

## TIPOLOGI STRATEGI KETAHANAN KOTA YOGYAKARTA TERHADAP BENCANA ALAM

### TYOLOGY OF RESILIENCE STRATEGIES FOR NATURAL DISASTERS IN YOGYAKARTA CITY

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#### ABSTRACT

*Urban areas in disaster prone require increased capacity in order to reduce the risk level. This study identifies resilience strategies in towards natural disasters in the village unit to obtain detailed data. This study uses field observations to find information about resilience strategies that have been carried out by the government and by the public in general and with snowball sampling techniques in each unit of analysis. Some strategies obtained were then made a typology of strategies found in several villages in the city of Yogyakarta. The results of this study are there are two types of strategies for increasing resilience in Yogyakarta, bottom-up strategy and top-down strategy. Bottom-up strategy is a strategy that was indeed initiated and carried out by the village although in the end it still cannot be separated from the role of main stakeholders, among others, is conducting disaster simulations, training in the use of emergency equipment, disaster socialization, planning, and infrastructure preparation. Top-down strategy is a strategy or policy carried out by the regional government in order to coordinate the level of resilience in the entire region of Yogyakarta, including the addition of the Kampung Tangguh Bencana (KTB), village expansion, organizing volunteers, and infrastructure development.*

**Keywords:** *strategy; resilience; natural disasters; Yogyakarta; Kampung Tangguh Bencana; typology*

#### ABSTRAK

Daerah perkotaan yang rawan bencana memerlukan peningkatan kapasitas untuk mengurangi tingkat risiko. Penelitian ini mengidentifikasi strategi ketahanan dalam menghadapi bencana alam dalam unit kelurahan untuk mendapatkan data terperinci. Penelitian ini menggunakan observasi lapangan untuk menemukan informasi tentang strategi ketahanan yang telah dilakukan oleh pemerintah setempat dan masyarakat secara umum dengan teknik pengambilan sampel bola salju di setiap unit analisis. Beberapa strategi yang didapat kemudian dibentuk tipologi strategi yang ditemukan di beberapa desa di Kota

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Yogyakarta. Hasil dari penelitian ini adalah ada dua jenis strategi untuk meningkatkan ketahanan di Yogyakarta, strategi bottom-up dan strategi top-down. Strategi bottom-up adalah strategi yang memang diprakarsai dan dilaksanakan oleh kelurahan walaupun pada akhirnya tetap tidak terlepas dari peran pemangku kepentingan utama, antara lain melakukan simulasi bencana, pelatihan penggunaan peralatan kedaruratan, sosialisasi bencana, perencanaan, dan persiapan infrastruktur. Strategi top-down adalah strategi atau kebijakan yang dilakukan oleh pemerintah daerah untuk mengkoordinasikan tingkat ketahanan di seluruh wilayah Yogyakarta, termasuk penambahan Kampung Tangguh Bencana (KTB), pemekaran kampung, pengorganisasian relawan, dan pengembangan infrastruktur.

**Keywords:** ketahanan; bencana alam; Yogyakarta; Kampung Tangguh Bencana; tipologi

## INTRODUCTION

Indonesia is located between 3 active tectonic plates that pass through Indonesia, namely the Eurasian, Indo-Australian and Pacific plates which cause high intensity of natural disasters. The activity of tectonic plates that collide with each other between oceanic plates and continental plates will cause seismic that are the origin of earthquakes. The effect of the plate sharpening also encouraged the formation of magma in the bowels of the earth and made Indonesia a Ring of Fire, a region of enormous volcanoes. In addition, the location of Indonesia at the junction of the continents of Asia and Australia led to monsoons which often became the cause of the storm with the flood disaster as a subsequent disaster. Related to natural disaster mitigation, for some disasters such as floods, landslides, fires, and several other disasters can be done through structural mitigation and non-structural mitigation.

Resilience can be understood as the capacity to anticipate, minimize, and absorb potential pressure or destructive power through adaptation. Besides that resilience is also considered as an activity of managing or maintaining certain basic functions and structures in the event of a disaster (Twigg, 2009). The concept of resilience greatly influences post-disaster regional planning, development and

reconstruction (Peng et al., 2017). (Kafle, 2011) also mentioned that community resilience can be interpreted as the ability of the community to anticipate and overcome disruption caused by disasters, then return to the conditions before the disaster occurred. Meanwhile, Twigg (2007) defines resilience as a broader concept of capacity. According to Twigg (2007), a focus on resilience means giving greater emphasis to what people can do for themselves and on ways to strengthen their capacity.

