



The Role of Collaborative Governance Communication in the Practice of an “Environmentally Oriented City” as a Mitigation Strategy for the Environmental Health Impacts of Rambak Industry Waste in Tulungagung

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Abstract. The cattle hide processing industry that produces rambak is an established livelihood activity in Tulungagung Regency, East Java, Indonesia. Its economic and cultural value, however, coexists with environmental pressures associated with liquid effluent, solid residues, and odor. This paper examines how collaborative governance communication can support an environmentally oriented city approach to mitigating those pressures. Rather than presenting primary field evidence, the study uses an analytical literature review that brings together recent scholarship on collaborative governance, environmental communication, risk communication, urban environmental governance, tannery waste, and Indonesian environmental regulation, complemented by official regional and international reports. The synthesis shows that the environmental problem is not only a matter of treatment technology or regulatory compliance. It is also a coordination problem in which government agencies, rambak producers, workers, residents, community organizations, and technical actors possess different information, interests, resources, and levels of influence. Effective collaboration therefore requires communication arrangements that make environmental information credible and usable, create repeated opportunities for two way dialogue, clarify responsibilities, and connect monitoring results to collective decisions. The paper proposes a communication architecture based on shared problem definition, transparent environmental information, inclusive deliberation, joint monitoring, feedback and grievance mechanisms, and adaptive learning. This framework offers a practical basis for linking local economic resilience with environmental health without treating small and traditional producers as the sole source of pollution.

Keywords: collaborative governance, environmental communication, rambak industry, environmental health, Introduction

1 Introduction

The environmental consequences of small scale and household industries are often discussed through the language of production efficiency, pollution control, and compliance. Such approaches are necessary, but they do not fully explain why environmental problems persist when technical solutions or regulatory instruments already exist. Waste becomes a governance problem when several actors have to make decisions about information, responsibility, investment, monitoring, and acceptable risk at the same time. In this situation, communication is not simply a channel for disseminating policy. It becomes a mechanism through which actors recognize a shared problem, define the problem differently, negotiate interests, and decide whether they are willing to act collectively.

Globally, poor waste management is recognized as an environmental health concern because inappropriate disposal and treatment can contaminate water, soil, and air and expose workers and neighboring communities to multiple hazards. The World Health Organization also emphasizes that environmental health interventions require coordination across sectors because the determinants of exposure frequently lie outside the health sector itself [2]. In developing urban and peri urban settings, the challenge is particularly visible where economic activities are embedded in residential areas and where local government has to reconcile livelihood protection with environmental standards.

Tulungagung provides a relevant setting for examining this tension. Rambak production based on cattle or buffalo hide has developed as a local household industry and forms part of the economic and social identity of several communities. Previous documentation identifies Kelurahan Sembung as an important center of rambak production, with the activity historically organized through household enterprises [3]. Recent research on the Tulungagung rambak industry also identifies solid residues such as livestock hair and liquid residues associated with cooking and lime water processes as environmental costs of production [4]. A 2025 study further reported high biological oxygen demand in liquid waste sampled from the rambak cracker industry in Tulungagung, demonstrating that the wastewater issue is not merely perceptual [5]. Public reporting has also recorded recurring odor and wastewater concerns around the rambak production area, including questions about communal treatment infrastructure [6].

Collaborative governance offers a useful starting point because environmental problems rarely fall within the authority or capacity of a single actor. Ansell and Gash define collaborative governance as arrangements in which public agencies engage non state stakeholders in collective decision making [1]. Emerson, Nabatchi, and Balogh subsequently developed an integrative framework that emphasizes principled engagement, shared motivation, capacity for joint action, and collaborative dynamics [2]. More recent evidence strengthens the argument that participation can improve environmental governance, while also showing that participation alone is insufficient: power delegation, communication intensity, and contextual conditions affect whether participation produces stronger environmental outcomes [9].

However, applying collaborative governance to the rambak case only as a public administration model would leave an important analytical gap. The central question of this paper is not simply whether government, producers, and residents participate. It is how communication structures the collaboration itself. Environmental collaboration can fail even when meetings are held and stakeholders are formally represented if

information is asymmetric, complaints are not translated into deliberation, technical knowledge is inaccessible, or decisions are communicated unilaterally. Research on collaborative environmental communication shows that collaboration is characterized by tensions between formal and informal institutions, economic and ecological priorities, local and scientific knowledge, and different understandings of acceptable change [10].

