Research Article

Revitalizing Malang's Environmental Future: Harnessing the Green Economy through Collaborative Governance

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Abstract.
The decline in the Environmental Quality Index (IKLH) in Malang City highlights worsening environmental conditions, particularly in water quality, which saw a drastic reduction from 69.26 in 2020 to 29.26 in 2022. This significant drop reflects the ineffective management of natural resources, including water, land cover, and air quality. With Malang's IKLH standing at 56.31 in 2022, the need for urgent improvement is clear. Addressing this requires concrete actions, starting with an analysis of environmental governance that engages key stakeholders such as the environmental agency, health agency, public works and spatial planning agency, and local environmental communities. A collaborative governance approach, grounded in the Green Economy Index (GEI), is proposed, integrating social, economic, and environmental dimensions. This study utilizes soft systems methodology and Penta helix analysis, incorporating perspectives from the government, community, academia, the private sector, and media. The aim is to develop an integrated governance model to enhance Malang's environmental quality. The analysis underscores a lack of coordination between government agencies, environmental groups, and the public, which hampers effective environmental management. By implementing the GEI framework, the proposed model seeks to address these gaps and optimize Malang City's environmental quality.

Keywords: environmental quality index, collaborative governance, pentahelix, green economy index

1. Introduction

The 2023 planning and development document for the city of Malang reveals a downward trend in the Environmental Quality Index (EQI), which reached 75.54 in 2020, dropped to 60.46 in 2021, and further declined to 56.31 in 2022. According to the Ministry of Environment [1] several factors can influence the EQI. A study conducted in Virginia, United States, assessed environmental quality trends by analyzing key components such as water, air, and land. Similarly, the decline in Malang's EQI may be attributed to various factors, particularly the Air Quality Index (AQI), Water Quality Index (WQI), and Land Cover Quality Index (LCQI).

The Water Quality Index (WQI) in Malang has shown a continuous decline, falling from 69.26 in 2020 to 55.19 in 2021, and further to 29.26 in 2022. This sharp decrease categorizes the WQI as low, highlighting the urgent need for improvement. The deterioration in water quality is likely due to pollution impacting water sources and rivers in the city. Consequently, improving the WQI has become a pressing issue for the Malang City Government. A study by Perwira [2] on the Brantas River's water quality in Malang revealed a significant decline, with deterioration occurring at three times the rate compared to the previous year. Similarly, research by Triwanda et al. [3] identified several factors contributing to this decline, including population growth, urbanization, industrial activities, and land development along riverbanks.

Additional studies by Djoharam et al. [4] and Sofiana et al. [5] suggest that the decline in water quality can be attributed to multiple factors, including temperature, hydrogen ion concentration, water pH, Total Suspended Solids (TSS), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), and Dissolved Oxygen (DO). Djoharam et al. [4] highlighted that chemical pollution results from interactions among these factors, with high levels of BOD and COD indicating significant organic pollution, as the river's oxygen is being consumed by microbes over a specific period. This depletion of oxygen reflects high levels of organic matter in the water. Sasongko et al. [6] further stressed that poor water quality should not be underestimated, as it can harbor bacterial contamination, such as coliform and other pathogenic bacteria, posing serious health risks in Indonesia. Triwanda et al. [3]reported that their analysis of water quality along the Brantas River in Malang did not meet the required standards, with pollution observed along the stretch from Splendid Bridge to Kol. Sugiono Bridge. These findings reinforce the need for urgent action to address water quality issues in Malang.

This finding aligns with a 2023 report from the Malang City Environmental Agency, which highlights the ongoing decline in water quality as a contributing factor to the city's deteriorating overall environmental quality. The degradation of water quality is also influenced by the amount of land cover present. Research by Ummiyati et al. [7] emphasizes that land cover significantly affects both water quality and environmental health, as it is closely related to natural vegetation and man-made structures that cover the land. Land cover impacts the water cycle, as natural land areas available for water infiltration can be obstructed by various constructions. The Land Cover Quality Index (LCQI), as defined by the UN Statistical Division's Framework for the Development of Environmental Statistics [8], describes land cover as the physical layer observed on the earth's surface, which includes vegetation, man-made structures, and water bodies.

