



WATER INFILTRATION POLICY FOR URBAN FLOOD MANAGEMENT

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Abstract

This research was conducted to determine the implementation of water absorption policies for flood management in urban areas, especially in the city of Cirebon at the Cirebon City Public Works and Spatial Planning (DPUPR) department. The research approach used is normative juridical, conceptualizing law as written norms so that this research emphasizes studies in the form of legislative products, namely those that regulate water absorption such as regional regulation number 38 of 2019 concerning the implementation of groundwater conservation through infiltration wells and infiltration holes. biopore. Policy implementation in flood management by the Cirebon City PUPR Service has included handling floods and puddles as a priority in the Regional Government Work Plan (RKPD) for 2025. For handling urban drainage, the PUPR Service's work target is to reach up to 83% by 2024, and 86% for 2025, and 89% for 2026. One of the strategies taken includes the creation of retention ponds, absorption wells and eco-drainage. However, there are still several obstacles in implementing this policy, such as limited resources and lack of community participation. To overcome these obstacles, efforts need to be made such as increasing the budget, providing adequate human resources, and educating the public about the importance of water absorption. Overall, the implementation of the water absorption policy for flood management in Cirebon City has shown a positive direction. With continued efforts and collaboration from various parties, it is hoped that this policy can be more effective in minimizing the risk of flooding in urban areas.

Keywords : Flood, Water Catchment, Policy

INTRODUCTION

Indonesia is a region that can be said to be prone to natural disasters. A natural disaster is an event that is divided into two based on its trigger. First, disasters that occur naturally such as floods, earthquakes, tsunamis, landslides, and so on. Some triggers for natural disasters do not occur naturally, such as famine caused by a combination of human and natural factors (Anon 2024). One natural phenomenon that can cause major losses that is prone to occur during the rainy season in Indonesia is flooding (Putri, Junaidi, and Mustika 2019).

Flooding is a natural disaster that often occurs in urban areas, including Cirebon City (Sari and Khafid 2021). The city of Cirebon faces challenges related to flood management due to decreased hydrological functions due to urbanization and reduced water catchment areas. Flooding can be caused by various factors, such as high rainfall, less than optimal drainage systems, and high levels of ground surface impermeability resulting from uncontrolled development. In 2021, Cirebon City experienced 4 flood points caused by high rainfall, and in 2022 it experienced an increase, namely there were 22 flood points but they were dominated by carelessly thrown rubbish. In 2023, the city of Cirebon will experience a very significant increase, namely there will be 46 flood points caused by high rainfall (Alshammari et al. 2023). To overcome this flooding problem, implementing water absorption policies

is very important to effectively reduce flooding in urban areas.

This research has a novel focus on analyzing the legalization of MSMEs in the development of Tourism Villages. Kurniawati and Rahayu (2020) focused on local community-based tourism village development strategies, while Suhartini et al. (2021) analyzed local government policies related to ecotourism-based tourism village development. Meanwhile, Puspitorini and Widiyanto (2022) examined MSME development strategies in the tourism sector during the Covid-19 pandemic. The research to be conducted is different from previous studies because it focuses on efforts to integrate aspects of MSME business legality with the development of Tourism Villages, which have not been widely discussed in previous studies (Latianingsih et al. 2022). This research is expected to provide policy recommendations for local governments and communities in improving the village economy through the development of Tourism Villages based on legal MSMEs.

One solution that can be implemented to reduce the risk of flooding in urban areas is to implement a water absorption policy (Nguyen et al. 2019). The water absorption policy aims to increase the soil's ability to absorb rainwater, thereby reducing the volume of air flowing into drainage channels and rivers. In this way, it is hoped that it can reduce the risk of flooding that occurs in urban areas. However, implementing the water catchment policy is not easy. There are various challenges that must be faced, such as limited open land available, as well as a lack of public awareness of the importance of the environment. Therefore, in-depth research is needed to ensure the implementation of water absorption policies in flood management in urban areas at the Cirebon City PUPR Service (Li et al. 2020).