This paper therefore advances a communication centered interpretation of collaborative governance. It proposes that the practice of an “environmentally oriented city” should be understood not as a label for a municipality but as a communicative governance orientation in which environmental quality, public health, economic activity, and community participation are coordinated through continuous information exchange and joint decision making. The concept is deliberately operational rather than treated as an established universal model. Its value lies in providing a lens for examining whether environmental objectives are communicated, negotiated, and translated into coordinated action at the local level.

Table 1. Proposed collaborative communication architecture for rambak waste mitigation.

Component	Primary function	Key actors	Expected governance value
Shared problem definition	Agree on waste pathways, environmental concerns, evidence gaps, and priorities	Government, producers, residents, technical actors	Reduces competing narratives and clarifies the common problem
Environmental information protocol	Standardize indicators, monitoring frequency, reporting, and interpretation	Environmental agency, technical institutions, producers	Improves transparency and comparability
Deliberative forum	Discuss evidence, negotiate responsibilities, and document decisions	All stakeholder groups	Creates meaningful participation and joint ownership
Joint monitoring	Combine formal measurements with structured community observations	Regulators, laboratories, producers, community representatives	Strengthens accountability and local knowledge
Grievance and feedback mechanism	Receive, verify, respond to, and close environmental complaints	Government and community facing units	Builds trust through visible institutional response
Adaptive review	Evaluate outcomes and revise practices or arrangements	Collaborative forum and decision makers	Supports learning and long term resilience

Sources: Ansell & Gash; Emerson, Nabatchi, & Balogh [1-2]

2 Discussion

2.1 The Rambak Waste Problem as A Multi Actor Governance Issue

The literature indicates that leather and hide processing generates environmental pressures through several pathways. Water intensive processing can produce effluent containing organic matter, suspended solids, sulfides, salts, and other contaminants; where tanning involves chromium, metal contamination becomes an additional concern

[12,13]. Recent assessments show that tannery effluent can carry complex mixtures of chemical and biological pollutants and that risk depends on the receiving environment and exposure pathways [13]. Treatment research demonstrates that significant reductions in chromium, COD, suspended solids, sulfides, and related parameters are technically possible, but treated effluent may still retain residual toxicity and therefore requires appropriate monitoring and complementary treatment [14-15].

These findings should not be transferred mechanically to Tulungagung. The precise chemical profile of rambak production depends on local processes, inputs, production scale, and the distinction between hide preparation for food and industrial tanning. The literature nevertheless supports a general conclusion: animal hide processing can generate waste streams that require management, and the environmental significance of those streams cannot be determined from odor or visible pollution alone. Local measurement is therefore necessary.

The solid waste dimension is similarly important. Studies of leather tanneries identify opportunities for converting solid residues into energy or other value added products, but also emphasize the challenge of managing waste in developing country contexts [16]. Barriers to circular bio economy practices include technical, institutional, economic, and regulatory constraints [17]. This is relevant to small producers because an environmental policy that simply prohibits disposal without providing feasible alternatives may shift costs onto producers and encourage informal disposal.

The governance problem follows directly from this complexity. The producer is responsible for daily operations, but the municipality or regency government controls many regulatory and infrastructural functions. Residents experience nuisance and potential exposure but may lack access to technical information. Health agencies may identify symptoms without being able to attribute them to one industrial source. Environmental agencies may have regulatory authority but limited resources for continuous monitoring. A collaborative approach treats these differences as a reason to coordinate rather than as evidence that one actor should carry the entire burden.

2.2 Communication Barriers in Collaborative Environmental Governance

The first barrier is asymmetry of information. Producers know production routines that may not be visible to regulators or residents. Residents know when odor or discharge occurs but may not know which parameters indicate environmental risk. Regulators may possess legal and technical information that is not communicated in accessible language. This asymmetry can create a cycle in which each group doubts the others' accounts. Communication should therefore create a shared evidence base rather than simply increase the volume of messages.

Environmental communication can become symbolic when meetings are dominated by formal authorities or technically sophisticated actors. Research on collaborative environmental governance shows that unequal representation and leadership can weaken collaboration [5,7]. For Tulungagung, a forum that includes producers and residents but gives them no meaningful opportunity to influence monitoring priorities, response procedures, or implementation schedules would have limited collaborative value. The communication design should specify how stakeholder input enters decisions.

