

# Collaborative Governance Framework for Cleaning Riverine Plastic Waste in Citarum River of Indonesia

Rieko KUBOTA

*The World Bank, Environment, Natural Resources and Blue Economy Global Practice  
1818 H Street, NW Washington, DC 20433 USA  
E-mail: rkubota@worldbank.org*

## Abstract

In the Asian region, rivers have been an undoubtedly strategic resource for human activities such as agriculture and transportation and as a water resource for everyday life. This has been true for the Citarum River of Indonesia for a long time. The river, however, has been endangered by pollution that harms its water quality to the extent that the river has been dubbed “the dirtiest river in the world” by the international media. Pollution sources include disposed plastic waste swept by runoff into the river. The Indonesian government has given serious attention to the issue, endorsing a presidential regulation in 2018 to tackle water pollution in the Citarum River. The “Citarum Harum” program is the vehicle for implementing this presidential regulation, involving multiple layers of government from the national to the village level. Aiming to clean-up and prevent pollution, including from different kinds of plastic waste that reach the river and eventually the ocean. This study has focused on observing the governance system of the Citarum Harum program, which includes plastic waste management and clean-up of the Citarum River, Indonesia by applying a collaborative governance framework (Emerson *et al.*, 2022) to examine how the program has been implemented from a governance perspective. It offers policy and action recommendations to further enhance the sustained collaborative governance of Citarum River plastic waste management in the years to come.

**Key words:** Citarum Harum program, collaborative governance, plastic pollution, plastic waste

## 1. Introduction

The Asian region is experiencing rapid population growth and burgeoning economic activities that have an impact on production and consumption patterns (Zhao & Schroeder, 2010). These changes have brought on negative environmental impacts, such as increased use and disposal of plastic packaging, and rising GHG emissions, resulting in heavy precipitation and recurring urban flooding (Emam *et al.*, 2016; Jalilov *et al.*, 2018). When the mismanagement of plastic waste is coupled with climate change, it results in the global issue of riverine plastic pollution by causing plastic waste to flow into water bodies, carried by wind and rainwater. Riverine plastic pollution further increases the risk of flooding by clogging drainages, waterways and rivers with plastic waste.

Meijer *et al.* (2021) estimated that 1,000 rivers accounted for 80% of marine plastic pollution worldwide. Lebreton *et al.* (2017) estimated that between 1.15 and 2.41 million tons of plastic waste currently enters the

ocean every year from rivers. The top 20 polluting rivers are mostly located in Asia. The plastic waste volume from Asian rivers accounts for 67% of the global total.

In the Asian region, people neglect to collect and clean up waste from water bodies for many reasons. Plastic is released from non-point sources, with multiple polluters existing along rivers and coasts, complicating this pollution issue. In recent years, there have been many research efforts aimed at understanding plastic pollution of the ocean in Asian countries. Governments that have been criticized for causing plastic pollution are urged immediately to get an understanding of the current situation regarding plastic waste generation, put in place national strategies such as national plastic action plans, and take immediate actions to prevent and clean up the pollution.

At the international level, the United Nations Environmental Assembly (UNEA) decided in 2022 to develop an international treaty on combatting marine plastic. The treaty has a strict timeline for completing negotiations by the end of 2024 to finalize it and bring it

into force as early as possible. An International Negotiation Committee (INC) was set up, and the negotiated agendas included countermeasures to the land-based plastic waste management and ways to prevent and monitor waste getting into riverine systems. Realistic, feasible measures for the ratifying states will need to be proposed in the upcoming treaty to ensure its implementation.

Resilience to potential plastic pollution can be built in multiple ways. One of the important measures would be to take an integrated waste management approach that involves collection, processing, and treatment to reduce plastic pollution (Winterstetter *et al.*, 2021). In many developing countries, however, the integrated waste management approach has been difficult to achieve due to multiple challenges such as waste generators' behaviors in disposing waste, lack of waste service provision by local government, lack of budgetary resources for waste management and lack of waste treatment infrastructure, to name a few.