While the strict definition of land cover focuses on vegetation and human-made features, it also extends to bare rock, soil, and water surfaces in practice. This comprehensive view of land cover demonstrates its critical role in the ecosystem and its influence on water quality.

Consistent with this definition, the Minister of Environment and Forestry Regulation No. 27 of 2021 on the Environmental Quality Index defines land cover as the area covered by vegetation based on satellite imagery analysis. The quality of land cover is represented by a value that reflects the condition of forest cover and non-forest vegetation. In Malang, the Land Cover Quality Index (LCQI) has been classified as moderate, with values of 59.98 in 2020, dropping to 54.67 in 2021, and then slightly increasing to 58.00 in 2022. These values fall short of the target set by the Malang City Government, which aimed for an LCQI of 61.15 in 2022. On the other hand, good air quality plays a crucial role in reducing harmful carbon emissions and pollutants, which in turn positively impacts environmental health. The Pan American Health Organization (2018) notes that poor air quality can lead to serious health issues such as liver disease, stroke, and lung cancer. In Malang, the Air Quality Index (AQI) is categorized as moderate, with fluctuations around a value of 56, according to the 2023 AQI report. These moderate levels of both LCQI and AQI highlight the need for continued efforts to improve the environmental quality in the city.

The exposition underscores the urgent decline in Malang's Environmental Quality Index (EQI), calling for immediate collective action. Furthermore, the introduction of the Green Economy Index (GEI) during the 3rd G20 Development Working Group Side Event, "Towards Implementation and Beyond: Measuring the Progress of Low Carbon and Green Economy," adds a critical framework for addressing these issues. The GEI consists of three pillars—environmental, social, and economic—each with specific indicators for deeper analysis. Its primary goal is to improve social and economic welfare while incorporating environmental considerations, ensuring a balanced and sustainable approach to development. By integrating these pillars, the GEI provides a comprehensive tool for guiding policies that enhance both human well-being and environmental sustainability in Malang.

In response to the declining EQI, the Malang City Government has outlined several initiatives in the Malang City Medium-Term Development Plan (RKPD) for 2005-2025. Achieving optimal improvement in the EQI requires collaboration among various stakeholders to meet shared environmental targets. To address this need, the current study focuses on the governance system for enhancing the EQI from a governance

perspective. Specifically, the research centers on integrated governance, emphasizing collaboration between different parties. This approach draws on the concept of collaborative governance developed by Ansell and Gash (2008), which provides a framework for understanding the roles and effectiveness of each stakeholder involved in the process. By applying this model, the study aims to evaluate how well these stakeholders work together to achieve sustainable environmental improvements in Malang.
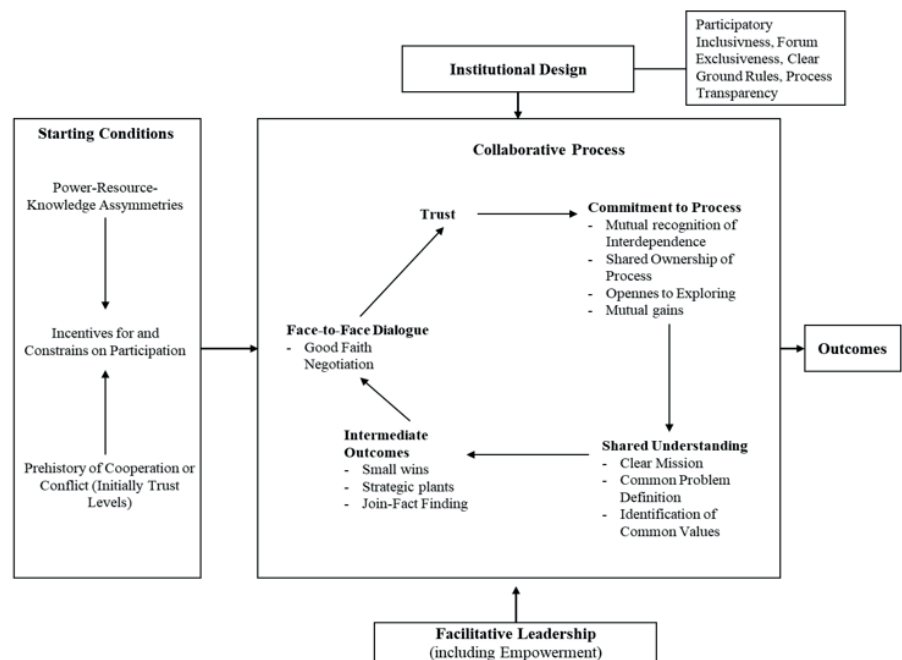
Figure 1: Mind Map of Collaborative Governance. Source: Ansel and Gash (2008) reconstructed by Author.