Capacity in relation to disaster risk reduction according to Twigg (2009) is a concept in which there are behaviors, strategies, and management steps and risk reduction to deal with a disaster. Behavior and strategy in the concept of capacity basically can be further elaborated into physical and non-physical development programs including the construction of infrastructure related to physical, social, and economic aspects. Capacity basically is not fixated on the behavior and strategy of an individual but is also related to the community and its space. According to the National Guidelines for Disaster Risk Assessment (BNPb, 2012) capacity is the ability of regions and communities to take action to reduce the level of threat and the level of loss due to disasters.

Vulnerability is a characteristic of a community that makes them easily affected by a disaster (UN-ISDR, 2009). According to BNPb (2012) vulnerability is a condition of a community or community that leads or causes inability to face the threat of disaster. There are three main principles in vulnerability research: identification of conditions that make people or places vulnerable to extreme natural events, models of exposure (Burton et al., 1993; Anderson, 2000 in Cutter et al., 2003); assumption that vulnerability is a social condition, a measure of community resilience or resistance to danger (Blaikie et al., 1994; Hewitt, 1997 in Cutter et al, 2003); and integration of community exposure potential and resilience with a special focus on a particular place or region (Kasperson, et al., 1995; Cutter et al., 2000 in Cutter et al, 2003). Singh et al., (2014) also emphasized that basically vulnerability from the perspective of danger and disaster is a conceptual relationship that connects humans

with their environment with the strength of social institutions and cultural values that sustain or oppose it.

According to the North Dhaka City Corporation (DNCC) in Kabir et al. (2018) the level of disaster resilience in urban areas can be measured through the Urban Disaster Resilience Index (UDRI) which was developed based on the Climate Disaster Resilience Index (CDRI) by the International Environmental Laboratory and Disaster Management of the School of Environmental Studies Graduate School of Kyoto University, Japan in 2008. UDRI according Kabir et al. (2018) measure resilience to city disasters by considering five dimensions: physical, social, economic, institutional and natural. All components of the resilience can then be elaborated on the conceptualization of the capacity made above. In Indonesia, the concept of a resilient city has now been able to be applied to a resilient city and has also been adopted by the BNPB Program as a disaster resilient village / village through Perka BNPB No.1 of 2012.

In general, economic turnover, population density, building density, and the use of cultivation areas in an urban area are classified as high, while economic, social, and physical factors are aspects that greatly affect adaptation and resilience in a city (Wardhani, 2017; Ayunda, 2014, and Darminto, 2011). This is an important concern because if the economic, social, and physical aspects are not controlled and are not balanced with good capacity then the region will have a high risk of disaster. In addition, there is a function  $R = H \times V / C$  for risk determination and risk reduction management. Hazard (H) is a variable that tends to be constant, therefore vulnerability (V) and capacity (C) are variables that can be managed so that the risk value (R) can be small.

The location of the city of Yogyakarta which is not far from the location of active faults and the earth plate subduction zone also makes this region a high threat of disaster. In general, the city of Yogyakarta has a high resistance index. However, there are still several kelurahan that have a low resistance index, there are Demangan, Panembahan, Muja-muju, Tahunan, Sorosutan, Rejowinan-

gun and Prenggan. (Krisnantara & M. Sani Roychansyah, 2019). In addition, the city of Yogyakarta is located between Mount Merapi and the southern coast of Java which has the threat of volcanoes and tsunamis. The number of densely populated settlements in the city of Yogyakarta also makes this region prone to fire disasters. The city of Yogyakarta is also crossed by several rivers that divide the Special Region of Yogyakarta from the upstream area in the north to the downstream area in the south which is prone to flooding and overflowing rivers when the discharge is high. The high risk of disasters in the city of Yogyakarta requires people to have to adapt to increase resilience to the disaster. Therefore, this paper examines the types of adaptation to improve disaster resilience by the people of Yogyakarta City. These types of adaptation can later be derived as an index of resilience to assess the resilience of an area in the face of a disaster.

