

# Exploring Guidelines for Disaster Waste Management in Southeast Asia

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## Abstract

Disaster waste is defined as the waste generated as a result of natural disasters. Not only are meteorological disasters becoming more severe and frequent due to climate change, but urbanization and population growth in Asia are also increasing the damage caused by natural disasters. Once a natural disaster happens, a huge amount of waste is generated, so guidelines for disaster waste management should be prepared before disasters happen. In Southeast Asia, guidelines for disaster waste have been established by Indonesia's national government and the Metropolitan Manila government in the Philippines, and have been developed at universities in Thailand. Each of these three sets of guidelines takes a different approach, so comparing them can provide suggestions for various points that are important to consider. This paper explores the three sets of guidelines for disaster waste management and attempts to formulate a typology from the perspectives of “motivations and mandates” for developing such guidelines and “entities responsible for the guidelines.” Such perspectives and typologies will be useful when assessing the status of disaster waste management in a country or region, or when considering specific policies for disaster waste management. In addition, academia has contributed to the development of these guidelines by utilizing their accumulated knowledge in waste management.

**Key words:** climate change, climate change adaptation, disaster waste management, Indonesia, natural disaster, the Philippines, resilience, solid waste, Thailand, waste management

## 1. Introduction

In recent years, natural disasters have become increasingly devastating in Asia. Not only are meteorological disasters becoming more severe and more frequent due to climate change, but urbanization and population growth in Asia are also escalating the damage caused by meteorological and geophysical disasters.

These natural disasters generate enormous amounts of waste. For example, typhoons and floods generate large amounts of damaged furniture, appliances, lumber, plants and trees as disaster waste, while earthquakes generate large amounts of debris. Waste generated by natural disasters is called disaster waste, and the amount of disaster waste generated can be equivalent to several years of solid waste in normal times, and in the case of a severe disaster, it may be equivalent to several decades of solid waste (Ministry of the Environment Japan, 2018). If massive amounts of disaster waste are generated from a single natural disaster and are disposed of at existing

landfills and other facilities, it uses up capacity of the facilities that had been planned for normal waste treatment and hinders future waste management.

Appropriate treatment and management of such disaster waste is an issue that deserves attention from various perspectives, including recovery and reconstruction from disasters, sustainable and appropriate waste management, and resilience of social infrastructure.

In general, Asian countries are not always sufficiently prepared for disaster waste management. It is necessary to consider such preparedness and develop specific policies and guidelines during normal times. In Japan, laws and regulations were developed after the Great Hanshin-Awaji Earthquake in 1995 and the Great East Japan Earthquake in 2011, but such efforts have not been undertaken sufficiently in emerging countries in Asia. Various United Nations organizations and other international agencies have created guidelines for disaster waste management (Joint UNEP/OCHA Environment Unit, 2013; Secretariat of the Pacific Regional

Environment Programme, 2021; United Nations Development Programme, 2014), but ideally, each country and local government should develop specific policies reflecting its unique circumstances.

In Southeast Asia, several countries are in the process of developing guidelines for disaster waste management. Specifically, guidelines for disaster waste are being established by Indonesia's national government, Metropolitan Manila in the Philippines and universities in Thailand.

This paper explores and compares the status of disaster waste management guidelines in these three countries. Since policy planning in disaster waste has only begun in the last few years, it might be a meaningful approach to review the trends in that field and compare the three countries in an attempt to formulate a typology.

## 2. Indonesia

Indonesia has experienced major earthquakes and tsunamis over the past two decades, including the Indian Ocean earthquake and tsunami in 2004 and the Sulawesi earthquake in 2018. Furthermore, volcanic eruptions occur frequently on the island of Java, and floods are very common. In response to these situations, Indonesia is becoming increasingly concerned about preparing for natural disasters, and the Minister of Environment and Forestry Regulation No. 1, year of 2024, concerning Disaster Waste Management was just released on 9 Jan 2024 (Republic of Indonesia, 2024). This regulation provides the basic frameworks for general matters, segregation, transportation, waste utilization, processing, final waste processing and reporting.