The Citarum River in West Java, Indonesia is the longest river in the region, stretching 269 km. The river is a resource for nine regencies and three cities along its course. It is also connected to smaller streams and artificial canals before reaching the ocean. It is an important source of water for Jakarta, the country's capital, as it provides 80% of its surface water and water sources for irrigation and industrial activities. The river, however, has been infamous as the most polluted river in the world (Blacksmith Institute and Green Cross Switzerland, 2013) because of its level of water contamination with metallic substances such as lead and aluminum far above international standards such as the US EPA's standard for drinking water. On top of that, the river is known to be highly polluted with significant amounts of plastic waste due to mismanagement of solid waste on the ground (Iqbal, 2022). In 2018, the Indonesian government initiated a national program called "Citarum Harum" (Fragrant Citarum), a rehabilitation program to transform the problematic status of the Citarum River into a source of drinking water by 2025. The program's actions include waste removal from waterways, with the mobilization of more than 7,000 military soldiers.

Previous academic literature exists that has attempted to analyze the Citarum Harum program using social network analysis, such as Chandra *et al.*, (2018). That study, however, put more focus on conducting social network analysis on the actors in the Citarum Harum program. There was not much discussion of its collaborative governance framework or analysis of the current governance of the program. This article will attempt to elaborate and analyze the program further to validate the phenomenon of collaborative governance that can be observed in the Citarum Harum program.

Therefore, this article will focus on reviewing the current status of the governance framework and the

challenges it faces in dealing with Citarum riverine plastic pollution, analyzing gaps and challenges in the current governance approach in the context of the Citarum River, and finally recommending environmental governance for Citarum riverine plastic pollution, in which multiple local governmental authorities and other stakeholders effectively take on responsibility for plastic waste clean-up along this trans-regional river.

This study will attempt to answer the following research questions:

- What is the current institutional framework and the challenges it faces in dealing with plastic waste management issues in the Citarum River?
- How was the collaborative governance framework applied in the context of riverine plastic waste management for the Citarum River, and how can the framework be strengthened for implementing plastic waste management?

By attempting to respond to the above questions, this research provides a case study of riverine plastic waste management for the Citarum River through the lens of governance aspects and other rivers that potentially face similar plastic pollution challenges.

Section 2 of this paper explains the methods and scope of this research. Section 3 describes the current situation and governance framework for tackling Citarum riverine plastic pollution issues. Section 4 applies the collaborative governance framework to the Citarum River program as the national initiative for cleaning the Citarum River of waste and pollutants, analyzes the gaps and remaining challenges in governing riverine plastic waste management for the Citarum River, and proposes using collaborative governance to further improve the riverine plastic waste management of the Citarum River and its watershed area.

## 2. Research Methods

This research was conducted in two stages.

In the first stage, a desk review was conducted on research papers and journal articles on collaborative governance applied to the environmental management. Collaborative governance varies in the scope and scale of its perspective. This research did not discriminate between variations in governance frameworks such as multipartner governance, participatory governance, collaborative public management, network governance and co-management regimes, which share common characteristics with collaborative governance in a broader sense (Emerson *et al.*, 2012). Collaborative governance was first introduced by Ansell and Gash (2008). It is defined as collaborative governance taking place in formal and state-initiated arrangements between governmental and non-governmental stakeholders. To grasp the current governance in Citarum riverine plastic waste management in Indonesia, a desk review was

conducted with research papers, reports published by international organizations and/or NGOs, government strategies and other relevant documents on plastic pollution in the context of the Citarum River in Indonesia. The key words used in this research included “plastic waste,” “plastic pollution,” “riverine waste,” “plastic waste clean-up,” “transboundary river management,” “Citarum River” and “collaborative governance.”

In the second stage, a collaborative governance framework was applied for analyzing the national initiative that had been dubbed “the Citarum Harum program initiative” by then President Joko Widodo in 2018 to extract the challenges and opportunities in riverine plastic waste management of the Citarum River.

Lastly, this study made policy recommendations on how the Citarum River’s riverine plastic waste management could be improved.

