

## The Resilience of the Community of Bantaran Ciliwung River East Jakarta, Influencing Factors, and Adaptation Steps

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**Abstract:** *The city of Jakarta has become a flood subscription every year. It has an impact on causing human casualties, environmental damage, property losses, and psychological and social impacts, thereby reducing the quality of life of the community. Some of the disasters that affect people's lives, namely floods, lonsor land, earthquakes, droughts, and environmental pollution, are caused by domestic and industrial waste. Therefore, this study was conducted to analyze the level of resilience of people living on the ciliwung river and the influencing factors, and what adaptation steps were taken to increase the resilience of the Ciliwung riverbank community in the face of floods. Data collection was carried out through questionnaires for primary data with 40 respondents affecting the community living on the Ciliwung river, while secondary data was carried out through a literature review. Data analysis was carried out with simple tabulations and descriptive quantitative and qualitative to determine the factors and steps of recurrence adaptation. This study uses the theory and concept of the Climate and Disaster Resilience Initiative (CDRI) chosen to assess resilience in this study because of its suitability to the conditions of the research area. The results showed that people whose resilience reached 75 percent and were not resilient reached 25 percent, the factor that affects the resilience of people living on the Ciliwung river in the East Jakarta Administrative Region is a protective factor. The conclusion of this study shows that most of the people who live on the ciliwung river are very resilient to flood disasters, while the resilience factors are influenced by the simple activities of the community on the river with suitable adaptation measures to the problem, it is good that this adaptation step is also influenced by community awareness education to disasters.*

**Keywords:** *Flood; Ciliwung Watershed Bantaran Community and resilience*

### Introduction

The natural situation and the surrounding environment significantly influence people's lives in every effort to improve livelihoods. One of them is the factor of natural disasters. Disasters are events that threaten and disrupt people's lives and livelihoods caused by natural and non-natural factors and human factors, resulting in human casualties, environmental damage, property

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losses, and psychological and social impacts. Some disasters that affect people's lives, namely floods, loss of land, earthquakes, droughts, and environmental pollution, are caused by domestic and industrial waste.

The intensity of floods in Jakarta, Bogor, Depok, Tangerang, and Bekasi areas continues to increase every year. Flooding is an event or situation where an area or land is submerged due to an increased volume of water caused by climate change, increased frequency, and silting and narrowing of river flows (Sunarharum, 2021). The existence of floods encourages the surrounding community to be able to adjust and adapt to be able to survive in the existing situation.

One of the areas of DKI Jakarta that is vulnerable to flooding and slums is the banks of the Ciliwung river (Fitrianti & Fadhilah, 2018) Since construction of various houses, offices, and other business districts, many residents have thrown garbage and sewage on the Ciliwung river. The problem resulted in the river's smell, dirt, and flooding, since the 2000s. (Manurung, 2014)

On the other hand, the occurrence of coastal tidal floods in the northern coastal area of Jakarta can also worsen the impact of river floods, resulting in extreme inundation that occurs every five years, which then changes the pattern to annual floods, as experienced in 1996, 2002, 2007, 2013, 2014, 2015, 2016, 2019, and 2020 (Agung Prambodo, 2006).

The trend suggests that significant floods are becoming more frequent, intense, and widespread. However, the city of Jakarta is also experiencing flooding due to inadequate capacity of drainage channels and flood control systems, clogged waterways, and a lack of catchment areas (Aisyah & Listiyandini, 2015c). The flooding event in February 2007 is considered the worst in history, with about seventy percent of the province affected. The flood directly affected 400,000 people and caused losses of nearly US\$1 billion (Sunarharum, 2021) In comparison, the floods in 2013 were not so severe, but the flood inundation lasted for 59 days, which then caused economic losses of US \$ 2 billion (BPBD DKI Jakarta, 2013). In addition to land subsidence of about 10 cm per year, it is also a factor in further increased exposure to extreme flood risk in several Jakarta areas (Aisyah & Listiyandini, 2015b).

## **Literature Review**

Resilience is a picture of the process and outcome of successfully adapting to difficult circumstances or very challenging life experiences, especially circumstances with high levels of stress or traumatic events (Wald et al., 2006).

