

Post Floods Disaster Management in Grobogan Regency

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Abstract

Waste handling cannot only be completed by one agency but involves related agencies to collaborate. Grobogan Regency has 17 of the 19 sub-districts that are included in the potential for flood disasters. After the flood disaster, there was trash that had to be handled. To resolve this, a good coordination pattern between agencies is needed. This research is descriptive research using primary and secondary data. Primary data was taken by measuring the amount of waste produced at 6 temporary 3R waste management locations in Grobogan Regency and conducting interviews with officers from the Grobogan Regency Environmental Service (DLH), BNPB, and DPUPR. Meanwhile, secondary data comes from data on the amount of waste produced under normal conditions as well as analysis of coordination and institutional patterns in handling post-disaster waste. The results of this research showed that the increase in waste after the disaster was 15% of normal conditions, whereas in the post-disaster coordination pattern it returned to internal coordination where each agency returned to work according to the duties and authority of each agency.

Keywords: *floods, post-disaster, waste management*

Abstrak

Penanganan sampah tidak hanya bisa diselesaikan oleh satu instansi namun melibatkan instansi terkait untuk berkolaborasi. Kabupaten Grobogan memiliki 17 dari 19 kecamatan yang masuk dalam potensi bencana banjir. Pasca bencana banjir menyisakan sampah yang harus ditangani. Untuk menyelesaikan hal tersebut diperlukan pola koordinasi yang baik antar instansi. Penelitian ini merupakan penelitian deskriptif dengan menggunakan data primer dan sekunder. Data primer diambil dengan melakukan mengukur jumlah sampah yang dihasilkan di 6 lokasi pengelolaan sampah sementara 3R di Kabupaten Grobogan dan melakukan wawancara kepada petugas Dinas Lingkungan Hidup Kabupaten Grobogan (DLH), BNPB, dan DPUPR. Sedangkan data sekunder berasal dari data jumlah sampah yang dihasilkan dalam kondisi normal serta analisis mengenai koordinasi dan pola kelembagaan dalam penanganan sampah pasca bencana. Hasil dari penelitian ini didapatkan bahwa kenaikan sampah pada pasca bencana sebesar 15% dari kondisi normal, sedangkan pada pola koordinasi pasca bencana kembali dalam koordinasi internal dimana setiap instansi kembali bekerja sesuai tugas dan wewenang dari masing-masing instansi.

Kata Kunci: *banjir, pasca bencana, penanganan sampah*

1. Introduction

Increasing human activity and increasingly frequent changes in land use are accelerating the process of Natural disasters are natural events that have a major impact on the human population. Indonesia is an archipelagic country that is geographically located at the intersection of four tectonic plates. The southern and eastern parts of Indonesia have volcanic mountain ranges, the rest is lowland, some of which is swamp land. Geographical conditions make Indonesia prone to experiencing natural disasters such as: earthquakes, volcanic eruptions, floods, and landslides [10]. Natural disasters have the potential to cause casualties, material loss and impact human life. Indonesia has a tropical climate which has two seasons, summer season and rainy season. This condition makes Indonesia prone to experiencing hydrothermal disasters such as: floods, landslides, forest fires and drought. Floods are a category of hydrothermological disasters that are often associated with the rainy season.

According to Minister of Public Works Regulation No. 12/2014 concerning procedures for planning urban drainage systems, it is stated that the criteria for flood parameters are flood height of more than 30 cm, inundation area of more than 4 ha, frequency of flooding in one year more than 6 times/year, and duration of flooding for more than from 4 hours [3]. The impact caused by floods is apart from material

and immaterial losses, there is also the potential for waste resulting from post-flood disasters. After the flood disaster, the waste that was carried away was construction waste and household waste.

The waste produced after a disaster is usually dominated by rubble or construction waste caused by the disaster. The generation of waste resulting from the flood disaster that occurred in Taiwan in 2001 was 18,700 tonnes and that generated from the floods that occurred in Semarang was 719 tonnes [2,8]. The high level of post-disaster waste generated requires good handling and quickly so that city sanitation is maintained. After the disaster, the waste management system experienced an activity anomaly, where the anomaly occurred due to the high amount of waste produced. Collection and transportation activities have changed due to having to serve refugee areas and assist in the evacuation process. The waste that has been transported is then sorted at the final processing site. In the post-disaster waste handling process, synergy between related agencies is needed, so that the process can run optimally.