The Department of Public Works and Spatial Planning, hereinafter abbreviated to DPUPR, is a Regional Apparatus of the City of Cirebon which carries out government affairs in the environmental sector which was formed to assist the mayor in regulation number 38 of 2019 which states that there is a lack of water absorption in the City of Cirebon, so it is necessary to increase water absorption. In this research, the author will discuss how to implement water absorption policies for flood management in urban areas.

The aim of this research is to analyze the effectiveness of implementing water absorption policies in dealing with floods in urban areas, especially in Cirebon City. This research is expected to provide policy recommendations for local governments in encouraging the development of Tourism Villages based on legal MSMEs, so as to help improve the village economy and the welfare of local communities.

RESEARCH METHODS

The research approach used is normative juridical, conceptualizing law as written norms so that this research emphasizes studies in the form of legislative products, namely those that regulate water absorption such as regional regulation number 38 of 2019 concerning the implementation of groundwater conservation through infiltration wells and infiltration holes. biopore.

RESULTS AND DISCUSSION

Implementation of the Water Absorption Policy for Flood Management in Urban Areas at the Public Works and Spatial Planning Department of Cirebon City

Cirebon City is located in the eastern part of West Java Province, precisely on the North Coast. Its strategic geographical location makes it the main transportation route through the northern coastal area known as the North Coast (Pantura) (Gandharum et al. 2022). Cirebon City has lowland topography with elevation variations that increase gradually from the coast towards the south, reaching a maximum height of 200 meters (Astuti et al. 2019). This lowland area has a height of between 0 and 2000 meters above sea level, with a slope of 0-3% which is marked as an urban area, 3-25% as a transition area, and 25-40% as a peripheral area.

Cirebon City's location in the northern coastal region of Java causes it to have characteristics that tend to be flat and muddy (Solihuddin et al. 2021). This is due to the fact that the northern coastal areas of Java face waters with low wave energy and are home to numerous river deltas. In fact, all deltas on the island of Java are located in the northern coastal region (Handayani et al. 2020). This northern coast faces the shallow waters of the Java Sea, with beaches that are generally flat, with slopes ranging from 0.06% in the Cirebon Bay area to 0.4% in the Karawang area. The coastal areas on the north coast of Java are dominated by alluvial deposits consisting of gravel, sand and mud. These deposits are generally poorly consolidated materials with low resistance to wave erosion (Berghuis et al. 2021).

Coastal conditions in Cirebon City are dominated by type III beaches, which consist of fine to medium sand, poorly sorted, loose and unconsolidated, dark brown in color, and contain white shell fragments. The flat nature of this location has led to extensive use of coastal areas for development activities, urban centers, and population growth towards the coast. This reduces support capacity and increases the vulnerability of coastal areas. The occurrence of abrasion in several sub-districts in Cirebon City has caused an increase in the length of the coastline of around 2.2 kilometers, with an annual increase of up to 100 meters in recent years (Harahap, Purba, and Syamsuddin 2019).

Areas that are vulnerable to being flooded are located in a number of locations, including Jalan Pemuda and Jalan Jalan Pemuda, Sukasari Village, Jalan Dr. Cipto Mangunkusumo, Gunungsari - Jalan Ampera, Perumnas Burung, Perumnas Gunung, Kali Tanjung, and Majasem.

The drainage system in Cirebon City generally uses small rivers as primary/secondary channels that flow by gravity, combining rainwater and household wastewater. With the rapid development of cities and increasing population, intensive land use has a direct impact on flooding and waterlogging in Cirebon City. In general, flood inundation is caused by:

- a) Flooding on main roads occurs due to depressions, especially on bridges that cross rivers. This is caused by the capacity of bridges and channels being smaller than the water discharge/flood that occurs.
- b) Flooding in residential areas is caused by channel capacity being smaller than the flood discharge that occurs, or because road culverts are blocked by sediment, or there are no road drainage channels.
- c) Buildings built above drainage channels cause narrowing of the channel cross-section.
- d) Lack of maintenance on existing drainage channels, with large amounts of rubbish deposited in the channels causing blockages in water flow.