Previous studies, such as Perwira [2] measured the water quality of the Brantas River in Malang and observed a gradual decline. Triwanda et al. [3] attributed this deterioration to several factors, including population growth, urbanization, industrial activities, and land development along the riverbanks. To address these challenges, this research adopts a collaborative governance approach based on the Green Economy Index (GEI) to develop an integrated governance model aimed at improving Malang's Environmental Quality Index (EQI). The study seeks to explore the fundamental principles of collaborative governance by examining the roles of key stakeholders—government agencies, the private sector, and local communities—in managing environmental concerns such as water quality, air quality, and land cover quality. This approach highlights the importance of cooperation between sectors to achieve sustainable environmental management.

2. Methods

The approach adopted in this study is qualitative, utilizing Soft Systems Methodology (SSM), which is particularly suited for understanding complex, ambiguous, and problematic situations. As outlined by Checkland and Poulter [9], SSM effectively handles differing perspectives and conflicts, making it a widely used methodology in social and humanities research. Its systemic learning orientation allows for the creation of new paradigms through the exploration and resolution of conflicts within dynamic social systems [10] The methodology involves seven steps to create a reconstructed model of integrated governance. First, the main issues are identified by assessing their urgency through literature review and brief interviews with relevant actors. Next, a rich picture is created to describe these issues, identifying benefits, problem solvers, and problem owners, while analyzing the rules, norms, values, and power dynamics within the social system. The third step focuses on developing a conceptual model by formulating a root definition to explore the root causes of problems based on actor relationships, followed by CATWOE analysis to uncover potential transformations within the problematic system. The fourth step involves preparing an actionable conceptual model for implementation by each actor. Subsequently, the fifth step compares the conceptual model with real-world conditions through Focus Group Discussions (FGD) with relevant stakeholders. In the sixth step, actions and changes are defined based on the FGD results and the developed conceptual model. Finally, the findings are presented to stakeholders, serving as a basis for policy development. This method allows for a thorough, iterative analysis of complex governance issues, leading to a model of integrated governance that addresses Malang's environmental challenges, particularly regarding the improvement of the Environmental Quality Index (EQI).

3. Results and Discussion

The Environmental Quality Index (IKLH) has emerged from extensive studies on environmental indices conducted across various academic sectors, including the Environmental Performance Index (EPI), Environmental Sustainability Index (ESI), and the Virginia Environmental Quality Index (VEQI). According to the Ministry of Environment [1] the IKLH's determination primarily incorporates elements from the EQI and VEQI. This is further supported by the Ministerial Decree Number 115 of 2003, which provides guidelines for assessing water quality status and regulates the calculation of the Water Pollution Index

(IPA). Additionally, the Ministerial Decree Number Kep-45/MENLH/10/1997 governs the Air Pollution Index. As a result, the Environmental Quality Index (IKLH) in Indonesia is categorized into three main components: (1) Water Quality Index (IKA), (2) Air Quality Index (IKU), and (3) Land Cover Quality Index (IKTL). Each of these indicators is measured using specific indices, including the River Pollution Index (IPS), Air Pollution Index (IPU), and Forest Cover Index (ITH).

Research conducted by Hadi et al. [11] reveals that, out of 32 water quality sampling points in Malang, only 9 met the established water quality standards, while 23 were found to be polluted. Similarly, Balqis et al. [12] indicated that, although groundwater quality in Malang is generally good, there is a significantly high risk of diarrhea due to elevated levels of *Escherichia coli* detected in microbiological tests. Furthermore, Triwanda et al. [3] predict that by 2026, water quality in Malang—particularly in the Brantas River—will show Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) levels exceeding Class 2 quality standards. This alarming trend is consistent with reports from the Malang City Environmental Agency, which document a decline in the Environmental Quality Index (IKLH) from 75.54 in 2020 to 60.46 in 2021, and further down to 56.31 in 2022. The primary factors contributing to this decline are water pollution and significant loss of land cover.

