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Politics of Environmental Policy, Co-Production, and Multi-Actor Governance in School-Based Systems

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ABSTRACT

Environmental governance issues in West Sumatra have impacted hydrometeorological disasters. The implementation of environmental policies has not been successful in managing the environment. This study analyzes the role of co-production in building knowledge-based governance in educational units. The focus of the study is directed at how the Environmental Care and Culture Movement in Schools (GPBLHS) can encourage the involvement of multiple actors, including schools, local governments, communities, and civil society organizations, in creating sustainable environmental knowledge. This study uses a qualitative approach with a case study design, located in four schools that have received the National Adiwiyata award: SDN 03 Pakan Labuah Bukittinggi, MTsN 10 Tanah Datar, SMPN 1 Payakumbuh, and SMAN 7 Padang. Data were collected through in-depth interviews, participant observation, and documentation studies, then analyzed using Grounded Theory techniques. The results show that the implementation of GPBLS in West Sumatra schools successfully integrates aspects of policy, curriculum, and school community participation. The co-production process takes place through active interactions between teachers, students, parents, local governments, and the community. The intensity of each actor's involvement varies. Schools act as both recipients of policies and producers of environmental knowledge, which is demonstrated through various innovations.

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Introduction

Environmental management faces significant challenges as the environment's carrying capacity and carrying capacity weakens amidst increasing population growth. Natural disasters such as floods, landslides, and global hydrometeorological disasters not only destroy public facilities and infrastructure but also worsen the condition and quality of the environment itself. Comprehensive environmental governance policies are considered a rational solution, and good environmental governance is positioned as a primary alternative in public policy and administrative studies. (Mehta et al., 2025). Good environmental governance emphasizes that environmental issues are not merely ecologically technical, but also how to build cooperation through the co-production of environmental policies in every process and arena of the policy, from the formulation stage, implementation, to evaluation. Good environmental governance must accommodate and recognize the roles of various actors in collaboration, participation, and co-production to form an effective policy. Therefore, various environmental governance policies are highly political, involving competing interests, power relations, and the distribution of authority among official and non-state actors. (Bulkeley, 2005). One of the environmental management and protection policies in Indonesia is the Minister of Environment Regulation (LKH) Number 52 of 2019 concerning the Environmental Care and Culture Movement in Schools (GPBLHS), a micro-policy that makes schools, school residents, and other stakeholders actors in building school-based environmental governance (Adil Mubarak & Putri, 2020). Through this policy, schools as educational institutions play a role not only as policy implementers

but also as strategic arenas for fostering environmental awareness, behavioral change, and long-term sustainability practices among the younger generation. However, the effectiveness of these policies depends not only on compliance with formal regulations but also on how knowledge is produced, transferred, and institutionalized at various levels of government (Peraturan Menteri LHK Nomor 52 Tahun 2019 Tentang Gerakan Peduli Dan Berbudaya Lingkungan Hidup Di Sekolah, 2019).

School-based environmental governance is a micro-level policy of most macro-environmental policies in Indonesia which is relatively easier in designing collaboration models, identifying roles and relationships between stakeholders, actors and stakeholders should be able to be mapped and implemented by all parties in the realm of shared environmental governance. (Ain et al., 2021). Ironically, however, it is precisely this micro-level governance process that experiences obstacles in its implementation, particularly in political dynamics such as relations between state institutions, both in vertical structures and at the same level, as well as interactions and relations between other stakeholders in this school-based environmental policy. This gap is clearly reflected in the decentralized governance structure that gives significant authority to one institution in the local government and less authority to another institution, even though the relationship between the two institutions in environmental governance should form an equal co-production of policies. This is also seen in the community, resulting in a relatively non-participatory implementation and adaptation of environmental policies (Muhammad Sibgatullah Agussalim et al., 2023) and (Adil Mubarak et al., 2022).

The problem of environmental governance in West Sumatra Province through the GPBLHS program finally faces complex structural and procedural challenges, hydrometeorological disasters such as floods, flash floods and landslides in December 2025 indicate that since this policy was rolled out in 2019 it has not been able to change attitudes and behaviors into pro-environmental behaviors with character so that concern for the environment increases, in fact the critical point in this crisis, resulting in hundreds of casualties, hundreds of thousands of affected residents, and economic losses reaching trillions of rupiah. (BPBD, 2025). This reality proves that environmental problems cannot be understood only as natural phenomena, but also as a manifestation of systemic and political environmental governance problems (Bulkeley, 2005). In other words, the accumulation of ecological disaster events and low concern for environmental preservation reflect that environmental policies, especially in the GPBLS program, have not been able to build environmental knowledge in local communities for environmental sustainability. (A Mubarak et al., 2024).