## METHOD

This study uses an inductive approach that is as an approach used to build a concept as a conclusion of an existing phenomenon. The inductive approach is basically also better understood as a research process that is specific to the public. Various phenomena or enter primary data in the field are then drawn into conclusions to be used as theories or variables. The data analysis technique used in this study is qualitative. Qualitative analysis techniques are often called naturalistic inquiry, which is that whatever the type, method, and style of analysis of a study, basically what is done is to read about the phenomena of an observed object. Qualitative research involves the use of empirical material in the form of case studies, personal experiences, introspection, life history, interviews, observation, historical, interactional, and visual texts that describe routine and problematic moments in individual and collective lives. In this study, a qualitative approach is used as a basis for finding and understanding strategies that have been developed by the community to adapt to natural disasters.

This study uses observations as many as 45 villages in the city of Yogyakarta. The unit

of analysis in this study is the stakeholders and related communities as the government and space fillers in the region. This research will identify the extent to which the government and the community make adaptations related to the disaster resilience strategies that exist in each of their observation units.

Field observations were carried out using questionnaire research instruments. The data collection technique was snowball sampling with the main respondent being the village head and his staff and then the village head was expected to be able to direct the researcher to respondents who were considered important in the area. Through this context, the observation to find community resilience strategies against natural disasters is to find out how people can survive under the threat of natural disasters. In addition, what efforts have been made by the community and the region to be able to minimize the level of disaster risk that exists. Each strategy is then scaled and scaled using min-max scaling so that each strategy has an index. Some strategies that were obtained then made a typology of what strategies are found in several villages in the city of Yogyakarta. The typology of strategy is

presented using a pie chart with the percentage of each strategy to see what strategies are generally used in each village.

## RESULTS AND DISCUSSION

Basically according to the explanation from the local kelurahan officials, all kelurahan rely on disaster socialization, disaster simulation, training in the use of emergency equipment by the BPBD. Simulation, training and outreach activities are basically carried out by the BPBD in each unit of the Kampung Tangguh Bencana (KTB). The implementation of simulation, training, and socialization is a form of adaptation of the people of Yogyakarta City. According to the presentation from the Yogyakarta BPBD team, basically the people of Yogyakarta City have had good resilience and preparedness after the experience of the 2006 earthquake and the Merapi eruption in 2010. These two events became a turning point in increasing the capacity to deal with disasters after the community was still blind about disaster. The following are the types of strategies carried out by each village in increasing resilience.

Table 1.  
Types of resilience strategies in each Village

Village	Strategy				
	Simulation	Training	Socialization	Planning	Build Infrastructure
Kricak	Available	-	Available	-	-
Karangwaru	Available	Available	Available	-	-
Tegalrejo	Available	Available	Available	-	-
Bener	Available	Available	Available	-	-
Bumijo	Available	Available	Available	-	-
Cokrodiningratan	-	Available	Available	-	-
Gowongan	Available	-	Available	-	-
Demangan	Available	-	Available	-	-
Kotabaru	-	Available	Available	-	-
Klitren	Available	-	Available	-	-
Baciro	Available	-	Available	-	-
Terban	Available	Available	Available	-	Available
Suryatmajan	Available	-	Available	-	Available
Tegalpanggung	Available	Available	Available	-	-
Bausasran	Available	-	Available	-	-
Sosromenduran	Available	-	Available	-	-