To support the issue at hand, we identified correlations between environmental management and environmental quality. Figure 2a illustrates different clusters, color-coded to represent closely related keywords. For instance, the **Green Cluster** encompasses terms related to economics and environmental policy, such as environmental economics, green economy, and ecosystem services. The **Blue Cluster** focuses on topics such as sustainability, quality control, and air quality, while the **Red Cluster** consists of terms like economics, water pollution, water quality, and environmental quality. Additionally, the lines connecting the nodes indicate relationships or co-occurrences between keywords, with stronger lines signifying a higher number of co-occurrences. Notably, keywords that are more central or possess more connections, such as sustainable development and environmental protection, are likely crucial for integrating multiple concepts or fields.

Figure 2b overlay analysis, also presented the time gradient, keywords in blue represent earlier works (around 2018), while keywords in yellow represent more recent research (closer to 2022. The yellow-colored nodes like *green economy* and *economic development* indicate that these topics have gained more attention in recent years.

The blue-colored nodes such as *sustainable development, air quality,* and *environmental protection* suggest that these were established topics several years ago and have continued relevance. The network maps out how different keywords in the field of sustainable development, environmental policy, economics, and related areas are interlinked. It shows the evolution of interest, with newer topics like *green economy* emerging as more recent trends, while foundational topics such as *sustainable development* have been consistently important across the timeline.
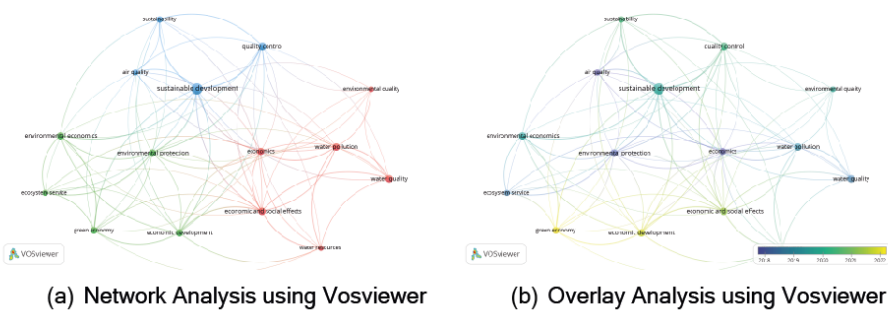

(a) Network Analysis using Vosviewer   (b) Overlay Analysis using Vosviewer

Figure 2: Vosviewer Analysis.

Based on the data analysis from the literature review, it is evident that topics such as the green economy, economic development, and their economic and social effects have garnered increasing research attention in recent years. The green economy and economic development are closely linked to environmental protection and environmental economics, both of which are strongly associated with sustainable development. Sustainable development, in turn, is interconnected with quality control, air quality, and sustainability. Additionally, economic and social effects relate to economics, water pollution, and water resources, which are also tied to water quality and environmental quality.

Furthermore, the National Development Planning Agency [13] introduced the Green Economy Index concept during the 3rd G20 Development Working Group Side Event titled "Towards Implementation and Beyond: Measuring the Progress of Low Carbon and Green Economy." The Green Economy Index serves as a tool to evaluate the performance of a country or region's green economy, considering various aspects such as efficient natural resource use, greenhouse gas emission reductions, renewable energy enhancements, and environmental sustainability in economic development. This index aids governments, policymakers, and economic actors in understanding

the extent to which environmentally friendly practices have been integrated into economic activities. By providing a comprehensive overview of progress toward a more sustainable economy, the index encourages the implementation of policies that support economic growth while preserving environmental integrity and promoting community welfare [1]

To ensure the success of environmental quality improvement in Malang City, collaboration across sectors is essential. As previously mentioned, the government plays a crucial role in environmental sustainability, as it has the authority to formulate policies that regulate the use, management, and sustainable utilization of the environment. By employing the concept of collaborative governance and integrating it with the Green Economy Index (GEI) framework—which consists of 15 indicators—multiple sectors can reap significant benefits. The GEI, encompassing three main sectors—social, economic, and environmental—correlates economic growth with environmental preservation, thereby optimizing the principles of sustainable development. This integrated approach fosters cooperation among various stakeholders, enhancing the effectiveness of initiatives aimed at improving environmental quality in Malang City.