According to Reivich. K and Shatte. As outlined in his book "The Resiliency Factor," explains resilience is the ability to overcome and adapt to severe events or problems that occur in life. Surviving in a depressed state and even dealing with adversity or trauma experienced in his life (Wald et al., 2006).

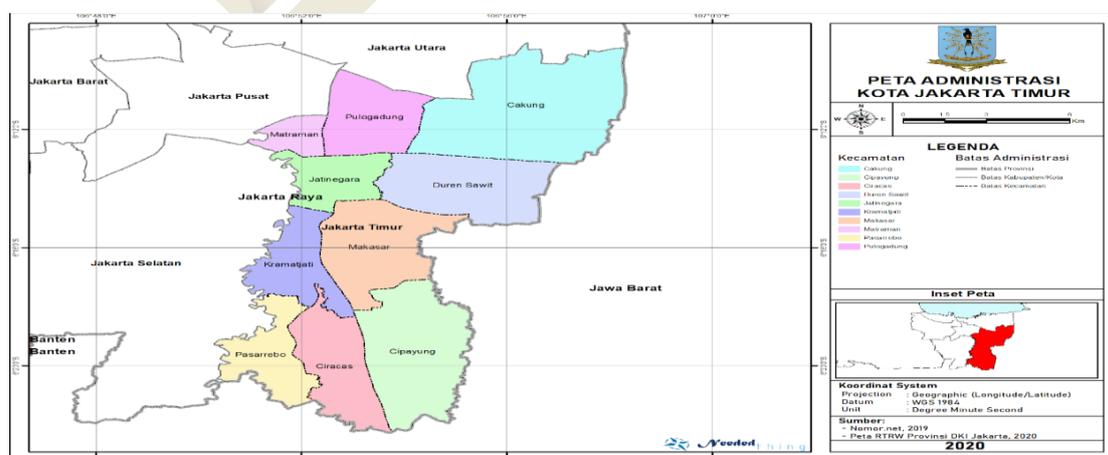
There are various psychological impacts of flood events; a system is needed to maintain the function and structure of the self in the face of disturbances, as well as the ability of the system to organize itself, which is related to pressure due to changes called resilience (Louis *et al.*, 2006). Resilience in the context of a disaster is the capacity of the community to manage the disaster well through a process of adaptation, maintaining essential functions within the community, and the capacity to recover as it was before the disaster (Twigg, 2013).

Resilience is an indicator of the sustainability of the life of a person living in a difficult situation. When a person is in a difficult situation, she tends to be depressed and is at a critical time. Twigg (Twigg, 2013) and (Aisyah & Listiyandini, 2015b) also outlined some of the characteristics of community resilience, namely anticipation, protection, adaptation, and resilience. Resilience itself is also related to social capital. Pidgeon et al (Pidgeon et al., 2014) pour out elements in social organizations in the form of pyramids that place the structure of the antecedent network of communities and the conditions of the community and their characteristics at the base. In the middle section, a process of social action from community capacity and social capital is placed. Next at the top is placed the community.

## Methodology

This research is a descriptive study that seeks to describe residents' resilience in flood-prone areas of East Jakarta in depth (Indonesia & Vanbreda, 2018). This study wants to describe the capacity, strength, or habits of optimistic residents so that they can survive and continue to behave productively in flood-prone areas.

East Jakarta was chosen as the research location because it is one of the administrative areas in DKI Jakarta that is the location of flood subscriptions every rainy season, namely in Outahan Bidara Cina, Kampung Melayu Village, Cilitan Village, and Cawang Village, as in the location map below.



Map of East Jakarta Research location

Table 1 of the subject of study

Subject	Sum	Percentage
Residents aged 30 to 55 years	31	51
RT Administrators	15	25
RW Board	10	17
Disaster Taske Force	4	7
SUM	60	100

The data above shows that observations were carried out on citizens of the age of citizens (aged 30-55 years), namely people who have lived for more than ten years in the region (51%). Furthermore, the data was obtained through interviews of RT administrators (25

percent); The number of RW administrators interviewed was (10%). In addition, focused discussions were held with four disaster task force people (7%).

