




Exploring People's Reasons of Living in Disaster-Prone Area and Promoting Disaster Risk Reduction in Urban Planning

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Abstract. Cities among other areas bear the brunt of the impact of climate-related disasters, especially cities that are located in the coastal zone. To build resilient cities, it is necessary to involve disaster risk reduction (DRR) in spatial planning (RTRW) because it has an essential role in both mitigation and adaptation. This research aims to review the implication of disaster mitigation-based RTRW on national security and explore why people stay in disaster-prone areas. Based on the results of research, it can be concluded as follows: disaster mitigation-based RTRW can reduce the risk of exposure to state strategic infrastructures within the national defense domain, and the implementation of disaster mitigation based-spatial planning in DKI Jakarta Province needs to be improved, proven by 17.04% of the built environment is located on the flood-prone with the estimation of 8.169 building units affected by the flood.

Keywords: RTRW · Spatial Plan · flood · disaster risk · mitigation · climate change

1 Introduction

Natural disasters and climate change are real threats facing the global society today [1] [4]. The impact of disasters can cause disruption in various aspects of development. The consequences encourage the role of the state as guarantor of national security to change the perspective on the environment through development policies and law enforcement in spatial planning. As urban areas and the cities' populations continue to grow and expand, it will make more people and assets being exposed to hazards [5] and running out of suitable land for settlements and other utilized land [4, 6]. Urbanization needs to be well planned because unplanned urbanization will only encourage the growth of informal settlements that can exacerbate existing vulnerabilities and contribute fairly to disaster risk in urban areas [10]. According to UNDRR (2020), between 1990 and 2015, there was a 30% increase in land-use per capita across hundreds of the world's cities, resulting in reduced environmental sustainability which consequently pushed settlements located in areas of high-risk exposure such as coastal areas, floodplains, and unstable slopes [3, 4, 7, 11, 18].

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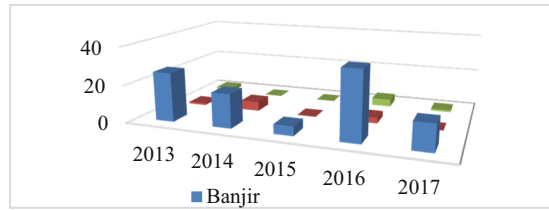


Fig. 1. Disaster events in DKI Jakarta Province between 2013 and 2017. Source: The data was acquired from Indonesia Disaster Data & Information (DIBI) in 2018 which was further processed by the researcher (2019).

The 2013–2017 Indonesian Disaster Data and Information (DIBI) shows the capital city DKI Jakarta Province, which is one of large coastal cities in Indonesia, is prone to three disasters, i.e. flood, landslide, and putting beliung (storm). The risk of flood is the highest among the other disasters and shows fluctuating pattern of flood frequency between 2013 and 2017 (Fig. 1). There are three hazards showed in the graph: the blue bar indicates flood (Banjir), orange for landslides, and grey represents putting beliung or storm. Some factors that cause flood in Jakarta include: 1) natural factors, changes in rainfall caused by El Nino and La Nina including tides and land subsidence, and 2) human activity factors such as settlements on river basin or riverbank, and poor drainage system. In addition, high demand for land is also believed as a prominent cause of flood, which particularly encourages the development of settlements in hazard-prone areas e.g., flood plains.

Based on previous research, South Jakarta among other municipalities in Jakarta Province was the most vulnerable with the highest number of flood points (12 spots), and the highest number of occurrence 42 times from mid-2017 to 2018 [12]. Taking from one sample, namely Pasar Minggu District which is the sub-district with the second largest number of affected RWs after Mampang Prapatan District, it shows that the flood problem is also influenced by other factors other than natural factors and human activity, namely political factors. Political factors in this case relate to the involvement of DRR practice in the spatial plan (RTRW) and law enforcement as well as the compatibility between spatial planning and its implementation.

