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The Adaptation Strategy of Flash Flood Victims in Urban Areas, Garut Kota Sub-District

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Abstract. In 2016, various settlements in Garut Regency, notably Garut Kota Sub-District, located along the Cimanuk River, were affected by a flash flood. As a result, many residents relocated to other places, far from the city. This research was conducted in three residential relocation areas: Gadok Housing, Kopi Lombang Housing and Cisereuh Housing. The purpose of the study is to determine the adaptation strategies of relocating communities. The research was conducted using mixed-methods techniques with descriptive quantitative and qualitative data analysis. The results are shown in the adaptation strategies of the affected communities and demonstrate that the relocated communities living in new settlements pursued adaptation strategies such as adjustment and adaptation with reaction. Adaptation by adjustment was carried out by accepting the post-relocation situation and taking up jobs in different sectors. Meanwhile, adaptation by reaction entailed making changes to the physical form of buildings, planting mixed gardens or constructing pet cages in the yard. Relocating residents often lacked the motivation to move to alternative shelters due to financial inability and a sense of comfort in their new settlement.

Keywords: Relocation, Settlements, Adaptation, Flood.

1. Introduction

Settlements form part of the environment outside protected areas, in both urban and rural areas. They consist of residential environments and places for activities that support lives and livelihoods (Law No. 4 of 1992 concerning Housing and Settlements). Therefore, settlements have an important meaning in human life. According to Suparno (2006), a settlement is a place for humans to live in that exhibits a particular purpose. With regard to its meaning, the term settlement derives from the translation of the word *pemukiman*, which implies a settlement process. Thus, it is clear that the term settlement includes the concept of time as part of a process. According to Midas (2020), community living preference varies depending on the community's socio-economic group.

A flood is considered to be one of the most destructive types of natural disaster that can occur (Downton, 2001). A flood event typically involves (1) loss of life, (2) damage to infrastructure, communication networks, agriculture and livestock, (3) loss of crops and community land and (4) the transport of sediment and pollutants (Golian, 2010 in Kourgialas, 2017). Over the last few decades, urban areas have seen an increased incidence of flooding. Floods in urban areas usually occur due to extreme rainfall and a city's vulnerability, threatening people's lives and the economic development of affected areas (Darabi et al., 2019). Garut Kota Sub-District is the capital of Garut Regency and is the centre of economic and social activity for the community. In 2016, part of Garut Kota Sub-District, located along the bank of the Cimanuk River, was affected by a flash flood that resulted in losses totalling billions of rupiahs. Experts from various fields of science indicated that such flash flooding was possible as the Garut region sits within

a basin surrounded by seven volcanoes. Excess rainwater will therefore spill out at a certain point. However, the situation was exacerbated by conditions within the Cimanuk Watershed, which has experienced silting due to human activities (Karnawati, 2016). After the flood waters washed away residential infrastructure, and in a bid to prevent a similar disaster from occurring in the future, the government chose to relocate several residential areas from Garut Kota Sub-District to safe locations in another sub-district.

According to BPBD Garut Regency, up to 339 heads of family were relocated from Garut Kota Sub-District to relocation points across several housing areas outside the administrative boundaries of Garut Kota Sub-District. Gadok Housing received the most residents from the Garut Kota Sub-District, followed by Cisereuh Housing and, finally, Kopi Lombang Housing. This type of relocation programme is an adaptation strategy in the context of dealing with a flood disaster (Seebauer, 2019). However, a relocation programme will also impact jobs, income, productivity, activities and the affected community (Mathur, 2011). Research by Finsterbusch (1981), in Diharjo (2018), states that the impacts of such a policy on the community can be grouped into five categories, namely (1) economic, for example, losing or getting a job, (2) environmental, namely a change in housing, (3) transportation, where either a driver or user of transportation services loses access, (4) socially, where an individual's social pattern changes and, finally, (5) psychologically, which manifests as stress and fear experienced by individuals. Therefore, the rehabilitation and reconstruction phase plays a vital role in modern disaster management strategies (Seneviratne, 2010). However, the relocation of settlements also provides an opportunity for the government to develop the settlement. This includes implementing land-use strategies and minimising illegal settlements, especially in developing countries (Muggah, 2008 in Geekiyanage, 2020).