N0.	Location	Big Puddle	Causes of Inundation/Flooding	Height (m)	Area (Ha)	Time (Hours)
1	Nuance	0.3	The capacity of channels and culverts is smaller than the flood discharge that occurs.	1	2	13
	Majasem	2	There is no inlet drain to the channel, the outlet channel is blocked by sediment and rubbish deposits.	0.2	2	15
3	Jln. Dr. Cipto Mangunkusumo	0.4	The capacity of channels and culverts is smaller than the flood discharge that occurs. The culverts are blocked by cable pipes, thereby blocking the	2.29	3	13

			flow of water.			
		0.5	The channel is under sedimentary deposits.	4.32	2	13
4	Park Corporation Jln. Gunungsari	0.3	Water does not enter the channel (Grill/Manhole). Drainage channel capacity on Jln. Kartini was smaller than the flood discharge that occurred.	0.2	3	10
	Sukasari Housing	0.5	The large amount of sediment in the channel causes water to overflow from the channel.	1.76	2	12
5	Majasem GSP Corporation	1	Lots of sediment and rubbish deposits in the drain.	0.3	1	16
6	Jln. Independent	0.3	The channel is under the road and covered by sediment. Water flows over the road surface because there is no drain inlet and manhole.	0.3	4	13
7	Sunness, Kriyan	0.5	The overflow of water from the Kesunean River through the sluice gates during the flood came at the same time as water from residential areas which could not flow into the Kesunean River.	1.5	3	3
8	Jln. Great-grandfather	0.3	inlet drain capacity ; The channel is under the sidewalk.	0.54	1	9
9	Triple Diamond Junction	0.3	Residential settlements are located below the basin; Damage to the sluice gate; The channel capacity is smaller than the flood discharge that occurs.	2,2	5	16
10	Semboja Paper	0.3	A large amount of sediment deposits in the channel; The channel leading to the outlet is still natural, covered by rubbish and grass.	1,2	2	10
11	Perumnas Permata	0.5	The channel capacity is smaller than the flood	1	3	17

				discharge that occurs. Lots of sediment and rubbish deposits in the channel.
12	Perum Ciremai	Griya 1		Overflow of water from the river CSorry, it looks like the table provided is incomplete and some columns have missing information. Can you provide more complete information or fill in the blanks?

Based on the results of previous research and discussions, the general conclusion that can be drawn is that the PUPRPKP (Public Works, Public Housing, Settlement Areas and Land) Service only handles flood management and waterlogging before and after they occur, not when a flood occurs (Lianbing, Daming, and Zhiming 2020). Implementation of policies in dealing with floods and waterlogging also involves a drainage development program which refers to the Regulation of the Minister of Public Works Number 12 of 2014 concerning the Implementation of Urban Drainage Systems (Xiong, Lu, and Tan 2023).

Minister of Public Works Regulation Number 12 of 2014 explains the implementation of an urban drainage system that separates the drainage network and waste water collection network in urban areas. This aims to optimize the function of each system so that it can operate effectively. In this case, the drainage network is responsible for managing rainwater flow and minimizing the risk of flooding and waterlogging, while the wastewater collection network is responsible for managing domestic and industrial waste.

In implementing the drainage development program, the Cirebon City Drainage Section PUPRPKP Service has an important role. They are responsible for planning, implementing and supervising the development of drainage infrastructure in urban areas. This effort involves careful planning, choosing the right location, and applying appropriate construction techniques to ensure the drainage system can function optimally in managing rainwater flow. However, research shows that the PUPRPKP Service focuses more on dealing with floods and waterlogging before and after they occur, rather than making direct prevention and mitigation efforts when a flood occurs. This may be due to factors such as limited resources, prioritization of emergency management, and reliance on reactions to natural disasters.