The Indonesian government, through Minister of Public Works Regulation Number 3 of 2013, states that every district or city is required to have facilities and plans for handling waste, including household waste, similar types of household waste, industrial waste and waste produced after a disaster [11]. In Indonesia in the last 10 years there have been 9521 flood disasters, one of which occurred in Grobogan Regency. In 2023, Grobogan Regency will face a flood disaster which will result in 3,167 houses being submerged and 47,914 residents having to evacuate [1]. Grobogan Regency has 17 sub-districts out of 19 sub-districts that are prone to flooding. The geographical condition of Grobogan Regency, which is crossed by a large river and flanked by two mountains, makes the disaster-prone map almost evenly distributed throughout the sub-district. The potential for large disasters makes post-flood waste management one of the main focuses in Grobogan district

2. Material and Methods

Geography of Grobogan Regency

Grobogan Regency has 19 sub-districts and 17 are prone to flooding. The high potential for flood disasters is due to the geographical conditions surrounded by limestone mountains and large rivers. The frequency of large disasters has an impact on the potential waste produced. The waste carried by water flows is construction waste and household waste.

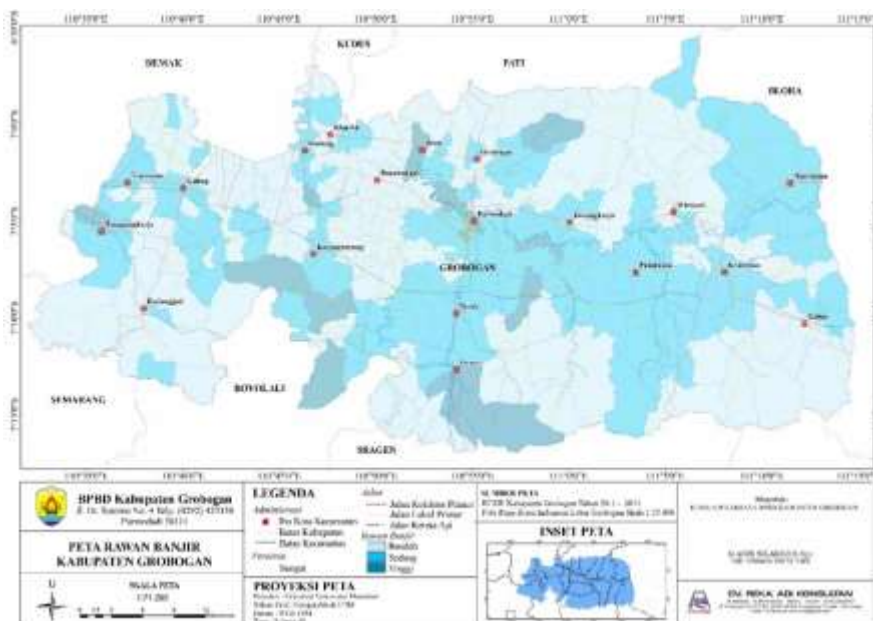


Fig 1. Grobogan Regency Disaster-Prone Map

Source: BPBD Grobogan (2022)

Data Collection

Data collection includes primary data and secondary data. Period collecting data from January-December 2023. Primary data obtained through observing the activities post disaster waste handling to obtain data the number of waste generation, the location of waste collection, the labor of waste handling. Secondary data was obtained through data available in the DLH of Grobogan Regency and extensive literature studies to obtain data on the amount of daily waste generated in Grobogan Regency.

Grobogan Regency waste management

Grobogan Regency waste management is carried out by the City Government through the Grobogan Regency Environmental Service (DLH). DLH manages municipal solid waste in a structured and massive manner. Currently, the average total daily waste entering the Ngembak landfill is 524,2 m³/hari. List of facilities owned by DLH Grobogan Regency for handling waste is as shown in **Table 1**.

Table 1. List of Facility DLH Grobogan Regency

Parameter		Unit
Service area	20	%
TPS	18	Unit
TPS 3R	11	Unit
Dump truck	6	Unit
Arm roll truck	8	Unit
Motorcycle	25	Unit
Pedicab	49	Unit

Source: DLH Grobogan Regency (2023)

3. Results and Discussion

In flood disasters, a large amount of waste is carried by water, causing the potential for waste to increase. In post-flood disaster conditions, the resulting waste is transported to the TPS 3R location for sorting before processing at the TPA. Based on the 11 TPS 3R locations in Grobogan Regency, there are 6 3R TPS that handle waste after the flood disaster. This is because the location of TPS 3R is in an area that is often hit by floods. The composition of post-disaster waste handled by TPS 3R can be seen in **Table 2**.

Table 2. Composition Waste Sorted at TPS 3R

No.	TPS 3R	Composition (Kg)						
		Organic	Wood	Plastic	Glass	Cloth	Metals	Rubber
1.	Mekarsari	393	179	295	196	56	156	210
2.	Pulokulon	1508	167	178	1305	237	60	267
3.	Kwariron	1733	188	142	1478	202	49	272
4.	Alam Sejahtera	1586	137	149	1655	278	69	259
5.	Ngudi Resik	1711	170	181	1308	240	63	270
6.	TPS 3R Plendungan	1921	176	130	1466	190	37	260



Fig 2. Post-Disaster Waste Generation

Post flood disaster in Grobogan Regency, the increase in waste generation reached 15% of the total waste generation that had to be managed. The phenomenon of increasing amounts of waste has occurred in several other countries affected by natural disasters. The percentage increase is in the range of 13-100% of the total waste that must be managed. Comparative data on the increase in post-disaster waste generation in Grobogan Regency and other countries can be seen in **Table 3**.