Regarding the legal system related to general waste management, and disaster waste management in Indonesia, Law No. 18/2008 concerning Waste Management forms the legal basis (Republic of Indonesia, 2008). Government Regulation No. 27/2020 concerning Waste Management of Specific Waste was enacted as one of the regulations under that legal basis. This government regulation designates six types of specific waste, including disaster waste, and encourages their proper management and disposal (Republic of Indonesia, 2020). Based on this government regulation, the Ministry of Environment and Forestry (MOEF, also known as KLHK in Indonesian) established a ministerial regulation for disaster waste, which was enacted in January 2024. This ministerial regulation provides basic definitions and concepts. It will

work as a set of guidelines of a sort for disaster waste management. To establish these guidelines as a ministerial regulation, MOEF engaged in frequent dialogues and consultations with other relevant ministries and agencies, such as the National Disaster Management Agency (NDMA, or BNPB in Indonesian), which is in charge of disaster management; the Ministry of Interior, which coordinates with local governments; the Ministry of Public Works and Public Housing, which is in charge of hard infrastructure including waste related issues; and the Ministry of Law and Human Rights. In addition to the national government, local governments in the areas affected by the earthquake and tsunami have also participated in these dialogues and consultations as stakeholders. With the issuance of the ministerial regulation, the Regional Disaster Management Agency (RDMA, or BPBD in Indonesian) and the environmental bureaus of local governments are required to take the lead in establishing contingency plans for disaster waste in their respective regions. Therefore, the ministerial regulation was formulated in a manner that also reflects comments from local governments.

The legal system forms a hierarchical structure, with the Law concerning Waste Management at the top, followed in order by the government regulation on specific waste, the ministerial regulation on disaster waste, and enactment of contingency plans in each region. Policies related to disaster waste management are to be implemented on this legal basis.

Another key point regarding the ministerial regulation for disaster waste is the involvement of academic experts. Diponegoro University has played an important role in formulating the ministerial regulation. In recent years, an evidence-based policy making (EBPM) perspective has been gaining importance in policy formulation. Academic experts can help that by providing data and information on each region, methodologies such as estimation of amounts generated, and knowledge such as policy analysis, so universities and research institutes may play an increasingly important role with their academic knowledge and achievements.

Further required initiatives will include the involvement of local governments. Based on the new regulation, local governments are expected to prepare their own contingency plans for disaster waste management. MOEF is said to have plans to conduct workshops to encourage local governments at high risk of natural disasters to take action.

## 3. The Philippines

A number of typhoons hit the Philippines almost every year. Giant typhoons such as Super Typhoon Yolanda that struck in 2013 cause extensive damage and produce large amounts of waste at once. Also, like Indonesia, the country is located on the Circum-Pacific

**Table 1** Outline of the guidelines for disaster waste management in Indonesia.

Indonesia "Ministerial regulation for disaster waste"	
Legal basis	- Law concerning Waste Management - Regulation concerning Specific Waste
Main entity	- Ministry of Environment and Forestry (MOEF)
Other entities	- National Disaster Management Agency (NDMA) - Diponegoro University

Belt, also known as the Ring of Fire, and has various active volcanoes. The eruptions of Mt. Pinatubo and Mt. Mayong are well known. Earthquakes are not infrequent either, and the importance of preparing for the “Big One,” a massive earthquake, has often been mentioned these years.

A look at the central government policies of the Philippines shows no specific mention of disaster waste management, in either waste policy or disaster prevention measures (Fernandez, 2022). In the National Disaster Risk Reduction and Management Plan (2020–2030), the term “disaster waste” is mentioned, but no specific description is given (Fernandez, 2022). The national government’s legal system does not specify responsibility for disaster waste.

From the view of disaster-related policy, the Disaster Risk Reduction and Management Act of 2010 (Republic Act (RA) 10121) is the legal basis for disaster management. This Act requires Local Government Units (LGUs) to prepare emergency response plans and disaster countermeasures (Republic of the Philippines, 2010). In response to this Act, the Metro Manila Development Agency (MMDA) is in the process of formulating guidelines for disaster waste management as part of its disaster risk reduction plan. The Act does not explicitly include disaster waste management, and the response to disaster waste will depend on the attitude of the LGUs. There are 17 LGUs in Metro Manila, and the guidelines are intended to assist these LGUs in formulating their contingency plans for disaster waste management. Preparations for the guidelines are currently underway, and the Solid Waste Management Office (SWMO) in the MMDA is considering forming a working group with members from the national government, LGUs, academic institutions and waste industry associations.