Collaborative governance is a governance strategy that involves various stakeholders, including the government, the private sector, non-governmental organizations, and the public, coming together in a forum to reach joint decisions [14]. This approach significantly benefits governments in managing regions and policies by engaging actors from diverse structures bound by a shared consensus [15]; [16]. Collaborative governance operates on principles of deliberation, collective action, constructiveness, and formality.

Numerous studies have explored the effectiveness of collaborative governance. For instance, Ovseiko et al. [17] demonstrated that applying collaborative governance principles within the UK's healthcare governance system markedly improved local stakeholder responses to health innovations implemented by the National Health Service (NHS). This finding underscores the effectiveness of the collaborative system initiated by the NHS and Health Innovation and Education Clusters (HIECs). Similarly, Jackson et al. [18] examined water resource governance cooperation between the Torres River Basin Government and Aboriginal tribes in Australia, highlighting how this collaboration empowered indigenous communities in economic, social, political, and river management sectors. Additionally, Rubasundram and Rasiah [19] investigated the impact of e-governance on corruption in ASEAN, finding that e-government initiatives improved governance and reduced corruption in Malaysia and Vietnam, though the effects varied across different government sectors. These studies collectively illustrate

the potential of collaborative governance in enhancing stakeholder engagement and achieving successful outcomes in various contexts.

The collaborative governance model is positioned as a viable solution to the challenges faced in education management, particularly in addressing the needs of students from minority groups in Malang. By focusing on maximizing educational services and fostering inclusive justice, this model is expected to enhance the management of belief-based education subjects for these students. Emphasizing consensus among stakeholders, collaborative governance aims to bridge the gap between community legislation and the implementation of service policies as outlined in the Ministry of Education and Culture Regulation No. 27 of 2016. This broader implication highlights its potential to advocate for societal interests in a comprehensive and inclusive manner.

For analytical purposes, this study will utilize the collaborative governance indicators identified by Ansell and Gash [14] which include starting conditions, institutional design, leadership, and the collaboration process. Collaborative governance is essential for supporting government policies, especially those aimed at delivering services to minority groups. The model is deemed efficient in tackling challenges and providing solutions in educational services for these groups. It promotes both formal and informal multi-stakeholder cooperation based on consensus, ultimately leading to optimal, accountable, and deliberative public services. This model is anticipated to offer new insights into policy studies and public administration, particularly in the effective implementation of policies from the central to regional levels.

3.1. Rich Picture

A rich picture serves as a valuable visual technique to provide a comprehensive and intuitive representation of a system or situation. By employing this method, the involved actors can be effectively illustrated, and the various problems, including sectoral ego conflicts, can be mapped out. In the context of Malang City, the rich picture specifically depicts the conditions surrounding environmental sector management and highlights the issues that contribute to the decline in the Environmental Quality Index (EQI) in the area. This visual representation enables stakeholders to grasp the complexities of the environmental challenges faced, fostering a deeper understanding of the interconnected factors at play and encouraging collaborative efforts toward addressing these pressing issues.
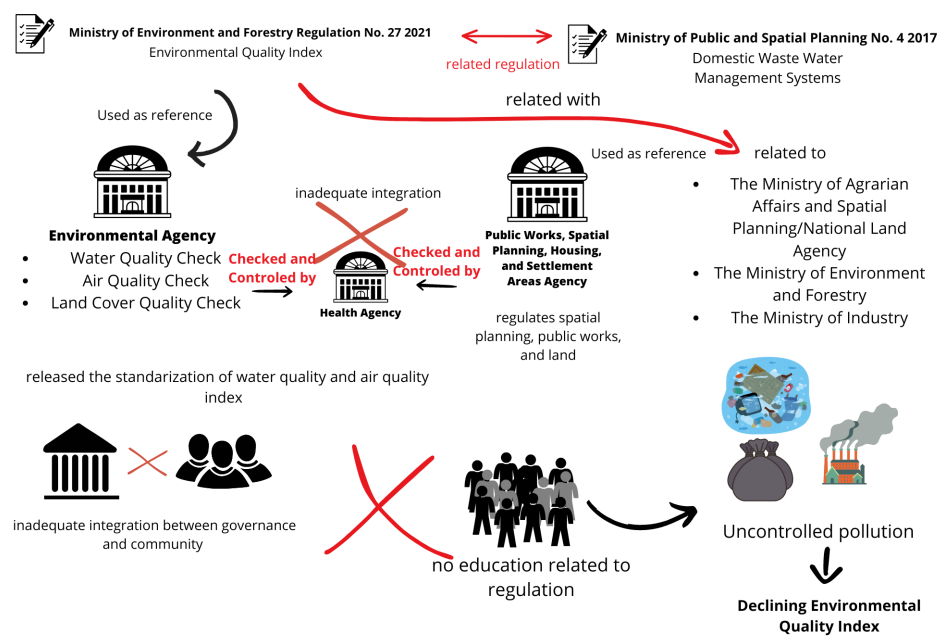
Figure 3: Rich Picture. Source: Data Reconstruction by Author.