The third barrier is the tension between economic livelihood and environmental protection. The rambak industry is not simply an “environmental offender”; it is also a source of income and local identity. A communication strategy that begins with blame may generate defensiveness and reduce willingness to disclose operational information. This does not mean that environmental obligations should be weakened. Rather, the framing should distinguish between accountability for impacts and support for transition. The literature on circular economy in the leather sector suggests that waste can become a resource when technological, economic, and institutional barriers are addressed together [16,17].

The fourth barrier is uncertainty about health impacts. Odor is immediately perceptible, whereas the long term significance of chemical exposure may require measurement and epidemiological assessment. Risk communication research suggests that uncertainty should be communicated openly and that information should respond to the concerns that communities actually have [9–11]. Authorities should avoid both extremes: minimizing concerns because causality has not been established, and attributing health outcomes to rambak waste without adequate evidence. A credible position is to acknowledge the concern, explain what is known and unknown, and establish a process for collecting better evidence.

Effective collaboration requires feedback from implementation, including information on what producers can realistically do, where compliance barriers occur, and whether residents observe improvement. Thomas et al. show that government communication practice can evolve through interaction with its institutional and social context [11]. This implies that local communication should be treated as a learning system rather than a fixed campaign.

2.3 From Information Delivery to Shared Problem Definition

The first practical step is to establish a shared problem definition. Instead of starting with the statement that “rambak waste is polluting the environment,” the collaborative forum should distinguish at least four questions: What waste streams are generated? Where do they move? What environmental indicators can demonstrate their effects? Which impacts are perceived by residents? This formulation avoids premature causal claims and creates a common agenda for measurement.

A shared problem definition also allows different forms of knowledge to be recognized. Scientific measurements are essential for determining pollutant concentrations, but local observations can help identify where and when sampling should occur. Producers can identify changes in production cycles, while residents can identify recurring odor episodes or discharge events. Communication is effective when these knowledge sources are connected rather than ranked in a way that automatically excludes local experience.

The second step is a common information protocol. Environmental information should be understandable, comparable, and timely. At minimum, the protocol could specify what is measured, who measures it, where results are stored, how often data are reported, and how deviations trigger action. The protocol should also distinguish between verified measurements, community reports, and unresolved allegations. This distinction is crucial for trust because it prevents complaints from being dismissed while also preventing unverified claims from being presented as established facts.

The third step is structured deliberation. Collaborative meetings should not function merely as socialization sessions in which authorities announce decisions. They should include agenda setting, presentation of evidence, stakeholder responses, negotiation of responsibilities, and documented decisions. Research on collaborative communication emphasizes that communication must manage tensions and support co created strategies [8]. In practice, this means that meeting procedures should allow disagreement without allowing the process to collapse into adversarial exchange.

2.4 Joint Monitoring and Accountability

Monitoring is the point at which communication becomes connected to environmental performance. A collaborative monitoring arrangement could involve environmental officers, producer representatives, community representatives, and technical partners. The exact composition would need to be determined through field research and local administrative authority; the literature does not justify prescribing a single institutional model.

A useful principle is “shared observation, differentiated responsibility.” Stakeholders do not need identical responsibilities. Government remains responsible for regulatory oversight; producers remain responsible for controlling waste generated by their activities; technical institutions can support sampling and interpretation; and communities can contribute observations and participate in verification. This arrangement avoids the common mistake of treating collaboration as an excuse to dilute accountability.

Transparency is also necessary. Monitoring results should be communicated in a form that non specialists can understand. A dashboard or periodic bulletin could summarize whether indicators are within applicable limits, what corrective actions are underway, and when the next review will occur. Such a system should not expose confidential business information unnecessarily. Its purpose is to make environmental performance visible enough to support accountability and learning.

The Indonesian regulatory framework provides an institutional foundation for this approach. Government Regulation No. 22/2021 establishes the broader environmental protection and management system, while Regulation No. 5/2021 specifies procedures for technical approval and operational eligibility in pollution control. The communication architecture proposed here does not replace these legal instruments. It complements them by creating mechanisms through which regulatory requirements can be translated into shared local understanding and monitored implementation.