In the Philippines, there is an association that is also making moves toward promoting disaster waste management. The Solid Waste Management Association of the Philippines (SWAPP), a non-profit association composed of various stakeholders from the public/private sector, academia and others, held an annual meeting in November 2022, with the theme of disaster waste management. The two-day annual meeting featured presentations and discussions on disaster waste from national and local governments, private companies, industry associations and academic institutions. Some international organizations and foreign researchers also attended the meeting.

**Table 2** Outline of the guidelines for disaster waste management in the Philippines.

<b>Philippines “Guideline for Disaster Waste in Metro Manila”</b>	
Legal basis	- Disaster Risk Reduction and Management Act
Main entity	- Solid Waste Management Office (SWMO), Metro Manila
Other entities	- University of the Philippines - Solid Waste Management Association of the Philippines (SWAPP)

Along with the establishment of guidelines for disaster waste management in Metro Manila, interest in disaster waste management has been growing in various sectors. Although not driven by explicit policies of the national government, the need for disaster waste management may be increasing due to awareness of the need to prepare for natural disasters such as frequent typhoons that happen almost every year and earthquakes that are sure to happen soon.

In March 2024, the SWMO conducted a kickoff meeting with stakeholders to develop the guidelines. As described above, the purpose was to assist LGUs in Metro Manila in formulating their contingency plans for disaster waste management. It is said that the key stakeholders will establish a working group, and tangible activities will be a key point for the MMDA’s disaster waste guidelines.

#### 4. Thailand

Floods in 2011 caused severe damage in the Chao Phraya River basin, including in the capital city, Bangkok and some industrial estates. Since then, the country has suffered from various natural disasters. Thus interest in disaster risk reduction is increasing, and academic institutions have been developing a disaster waste handbook. The handbook comprises three parts, 1. Definitions and General Information, 2. Disaster Waste Management Handbook for Communities, and 3. Disaster Waste Management Handbook for Municipalities. The handbook aims to explain the basic approach to disaster waste management and raise points reflecting circumstances particular to Thailand (Towprayoon et al., 2023).

Thailand has no legal system or policy directly dealing with disaster waste. On the other hand, the National Disaster Risk Management Plan directs natural resources and environment-related issues to be handled under the guidance of the Ministry of Natural Resources and Environment (MONRE) and the Department of Local Administration (DLA) in the Ministry of Interior (Kingdom of Thailand, 2015). According to discussions with MONRE officials, under the waste management policy stipulated by MONRE, disaster waste is assumed to be classified as solid waste, and solid waste is to be managed by the local governments. In short, it can be inferred that disaster waste is to be handled by local governments as solid waste. However, it is unlikely that any guidelines have been established for disaster waste at

**Table 3** Outline of Thailand’s guidelines for disaster waste management.

<b>Thailand “Handbook for Disaster Waste Management” by academia</b>	
Legal basis	N/A
Main entity	- Graduate School of Energy and Environment (JGSEE-KMUTT) - Kasetsart University (KU)
Other entities	- Local governments to implement

the local government level.

Meanwhile, academic institutions in Thailand have begun formulating a handbook on disaster waste management. King Mongkut's Institute of Technology - Graduate School of Energy and Environment (JGSEE-KMUTT), Kasetsart University (KU) and the National Institute for Environmental Studies Japan (NIES) have been collaborating to develop a waste management scheme that can respond to disasters and climate change. The project was launched with support from the Ministry of Higher Education, Science, Research and Innovation, and the two main themes have been "disaster waste: pandemics and floods" and "climate change: plastic waste." Regarding disaster waste, handbooks constituting simple sets of guidelines are being developed for implementation by specific local governments. Ultimately, the goal is to feed the result back to MONRE and other ministries and agencies, helping to create a system in which the national government encourages and supports local governments in formulating disaster waste management plans. While Indonesia and the Philippines have policy mandates of some kind and government agencies have been establishing guidelines for disaster waste management based on these mandates, Thailand is unique in that academic institutions are taking the lead without a mandate from the governments.