Figure 1. The impact of hydrometeorological disasters in West Sumatra
Source: West Sumatra Province BPBD Report

Based on the issues and challenges of school-based environmental governance, this study will analyze the gap by examining the political dynamics of environmental policy in building environmental governance knowledge through co-production in the GPBLHS program in West Sumatra. (Gerlak et al., 2023). This study will focus on how multi-stakeholder interactions, including schools with the Adiwiyata predicate, relevant agencies such as the Education Office and the Environmental Office, non-governmental

organizations (NGOs), communities, parents, and students, develop a governance framework that illustrates the roles and relationships between these stakeholders. By positioning schools as policy implementers and knowledge producers, this research contributes to the debate on public policy implementation, multi-actor governance, and participatory approaches to environmental sustainability. (Good et al., 2023).

Therefore, the main problem formulation of this study is: How does co-production function as a political mechanism (actor interaction and relationship) and good environmental governance through shaping the knowledge, attitudes and pro-environmental behavior of the younger generation (students) in the implementation of school-based environmental policies in West Sumatra? The results of this study are expected to provide theoretical contributions to the study of governance and public policy as well as practical insights for policy makers who seek to strengthen participatory and knowledge-based approaches in the implementation of environmental policies at the micro level.

Theoretical Framework

This research is based on five interrelated theoretical frameworks: public policy, environmental governance, co-production, Adiwiyata schools, and pro-environmental behavior. These five frameworks collectively form the basis for a conceptual design to describe and analyze the roles, relationships, and interactions of multiple actors as co-productions of school-based policies in building environmental knowledge to foster pro-environmental behavior or character among students in West Sumatra.

Public Policy

Public policy is defined by Thomas R Dye as any choice of government to do something or not to do something (Cashore & Howlett, 2020). Public policy is any decision made by the state as a strategy to realize the state's goals. Public policy is the study of how to solve problems by providing recommendations to address them (Knill & Tosun, 2020). According to (Althaus et al., 2023) the many definitions of public policy, it is difficult for us to determine a precise definition of public policy, therefore, to facilitate understanding of public policy, it can be identified in 5 characteristics of public policy, namely: 1. Has a goal designed to achieve its goals; 2. Involves decisions and their consequences; 3. Structured and arranged according to certain rules; 4. Political in nature; 5. Very dynamic.

Based on the definition and characteristics of public policy, environmental policy refers to government actions that influence or attempt to influence environmental quality or the use of natural resources. Environmental policy is a set of principles and objectives used to guide decision-making about human management of environmental capital and environmental services (Roberts, 2010). Environmental policy is not found in a single law or administrative decision. Rather, it is established by the diverse set of laws, regulations, and court precedents that govern the country, and is influenced by the attitudes and behavior of the officials responsible for implementing and enforcing the laws. Environmental policy encompasses not only what governments choose to do to protect environmental quality and natural resources, but also what they choose not to do; a decision to inaction means governments allow other forces to shape the environment (Kraft, 2021).

Environmental Governance

Environmental governance is a series of processes within a regulation implemented by various institutions through interaction and collaboration in managing and resolving environmental problems at various levels of authority (Bennett & Satterfield, 2018). Environmental governance aims to regulate individual behavior or collective action in realizing environmental quality recovery (Armitage et al., 2012). Environmental governance involves multi-actor participation including influence from the community, environmental governance is not a monopoly of authority but must involve various stakeholders (Parmiggiani et al., 2018), the contemporary governance perspective emphasizes the involvement of various actors, including local governments, private sector entities, civil society organizations, and community groups (Carayannis et al., 2012; Hermawan & Astuti, 2020). Public policy studies view environmental governance as an official legal instrument created through a formulation process, and must be implemented so that results can be achieved and then evaluated if problems are found. (Zhu & Li, 2025). Participation is the key in environmental governance, through a participatory and collaborative approach, environmental governance standards will improve the process and results, therefore the convergence of stakeholder