In the diagram above, the relationships among the various actors involved in environmental management are clearly illustrated, highlighting their contributions to the Environmental Quality Index (EQI) in Malang City. The Environmental Agency emerges as a crucial policymaker, responsible for formulating regional policies related to environmental management, system development, waste management, prevention, mitigation, and restoration efforts. This agency also oversees waste management activities. Given the decline in the EQI in Malang City, the Environmental Agency's role is especially significant. As stipulated in Regulation No. 27 of 2021 from the Ministry of Environment and Forestry, the agency is tasked with monitoring key factors such as water quality, air quality, and land cover. Unfortunately, data shows a consistent decline in the Water Quality Index (IKA) in Malang over the years. According to research by Fadhilah and Haribowo [20], pollution in the Brantas River significantly contributes to this deterioration, a finding that is further corroborated by the rich picture which highlights the severe pollution resulting from waste production. This visualization serves to emphasize the critical challenges faced by the Environmental Agency and the interconnected nature of environmental issues in the region.

Based on the diagram, the Public Works and Housing Agency (PUPR) is integral to regional development and closely collaborates with the Environmental Agency. The PUPR is responsible for establishing regulations related to housing areas, spatial planning, water resource management, and public infrastructure provision. Their functions

are directly linked to environmental considerations, and their work is highly interrelated with that of the Environmental Agency. While the Environmental Agency focuses on monitoring water and air quality as well as land cover, the PUPR regulates settlements, water resources, and infrastructure development.

To achieve effective environmental governance, coordination between these agencies is essential. In addition to their responsibilities, monitoring by the Health Agency, which includes checking for bacterial contamination in river water, is also critical. These efforts necessitate cohesive environmental management policies across institutions; however, overlapping policies can hinder successful implementation and may lead to misinformation or mishandling of environmental issues. Moreover, the role of environmental communities and the public is significant in this context. Reports from the Environmental Agency indicate collaborative efforts with various communities, such as the "Resik Kotaku, Tahes Awak ku" initiatives, which focus on recycling waste and organizing clean-up campaigns in urban areas. These activities involve participation from the Environmental Agency, PUPR, and Malang's Regional Disaster Management Agency (BPBD), aiming to enhance public awareness of proper waste disposal practices. However, it is crucial to emphasize that collaboration between the government, the community, and environmental organizations needs to occur more regularly to foster sustainable practices. Currently, this collaboration is inconsistent, and public awareness of environmental management policies—particularly in relation to the Brantas River and Malang's slum districts—remains limited. Addressing this gap is vital for promoting a more effective and sustainable approach to environmental management in the region.

According to Hasan et al. [21] poor sanitation, particularly concerning waste management and drainage systems, remains a significant challenge in the slums of Malang. Their study of five urban villages revealed that two had low-quality drainage systems, two were classified as medium, and only one was deemed to have high-quality drainage. Tackling these sanitation issues necessitates collaboration among various stakeholders, which includes establishing waste disposal infrastructure, creating waste banks, and enhancing environmental management systems.

Furthermore, the decline in environmental quality can be attributed to inadequate coordination among government institutions, often exacerbated by overlapping policies. This lack of clarity has hindered effective communication and dissemination of environmental regulations to the public, contributing to insufficient collaboration with environmental communities. As a result, these factors have collectively led to a decline in the Environmental Quality Index and uncontrolled waste production in the area.