The high level of built-up land in Pasar Minggu District (81.96%) which is located in the flood-prone area is clear evidence that law enforcement and development directions in Jakarta are not running optimally. There are 38 RWs with a total of 8,169 building units located in the flood-prone areas [12]. Therefore, in order to protect current development process, the government is deemed necessary to intervene in development policies, especially spatial plan (land-use plan). Within Sendai Framework, land-use plan is highlighted as part of national and local actions to be taken under Priority 3 (investing in disaster risk reduction for resilience) and to lessen a degree under Priority 4 (enhancing disaster preparedness for effective response and to “Build Back Better”) [7]. Therefore, integrating disaster risk reduction into spatial plan is very essential as numbers of specific actions can be taken such as restricting or limiting development in disaster-prone areas, and main-streaming disaster risk reduction into critical infrastructure development [12–15].

Knowing the implications of disaster mitigation-based RTRW on national security can help the government review national development policy directions and promote international agreements in order to achieve the global common goal which is to become resilience nations and cities towards disasters. In addition, to help the government find the right flood mitigation strategy in Jakarta, it is very important to know the reasons why people build settlements in flood-prone areas.

2 Methods

The research method used in the study of the analysis of the implications of disaster-based RTRW and the sociological perspective of the reasons people choose to stay in the disaster-prone area is classified into a qualitative approach. The data used are the results of interviews with government institutions that serve as an advocacy arm for spatial planning and related functions in Jakarta, academic guidelines of spatial plans, flood risk profiles, and other related regulations.

A more practical research design can be seen in Fig. 2.

An overview of the implications of DRR-based spatial planning on national security is obtained from information collected through literature studies and in-depth interviews with informants (informants) from the PPPP Division of BAPPEDA DKI Jakarta Province and BIG regarding the involvement of DRR in spatial planning and the obstacles found in its implementation from the perspective of governance. The main literature used in the analysis of disaster studies in the RTRW is the DKI Jakarta Provincial Regulation No. 1 of 2012 concerning the RTRW and the academic text of the preparation of

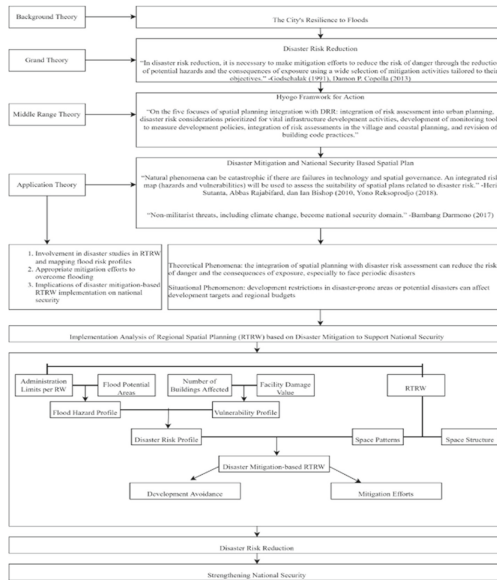


Fig. 2. Research design for the study of implication of DRR-based spatial planning on national security. Flood risk profile and RTRW map are acquired from previous research and the government institution. Source: Analysis Results

the 2030 RTRW by BAPPEDA of DKI Jakarta Province as well as the flood risk profile of the results of previous research that has been carried out.

The flood risk profile in this study becomes the basic data used to review current spatial plans and regulations. The use of a risk profile is expected to answer the degree of involvement of DRR practice in regional development and describes the extent to which government capacity is carrying the responsibility. In places where there is low capacity to implement, regulations may become a dilemma and not be workable, but it is clear that incorporating natural ecosystem services into spatial plan and ensure protection of the environment could protect the cities from the detrimental consequences of environmental crises which also relates to the context of national security.