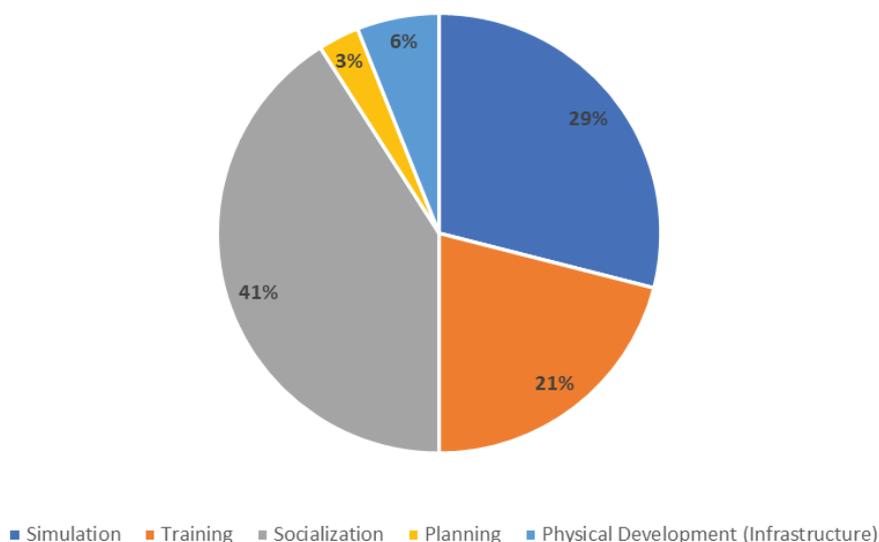
Lanjutan Tabel 1

Village	Strategy				
	Simulation	Training	Socialization	Planning	Build Infrastructure
Pringgokusuman	Available	-	Available	-	-
Ngampilan	Available	Available	Available	-	-
Notoprajan	-	-	Available	-	-
Pakuncen	-	-	Available	-	-
Wirobrajan	-	-	Available	-	-
Patangpuluhan	-	-	Available	-	-
Gedongkiwo	Available	-	Available	-	-
Suryodiningratan	Available	-	Available	-	Available
Mantrijeron	-	-	Available	-	-
Patehan	-	Available	-	Available	-
Panembahan	-	-	Available	-	Available
Kadipaten	Available	Available	Available	-	Available
Ngupasan	-	-	Available	-	-
Prawirodirjan	Available	Available	Available	-	-
Purwokinanti	Available	Available	Available	-	Available
Gunungketur	-	-	Available	-	-
Keparakan	-	-	Available	-	-
Wirogunan	-	Available	-	-	-
Brontokusuman	Available	-	Available	-	-
Semaki	Available	Available	Available	-	-
Muja-muju	Available	Available	Available	-	-
Tahunan	Available	Available	Available	-	-
Warungboto	Available	Available	Available	Available	-
Pandeyan	Available	Available	Available	Available	-
Sorosutan	Available	-	Available	-	-
Giwangan	Available	Available	Available	-	-
Rejowinangun	-	-	Available	-	-
Prenggan	-	-	Available	-	-
Purbayan	Available	Available	Available	-	-

Source: Interview (2018)

In general, the strategy undertaken at the village level is socialization related to the threat and risk of disasters in the region. This is done by BPBD Yogyakarta as the main stakeholder in regional disaster management. In addition, simulations were also carried out related to any disaster threat in each of these areas. In general, this simulation is for earthquake and fire incidents. Training is also quite often done. Training in this case is training using emergency equipment such as

shelter kits, evacuation equipment, and hydrant use. Infrastructure preparation is the preparation of everything that functions to prevent or mitigate and anticipate a disaster. Some things that are done by the villages in Yogyakarta are by preparing evacuation routes and gathering points. In addition, planning is also available in several villages. This is related to the presence or absence of an annual village program in the form of capacity building for disasters in it.



**Figure 1.**

Percentage of Strategy for Resilience of Village Level Unit Resilience in Yogyakarta City.

Source: Author Analysis (2018).