Addressing these challenges will require a concerted effort to improve coordination and collaboration among all stakeholders involved in environmental management.

3.2. Model

Based on the issues outlined in the rich picture above, it is clear that the roles of various actors and the collaborations that have occurred, as well as the shortcomings such as suboptimal environmental management, arise from a lack of proper coordination among government institutions. This is further exacerbated by overlapping policies, insufficient public outreach, and inadequate cooperation with environmental communities. These challenges have led to the development of a model for environmental management based on the Green Economy Index (GEI).

The Green Economy Index (GEI) serves as a vital tool for assessing the success of a region or country in implementing green economy principles aimed at achieving sustainable development while minimizing negative environmental impacts. This index encompasses several key indicators, including resource efficiency, carbon emission reduction, renewable energy usage, air quality, waste management, and ecosystem protection and restoration. Additionally, social indicators such as social inclusion, economic inequality, and quality of life play a significant role in the evaluation process. By integrating economic, environmental, and social dimensions, the GEI offers a comprehensive overview of a region's performance in transitioning toward a more sustainable, low-emission economy. This holistic approach is crucial for fostering collaboration and ensuring that all stakeholders are aligned in their efforts to improve environmental management and enhance the overall quality of life in the community.

The use of the Green Economy Index (GEI) as a monitoring tool to control environmental quality is not without reason. As explained, the Environmental Quality Index (IKLH) in Indonesia initially emerged as a tool to measure and monitor environmental conditions across different regions. This indicator was introduced to oversee environmental quality, ensure transparency and accountability, and promote environmental protection, all of which are supported by various policies. The establishment of the IKLH itself was influenced by Indonesia's commitment to international conventions that advocate for environmental protection, such as the Kyoto Protocol on reducing greenhouse gas emissions, the Paris Agreement with a target of reducing emissions by 28-41% by 2030, and the Convention on Biological Diversity, which emphasizes biodiversity conservation.

However, long before the advent of the Green Economy, Indonesia had already enacted laws governing environmental management. These include the Basic Agrarian Law of 1960, the establishment of the Ministry of Environment in 1978, the Environmental Management Act No. 4 of 1982, the Environmental Management Act No. 23 of 1997, and the Environmental Protection and Management Act No. 32 of 2009, which has continued to evolve based on existing regulations. Naturally, these laws have developed over time. The progression of environmental regulations in Indonesia has also been shaped by international conventions, as mentioned earlier.

Based on these considerations, Indonesia, in developing the IKLH, has incorporated the principles of the Green Economy and aligned with the objectives of the Sustainable Development Goals (SDGs), particularly Goal 6 on clean water and sanitation, Goal 11 on sustainable cities and communities, Goal 13 on climate action, and Goal 15 on life on land. Therefore, the use of the Green Economy Index to control and monitor environmental quality is a well-founded step, demonstrating its alignment with the improvement of environmental quality in Malang City.
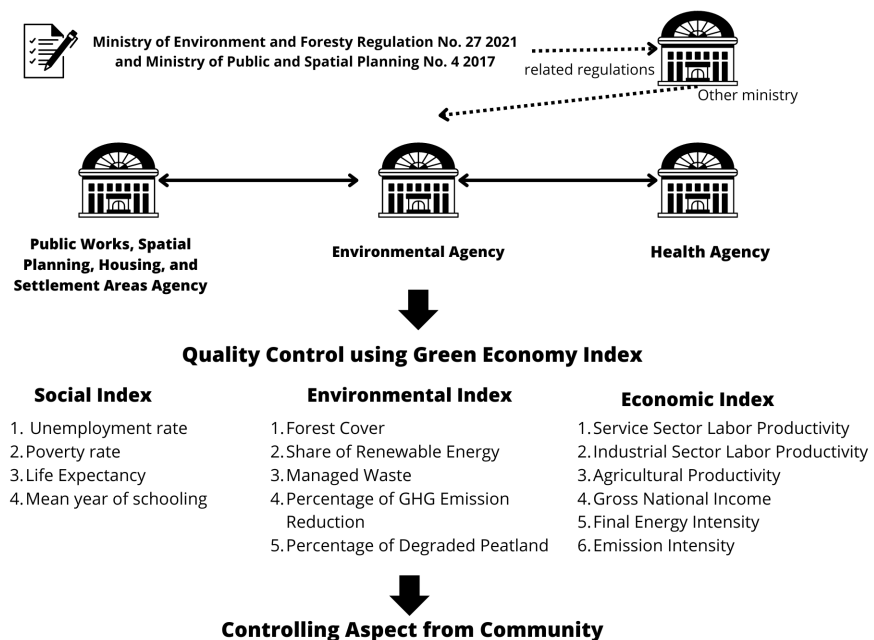
Figure 4: A Model of Governance Approcah. Source: Data Reconstruction by Author.