perspectives and stakeholder capacity is also an influencing factor in determining more effective environmental governance mechanisms (Jager et al., 2020). Stakeholder involvement and stakeholder capacity development lead to legitimacy for an environmental governance policy. Legitimacy is an important form of political support for the implementation of governance policies to be more effective and efficient. (Visseren-Hamakers, 2015). The environmental governance framework in this study makes school-based environmental policies a form of environmental governance at the micro level through a dynamic political role in the form of collaboration, negotiation, authority and knowledge exchange, where environmental governance knowledge is not only a static collection of information from experts, but as a result that is actively and dynamically constructed through the social and political constellation of interactions between various stakeholders. Multi-actor governance will analyze stakeholder involvement in each arena and stage of the program activity process. (Newig et al., 2023). Semakin tinggi kapasitas actor yang terlibat maka semakin kuat legitimasi kebijakan (Hedlund et al., 2023).

Co-Production

One of the main elements of the public administration system is cooperation in implementing policies, school-based environmental policies through the GPBLS program refer to the concept of co-production which originates from public administration theory(Wyborn, 2015), according to Elinor Ostrom (Alford, 2014), co-production is a process of direct cooperation between the state and citizens to plan, design and implement a program in an equal relationship. In co-production, society is in a strong position. Society is not only a passive object receiving the results of policy, but is an active subject using its environmental knowledge, the resources it possesses, and its extensive social network to increase the effectiveness and legitimacy of public action (Gerlak et al., 2023). The concept of co-production is the basis for understanding the interactions and relations of policy actors. Co-production as a dynamic concept allows this research to analyze multi-level problems that involve not only different strategies but also different and sometimes contradictory meanings (Bandola-Gill et al., 2023).

One of the formulations of this research is how the roles and relationships between actors, so that the co-production of the implementation of school-based environmental policies is linked to joint decision-making, joint implementation and joint responsibility between the government, non-governmental institutions and the community and other stakeholders(Turnhout et al., 2020). This research makes schools through the GPBLHS program an empirical arena for interaction between the government and the community (school residents and communities outside the school) in collaborative governance, program co-production, and multi-actor participation as the main analytical components, including actor configurations, power relations, institutional arrangements, and the process of co-creating knowledge. (Daka & Madimutsa, 2020). These components form the basis for the operational analysis of co-production to describe the results of policies and governance, namely pro-environmental behavior, stakeholder capacity and institutions (He, 2018).

This study is very relevant to the focus of the study on environmental policy and governance because there is a lot of local environmental wisdom that requires community involvement to maintain the sustainability of their environment.(Gerlak et al., 2023; Rome & Hoechstetter, 2010). Integrating theory with local wisdom and knowledge can portray co-production and governance more comprehensively and in a context-sensitive and adaptive manner. (Flinders et al., 2016; Turnhout et al., 2020).

Adiwiyata schools

Adiwiyata Schools are schools that have received certification as schools that have met the criteria for being environmentally friendly. *Adiwiyata* Schools is a government program regulated by the Minister of Environment and Forestry Regulation No. P.53/MENLHK/SETJEN/KUM.1/9/2019 concerning the Adiwiyata Award and Minister of Environment and Forestry Regulation No. 51 of 2019 concerning the Environmental Care and Culture Movement in Schools (Utaya & Wafaretta, 2021). *Adiwiyata* Schools play a role in providing environmental education for the school community and its surroundings, actively involved in the planning, implementation, and evaluation of school-based environmental governance to realize green character and healthy living behavior as an awareness that will be transmitted to the wider community. Adiwiyata Schools are a national policy so that throughout Indonesia every school is involved in it, although each school varies in its implementation and progress (Hamidah et al., 2024)

As an effort to build good environmental governance, *Adiwiyata* schools are a collaboration of various actors, including the entire school community, namely the principal, teachers, employees, and students as *Adiwiyata* cadres. Other actors involved are the community or society such as non-governmental organizations (NGOs), the private sector, including the business world, and the government (Fedrya & Frinaldi, 2025). *Adiwiyata* school-based environmental governance is a complex policy and will be interdependent with various sectors, therefore, the role of multi-actors is the basis of governance where policies are formed through the interaction of various stakeholders who each have their own main roles (Calliera & Capri, 2022). Schools have an intermediary role that connects national policy objectives with local wisdom values and practices, while external actors will synergize to build collective networks for the operationalization of good environmental governance in school institutions. (Frinaldi et al., 2026).