In this context, it is important to evaluate and improve efforts to deal with floods and waterlogging in Cirebon City. PUPRPKP Department can consider allocating more resources and attention to prevention and immediate response when floods occur. This may include routine care and maintenance of drainage systems, monitoring weather and hydrological conditions, and developing early warning systems and emergency response plans. Apart from that, there needs to be better coordination between the PUPRPKP Service and other related agencies, such as the Regional Disaster Management Agency (BPBD) and regional governments, to strengthen efforts to overcome flooding and waterlogging as a whole. Collaboration between various parties can increase preparedness in facing flood disasters and strengthen a holistic management system.

In order to improve the implementation of flood and waterlogging management policies, it is also important to involve active community participation. Communities need to be empowered to have

a good understanding of preventing floods and waterlogging, and be involved in activities such as awareness campaigns, good waste management programs, and participation in maintaining drainage infrastructure around their environment.

The Cirebon City PUPRPKP Service, in carrying out the activities that have been determined, shows consistency in their implementation. This can be seen through routine activities carried out to monitor the development of drainage channels and maintain proper drainage function. The level of complaints regarding flood spots and standing water in Cirebon City is also measured through public reporting, including through online complaint services. Although there are still deficiencies in the honesty of the PUPRPKP Service in optimizing these complaints to the people of Cirebon City. The organizational structure has a significant role for the PUPRPKP Service in implementing policies, including norms and relationship patterns that occur within the internal bureaucracy. For example, the Secretary of the Cirebon City PUPRPKP Service, Water Management and Urban Drainage Sector, as well as the Technical Implementation Unit work openly and transparently. Thus, the Cirebon City PUPRPKP Service collaborates with other organizational structures to resolve existing flooding and inundation problems.

Based on the explanation above, the PUPRPKP Service carries out policy implementation well by implementing a policy implementation model. Although there are several obstacles in implementing this, such as a lack of adequate human resources and a lack of honesty in implementing policies, such as a lack of publication of the budget for drainage channels to the public.

Factors that hinder the implementation of PUPRPKP Service policies include internal and external factors. External factors include the large amount of rubbish which is the main factor in the occurrence of waterlogging and flooding in Cirebon City due to human activity which still throws rubbish into the drainage channels. Apart from that, the changing spatial factors in Cirebon City are also an inhibiting factor, and there are several areas that still have few drainage channels, which makes the Cirebon City PUPRPKP Service face obstacles in building drainage channels due to land ownership which is still owned by the community.

Evaluation and Analysis of Related Legislation

a. Law of the Republic of Indonesia Number 24 2007 concerning Disaster Management

The implementation of Law Number 24 of 2007 concerning Disaster Management is closely related to various laws and regulations relating to disasters. In this context, the linkage analysis includes the relationship between the law, its implementing regulations and other regulations governing disaster management. Basically, Law Number 24 of 2007 regulates the implementation of disaster management in three stages, namely pre-disaster, disaster and post-disaster. This stage must be carried out continuously to ensure effectiveness in dealing with disasters. In its implementation, this Law is supported by implementing regulations which regulate in more detail the concrete steps that must be taken at each stage of disaster management. Apart from that, the implementation of Law Number 24 of 2007 is also related to other laws and regulations related to disasters. Some examples of these regulations include:

1. Law Number 6 of 2011 concerning Immigration: This regulation is important in regulating disaster management related to immigration aspects, including regulations related to evacuation and protection for foreign nationals affected by disasters.
2. Law Number 23 of 2014 concerning Regional Government: This regulation provides the basis for regional governments to manage disaster management in their regions. This includes the formation of a Regional Disaster Management Agency (BPBD) and determining responsibility and authority in disaster management.
3. Government Regulation Number 21 of 2008 concerning the Implementation of Disaster

Management: This regulation provides a legal umbrella that regulates in more detail the duties, functions and authority of relevant institutions in disaster management, including BPBD and the National Disaster Management Agency (BNPB).

4. BNPB Regulation Number 2 of 2020 concerning Disaster Management Standards: This regulation regulates operational standards and procedures in disaster management which serve as a reference for all related parties in carrying out disaster management actions.