The psychosocial perspective in this study relates to the reasons that underlie people doing activities or living in disaster-prone areas. According to Durkheim, social life can help each individual shape their respective personalities such as how individuals in society behave, think and feel things. In relation to disasters, patterns of behavior, values, cultural norms, and beliefs in social life (society) can form social facts that can affect the potential for hazards where people live and/or carry out activities [16]. Exploring the sociology behind people's reasons to stay in disaster-prone areas can help the government find the right mitigation strategy in order to minimize vertical conflict and accelerate the achievement of resilience cities towards disaster. The psychosocial perspective was obtained from the views of experts who were interviewed directly by researchers in three government agencies, namely BIG, BAPPEDA DKI Jakarta Province, and BNPB, as well as field surveys.

3 Result and Discussion

Various efforts have been made by the Government of Jakarta Province to deal with floods that occurred almost every year in the last decades. Disaster mitigations are dominated by structural approach, e. g. the construction of BKTs, sea dikes, river normalization, and drainage system improvement. In order for the development to achieve the optimal outcomes and a myriad of other benefits, the government is deemed necessary to intervene in development policies, particularly the spatial plan or RTRW. The Ministry of ATR/BPN (Agrarian and Spatial Planning) is also aware the relevancy of climate change mitigation in urban planning practices, not limited to building restrictions in hazard-prone areas, the development of evacuation plans, and mainstreaming disaster risk reduction in critical infrastructure.

Planning regulation has a positive role to play in DRR. It can minimize the risk of hazard on infrastructures, including settlements, through ensuring location in less risky areas [8, 9, 17, 19]. In term of regulation, good practices may entail relaxing provisions such as ensuring the location of land near services is affordable for the underprivileged [6, 9, 17, 19]. Less prescriptive legislation could mean relying more on design approaches rather than creating desirable area safer while being realistic about development pressures on land [7]. Integration of DRR into plans can also assist with post-disaster response and rebuilding. Spatial plans can assist to improve emergency response through suitable arrangement of spatial pattern and structure. This may include strategic provision of open spaces and well-planned road networks for rescue operations and other mitigation types in the context of spatial planning.

In Indonesia, the national government gives the authority to regulate spatial planning and development, and local zoning ordinance to regional government through Regional Spatial Plan (RTRW) and the Detail Spatial Planning (RDTR). The RTRW document becomes the basis for regulating, controlling and utilizing provincial and city land utilization in order to achieve sustainable development and minimize the risk of disasters. One of the RTRW feasibility studies upon disaster is being pursued through a one map policy. In the one map policy, the regional government is recommended to provide RTRW assistance with the Ministry of ATR/BPN and BIG (Geospatial Information Agency) to align Provincial RTRW and Regency RDTR with the spatial plan above it including disaster content and updates on gap analysis of the social services and natural resource. The addition of disaster content in the RTRW is motivated by the fact that each region, both province and regency, has potential hazards risks that need to be managed. Thus, it is essential to take spatial into account as an effort to reduce disaster risk, especially if there are indications of periodic (annual) disasters such as floods.

The most recent DKI Jakarta Province spatial plan has been legalized in Regional Regulation (Perda) No. 1 of 2012 concerning RTRW 2015–2030 (RTRW 2030) [20]. The RTRW 2030 gives an opportunity for Provincial Government to revise spatial pattern and structure plans every five years. The spatial pattern and structure plan include the arrangement of settlement, infrastructure network as well as land utilization (protection and cultivation). In its implementation, the RTRW needs to refer to Law No. 26 of 2007 concerning Spatial Planning [21], and PUPR Regulation No. 28 of 2015 concerning the Establishment of River Boundaries and Lake Borders, to meet the expectation of open space designation of at least 30 percent, building coverage of not more than 70 percent, and establishment of river border line (riparian) for avoidance purpose. The PUPR regulation stipulate measures to avoid development within specific distance from riverside based on the depth of the river e. g. 10 m, 15 m and 30 m. The 10-m border line along the river channel is set for rivers with a depth of 3 m, while the 15-m border line from the left and right bank of the riverbed is for rivers with a depth of 3 m to 20 m and for a 30-m border line for rivers with a depth above 20 m. River basin or riverbank is categorized as local reservation areas, in which along with other five categories of protected areas, including disaster-prone, stipulated in the spatial planning law [22].