Pro-environmental Behavior

Green education through the GPBLHS program aims to realize sustainable environmentally friendly behavior for school residents, the formation of green character through growing awareness and concern for the threat of environmental pollution due to waste and encouraging massive community involvement to protect and maintain environmental sustainability (Widyaswar et al., 2024). Pro-environmental behavior (Truelove & Gillis, 2018) is a key indicator for assessing the success of school-based environmental policies, where schools have an environmentally based curriculum, active participation of school residents, and have environmentally friendly supporting facilities.

Method

This study uses a descriptive qualitative research approach to describe the roles and relationships of actors and stakeholders in the co-production of school-based environmental governance. (Creswell & Creswell, 2017), The descriptive qualitative design chosen is verification-evaluative which aims to extract meaningful information from informants and provide insight and input to the evaluator. This design is inductive casuistic in nature where the GPBLHS program is the main phenomenon (Bungin, 2020). The casuistic nature of this research is reflected in the systematic and exploratory efforts towards the typical phenomena experienced by each region and school level through their in-depth understanding and experience (Gammelgaard, 2017), (Assyakurrohim et al., 2023).

Data Collection Techniques

Data collection in this study was conducted using three main techniques: in-depth interviews, participant observation, and documentation studies. These three techniques were chosen to complement each other, resulting in more comprehensive, valid data, and a comprehensive depiction of the implementation of the Environmental Care and Culture Movement in Schools (GPBLS)(Denzin, 2017). In accordance with the research focus, four schools that won the Adiwiyata National Award in West Sumatra, namely SDN 03 Pakan Labuah Bukittinggi, MTsN 10 Tanah Datar, SMPN 1 Payakumbuh, and SMAN 7 Padang were selected based on three criteria: (1) these schools have relative advantages even though they are at different levels of education, (2) they are quite active in interacting with various stakeholders, and (3) they have innovative policy and program products. Research informants were selected using purposive techniques (Assyakurrohim et al., 2023; Lexy, J, 2017). based on the following criteria: (1) actors directly involved in environmental education policies, both at the local government and school levels; (2) actors who have an important role in managing environmental programs in schools, including principals, teachers, and education staff; (3) students who are active in environmentally conscious school activities; (4) parents and the community around the school who feel the impact of changes in student behavior; and (5) civil society organizations or NGOs who act as supporting partners for schools in implementing environmental programs. Data collection took place between April and November 2025 through in-depth interviews, participatory observation and collecting various primary and supporting documents in full.

Table 1. Research Informants

No.	Informant Category	Institutional Affiliation / Role	Main Function in GPBLHS Implementation
1	Policy Stakeholders	Department of Education and Environment of West Sumatra Province and Regency/City (Padang, Bukit Tinggi, Tanah Datar, Payakumbuh)	Communicating programs, providing technical guidance, and program implementation support.
2	Principal and Teachers' Council	SDN 03 Pakan Labuah Bukittinggi, MTsN 10 Tanah Datar, SMPN 1 Payakumbuh, and SMAN 7 Padang	Program manager, internal school policy maker, environmental activity facilitator, and school community participation driver
3	Students	Adiwiyata cadres in each school	The main actors in environmental education, agents of change, recipients and disseminators of knowledge transfer to families and communities
4	Parents and Community Leaders	School committee and community leaders	partners in maintaining the sustainability of the program, as well as beneficiaries of changes in student behavior
5	Environmental NGOs / CSOs	Wahana Lingkungan Hidup Indonesia (WALHI)	Providing advocacy, education and training, critiquing and evaluating policies and programs

Source: Processed by the 2025 Research Team

Data Analysis and Triangulation

The data was analyzed using manual data analysis procedures (MDPA), the use of this procedure because the data obtained is emic so it requires participation through the researcher's instrument as a whole. The procedures carried out in analyzing the data consist of: (1) daily field data notes, (2) transcripts, namely copies of daily notes obtained from the field that are made objectively and naturally, (3) Coding, namely giving codes to mark the analysis on parts of the data that are considered important and represent phenomena in the field, (4) Categorization, namely grouping the same coded data by sorting and analyzing the code, (5) themes, namely determining the model from the code categorization carried out previously through triangulation by finding themes and sub-themes, selecting themes, building a theme hierarchy, and connecting themes with models, (6) Memos, namely building theories with comprehensive and in-depth analysis (Rofiah & Bungin, 2024)(R et al., 2023). Testing the validity of research data uses several techniques to test the credibility of the data, namely through source triangulation, method triangulation, time triangulation, and member checks (Bans-Akutey & Tiimub, 2021)

Results and Discussion

Based on the results of in-depth interviews with all informants, through the data processing process using transcription, coding, themes and memo mechanisms, a categorization can be presented that describes the pattern of relationships between actors in environmental governance in the implementation of school-based environmental policies in West Sumatra.