Research data were obtained from 4 exits affected by flood disasters in the administrative area of The City of East Jakarta in June-August 2022 through the following methods: (a) Observation, direct observation of various forms of behavior of research subjects, both non-verbal behavior and verbal behavior, namely community behavior when the location is affected by floods (b) Interviews with residents of RT and RW; The interview is based on interview guidelines that have been made by research studies, namely resilience, coping strategies and positive behavior of residents in the face of flood disasters. (c) *Focus group discussion* (FGD), focused discussion with disaster stages with focused discussion guidelines that have been made following research studies, namely resilience, *coping strategies*, and positive behavior of residents facing flood disasters.

A secondary survey was carried out for secondary data to obtain references to adaptation efforts to increase social resilience from the literature review. Meanwhile, the primary survey was conducted with *In-depth Interviews* with selected *stakeholders*. *In-depth Interviews* were conducted to collect information on *stakeholder* responses to adaptation directions for increasing resilience. *Selected internal stakeholders* related to research in the East Jakarta Region from the government are the Exitahan office, the Community Empowerment Institute (LPM), and the Disaster Task Force. From the community, side is the RW management and RT management.

## Findings & Discussion

The resilience ability of the community after the flood disaster is shown in the table below:

**Table 2 Community Resilience of the Administrative City of East Jakarta**

No	Resilience	F	Percentage
1	Excellent	15	25
2	Good	30	50
3	Not Good Enough	15	25
4	Bad	-	-
5	Very Unkind	-	-
	Total	60	100

Source: research data processing results

Based on the results of the research above regarding the picture of the resilience ability of the East Jakarta Administrative Kora community, table 1 shows that out of 60 respondents, there are 15 people (25%) who have excellent resilience ability, 30 people 50 percent experience good resilience and while there is 15 percent who are not good. Resilience is the capacity to respond healthily and productively when facing difficulties or trauma, where it is essential to manage the stresses of daily life (Pidgeon et al., 2014).

Efforts to understand resilience can never be separated from protective factors and risk factors. (Twigg, 2013) explain that protective factors play a role in modifying the adverse effects that are detrimental to life and help increase self-resilience, like preventing bad things that may happen in the future. Among the protective factors are (a) Individual attributes, the ability to control oneself and emotions; (b) A warm and trusting relationship, family

relationship, or friendship; (c) *External support systems*, social relations with the surrounding environment: neighbors, work environment, or community. Risk factors are things that give rise to vulnerability to distress. Risk factors refer to painful conditions that can lead to maladjustment (inability to adjust). Among the risk factors affecting resilience are diseases carried from birth and stressful social and economic environments.

**Table 3 Protective Factors of society that favor resilience**



Region	Characteristics of citizens and the environment
Kelurahan Bidara Cina	Community residents create environmental care groups at the community level, physically raise houses from the banks of the Ciliwung river and carry out mutual aid work after the flood; besides that, there is an evacuation map.
Kelurahan Cawang	There has been a conventional early warning system in the community environment if the flood arrives, and after the flood, the community will also carry out cooperation to resolve the impact of the flood
Kelurahan kampung Melayu	A disaster task force has been formed at the RT and RW levels; routinely, the community is accompanied by universities to provide counseling and socialization about flood disasters.
Kelurahan Jatinegara	The community has built a mutual aid system in disaster management and an embankment that withstands floods; besides that, a disaster task force can carry out emergency response and education to residents.

Source: research data processing results

The factors that affect the resilience of the ceiling riverbank community in the East Jakarta Administrative City Area are, among others, social factors, where there is a close relationship between the community to make them feel at home and comfortable living there; the factor of ease of access; the factor of distance from the source of their activities; economic factors, namely the high price of land, as well as other factors such as the existence of a community that cares about disasters and physically. The community can carry out essential activities such as making temporary embankments or the existence of multi-story houses as temporary gathering places.

Preparedness is an essential aspect of disaster management. The development of disaster management capabilities is emphasized in improving the ability of the community, especially communities in disaster-prone areas, to reduce the threat early. So far, disaster preparedness in the community has not been going well. There is no system that makes people trained in disasters, while existing early detection systems for disasters have not been able to be adequately accessed by the community.