### **3. Riverine Plastic Waste Management of the Citarum River**

#### **3.1 National Policy for Tackling Plastic Pollution**

To resolve plastic pollution issues in Indonesia, the Indonesian government has facilitated the development of the National Plastic Action Partnership (NPAP), launching NPAP in early 2019. NPAP aims to reduce marine plastic debris by 75% by the year 2025 compared to the baseline year of 2017 and to make it plastic-free by 2040. In NPAP, “plastic-free” is used as a concept for promoting the use of alternate choices of materials and products. Though the meaning is not strictly defined, this paper keeps NPAP’s original wording. It has four main pillars of categorized priority actions: 1) policy, 2) investment and sustainable finance, 3) innovation (research, technology development, business models and markets) and 4) metrics (transparency and accountability). NPAP convenes and taps into the resources of multiple stakeholders that are accountable for the country’s marine plastic debris and facilitate concrete responsibilities and actions for achieving the 75% reduction goal by 2025. NPAP is also supported by the National Plastic Action Roadmap, which identifies and prioritizes actions. NPAP has engaged nine ministries, four regional governments and more than 100 leaders from public, private and non-governmental institutions to contribute to its common targets. It has been serving as a platform for multiple stakeholders ranging from policymakers, the private sector, investors, civil society organizations, academia and non-governmental organizations, including international organizations.

#### **3.2 Context of the Citarum River**

The Citarum River in West Java, Indonesia is the longest river in the region, extending 269 km down to its mouth in the Java Sea. The river runs through nine regencies and three cities. It is regarded as a strategic river

serving as a source of raw water for drinking water in the most populated city in the country, Jakarta, as well as a source of water for agricultural irrigation, hydroelectric power plants and fisheries. It is said to have the largest watershed in West Java, occupying 6,614 km<sup>2</sup>. However, the illegal dumping of both industrial and municipal solid waste and wastewater has polluted it, resulting in harm to human and environmental health and economic losses. The most obvious pollution problem has been the plastic waste that enters the Citarum River, where it floats from upstream to downstream.

#### **3.3 Riverine Plastic Waste Management in the Citarum River**

In Indonesia, plastic waste is estimated to represent 30%–50% of total municipal solid waste (MSW) (World Economic Forum, 2020). The NPAP system model estimates around 620,000 tonnes of plastic waste flowing into Indonesia’s riverine environment in 2017. It is said that 61% of MSW is not collected properly and is mismanaged, leaving waste generators such as households and commercial entities to treat waste in undesirable ways such as open dumping and burning. Out of this 61% of mismanaged waste, 78% of households in Indonesia are estimated to burn waste illegally and 10% to dump or bury waste, leaving 12% of households, intentionally or with no other choice, disposing of waste in public waterways and rivers that eventually flow into the ocean (World Economic Forum, 2020). Plastic waste mainly comes from food and daily product packaging, shopping bags, toys, sanitary products and cigarette butts. It is difficult to estimate the total volume of plastic waste that gets into the Citarum River on a daily or annual basis. Cordova *et al.*, (2022) conducted spatial and temporal monitoring of plastic waste between 2018 to 2020 at 25 sampling stations and recounted that more than 85% of riverine waste in the Citarum River was macroplastic waste (waste size larger than 5 cm). Pamungkas *et al.* (2021) conducted a plastic waste sampling survey at a midstream point along the Citarum River in the rainy season and observed that the largest amount of plastic waste was accounted for by thin plastic packaging and styrofoam. Thin plastic packaging seems to have mostly come from food packaging such as snacks and condiments and sanitary product packaging, while the styrofoam may have come from takeaway food packaging and electric product packaging.

#### **3.4 Citarum Harum as a Program-coordinating Body for Citarum River Pollution**

Historically, various efforts have been made by the Indonesian government to clean-up the Citarum River and resolve its pollution issues. These date back to 1989 when the “Kali Bersih” or “Prokasih” program was implemented; followed by the “Citarum Bersih,” “Geulis dan Lestari” or “Citarum Bergetar” program. In 2008 the

name of the program was changed to “Citarum Terpadu,” and it was transformed into the current program called “Citarum Bestari” in 2013. None of the previous programs, however, demonstrated success in cleaning the river or preserving the watershed, even though trillions of rupiahs were spent on these programs (Chandra *et al.*, 2018).