3.1 Implication of DRR-Based Spatial Planning on National Security

National security is defined as a function and condition that can produce and create a sense of security, peace, and order, where these conditions are one of basic human needs [23]. In the Attachment to Presidential Regulation No. 7 of 2008 concerning the General Policy for National Defense, national security is interpreted as a sense of security and peace from the Indonesian Nation within the Unitary State of the Republic of Indonesia (NKRI). The concept of national security includes all the resources and efforts to maintain a sense of security and peace, consisting of national defense, state, public and human (individual) security [24].

Today, national security is experiencing a paradigm shift from being oriented to the state to being oriented towards society, so that security is not only the domain of the interests of the state but also of the interests of individuals and society in general [25]. The concept of national security emphasizes the government's ability to protect, not

only the country's territory from threats, but also the interests of the people and national interests. According to the 2008 Defense White Paper, the types of threats are categorized into two, namely military and non-military threats. Military threats are defined as threats using armed force or military force, while non-military threats have a broader dimension, namely ideological, political, economic, socio-cultural, technology and information as well as public safety without involving the role of military force [25].

From the perspective of defense science, disaster is a non-military threat because the consequences resulting from a disaster can disrupt the safety and another aspect of development for the entire nation. Disaster is a natural phenomenon that causes social disruption and is a threat to national defense so that it involves elements of both military and non-military defense to deal with it. According to Mandel (2002), disaster is a new, non-military security threat that needs to be included in the national security agenda of countries around the world [26]. The linkage between disasters and national security lies in the discussion of the impact of hazard exposure on the functioning of the social system, casualties, and development. The implication of climate change and other extreme events (disasters) on national defense lies in the risk of damage to transportation infrastructure and also affects energy production so that it affects all infrastructure that depends on energy supplies [27]. The increased risk of flood can affect the safety and health of people, property, infrastructure, the economy, and ecology of the region as well [27].

In recent years, our country has faced a discourse on the urgency of a national defense-based development policy. The concept of structuring the defense area as mandated in Government Regulation (PP) No. 68 of 2014 concerning the Arrangement of the State Defense Territory is an implementation of Law No. 3 of 2002 concerning State Defense [28] and Law No. 26 of 2007 concerning Spatial Planning. The state defense area is defined as an area to defend the sovereignty, territorial integrity of the Republic of Indonesia and the safety of the entire nation from threats and disturbances to the integrity of the nation and state. The concept of structuring the defense area is used for the benefit of defense management, where in peacetime it is used for the benefit of development and development of defense capabilities as well as for war purposes during a state of war [29]. The defense area is then stipulated in the development policy as a national strategic area used by the TNI to strengthen defense capabilities and safeguard the country's sovereignty, such as bases, training areas, military installations, equipment and weapon testing areas, explosive goods storage areas and ammunition disposal, national vital object, and military air defense interests [30].

PP No. 68 of 2014 articles 13–19 further explain that in the implementation of defense areas, the government and local governments are required to provide land for the development and development of defense areas through the conversion of cultivated land with certain conditions without disturbing the function of the environment and ecosystem. The Defense Area Plan (RWP) refers to the national spatial plan, national strategic area, provincial and sub-provincial (regency and district) spatial plans along with detailed plans (RDTR and RTBL). RWP, just like RTRW, are enforced for 20 years and can be reviewed every five years if three things occur, namely 1) a national/ severe scale disaster; 2) changes in territorial boundaries; and 3) changes in national policy in the defense sector [29].