Data processing coding co-production of school-based environmental governance

To move beyond descriptive open coding and identify relational patterns across categories, the analysis proceeded to the axial coding stage. This phase aimed to cluster initial codes into higher-order thematic categories that reflect structural dimensions of co-production in school-based environmental governance. The axial coding process reveals that environmental policy implementation in schools is not fragmented, but organized around interconnected governance mechanisms involving pedagogical practices, leadership dynamics, collective participation, and behavioral internalization. These categories illustrate how

co-production operates simultaneously at institutional, organizational, and socio-cultural levels. Table 2 presents the synthesized thematic categories derived from the axial coding process.

Table 2. Processed Data Results In The Form Of Coding

Axial Category	Conceptual Sub-Category	Related Codes
Contextual and Practice-Based Environmental Learning	Context-based environmental learning	C1, C17
	Practice-oriented learning (school garden, composting, waste sorting)	C3, C11, C16
	Environmental and health literacy development	C10
Collective Participation and School Community Action	Active student participation in environmental programs	C2, C13
	Collective school movement and community service	C7, C8, C18
	Student creativity and environmental innovation	C9, C14
Leadership and Pedagogical Innovation	Principal leadership as a mobilizing force	C4, C15
	Teachers as environmental change agents	C12
	Pedagogical innovation in environmental education	C5, C19
Environmental Character and Behavioral Formation	Individual responsibility in waste management	C6
	Internalization of pro-environmental norms and habits	(Integrated across C2, C10, C13)

Source: Results of data processing by the research team: 2025

The axial coding results demonstrate that co-production in school-based environmental governance is structured around four interrelated dimensions: pedagogical integration, collective mobilization, leadership mediation, and character formation. These dimensions suggest that environmental governance is sustained not merely through regulatory compliance, but through embedded social practices within the school ecosystem. Leadership plays a pivotal mediating role in translating inter-agency policy frameworks into contextualized educational practices, while participatory mechanisms ensure that environmental values are internalized beyond formal instruction. Consequently, co-production evolves from collaborative policy design into institutionalized environmental governance embedded in daily school routines.

Patterns of Multi-Actor Interaction and Co-Production

The analysis identifies three dominant patterns of interaction that structure the co-production of environmental governance knowledge. First, vertical coordination occurs between provincial agencies (Dinas Lingkungan Hidup and Dinas Pendidikan) and schools through policy guidance, technical assistance, and monitoring mechanisms linked to Adiwiyata and GPBLS indicators. Second, horizontal collaboration emerges among schools, NGOs, and community organizations in the form of joint training sessions, environmental campaigns, and knowledge-sharing forums. Third, internal school-based collaboration is observed through teacher–student working groups and student-led environmental clubs that operationalize policy objectives in daily routines.

These interactional patterns demonstrate that knowledge production is not a linear transfer from state to society but a recursive process in which policy frameworks are continuously reinterpreted by local actors. Co-production functions as a mechanism for embedding formal environmental policy into culturally resonant practices, including the integration of Minangkabau values such as *alam takambang jadi guru* into curricular and extracurricular activities. This finding supports Ostrom's proposition that public service

outcomes are enhanced when users and providers jointly contribute to design and implementation processes.

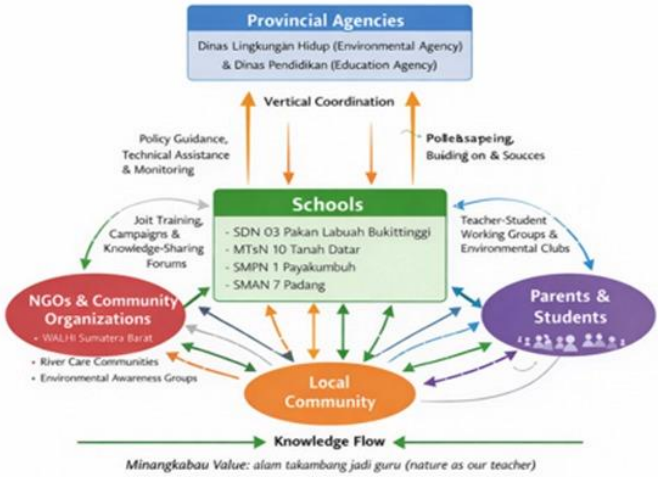

Figure 2. Pattern of co-production in school- based environmental governance

Descriptive Indicators of Governance Knowledge Institutionalization

Although the study is qualitative, descriptive indicators are employed to summarize the intensity and scope of co-production across cases. Table 2 presents aggregated descriptive values derived from coded interaction events and institutional outputs, including policy meetings, joint activities, and formalized school regulations.