The Citarum Harum program was introduced as part of Presidential Regulation No. 15/2018 concerning the Acceleration of Pollution Control and Damage to the Citarum River Watershed, which was a response to an urgent call by international and domestic non-governmental organizations who called the river “the dirtiest river in the world.” The Citarum Harum program was led by a taskforce established specifically for the Citarum Harum project headed by the Coordinating Ministry of Maritime Affairs (Fig. 1). The Ministry of National Development Planning of the Republic of Indonesia (Bappenas) was assigned to review previous Citarum River management programs and make new plans and programs for integrated watershed management of the Citarum River in a national strategic planning document. Aside from that, a unit called “Satgas,” consisting of a taskforce and field units in the Citarum watershed area, was made responsible for developing action plans and implementing actions to control pollution and damage on the ground. Bappenas was also tasked to coordinate actions prepared by Satgas to organize the efforts occurring under the Citarum Harum program.

The main content of the Citarum Harum program has consisted of the following (Idris *et al.*, 2019):

- Dividing the tasks and responsibilities of the central government, regional governments, Indonesian National Armed Forces (TNI), Indonesian National

Police (POLRI) and other actors related to Citarum River restoration and management.

- Determining the operational structure of Citarum Harum activities and operations
- Improving regulations for stronger law enforcement
- Establishing supportive policies to deal with social problems and plan for job opportunities along the upper and middle reaches of the Citarum River.
- Involving the community through community empowerment

As shown in Fig. 1, an operational structure has been developed and the tasks and responsibilities of each involved governmental body have been allocated. Prominence in the operational structure was given to the Dan Sektor, which played a role in engaging with community members to stop pollution and damage to the river and restore the river environment through coaching and educational programs. The Dan Sektor deployed more than 7000 staff divided among the 22 sectoral areas along the Citarum River.

An unusual stakeholder who was involved in the Citarum Harum program was the TNI as one of the program implementers. Realistically in case of the Citarum Harum program, the TNI has had the most dominant power in the governance of Citarum Harum and by far, the TNI has had the strongest influence and extensive power among all of the stakeholders involved in the Citarum Harum program. For example, all actions related to the Citarum River needed to be approved by the military under the Citarum Harum program. This was especially prominent in the upstream reaches of the Citarum River. Thousands of TNI personnel were deployed to supervise and implement programs in the Citarum River area. Moreover, this unconventional