Development dynamics that are not in accordance with the plan and needs are the logical reasons for the spatial plan to be revised. DKI Jakarta Province, with its high development dynamics, demands periodic changes in spatial structure as a consequence of the massive development of mass transportation networks in the last decade. Agglomeration of development in DKI Jakarta Province causes changes in spatial patterns and land use to be inevitable, plus there are regional investment targets that need to be implemented in order to achieve the PAD (Original Local Government Revenue) target every year. On the other hand, environmental problems are a challenge that needs to be addressed amidst the ongoing dynamics and competition for development. In other words, the desire of DKI Jakarta Province to become a world-class urban area needs to be balanced with a response to the environment which tends to show a decrease in quality (degradation).

The impact that has been felt is a decrease in the availability of clean water, such as in Central Jakarta, land subsidence in the northern part of Jakarta and flood that still occurs at several points in the province. In addition, Jakarta also has other potential disasters that need to be anticipated, namely earthquakes [31]. The existence of a transportation network renewal in DKI Jakarta Province, can automatically change the spatial structure, becoming an opportunity for the government to revise the RTRW. In addition to updating the development of spatial structures, the RTRW needs to consider and add disaster risk reduction (DRR) and climate change adaptation (API) analysis [32]. The contents of DRR and API need to be translated more deeply and be more implementable so that it can be translated well by development planners and the wider community.

Efforts are still being made to study the integration of DRR and spatial planning in Indonesia. In that regard, the initial step that has been taken is the one map national policy which aims to synergize spatial plan at the provincial and sub-provincial levels. The revised RTRW needs to be adjusted to the spatial directives at higher level and it is recommended to add some thematic content such as zoning plans for coastal areas and small islands, natural resource management and disasters profile. The aims are to meet the criteria of development avoidance in red (critical) areas and to synchronize the implementation and plan with the objectives of national development.

As a national agency that carries out supervision and consultation functions for RTRW, BIG and the Ministry of Agrarian Affairs and Spatial Planning testified that there are still many regions have not yet submitted the request for supervision, in which one of them is DKI Jakarta Province. RTRW supervision for level I (provincial) and II (regency and sub) regions to the national level will provide a more objective perspective on spatial pattern and structure planning besides to adjust the needs, and to sync with higher level spatial plans and the neighbor region RTRW, especially for cross border issues, i. e. disaster management. Disaster management practice often experience unforeseen obstacles, one of which is due to partial disaster management. Disasters need to be handled by seeing disasters as a form of unity that is expressed as the upstream, middle, and the downstream.

To find out further whether the implementation of land utilization in Jakarta is in accordance with the planned development directions, as well as whether the current spatial plan is not risking the safety of communities and has a larger impact on development and security, it can be seen from the disaster risk profile. From the other research, the 2019

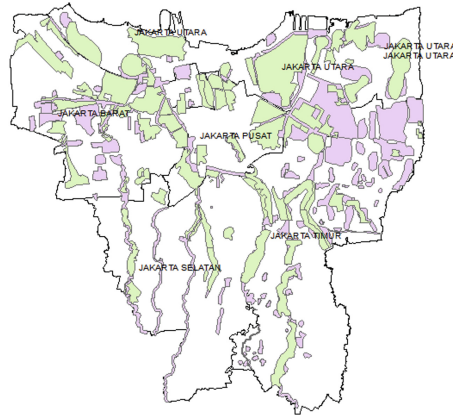


Fig. 3. Flood-prone area in Jakarta Province based on flood occurrences in the year of 2002 and 2007. Source: Analysis Results

flood risk profile shows that the distribution of potential flood areas in Jakarta Province is quite wide. The data recorded for the two largest flood events were the floods that occurred in 2002 and 2007. In 2002 and 2007, the average rainfall reached 2,288.9 mm and caused inundation heights in several places in 2002 to reach 4 m. In 2007, three days of heavy rain caused the water level downstream of the Ciliwung River to reach 10.5 m, whereas the water level downstream under normal conditions only ranges from 7–7.5 m [31]. From these data, the total area of potential flood inundation in DKI Jakarta Province is 270,894,631.35 m² with details of 127,494,610.22 m² in 2002 (green) and 143,400,021.13 m² in 2007 (purple) or 40.95 percent of the total area of DKI Jakarta Province (Fig. 3).