Table 2. Descriptive Indicators of Co-Production and Governance Knowledge

Indicator	Mean	SD	Minimum	Maximum	Interpretation
Number of multi-actor coordination meetings	6.5	1.7	4	9	Moderate to high level of formal coordination
Joint school–community activities	8.2	2.1	5	12	Strong community engagement in implementation
Environmental policies formalized at school	3.0	0.8	2	4	Institutional embedding of policy objectives
Student-led environmental initiatives	10.4	2.5	7	14	High level of youth participation

Source: Data processing results coding by the research team

The descriptive statistics summarize the intensity and variation of co-production practices and multi-actor interaction across the research sites. The indicator *number of multi-actor coordination meetings* (Mean = 6.5; SD = 1.7) reflects a relatively stable level of formal coordination, with moderate variation among schools and localities. This suggests that cross-actor meeting mechanisms are institutionally established, although their frequency remains contingent upon local administrative capacity and the degree of support provided by municipal and provincial authorities.

The indicator *joint school–community activities* (Mean = 8.2; SD = 2.1) demonstrates a strong level of community engagement in policy implementation, accompanied by a comparatively higher degree of variability. This pattern indicates that the effectiveness of school–community collaboration is highly context-dependent, shaped by the strength of local social networks, community leadership, and the active involvement of civil society organizations.

For *environmental policies formalized at school* (Mean = 3.0; SD = 0.8), the relatively low but consistent mean value suggests that the institutionalization of environmental policy at the school level has progressed in formal terms, yet remains limited to a narrow set of internal regulations and administrative documents. This finding implies that structural governance arrangements tend to evolve more slowly than participatory practices.

By contrast, *student-led environmental initiatives* exhibits the highest mean score (Mean = 10.4; SD = 2.5), indicating a high level of youth participation alongside substantial heterogeneity across cases. This underscores the central role of students as operational actors in the co-production of environmental governance knowledge, while also highlighting that institutional support and school culture are critical determinants of the sustainability and scalability of participatory initiatives.

Overall, the descriptive pattern reinforces the argument that co-production in school-based environmental governance is stronger in participatory and social practice dimensions than in formal-institutional arrangements. Consequently, the long-term sustainability of policy outcomes depends on the capacity of governance actors to bridge community engagement with the strengthening of internal policy structures and knowledge management systems.

Actor Network Visualization and Relational Dynamics

To illustrate the relational configuration of governance actors, Figure 3 presents a conceptual network model of interaction in GPBLS implementation. The model maps the central role of schools as hubs connecting provincial agencies, municipal offices, NGOs, community leaders, and students. The density of ties between schools and NGOs reflects the importance of civil society in translating policy norms into socially meaningful practices, while the strong linkages with provincial agencies highlight the continued relevance of hierarchical authority in setting performance standars

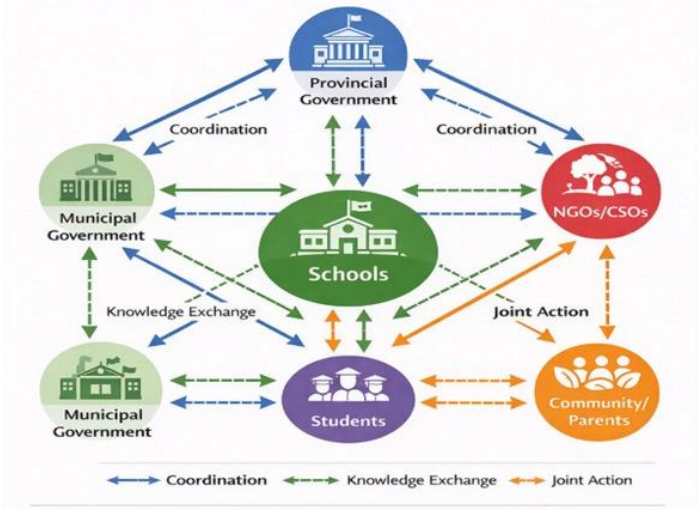

Figure 3. Multi-Actor Interaction Network in GPBLS Implementation

Figure 3 illustrates the relational configuration of governance actors involved in the implementation of the School-Based Environmental Awareness and Culture Movement (GPBLS) in West Sumatra. The diagram positions schools as the central hub within the governance network, connecting provincial and municipal governments, non-governmental organizations/civil society organizations (NGOs/CSOs), community/parents, and students through three primary modes of interaction: coordination, knowledge exchange, and joint action.