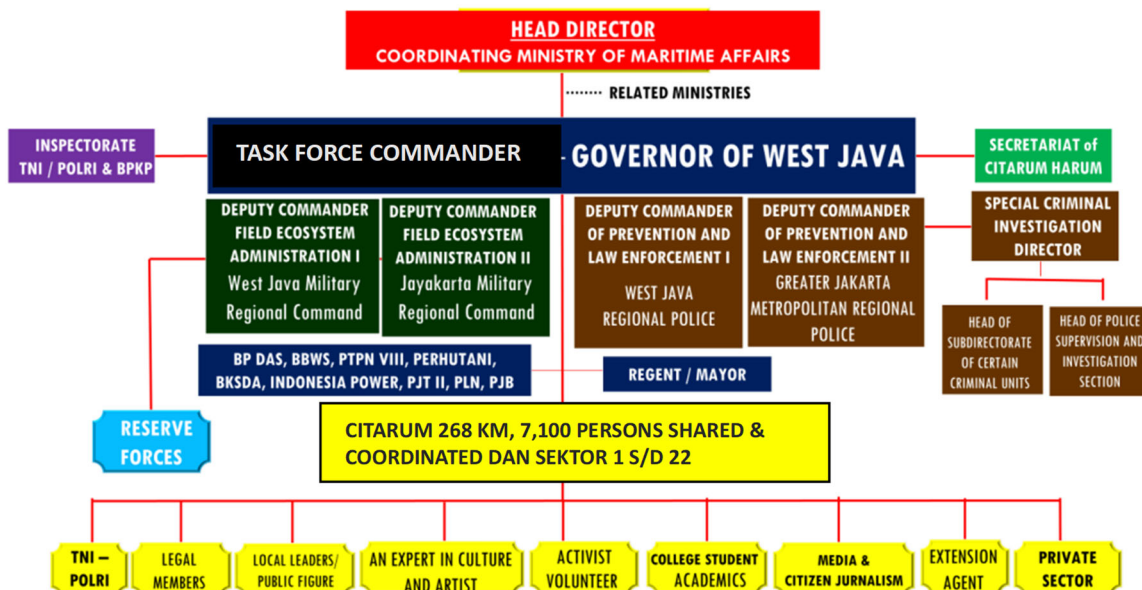


Fig. 1 Organizational structure of the Citarum Harum program based on the presidential instruction in Presidential Regulation No. 15 of 2018.

military involvement was considered not only as a means of implementing the program effectively but also to expand non-war military operations. As implementation of the Citarum Harum program has progressed, however, it has become clear that the military's involvement has resulted in an unequal power relationship within the Citarum River and watershed management under the Citarum Harum program. The criticism has arisen that the military's involvement has gone against the concept of water governance that requires all stakeholders to be working in partnership with reduced sectoral self-interest so that the collaborative program can run more optimally (Mustofa *et al.*, 2021).

#### 4. A Collaborative Governance Approach to Citarum Riverine Plastic Waste Management and the Way Forward

##### 4.1 Analysis of the Citarum Harum Program, Applying Collaborative Governance

Emerson *et al.* (2012) defined a collaborative governance regime (CGR) as a governance framework that promotes public policy decision making and management for engaging people constructively across the boundaries of public agencies; levels of government; and/or the public, private and civic spheres so as to fulfill a public purpose that could not otherwise be accomplished. There are several versions of definitions of collaborative governance. The representative one is that proposed by Ansell and Gash (2008) that defines collaborative governance taking place in formal and state-initiated arrangements between governmental and non-governmental stakeholders. The definition by Emerson *et al.*, expanded the concept of collaborative governance by including partnerships among the state, private sector, communities and others. The integrative Framework for Collaborative Governance developed by Emerson *et al.* (2012) is illustrated in Fig. 2, showing CGR within a system context. It enshrines collaborative dynamics consisting of three interactive components:

principled engagement, shared motivation and capacity for joint action. The three components work together to produce collaborative actions that eventually have impacts. In the context of plastic waste management, interestingly, there are a few studies on collaborative governance in plastic waste management in Indonesia. Ain *et al.* (2021) found that a legal framework on plastic waste management offers a basis for collaborative governance but community participation and compliance with legal frameworks are weak. This is partly due to the lack of common goals among the relevant stakeholders in the collaborative governance. Chandra *et al.* (2018) analyzed the key actors in the Citarum Harum program using social network analysis and identified a need to further enhance the capacity of the Citarum Authority's Special Agency, with coordination among various relevant parties, such as district and local governments located in the watershed area. Key actors to collaborate with will be the West Java Provincial Government and Ministry of Public Works.

Analyzing this CGR and its propositions in light of issues involving Citarum riverine plastic waste management, the following system context and collaborative dynamics were observed to lead to collaborative action in the Citarum Harum program:

**Drivers:** There were several key drivers entering into this Citarum Harum program that brought together multiple stakeholders including national and local governments, the private sector and other organizations. First and foremost, a strong political mandate and leadership by the president in endorsing the Presidential Regulation in the most urgent manner is the first of its-kind in the regulations of the environment sector. This urgent action taken by Indonesia's national leader has provided a strong impetus for initiating this CGR. There were also consequential incentives that relevant stakeholders shared in cleaning the Citarum River. An analysis conducted by the Government of West Java Province in 2014 showed poor performance in environmental indicators suggesting poor ecosystem conditions in the Citarum River. The level