The establishment of a relocation programme will undoubtedly lead to specific adaptation responses for the communities affected. According to Hardoyo (2011), adaptation involves the establishment and maintenance of a mutually beneficial relationship between an organism and its environment. In general, adaptation refers to the development of generic and behavioural characteristics that help individuals cope with environmental changes in order to survive (Kitano, 2002 in Ullah, 2020). In other words, adaptation involves behaviour linked to a survival strategy (Mulyadi, 2007). Housing adaptation aims to enable residents to live independently in their own homes. Resources also shape the adaptation process in the environment of a community group (King, 2018). It is crucial to ascertain the community's level of success in terms of adapting to its relocation (Yan, 2018). Many factors drive the success of relocation, both internal and external (Andy, 2010). Cao (2016) revealed that occupant preferences could play an important role in satisfaction with living, with factors including the quality of housing to the social conditions within the surrounding community (Ren, 2017).

A relocation strategy aims to reduce the detrimental effects of environmental change while boosting welfare opportunities (Thorn, 2015). Yet there are also important challenges to face as part of any post-resettlement adaptation (Rogers, 2019). The government must provide information and actively assess the selection of the area along with planning, implementation and monitoring of the relocation programme (Cernea, 1985 in Habich-Sobiegalla (2020). The calculation of the living needs of the relocated community groups is directly proportional to the residents' level of residential satisfaction (Zhao, 2018 and Sina, 2019). According to Altas and Ozsoy (1998), residential satisfaction in a residential space is a function of three groups of variables, namely user characteristics, the physical attributes of a space, and the users'

beliefs and perceptions of the space. This study describes the adaptation strategies of communities affected by the flash floods in Garut Kota Sub-District that had to relocate to alternative sites. The research is expected to contribute to the scientific development of settlement geography and urban geography in the study of urban settlement management and the government's benefits as input related to the procurement or improvement of settlement relocation programmes.

2. Research Method

The research was conducted in three relocation settlements, namely Gadok Housing in Tarogong Kaler Sub-District, Kopi Lombang Housing in Tarogong Kidul Sub-District and Cisereuh Housing in Karangpawitan Sub-District. These settlements are located far away from their previous sites in Garut Kota Sub-District. The study uses an ecological approach and the theme of human behaviour-environment analysis. It uses mixed methods and the concurrent triangulation strategy, whereby qualitative and quantitative data are collected at the same time in order to obtain complete results from the analysis. The quantitative method is used to determine the influence between variables; thus, the magnitude of the variables' influence on community decision-making can be identified. This was carried out through structured interviews with 45 family heads from Garut Kota Sub-District who were victims of a flash flood disaster in 2016. In detail, they comprised 21 family heads in Gadok Housing, 19 in Cisereuh and 5 in Kopi Lombang. The sample population was determined using the simple random sampling method. The flow of research undertaken included a literature study, primary data collection, interviews, data processing and analysis of research.