To support the success of this approach, collaboration between various sectors is essential. This is based on the Ministry of Environment and Forestry Regulation No. 27 of 2021 concerning the Environmental Quality Index, alongside the Ministry of Public Works and Public Housing Regulation No. 4 of 2017 on Domestic Wastewater Management. These regulations govern the Environmental Quality Index, which includes the Water

Quality Index, Air Quality Index, and Land Cover Index. They provide guidance on data collection and monitoring, such as conducting water quality monitoring at least once per season and inspecting river water quality at upstream, midstream, and downstream locations. Meanwhile, the Ministry of Public Works and Public Housing Regulation No. 4 of 2017 addresses the installation of wastewater management systems, domestic wastewater treatment installations, and fecal sludge treatment facilities, including the use of lateral and service pipes for wastewater discharge.

These regulations demonstrate the interconnectedness of various policies related to environmental issues, highlighting the need for integrated and focused policy implementation to optimize results. In addition to regulations from the Ministry of Environment and Forestry and the Ministry of Public Works and Public Housing, other policies come from various ministries, such as the Ministry of Agrarian Affairs and Spatial Planning and the Ministry of Industry. Policies from the central government can then be effectively executed at the local government level, where the roles of the Environmental Agency, Public Works and Housing Agency (PUPR), and Health Agency become particularly important. These three local institutions need to collaborate with other governmental bodies, such as the Social Affairs Office and the Regional Disaster Management Agency (BPBD), as each has its own specific duties to optimize environmental management.

Building on this foundation, the model produced by the collaboration of these local institutions leverages the **Green Economy Index (GEI)**, which encompasses three key aspects, each with its own set of indicators: (1) Social Aspect, including: Unemployment Rate, Poverty Rate, Life Expectancy, Average Schooling Duration. (2) Environmental Aspect, including: Forest Land Cover, Renewable Energy Share, Managed Waste, Greenhouse Gas (GHG) Emission Reduction Percentage, Percentage of Degraded Peatland. (3) Economic Aspect, including: Labor Productivity in the Services Sector, Labor Productivity in the Industrial Sector, Agricultural Productivity, Gross National Income, Final Energy Intensity, Emission Intensity

These aspects and their indicators are expected to help manage the issues at hand. For example, the problem of drainage in Malang City can be addressed through the environmental aspect by implementing policies related to drainage construction and land cover management. Another example is air quality, which has been increasingly polluted by vehicle emissions and waste management issues. This can be controlled using the environmental aspect by reducing greenhouse gas emissions and the economic aspect by managing emission intensity. Utilizing the GEI with its three aspects and respective indicators is expected to monitor and oversee environmental quality

effectively, and public outreach and engagement with environmental communities are essential to this process.

4. Conclusion

The Environmental Quality Index in Malang City has shown a declining trend, which is evident from indicators such as Water Quality, Air Quality, and Land Cover Quality. This decline is not without cause, as it corresponds with the increasing human needs and activities that lead to environmental mistreatment. As with the birth of the Green Economy concept, which is based on existing regulations, Indonesia refers to the Ministry of Environment and Forestry Regulation No. 27 of 2021, which governs the Environmental Quality Index. Based on this regulation, it is known that optimal cooperation between institutions at the local government level is necessary, particularly between the Environmental Agency, the Public Works and Housing Agency, and the Health Agency. These three regional government institutions play a crucial role in issuing policies, conducting public outreach, and fostering cooperation with local communities and environmental groups in Malang City. This study presents a collaborative model using the Green Economy Index through three aspects: the economic aspect, the social aspect, and the environmental aspect

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