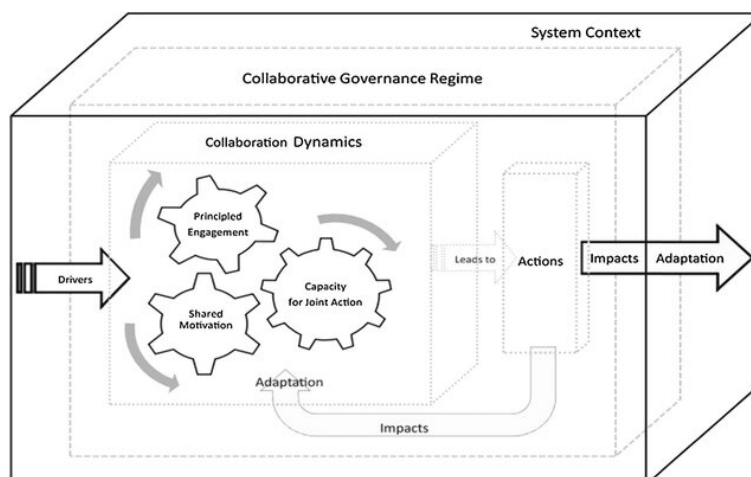


Fig. 2 Integrative Framework for Collaborative Governance developed by Emerson *et al.* (2012).

of river water pollution is high and flood events are increasingly frequent. The consequences of the decline in water quality and high frequency of flooding have included disruptions to strategic infrastructure such as flood control dams and waterworks and poorer performance of sanitation infrastructure facilities such as wastewater treatment plants (Idris *et al.*, 2019). Two driving elements, leadership and consequential incentives, were present for starting collaborative governance and were observed when the Citarum Harum program was launched (Proposition 1).

**Principled Engagement:** Deliberation, definition and determination of the problem and the actions to be taken were carried out by the central government from the start of the program (Proposition 2). Bappenas was tasked with reviewing the previous programs that had been implemented to clean up the Citarum River and develop an integrated river management plan based on their review findings. An action plan was formulated that was to be headed by the Coordinating Ministry of Maritime Affairs and delegated to a taskforce under the command of the governor of West Java. Another powerful actor in the Citarum's case was the National Armed Forces, governed by the Ministry of Defense. It remains unclear how the resources were mobilized to carry out the actions while the Coordinating Ministry of Maritime Affairs headed the Citarum Harum program's operational structure, and how the resources including personnel and budgets were mobilized from the ministries and their regional/local department entities.

**Shared Motivation:** Motivation and commitment to clean the Citarum River was shared by all Indonesian stakeholders in overturning the image of the dirty Citarum River after seeing it criticized as the dirtiest river in the world by international media coverage multiple times. A short documentary film (Planet Ark, 2018) produced by environmental activist Gary A. Benchehib documenting his canoe journey along the polluted Citarum River also caught the attention of former President Joko Widodo, who promised to revitalize the Citarum River. The impactful visual images of the polluted river and the bad reputation earned internationally drove the country's politicians to restore the environment and the country's image. Trust and mutual understanding among the stakeholders involved in the Citarum Harum program were critical in carrying out the joint planning, prioritization, consultation, implementation and coordination of the prioritized actions. Principled engagement also fosters trust, mutual understanding and shared commitment by generating and sustaining shared motivation (Proposition 3) and vice versa to create a "virtuous cycle" of shared motivation and principled engagement (Proposition 4).

**Capacity for Joint Action:** The main theme of the Citarum Harum program is "One Command Program from Upstream to Downstream in managing the River

watershed with all parties aiming at community welfare." President Joko Widodo called for structured actions from upstream to downstream along the Citarum River rather than fragmented actions by different actors along the river and in the watershed. As the name of the program suggests, it represents the president's expectation for it to be a centralized decision-making system for all activities to be taken to support the Citarum Harum program. Figure 1 shows the organizational structure of the Citarum Harum program, which also represents the hierarchical relationship among the different actors involved in the Program. The Task Force that was established to centralize the decision-making under the program is headed by the governor of West Java. Setting aside an evaluation of the efficiency and effectiveness of its centralized system, this "One Command Program" has ensured alignment of various actions. The capacity for joint action was assisted by the shared motivation and principled engagement of multiple government entities present in the organizational structure (Proposition 5).