To make the handbooks more effective and practical, academia must persuade the national government and local governments to commit to and raise awareness of disaster waste management.

## 5. Discussion

Having overviewed the situation regarding establishment of disaster waste management guidelines in Indonesia, the Philippines, and Thailand, this section compares the cases of the three countries and attempts to formulate a typology. Through a "cross-cutting analysis" of the issues common to all three cases, issues specific to each country, and the circumstances of local governments in the policy framework of these three guidelines, the two perspectives emerged: 1. Motivations and mandates and 2. Entity responsible for the guidelines. The aim of this section is to provide a cross-cutting analysis using these two perspectives.

For example, Japan's disaster waste guidelines are based upon laws regarding both waste management and disaster management, and the leading agency of the guidelines is the Ministry of the Environment, which is in charge of waste management laws. The three guidelines show approaches that differ from those of Japan.

### 5.1 Motivations and Mandates

The table above attempts to summarize and formulate a typology of the motivations and mandates for the

**Table 4** Motivations and mandates of guidelines for disaster waste management.

Countries	Motivations	Mandates
Indonesia	Law and regulations for national waste management	Direct mandates
Philippines	Law for national disaster management	Indirect mandates
Thailand	Academic interests in waste management	No mandates

guidelines on disaster waste management in the three countries.

A motivation is the rationale for establishing guidelines for disaster waste management. Mandates based on legal systems and policies serve as a type of motivation, but other demands might constitute motivations as well. Mandates from legal and policy systems influence the effectiveness of guidelines. Guidelines may be less effective if there are no mandates. In fact, other guidelines have been developed in Asia developed by governments, but without mandates from law or policy. These guidelines have not been recognized among the stakeholders.

Looking at the specific example in Indonesia, the guidelines were established based on the hierarchy of waste-related laws and the bureaucratic structure, and it included a direct, explicit mandate for disaster waste management from waste-related laws and policies.

In the Philippines, a local government is attempting to develop disaster waste guidelines in line with the mandate for disaster-related policy from the national government. There is no legal framework that explicitly indicates the need for disaster waste management, and compared to Indonesia, the guidelines are based on a less explicit, or indirect, mandate.

In Thailand, there is no national or local government policy mandate, so academic institutions are taking the lead in establishing a handbook which is a simple set of guidelines of a kind. Academic interests in and disaster waste and demands for its management have been increasing due to factors such as appropriate waste management and climate change, and this is the motivation behind the establishment of the handbook.

This cross-cutting analysis provides interesting foresight to those considering guidelines. As its name suggests, disaster waste management is a combination of disaster management and waste management, and either disaster-related or waste-related policies will likely become the leading policy mandates. Most disaster waste management practices are closely related to waste management. The establishment of guidelines regarding disaster waste management, which will be discussed below, will also be led by waste-management-related

ministries, agencies and organizations. If a waste management policy constitutes a mandate, it will facilitate the smooth establishment of guidelines. If the mandate is a disaster-related policy, awareness will need to be raised in the waste-related sectors, and their strong commitment will be essential.

It will also be interesting to observe the move toward the development of guidelines based on an academic approach, rather than a policy mandate first, as in the case of Thailand. In addition to the disaster and waste fields, some approaches to disaster waste management are expected to arise from the perspective of climate change and other issues. Academia can connect these hot topics with disaster waste management in order to mainstream and prioritize it. However, from the viewpoint of policy effectiveness, it will be necessary eventually to connect academic-based guidelines with policy mandates, or the guidelines may not be implemented as a disaster waste-related policy, making them less effective.

## 5.2 Entities Responsible for Guidelines

This section explores entities developing guidelines for disaster waste management. The specific activities of disaster waste management are closely related to waste management. The involvement of disaster-related policy is limited to budget allocation and coordination with other stakeholders in saving lives and restoring infrastructure.

Table 5 summarizes the key entities developing the guidelines in the three countries. The entities are selected from the waste management sector, as they play important roles. In the table, the symbol © indicates the main entity; ○, a contributor to the guidelines; and △, a stakeholder supporting their development.