Preparedness efforts are a form of community resilience to disasters, especially floods. The level of community resilience is a measure of a community's ability to absorb change and survive in a specific condition in its environment. According to Reivich and Shatte (Wald et al., 2006), the seven abilities that make up resilience are the following: regulation, emotion, impulse control, optimism, empathy, causal analysis, self-affectation, and reaching out.

Every individual has all the resilience factors above, but what distinguishes one individual from another is how the individual uses and maximizes the factors in himself so that it becomes an ability that helps the individual to survive in the face of difficulties or crises experienced, as well as prevent things that can trigger stress in the recovery period and can provide the ability to rise better than the previous situation. People who have experienced disasters and have begun to rise from the slump or resilience but still have a low level of vigilance.

## **Support and Parenting**

The support and care that exists in the people of East Jakarta come from the Kelurahan, as well as organizations and communities, agencies, and political parties with interests. Support is provided by them in the form of assistance when there is a flood, while the government and existing organizations, such as PMI, provide support and care through empowerment efforts made to the community. For example, Kelurahan provides empowerment to the community by increasing residents' knowledge through counseling activities about floods or PMI, which shows their care to residents by improving community-based disaster preparedness (SIBAT) by providing knowledge and training to them (Aisyah & Listiyandini, 2015a).

The impact of this care is long-term, which can increase the knowledge, ability, and independence of residents in the face of floods. Meanwhile, the assistance provided during floods by other stakeholders, such as private sector industries, is only incidental or *short-term* through assistance provided during significant floods, generally in the form of logistical assistance.

## **Behaviour Adaptation and community mitigation in flood disasters**

Adaptation Behavior and Actions of Riverbank Communities Towards Flood Disasters. There are two types of preparedness activities that are often carried out for life safety protection that can be used in any danger, namely (Aisyah & Listiyandini, 2015b): making family evacuation planning (planning gathering points, transportation, and evacuation routes) and simulated training on family evacuation planning.

In addition, (Pidgeon et al., 2014) argue that at the household level, in addition to protecting life safety, it is also carried out on the protection of property owned by registering with insurance (Irwan et al., 2022) and also taking steps to deal with disasters in an emergency, making action plans to deal with disasters, making evacuation route plans to deal with disasters, carrying out divisions of tasks in the face of disasters, preparing emergency equipment, agreeing on evacuation sites, conducting evacuation training and simulations, life insurance, and property insurance (Irwan et al., 2022).

Meanwhile, mitigation efforts are considered to be able to reduce and or eliminate losses and casualties that may occur due to disasters, namely by making preparations before the disaster occurs. With the aim, first, to minimize the risks and or impacts that may occur due to a disaster, from damage to natural resources. Second, as a guideline for the Regional Disaster Management Agency in making development plans in areas affected by floods. Third, help increase public awareness and knowledge in dealing with disaster risks and impacts.

Flood disasters cannot be avoided entirely, but communities can reduce the likelihood of flooding and reduce its impact by taking simple actions in a participatory manner, such as:

1. Clean sewers, gots, and rivers from garbage and sand so they can drain water out of residential areas to the maximum.
2. Create effective landfills and systems to prevent garbage dumping into rivers or sewers.
3. Add a setting valve, drain, or bypass line to drain water out of the housing.
4. Strengthen the riverbanks by planting trees and shrubs and creating infiltration fields in the yards of houses connected to drainage channels.

5. It removes houses, buildings, and other construction from the floodplain so that the river can use the area to drain water that cannot be accommodated in the river body when it rains.
6. They are reforesting the rain catchment area so trees and shrubs can absorb rainwater.
7. Create green areas to absorb water into the soil.

### Reference to Community Adaptation Efforts

Based on the results of the literature study, several directions of social adaptation efforts can be obtained that can be carried out, as shown in the following table.