Furthermore, to go deeper understanding of what factors could increase the risk of flood in the context of land utilization, a sample of the implementation of the RTRW was used in one of the sub-districts with the highest flood point, Pasar Minggu District, South Jakarta. From the results of the study, it was found that the area of flood inundation in Pasar Minggu District was found to be 17.04 percent of the total area of the sub-district. The results of the overlapping of spatial pattern plans with flood potential areas in Pasar Minggu District show that 81.96% of the flood potential area is built up land with the largest percentage found in irregular residential land use (46.84 percent).

Disaster-prone areas are physically vulnerable areas that need to be avoided from development activities. UU No. 26 of 2007 mandates that spatial planning in general is expected to be able to realize three things, namely being effective and efficient and able to support sustainable environmental management, not wasting space utilization and not causing a decrease in space quality [21]. The discovery of a spatial pattern plan for built-up land in a potential flood area shows that the current spatial pattern plan still does not meet the sustainable criteria, where disaster as a potential, problems and conditions have not been considered as a basis for regional development and management.

The position of disaster-prone areas in the spatial plan is a basis for consideration in avoiding development. Avoidance of development in disaster-prone areas is one of the

mitigation efforts aimed at minimizing casualties and property losses caused by disasters. Thus, identification of potential disaster areas becomes a very important prerequisite for the preparation of spatial plans and is not easily negotiated.

Overall, the area of land use that has undergone conversion in DKI Jakarta Province is 55.07 percent, with 39.62% of non-built land converted to built-up land. This is different from what happened in the research sample of Pasar Minggu District. Before the RTRW was implemented, the proportion of built-up land in the sub-district was 88.33 percent, which was dominated by “irregular housing” land use spread throughout the kelurahan with a percentage of 57.76 percent of the total land area. However, after the RTRW was implemented, the percentage of built-up areas decreased by 4.4%. This is a positive impact considering the ideal allocation for built-up areas is supposed to be 70% referring to Law No. 26 of 2007 [21]. The proportion of cultivated area stipulated in the spatial planning regulation should not be more than 70 percent and the cultivated area should not overlap with the protected area. It aims to maintain the balance of nature and realize sustainable development. Thus, for better spatial planning, it is necessary to limit development with the aim of limiting or reducing the percentage of built-up land use.

From the perspective of compatibility of land use with the spatial plan of the DKI Jakarta Province RTRW 2030, many land practices planned for “commercial services” in their implementation are used for other basic service facilities, such as warehousing and housing. Disharmony between the norms and the implementation of spatial plan as found in some of the examples above is believed can result in several things, one of which is an increase in the risk of hazards and vulnerability. The regulation disharmony with the implementation can exacerbate the face of urban management and alter the ecosystem of the region, which leads to environmental degradation and effect development investment. In other words, non-compliance with the provisions of development avoidance and the inconsistency between land use and spatial pattern plans are an indication of spatial planning violations that could increase the risk level of hazard and vulnerability.

3.2 Living in Disaster-Prone Areas from Psychosocial Perspectives

Communities or individuals often respond that new cultural choices or values (new unusual things) are demands that must be met. In relation to the study conducted, the community changes the function of the land they own is closely related to financial and political factors. Financial factors refer to the financial limitations of the community to choose a safe area as a place to live. While political factors refer to development policies that determine the function of certain spatial patterns in an area, including the granting of land acquisition permits for other land uses to the business sector.

