Village government • Voluntary organizations • Community
Monitoring and Evaluation/ Supervision	• Local government agencies • Village government • Voluntary organizations • Community • Media	-	• Local government agencies • Village government • Voluntary organizations • Community	-

Source: Field Data Processed

From Table 5 above, it is evident that the government, through its local agencies, dominates participation from ideation, financing, human resources to material resources. The government's domination is not only in terms of resource participation but also extends across all stages of activities, from socialization (program introductory phase) to monitoring and evaluation. This domination can be understood as the government still being the entity that must play a primary role in directing activities in all sustainable development sectors (Hopwood et al., 2005). The government is believed to have a central leadership role and a strategic direction through formulating regulations and policies, infrastructure development, and sustainable environmental conservation, including waste management and water resilience. This situation also aligns with the scenario presented by Alpenberg et al. (2018), where government institutions in Sweden play a key role in environmentally oriented development and consistently engage the business sector and the public to work and live considering sustainable environmental conservation.

Methods of Stakeholder Participation

The stakeholder engagement method is crucial in collecting initiatives and aspirations, determining decision-making processes, formulating planning, collaboratively implementing development, and reflecting on development activities through monitoring and evaluation. The following provides an overview of the stakeholder engagement method in waste and water security management in West Java Province across various stages of activities.

Table 6. Methods of Stakeholder Participation

Stages of Activities	Stakeholder Engagement Methods			
	Inform	Consult	Collaborate	Monitor & Evaluate
Planning	Live dialogue Letter Telephone Social Media Mass media	Live dialogue Letter Meeting Visit	Live dialogue Letter Meeting Visit Workshop/FGD	Meeting Visit Survey
Implementation	Live dialogue Letter Telephone Social Media Mass media	Live dialogue Letter Meeting Visit	Live dialogue Letter Meeting Workshop	Meeting Visit Survey
Surveillance/Monev	Live dialogue Letter Telephone Social Media Mass media	Live dialogue Letter Meeting Visit	Live dialogue Letter Meeting Workshop	Meeting Visit Survey

Source: Field Data Processed

There is no specific approach to determine stakeholder engagement methods (Luyet et al., 2012; Wilker et al., 2016). However, Table 6 shows that stakeholder engagement in waste and water security management in West Java Province is carried out in various ways, such as surveys, direct dialogues, written correspondence, telephone communication, social media, mass media, meetings, workshops, field visits, and Focus Group Discussions (FGD). Various methods are utilized in the activities' implementation stages and stakeholder participation levels.

Surveys are employed to gather opinions and feedback from stakeholders without the need for face-to-face meetings, making it an effective and efficient method to capture stakeholder needs and opinions. Direct dialogues are used to listen to the opinions and inputs of stakeholders regarding decisions or the implementation of development activities. Even in this digital era, stakeholder dialogues can be conducted digitally through online platforms such as WhatsApp and Twitter. Meetings are held to provide up-to-date information about activities and receive input. Through meetings, stakeholders share opinions, provide criticism, and collaborate on implementing activities. Meetings are often conducted informally, creating a relaxed and less formal atmosphere. Workshops are conducted to discuss specific issues and provide stakeholders with knowledge, understanding, and skills. FGDs are implemented to gain a deeper understanding of the perspectives of all stakeholders, fostering intensive discussion and the exchange of ideas.

Based on the field interview results, it is found that there are several factors hindering stakeholder participation. These participation barriers include budget limitations (Bello et al., 2017) within local government organizations to support program implementation, leadership turnover within the organizational environment of local government organizations, where leadership changes often lead to policy changes (Bunce, 1979), differences in priority-setting among sectors (Bello et al., 2017), inconsistent understanding among stakeholders regarding program implementation and benefits (Bello et al., 2017; Liu & Martens, 2023), sectoral thinking and the scope of activities, as well as suboptimal community support (Newig et al., 2023) in ensuring the success of waste and water security management in West Java Province.

E. CONCLUSION

In conclusion, waste and water security management in West Java Province is predominantly driven by a single stakeholder, namely the government or public sector, which assumes a highly dominant role in policy formulation and implementation. In contrast, the participation of other key stakeholders, including the business sector, academia, media, voluntary organizations, and the community, remains limited. The limited involvement of these stakeholders may hinder the development of comprehensive, inclusive, and sustainable approaches to environmental management, as multi-sectoral collaboration is essential for addressing the complex challenges associated with waste and water security. The low level of stakeholder participation indicates the challenges in engaging stakeholders in waste and water security management across various stages of environmental activities, ranging from planning to monitoring and evaluation. Furthermore, the allocation of resources by stakeholders other than the government is also limited.

To improvestakeholders participation in waste and water management in West Java Province, it is advised that the government take the initiative to develop an inclusive and participatory governance structure by establishing formal mechanisms, such as advisory boards, working groups, or consultative forums, to promote regular dialogue and collaboration among a wide range of stakeholders. It is also important to ensure that all stakeholders' interests and expertise are represented. In addition, the stakeholder capacity needs to be enhanced through knowledge sharing, workshops, and technical support to strengthen stakeholders'

competencies in strategic planning, project management, and evaluation methodologies. Finally, the policy and regulatory framework related to waste and water security management should explicitly outline the roles and responsibilities of each stakeholder to prevent the perception that the government is solely responsible for all public affairs. The government also needs to pay attention to creating a sense of collective responsibility and ownership over projects by emphasizing how stakeholder contributions directly impact the success and sustainability of initiatives.

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