Table 3. Differences in post-disaster waste generation compared with other countries

No.	Location	Country	Type of Disaster	Waste Generation		Increase (%)
				Normal (Ton)	Post Disaster (Ton)	
1.	Grobogan Regency	Indonesia	Floods	253,67	291,72	15
2.	Bangkok*	Thailand	Floods	9.400	11.000	17,02
3.	Canghua Country**	Taiwan	Floods	191,52	670,52	39,98
4.	Kumamoto***	Jepang	Earthquake	0,88	1,76	100

* Nakayama et al (2013)

** Chen et al (2007)

*** Sakai et al (2018)

Post-disaster conditions mean that waste transportation vehicles must work optimally with different operational patterns. Post-disaster waste handling in Grobogan Regency deployed dump truck type operational vehicles with a total of 4 employees. The working hours provided are 8 hours and after complying with national working hours according to Government Regulation No. 35 of 2021. Waste handling work carried out after a disaster includes: cleaning, collection, transportation to TPS 3R and TPA.



Fig 3. Post-Disaster Floods Cleaning

Post-disaster waste is then transported to the TPS 3R location for sorting. In waste transportation activities, the method used is the Stationery Container System (SCS). The transportation equipment used in Grobogan Regency is a dump truck type so that the waste collected at the source must be transported to the truck manually. The composition of waste sorted at TPS 3R can be seen in **Table 3**.

Coordination Patterns in Post-Disaster Waste Handling

In this research, an analysis of coordination in the implementation of post-disaster waste management activities was carried out using the interview method. There are 3 agencies as targets for resource persons, namely: BPBD, DLH and DPUPR Grobogan Regency.

Internal Coordination

Internal coordination is coordination that occurs only within the organization. In this coordination, the command head will usually instruct those in charge and require responses from all relevant parties in the organization before planning. In organizations operating in the field of disaster management, the head of command requires responses from all related parties to obtain information about the surrounding conditions, both in terms of infrastructure, humans, and natural conditions. This information will be used for the command head to determine the next disaster management strategy and will be used to always be up to date with information on disasters that are currently occurring [7].

External Coordination

This coordination usually occurs between 2 or more institutions. External coordination is usually needed to streamline the roles of various parties so that each party can focus and help each other fill existing roles in dealing with disasters. This coordination requires mutual openness and understanding from the

parties involved. In addition, a new agreement is needed that is agreed to by all parties so that this coordination runs well and effectively. Opinions from several experts are sometimes also needed as neutral alternative options [6].

Post Disaster Coordination

In the post-disaster recovery activities began to be carried out by the DPUPR and the DLH began to restore infrastructure, especially infrastructure related to waste. DPUPR is making repairs to the affected infrastructure, one of which is TPS 3R which will later be used by DLH as a means of handling waste before it is taken to the final disposal site. DPUPR is also tasked with carrying out restoration of roads and waterways to make it easier for the community and related agencies to carry out post-disaster recovery activities.

In this process, the pattern used by the three institutions returns to an internal pattern, where each institution focuses on its respective tasks without requiring assistance or communication with various parties. DPUPR will focus on infrastructure while the Environmental Service will focus on waste left after the disaster. The institutional patterns that occur in each phase are very different. During the pre-disaster period, we can see how each institution played an individualistic role in carrying out various methods to mitigate the disaster. All institutions move according to their respective work programs under different command heads. Meanwhile, in the disaster response phase, institutions are required to collaborate in dealing with existing disasters so that dynamic patterns can be seen with various functions from each institution collaborating. However, after the disaster response phase ended, the agencies returned to work according to their respective portions.

4. Conclusion

Grobogan Regency is one of the districts with a large potential for flood disasters. After the flood disaster, there is a potential for an increase in waste of 15% from normal conditions. Post-disaster waste handling is carried out by DLH by cleaning, collecting, and transporting waste to TPS 3R for processing before being transported to TPA. The process in TPS 3R is sorting with the components being sorted: organic, wood, rubber, glass, paper, cloth, and metal. Post-disaster waste management involves stakeholders, namely BPBD, DLH and DPUPR. In post-disaster handling, coordination between institutions returns to internal functions where each relevant agency has a work program for handling post-disaster waste.

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6. Abbreviations

%	Percentage
3R	reduce, reuse and recycle
DLH	Environmental and Cleanliness Agency of Grobogan Regency
DPUPR	Department of public works and public housing
TPA	Landfill
BPBD	Regional disaster management agency

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