Vertical coordination is represented by bidirectional links between provincial and municipal governments and schools, reflecting the flow of regulatory guidance, technical assistance, monitoring, and performance standards associated with Adiwiyata and GPBLS policy instruments. Horizontal linkages between schools, NGOs/CSOs, and community/parents indicate collaborative platforms for capacity building, advocacy, and the translation of policy norms into socially embedded practices. Internal school-based interactions, particularly between schools and students, highlight the role of students as operational actors who enact environmental governance knowledge in daily routines and peer-based initiatives.

The density and reciprocity of ties in the network demonstrate a hybrid governance arrangement in which hierarchical authority and participatory engagement coexist. This configuration underscores that environmental governance knowledge is co-produced through continuous interaction among state and non-state actors, rather than being linearly transmitted from policy makers to implementers. The model supports collaborative governance theory by illustrating how legitimacy, policy ownership, and adaptive capacity

emerge from sustained coordination, shared learning, and collective action across multiple institutional levels.

Analytical Propositions and Discussion

Two analytical propositions guide the interpretation of findings. First, co-production enhances policy legitimacy and stakeholder ownership in environmental governance. Empirical evidence from joint decision-making forums, participatory school programs, and community-led initiatives indicates that actors who are directly involved in implementation develop a stronger sense of responsibility for policy outcomes. This supports the theoretical claim that legitimacy emerges from inclusive governance processes rather than solely from legal authority.

Second, multi-actor governance facilitates the institutionalization of environmental knowledge within school governance structures. The formal adoption of environmental guidelines into school regulations, curricula, and routine practices demonstrates how networked interactions translate into durable institutional arrangements. However, the findings also reveal constraints, including dependence on external funding and variability in leadership commitment, which affect the sustainability of co-production outcomes.

Overall, the results confirm that environmental governance knowledge in the context of GPBLS is a socially constructed and politically negotiated product of interaction among diverse actors. This hybrid model of governance aligns with broader debates in public policy that emphasize the shift from government to governance, where policy effectiveness is increasingly contingent upon the capacity of institutions to mobilize collaborative networks and embed policy norms into local socio-cultural contexts.

Conclusion

This study concludes that the implementation of the School-Based Environmental Awareness and Culture Movement (GPBLS) in West Sumatra is fundamentally shaped by co-production and multi-actor governance arrangements that position schools as both policy implementers and knowledge producers. Environmental governance knowledge emerges as a socially constructed and politically negotiated outcome of sustained interaction among provincial and municipal agencies, schools, non-governmental organizations, community actors, and students. The findings confirm that participatory engagement and networked coordination enhance policy legitimacy and stakeholder ownership, while enabling the integration of formal regulatory frameworks with local and experiential knowledge within school-based institutional structures.

From a practical perspective, the results imply that policymakers and education authorities should institutionalize continuous stakeholder engagement mechanisms, such as regular multi-actor coordination forums and inter-school learning networks, to sustain the co-production of environmental governance knowledge. Strengthening school-level knowledge management systems through standardized documentation, performance indicators, and digital reporting platforms is essential to bridge participatory initiatives with formal policy arrangements. Targeted capacity-building programs for teachers, student leaders, and community partners are also necessary to reduce disparities in implementation quality across different local governance contexts.

This research is subject to limitations, including its focus on four Adiwiyata Award–winning schools, which constrains the generalizability of findings to institutions with lower levels of institutional capacity, and its reliance on self-reported and cross-sectional data, which limits the analysis of long-term governance dynamics. Future research is advised to adopt comparative and longitudinal designs across diverse socio-economic settings and school performance categories, and to incorporate mixed methods, including quantitative indicators and social network analysis, to more robustly examine the causal relationships between co-production, governance structures, and the sustainability of environmental policy outcomes

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