In the case of Indonesia, the guidelines are being established by MOEF as a ministerial regulation. MOEF is in charge of the overall waste management policies including the legal basis for the guidelines. MOEF is the main entity responsible for decreeing the guidelines, and it also works with disaster-related and infrastructure-related ministries and agencies as appropriate. Once the guidelines are established, the environmental departments of local governments will implement the disaster waste management plans according to the hierarchical bureaucratic structure of waste management. They have been involved in regular consultations regarding the guidelines. It is also worth noting that academic institutions are involved in establishing these guidelines. Academia's contribution to the guidelines from their knowledge of waste management and disaster waste management will be valuable.

In the Philippines, the SWMO in the MMDA is preparing to develop disaster waste management guidelines. These guidelines will support 17 LGUs in Metro Manila in developing disaster waste management plans. As mentioned above, the motivation for these

**Table 5** Entities involved with guidelines for disaster waste management.

(©: main entity, ○: contributor to the guidelines, △: stakeholder)

Country	Waste management entity		
	National government	Local governments	Academia/ others
Indonesia	© Ministry of Environment and Forestry (MOEF)	△	○ Diponegoro University
Philippines	△	© Solid Waste Management Office (SWMO), Metro Manila	○ University of the Philippines Solid Waste Management Association of the Philippines (SWAPP)
Thailand	—	△	© King Mongkut's Institute of Technology Kasetsart University

guidelines is a disaster-related mandate, not a waste-related one. On the other hand, the SWMO is a waste-related agency. To harmonize the disaster-related and waste-related policies, the SWMO is said to be considering a working group including some disaster-related departments and agencies from national and local governments. As the contents of the guidelines are closely related to solid waste management, the NSWMC, which represents national waste-related policies, and the LGUs are scheduled to participate in the working group. Additional members of the working group will include the University of the Philippines and SWAPP, who are expected to provide various insights from academia and relevant industries in waste-related sectors.

In Thailand, academic institutions are attempting to establish a handbook for disaster waste management without any policy or legal mandates. Although it is being called a "handbook," it is a simple set of guidelines of a kind. The main entities responsible for these guidelines are academic institutions with many years of experience in the waste management field. As noted many times above, disaster waste management is closely related to normal waste management, such as municipal solid waste. From this point of view, it would be reasonable for academic institutions that have accumulated knowledge in waste management to collaborate effectively to formulate guidelines. While taking an academic perspective as a motivation, these guidelines should be incorporated into the legal and policy frameworks in the future, or they will not be utilized due to the lack of effectiveness. In that case, it will be necessary to collaborate with not only the waste-related sector but also the disaster-related sector and other actors such as infrastructure development.

The main entities developing the guidelines are the

national government in Indonesia, a local government in the Philippines, and academia in Thailand. The point raised here is that the approach to the guidelines differs depending on the circumstances of each country. In other words, the national government is not the only entity that can lead the development of guidelines. Various agencies and organizations can also take the lead.

## 6. Conclusions

Indonesia, the Philippines and Thailand are three countries in Asia where disaster waste management guidelines are being established, but each case has different circumstances and background factors. In exploring them, two perspectives appear: the “motivations and mandates,” and the “entities responsible.” In the future, when trying to establish guidelines for disaster waste management in a country or region, an effective approach would be to assess mandates, policy actors and other factors, and clarify who the stakeholders are and what their roles and responsibilities will be. Specifically, disaster-related and waste-related legal systems and policies should be analyzed to identify descriptions related to disaster waste and the relevant ministries and agencies. Next, the relevant stakeholders are identified and their responsibilities, interests and so on regarding disaster waste should be sorted out. This way, approaches for mainstreaming disaster waste management are clarified.

It is noteworthy that all three countries have seen contributions from academia. The knowledge accumulated over the years in the field of waste management will be useful in establishing guidelines for disaster waste management. In addition, there may be a role for academia in mainstreaming disaster waste management from the perspectives not only of disaster-related and waste-related issues but also other issues or goals such as climate change, business continuity and resilient society. A move by academia to take the lead and eventually connect it to policy, as in Thailand, motivates experts and researchers.

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