The linkage of Law Number 24 of 2007 with these regulations is very important to create a comprehensive and coordinated legal framework for disaster management. With these regulations, it is hoped that disaster management can be implemented effectively, efficiently and coordinated by the various parties involved, including the central government, regional government and the community.

b. Law Number 26 of 2007 concerning Spatial Planning for natural and non - natural disasters

Implementation of the Disaster Management Law can affect regional spatial planning because disasters can impact land use, settlement patterns and infrastructure. In this context, the Spatial Planning Law is an important instrument for regulating and supervising land use and regional development by considering disaster risk mitigation. The Spatial Planning Law covers various aspects of spatial planning, including land space, sea space, air space and space inside the earth. The aim of this law is to maintain the quality of national territorial space so that it can be sustainable and contribute to general welfare and social justice.

In the context of disaster management, the Spatial Planning Law can provide guidelines and restrictions regarding the use of land that is vulnerable to disasters, such as flood areas, steep slopes, or earthquake-prone areas. This can be done through the establishment of zoning or special areas that regulate land use and development in the area. Apart from that, the Spatial Planning Law can also strengthen disaster mitigation efforts through spatial planning that considers disaster risk factors. For example, in determining regional spatial planning, attention must be paid to the location of infrastructure development that is safe from disaster risks, such as taking into account the distance from the coast to avoid the danger of tsunamis or considering slope stability when building in landslide-prone areas.

With the link between the Disaster Management Law and the Spatial Planning Law, it is hoped that disaster management can be integrated holistically in regional spatial planning and management. This will help reduce disaster risks, protect communities, and maintain the sustainability of regional spatial planning in order to achieve general prosperity and sustainable social justice.

c. Mayor's Regulation Number 38 of 2019 concerning Implementation of Groundwater Conservation through Absorption Wells and Biopore Absorption Holes

The Public Works and Spatial Planning Service, or what is usually called the PUPR Service, only handles flood disaster problems before and after a flood disaster occurs. In implementing policies for flood management, the implementation of the water absorption program refers to Cirebon Mayor Regulation number 38 of 2019 concerning the Implementation of Groundwater Conservation through Absorption Wells and Biopore Absorption Holes. The provision of infiltration wells and biopore absorption holes is one of the water conservation techniques that functions as a place to collect rainwater that falls on the roofs of houses or water-tight areas and then seeps it into the ground. The aim and purpose of this Mayor's regulation is to collect and store rainwater, increase groundwater reserves, reduce rainwater runoff into drains and other water bodies, and reduce the occurrence of puddles and floods and utilize them during the dry season.

Policy implementation in flood management by the Cirebon City PUPR Service has included handling floods and puddles as a priority in the Regional Government Work Plan (RKPD) for 2025. For handling urban drainage, the PUPR Service's work target is to reach up to 83% by 2024, and

86% for 2025, and 89% for 2026. One of the strategies taken includes the creation of retention ponds, absorption wells and eco-drainage.

This is in line with Mayor Regulation number 38 of 2019 which regulates the implementation of groundwater conservation through infiltration wells and biopore absorption holes.

CONCLUSION

Based on the results of the discussion, the researchers concluded that the Cirebon City PUPR Service had implemented a water absorption policy for flood management in urban areas. This policy is based on several laws and regulations, including Law no. 24 of 2007 concerning Disaster Management, Law no. 26 of 2007 concerning Spatial Planning, and Cirebon City Regulation No. 38 of 2019 concerning Implementation of Groundwater Conservation through Infiltration Wells and Biopore Infiltration Holes. Implementation of this policy is carried out through several programs, such as the construction of retention ponds, infiltration wells and eco-drainage. Apart from that, the Cirebon City PUPR Service also targets to reach a percentage of urban drainage management of up to 89% by 2026.

However, there are still several obstacles in implementing this policy, such as limited resources and lack of community participation. To overcome these obstacles, efforts need to be made such as increasing the budget, providing adequate human resources, and educating the public about the importance of water absorption. Overall, the implementation of the water absorption policy for flood management in Cirebon City has shown a positive direction. With continued efforts and collaboration from various parties, it is hoped that this policy can be more effective in minimizing the risk of flooding in urban areas.

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