2.5 Grievance Mechanisms as Communication Infrastructure

Complaints are often treated as administrative burdens, but they can be an important source of environmental information. A grievance mechanism should have at least four functions: receiving reports, verifying information, communicating findings, and documenting responses. The most important design feature is closure. Residents should be able to see what happened after a complaint was submitted. Without feedback, repeated complaints may be interpreted as institutional neglect.

Risk communication literature emphasizes trust and the credibility of communicators [9,10]. Trust does not require authorities to accept every allegation. It requires them to demonstrate that allegations are taken seriously and evaluated according to transparent

procedures. A grievance mechanism can therefore improve trust when it is predictable, accessible, and responsive.

Digital tools can support this process, but they should not replace face to face communication. Digital reporting may be useful for timestamps, photographs, locations, and status tracking, while community meetings remain important for interpreting recurring patterns and negotiating collective solutions. The appropriate mix depends on local access and institutional capacity.

2.6 Linking Environmental Mitigation to Local Economic Resilience

An environmentally oriented city strategy should avoid presenting environmental protection and local economic development as mutually exclusive. Evidence from leather industry research suggests that waste valorization can create opportunities for resource recovery and circular production [16,17]. However, circularity should not be assumed to be automatically feasible. Technical quality, markets, investment, skills, and regulation determine whether a waste to resource pathway can operate.

Communication has a role in this transition because producers need to understand not only the environmental requirement but also the economic rationale and available support. The government can facilitate communication among producers, technology providers, financial institutions, universities, and potential markets. Universities and technical agencies can help translate treatment research into locally appropriate options. Producer associations can aggregate demand for equipment or services, potentially reducing costs.

The governance objective is therefore not merely “cleaner production” but a negotiated transition pathway. A producer who faces high compliance costs may require technical assistance or phased implementation, while a producer who repeatedly ignores requirements may require enforcement. Differentiating support from enforcement can make the overall system more credible because collaboration is not confused with leniency.

2.7 Proposed Collaborative Communication Architecture

Based on the literature, the paper proposes six linked components. First, a multi stakeholder environmental communication forum should bring together the regency government, relevant village or subdistrict actors, producers, community representatives, health and environmental agencies, and technical institutions. Second, a shared environmental information protocol should establish common indicators and reporting procedures. Third, periodic deliberative meetings should transform information into decisions. Fourth, joint monitoring should connect community observations with formal environmental measurement. Fifth, a grievance and feedback mechanism should ensure that concerns generate traceable responses. Sixth, adaptive review should allow the arrangement to change when evidence or local conditions change.

3 Conclusion

This paper has argued that the persistence of environmental pressures associated with the rambak industry in Tulungagung cannot be explained by treatment technology or

regulatory compliance alone. Drawing on an analytical review of collaborative governance, environmental communication, risk communication, and tannery waste literature, the discussion shows that the underlying problem is fundamentally one of coordination among actors who hold different information, interests, and levels of influence. Communication is therefore not incidental to collaboration; it structures whether collaboration produces meaningful and durable outcomes.

The paper's central contribution is the proposed communication architecture comprising six linked components: shared problem definition, a transparent environmental information protocol, inclusive deliberative forums, joint monitoring, grievance and feedback mechanisms, and adaptive review (Table 1). Together, these components reframe the practice of an “environmentally oriented city” as a continuous communicative process rather than a static administrative label, and they offer a way to reconcile environmental health protection with the economic and cultural value of small scale producers.

Because this study relies on literature synthesis rather than primary fieldwork, its propositions should be treated as a framework to be tested rather than as an established finding. Future research should validate the proposed architecture through empirical work in Tulungagung, including stakeholder interviews, participatory monitoring, and longitudinal assessment of whether the six components measurably reduce information asymmetry, complaints, and environmental health risk over time. Comparative studies of other small scale artisanal industries facing similar governance dilemmas would also help assess how far the framework generalizes beyond the rambak case.

Acknowledgments. The authors would like to express their sincere gratitude to Universitas Negeri Malang (UM) and the Faculty of Social Science (FIS UM) for their generous support and funding of this research through the internal research grant scheme. The authors also extend their appreciation to colleagues and the research team for their valuable contributions and collaborative effort throughout the research process. Finally, the authors are grateful to all parties who provided insights, feedback, and encouragement that helped strengthen the quality of this work.

Disclosure of Interests. The authors have no competing interests to declare that are relevant to the content of this article.

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