#### 4.2 Conclusions and Policy Recommendations

This study has focused on observing the governance system for the plastic waste management and clean-up of the Citarum River, Indonesia. Receiving a bad reputation for the world's dirtiest river, Indonesia's government took it seriously, established a national policy for reducing marine plastic debris and launched the initiative called "Citarum Harum," a national coordination mechanism to clean up and restore environmental health to the Citarum River from 2018 to 2019. An Indonesian ecosystem of multi-stakeholders reducing marine plastic debris can be considered to have existed through the NPAP system since 2019. Influential government and business leaders are committed to acting towards achieving the common targets by 2025 and 2040.

This study has aimed to offer a more in-depth analysis of the Citarum Harum program and the application of its collaborative governance framework, which previous literature has not provided. By applying and analyzing the Citarum Harum program with its integrated framework of collaborative governance that Emerson *et al.* (2012) developed, this study has confirmed that the propositions for the integrated collaborative governance framework are mostly observed in the Citarum Harum program. The program attempts to involve multiple line ministries and relevant stakeholders from the national to local level. It has a clear organizational structure with leadership assigned to the governor of West Java province. However, some literature has pointed out that military has had a significantly strong influence on how the program is implemented, and may have impacted it in this regard, because it resulted in multiple ultimate decision makers in one program. Further analysis is needed regarding how collaborative governance copes with the situation when there are

multiple-decision makers and how the governance can ensure coherent and fair decision-making and resource allocation mechanisms within the governance regime. The Citarum Harum program is still an ongoing program, so its impact and effectiveness are yet to be determined. Future studies are expected to assess the program's impact.

Based on the current collaborative governance approach the program has been taking, this study concludes by offering the following policy and action recommendations to further enhance the collaborative approach to the issues and achieve the common target of reducing marine plastic debris by 2025:

1. An extended producer responsibility (EPR) scheme to be implemented for the Citarum River.

Indonesia is currently undertaking preparation of a nation-wide EPR scheme for plastic packaging with plans for its endorsement and implementation by 2026. EPR is used in many countries as an enabling policy that requires a collaborative approach among government, industry and the people to make EPR work and achieve plastic waste collection and recycling. Along the Citarum River, more than a thousand industries exist and operate businesses that may directly or indirectly affect river's environmental health. Geographically-specific EPR in the Citarum River area may raise the potential for operating waste recycling and clean-up by setting up operational and financial mechanisms related to EPR as part of the Citarum Harum program.

2. A collaborative mechanism for waste management at the regional level.

Responsibility for plastic waste management in rivers is often parceled out into different departments of different local governments. For example, in Bangkok, Thailand, waste collection and clean-up in rivers and canals is the responsibility of the local district offices and Department of Drainage and Sewage, while waste collection, transportation and disposal are carried about by the district offices under the supervision of the Department of Environment of the Bangkok Metropolitan Administration (BMA). Ishigaki *et al.* (2018) found that there was little communication between these two departments and the district offices and also between the two departments at the BMA headquarters regarding whether waste was properly collected from water bodies and transported to the appropriate waste disposal site. As a result, waste collection service was not implemented as often as planned in the overall waste management policy and no monitoring of implementation was conducted (Ishigaki *et al.*, 2018). When there are different levels of governance involved, situations can arise where miscommunication occurs, eventually leading to situations in which nobody takes responsibility, and thus no action is taken to tackle the problem. Complications can arise in plastic waste

management for multiple rivers due to the involvement of multiple local government authorities. Therefore, collaborative governance would be necessary firstly to define the roles and responsibilities of involved entities in strategic government documents and secondly to establish a mechanism for regularly communicating, reporting and monitoring the progress in plastic waste management along the Citarum River. All of the nine regencies and three cities need to be involved and coordination of their respective roles at the national and provincial levels is needed.

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**Rieko KUBOTA**

Ms. Rieko currently serves as senior environmental engineer at the World Bank’s Environment, Natural Resources and the Blue Economy Global Practice division.

She has led project preparation, policy advisory and analytical work on solid waste management, plastic pollution and the circular economy agenda in the East Asia and Pacific region since 2020. She served as researcher/international project coordinator in the field of municipal solid waste management in the Asian region at the National Institute for Environmental Studies in Japan from 2011 to 2020.

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