The decision of individuals or community groups to change the environment is based on the system built in their environment [2, 6, 9, 11, 17]. Macionis (2012) said that social life encourages adjustment and deviation [16]. Both are closely related to social control. Adjustment in a homogeneous society means carrying out the rules that apply from generation to generation, while deviation is an attitude that is formed on the basis of usefulness, where socio-cultural values that drive people’s behavior, if there is no mismatch, will create deviations [16]. Meanwhile, Kartodiharjo and Jhamtani (2009) underlined that politics such as the issuance of regional regulations have a very large

impact on the management of natural resources and the environment at the subnational (local) level, apart from economic incentives in the community [33].

Thus, in development practice in Indonesia, decentralization has an impact on sudden changes in environmental management, related to the distribution of power (power) and social security [34]. The spatial planning stipulated in the Regional Regulation provides an opportunity for the government to regulate development in each region in its area, including limiting the interaction between the community and the environment. From a sociological perspective, local regulations are one of the political factors that influence how people perceive and evaluate their environment.

Deviations can occur, either because of the presence or absence of choice. Economic factors are one of the drivers that cause an individual in the community or society as a community not to follow the direction of development, it can be caused by the inability of the community to find a safe and decent location, or other incentives such as the proximity of the location to sources of livelihood, etc. There are three reasons why people take deviant actions: 1) the form of deviation depends on cultural values; 2) the community becomes the perpetrator of deviance because of the response given by other communities; and 3) how society determines values and defines non-compliance with rules, this reflects social inequality.

The largest land use conversion that occurred in the previous research sample was irregular housing with the highest percentage conversion, namely regular housing and offices/trade/services. This social phenomenon indicates that land use conversion is based on political factors. Before the community was driven by financial factors, namely selling houses to the business sector for a relatively higher price than the predetermined price, a consensus had been established between permits for the construction of regular housing areas and offices/trade/services in the area.

4 Conclusion

From the various explanations above, it can be deduced that disaster mitigation-based RTRW can be a representation of national government support to local government to manage non-military threats independently. The urgency to include disaster mitigation studies in spatial arrangements in each region is driven by several things: 1) the non-enforcement of zoning provisions, in which 70 percent is for built-up land and 30 percent for open space; 2) it is suspected that there is an inconsistency between land use and the spatial pattern plan in the RTRW document; 3) avoidance of development has not been implemented in areas with potential for flooding and river boundaries; and 4) the RTRW map has not provided spatial information on potential disaster-prone areas.

5 Recommendation

The flood mitigation efforts in DKI Jakarta Province have absorbed quite a large amount of APBN and APBD budgets up to trillions of rupiah. The absorption of APBN and APBD budgets is mostly used for structural mitigation such as the construction of BKT, interconnection of BKT and BKB, normalization of water bodies, increasing capacity of

water pumps and sea dikes, and relocation of illegal settlements on river borders. However, these efforts are deemed incapable of providing significant outcomes for reducing flood risk in DKI Jakarta Province and its surrounding areas.

The problem of flooding in DKI Jakarta Province needs to be seen from the perspective of functional area entities (upstream-downstream watershed) and spatial (separate areas). From the area entities viewpoint, DKI Jakarta Province is located downstream of the Citarum Ciliwung Watershed (DAS). To overcome the problem of flood in DKI Jakarta Province, identification of flood problems needs to consider the contribution in the Upper and Middle Watersheds. Meanwhile, from the spatial context, morphologically, DKI Jakarta Province is a low-lying coastal city which is dominated by residential land with a percentage of at least 60 percent. Cities in developing countries, which have a large population, are synonymous with aging infrastructure, so that cities in developing countries have a high risk of disasters, especially floods.

Therefore, the intervention for flood prevention that is deemed necessary is a regulation that can control and regulate all development activities. This is because the impact caused by natural disasters is much greater than the focus received from the government, such as budget allocations. Thus, flood prevention in the Downstream (DKI Jakarta Province) needs to be supported by a regulation governing spatial planning. This is aimed at protecting the safety and security of people's livelihoods, vital local and national infrastructure, maintaining a balance of development and efforts to minimize losses due to other disasters.

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