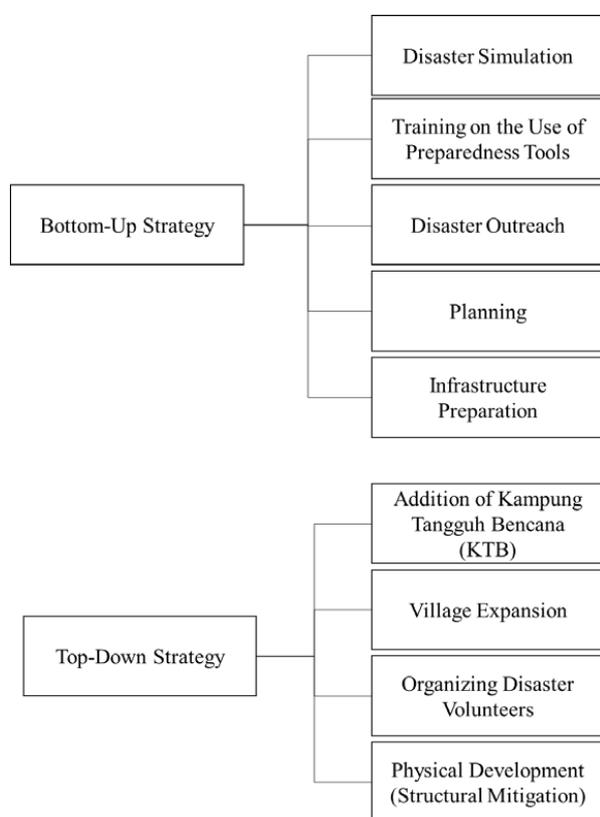
In addition to efforts to increase resilience sourced from each kelurahan, several efforts to increase resilience according to stakeholders who handle disasters in this case are BPBD Yogyakarta is actively each community group and kelurahan submit proposals for activities related to increasing capacity to deal with disaster. Some villages and villages that have not yet become KTB and Katana at this time are also competing to submit themselves to become KTB and Katana. But this also needs to be well prepared through the preparation of its organization and supporting facilities and infrastructure. In addition to making socialization, training and simulation effective, there is also a discourse for village division in Yogyakarta. This certainly has terms and conditions that are quite diverse and tend to be complicated with one of the requirements being that they must be unique or unique to the region to later be used as the name of the village. In addition to the socialization, training, and disaster simulation, in Yogyakarta City there are also several community or volunteer groups who are on standby 7/24 hours to monitor disruptions or disasters that arise. The community and also the local government in this case are BPBD always connected both through the

media and amateur radio. The existence of this group of volunteers who have been able to quickly and responsively to be alert when there is a turmoil due to natural and non-natural disasters. These community groups and volunteers work for all levels of society and work holistically in all parts of the city without focusing on a particular administrative unit, even these volunteers often work across cities / districts.

In addition to the adaptation efforts undertaken by the local government through socialization carried out by the BPBD, several efforts have also been made in terms of physical development to prevent the emergence of disaster risk. This effort is more about structural mitigation efforts. Some examples of this mitigation effort are to concrete river embankments such as those in the Winongo, Code, and Gajahwong Rivers to minimize the occurrence of river bank landslides. In addition, there are improvements in drainage at several points of the road to minimize inundation.

In general, the social and cultural characteristics of the community in the city of Yogyakarta are almost the same in all existing kelurahan units. Through a culture of "guyub rukun" and mutual cooperation,

Yogyakarta society is able to have strong cohesion both in the smallest to the largest community unit. Through the smallest community unit, for example, with the existence of the Kampung Tangguh Bencana (KTB) the community routinely conducts training, simulations, and socialization related to disaster response facilitated by BPBD. Larger community units, for example, include the Kelurahan Tangguh Bencana (Katana) to the Taruna Tanggap Bencana (Tagana) and several community or volunteer groups and the Yogyakarta Special Region Disaster Risk Reduction Forum (DIY PRB Forum).



**Figure 2.**

Typology of Strategy for Resilience to Natural Disasters in the City of Yogyakarta  
 Source: Author Analysis (2018)

Based on the findings of several resilience strategies above, these strategies can be classified into two types, namely bottom-up and top-down strategies as shown in Figure

2 below. The bottom-up strategy is a strategy that is purely carried out by the community or village and comes from mutual cooperation and local wisdom of the community. This was then massively carried out and has become a local culture in dealing with a natural disaster. The strategy is then used as social capital and can be proposed as a disaster management program to BPBD Yogyakarta. The top-down strategy is a strategy or policy carried out by the local government in order to coordinate the distribution of resilience levels throughout the Yogyakarta area. Budgeting for strategies as well as programs and activities all emerges at the initiative of the Central Government and Regional Government which is then directed to the smallest government unit in this case is the kelurahan to be implemented in their respective regions.

**CONCLUSION**

There are two types of strategies for increasing resilience in the city of Yogyakarta, those are bottom-up strategies and top-down strategies. Bottom-up strategy is a strategy that was initiated and carried out by the village although in the end it still cannot be separated from the role of other stakeholders in this case the BPBD Yogyakarta. Top-down strategy is a strategy or policy carried out by the regional government in order to coordinate the level of resilience in all regions of Yogyakarta. The higher role is basically found in bottom-up strategies, this is because the various problems that exist in disaster management are the direct domain of the community as subjects facing disasters so that all needs and how the right strategy must come directly from the community.

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