**Table 4.**

#### Reference to social adaptation efforts in the face of floods in the research area

Adaptation efforts from the literature	Source
The number of residents who are members of the community as well as the number of residents who participate in social activities	
Community involvement setting up refugee tents	Aminudin, 2013 dalam Nurhaimi dan Rahayu, 2014
Community involvement in establishing a soup kitchen	Aminudi (2013) dalam Nurhaimi dan Rahayu (2014)
Community involvement in distribution Help	Aminudi (2013) dalam Nurhaimi dan Rahayu (2014)
Help-help	Huda, 2014
Working on norms to keep going well	Huda, 2014
Devotional work	Nurhaimi dan Rahayu, 2014
Formation of groups based on regional similarities/proximity	Sander dan Lowney, 2006
Group formation based on similar hobbies/needs	Sander dan Lowney, 2006
Certain celebrations	Sander dan Lowney, 2006

Source: processed secondary data

**Table 5.**  
**Reference to social adaptation efforts in dealing with floods in the region research**

Adaptation efforts from the literature	Source
Populasi penduduk yang mengalami sakit akibat pencemaran air banjir ( <i>waterborne disease</i> )	
Using clean water efficiently	Aminudin, 2013 dalam Nurhaimi dan Rahayu, 2014
Does not allow saplings to play in floodwaters	Ariantoni, Paresti & Hidayati, 2009
Keeping sewage and dirty water systems working	Ariantoni, Paresti & Hidayati, 2009
Socialization and advocacy of health sector adaptation	Ministerial Regulation on Strategy Health Sector Adaptation to Impacts of Climate Change, 2009
Improvement of existing health services	PMI Disaster Management Division Center, 2007
Establishing a health post and emergency health assistance	Aminudi (2013) dalam Nurhaimi dan Rahayu (2014)
Availability of disaster awareness programs or training	
Education of the public	Nurhaimi dan Rahayu, 2014
Increased awareness of possible changes in farming patterns	Divisi Penanggulangan Bencana PMI Pusat, 2007
Swimming lessons for Children	Divisi Penanggulangan Bencana, PMI Pusat, 2007
Preparation and delivery of preparedness plans	Khan, 2008
Creation of evacuation routes	UNISDR, 2009
Establishing flood response community groups	Ariantoni, Paresti dan Hidayati, 2009
Internet access	
Implementation of flood information systems directly to the material and nonmaterial communities to the community	Ariantoni, Paresti dan Hidayati, 2009
Integrating institutional and community engagement in planning	Huda, 2014

Source: processed secondary data

The reference to adaptation efforts aims to reduce the population of residents who experience illness due to *floodwater pollution (waterborne disease)* and to support the smooth availability of disaster awareness programs or training.

**Table 6.**  
**References to social adaptation efforts in the face of flooding, specifically for urban areas**

<b>Adaptation efforts from the literature</b>	<b>Source</b>
The ability of the population in the decision-making process (democratic level)	
Village/kelurahan website creation	Kuripan penengahan.desa.id, 2016
Building public spaces for democracy	Evans & Boyte, 1992 dalam Imagawa, Porter, Sulis, Wozniak, & Minerbi, 2016
Providing material and nonmaterial support to the community	Huda, 2014
Integrating institutional and community engagement in planning	Huda, 2014

Source: processed secondary data

The above reference of adaptation directions is specific to urban areas based on their social resilience. The reference to adaptation efforts aims to improve the ability of the population in the decision-making process. The adaptation directives are then asked by selected stakeholders whether they are appropriate to be applied in the research area or not.

### **Conclusion**

Based on the results of the analysis that has been carried out in the previous discussion, conclusions can be obtained from this study as follows:

1. The East Jakarta area is *resilient* from a social point of view in the face of flooding overflows in the Ciliwung River and is in the excellent category.
2. There are several similarities and characteristic differences among the study areas. The similarity of the characteristics of the area is that it is an urban area affected by floods whose communities still have a concentration on mutual aid. However, community participation in social activities is low. Increasing social resilience can be done several things as follows:
  - a. It is optimizing activities that involve community cooperation and optimizing the role of certain groups that have formed in the region.
  - b. The need for assistance and involvement of the government's role in dealing with flood conditions.
  - c. We are optimizing the role of existing health facilities, seeking easy access to clean water, and implementing the most suitable planting pattern.
  - d. Education related to disasters, establishing emergency response groups, and increasing the readiness of the community and the government in facing floods from various aspects.
  - e. Increase cooperation between the government and the community to deal with floods.
  - f. It facilitates communication between the community and the government through infrastructure to support communication. In addition, it is also necessary to maximize the existing communication support infrastructure.

- g. Encouraging inter-community engagement through the provision of needs during floods by the community and for the community.

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