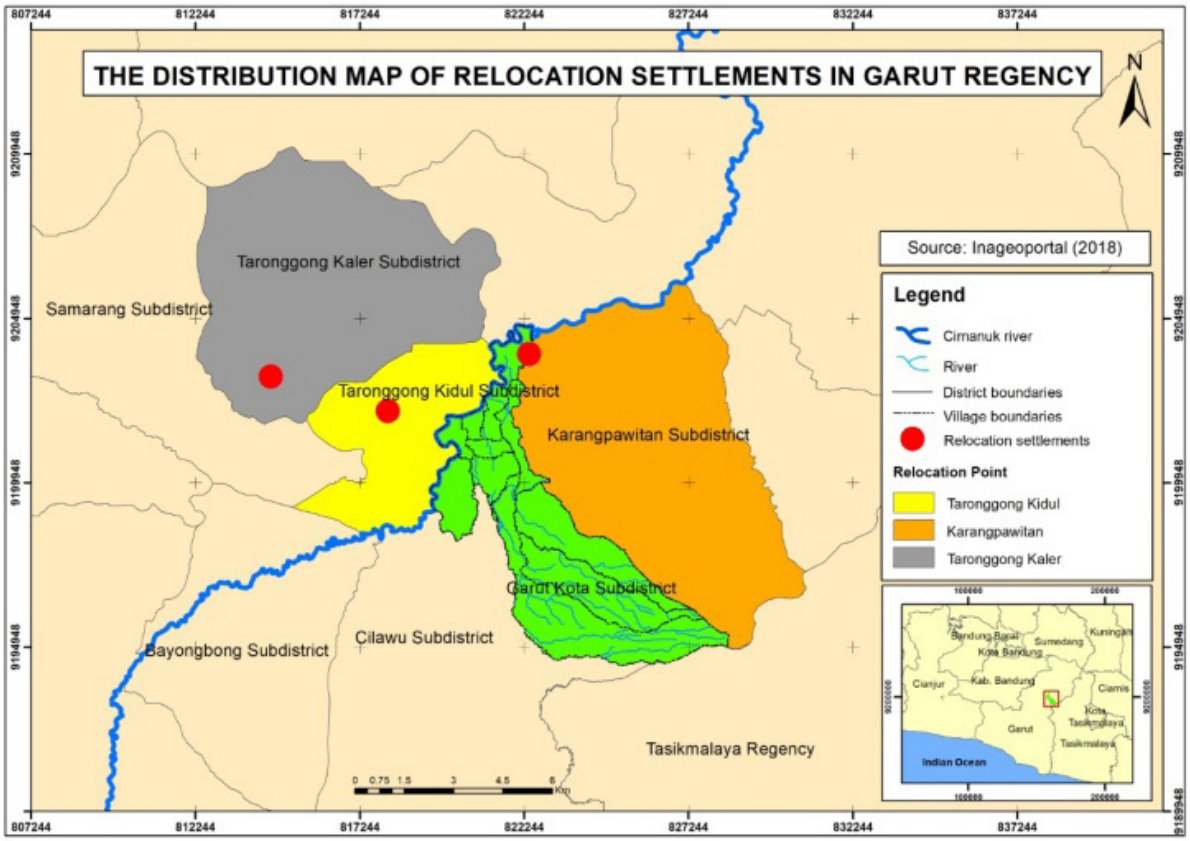

Figure 1. Research area

The study examined the following variables: interactions between affected communities and their living environment, the distance from the relocation settlements to public facilities, workplaces and families, and the physical and social environmental conditions around the new residences. The qualitative element of this study consisted of in-depth interviews with various community leaders to elicit more in-depth information concerning the victims' adaptation strategy. The data obtained from the structured interviews using a questionnaire guide were then processed using SPSS and further analysed using descriptive quantitative and qualitative analysis methods. This research also analysed how many people switched to different livelihoods and how people utilised their new environment. The research locations are shown in Figure 1.

3. Results and Discussion

Relocation is a process that will affect the life of a community, both physically and socially (Tadgell, 2017). According to Rapoport (1969), social satisfaction is a factor to consider when developing a settlement. Every space within the settlement will have a broad meaning depending on individuals' level of appreciation and cognition when using it. According to Dunn (2000) in Armi (2017), one impact of a policy involves a change in social conditions. Sina (2019) highlighted that social conditions influence the successful adaptation of affected communities. Based on the interview results shown in Figure 2a, 95% of the relocation population reported being quite satisfied with their social conditions in the new housing. Most of the relocated residents have high levels of interaction and participation in the community activities in their new neighbourhood. This reflects the fact that the respondents find it easier to socialise with and adjust to other residents who have themselves been relocated. This social satisfaction represents one of the preferences that people indicate for remaining in the area to which they have been relocated.

According to Bell, in Altman (1980), there are various types of adaptation actions linked to different adaptation strategies, namely (1) adaptation by adjustment, (2) adaptation by reaction and (3) adaptation by leaving/withdrawal. Suharto (2002) states that adaptation strategies can theoretically be interpreted as an individual's ability to apply a variety of methods for dealing with the problems that occur within their life. In other words, adaptation can be interpreted as an effort to reduce discrepancies in a system. The people of Garut Kota Sub-District that had to be relocated due to the flash flood in 2016 certainly had an adaptation strategy for surviving in their new dwellings. It was possible to follow an ecological approach by knowing the community's adaptation strategy. Human behaviour-environment analysis was thus carried out. Based on the data indicated in Figure 2b, 40% of the relocation population stated that they were fully willing to be relocated with all of their family members. Meanwhile, 60% stated that they initially had no choice but to stay in the relocation areas. Most of the relocation residents answered that they did not have enough money to rent or buy a house in urban and surrounding areas. Hence, they chose to continue living in the relocation house due to the assistance provided by the Garut Regency Government.

This forced many family heads to switch livelihoods to provide for the needs of their family while also owning a house in which to live. In general, the relocation residents who changed livelihoods were those with limited options as a result of, for example, having minimal education and exceeding the age limit to work in the formal sector. As a result, they were compelled to switch to roles in the informal sector, such as traders or labourers, that have no criteria regarding education or age (Shabira, 2020). Therefore, as shown by the conditions outlined above, the relocated people adapted to their new circumstances and context. It is also known that some of the relocated residents attempted to adjust to their new living environment by using their house as a place of business, an example of which is illustrated in Figure 3a.

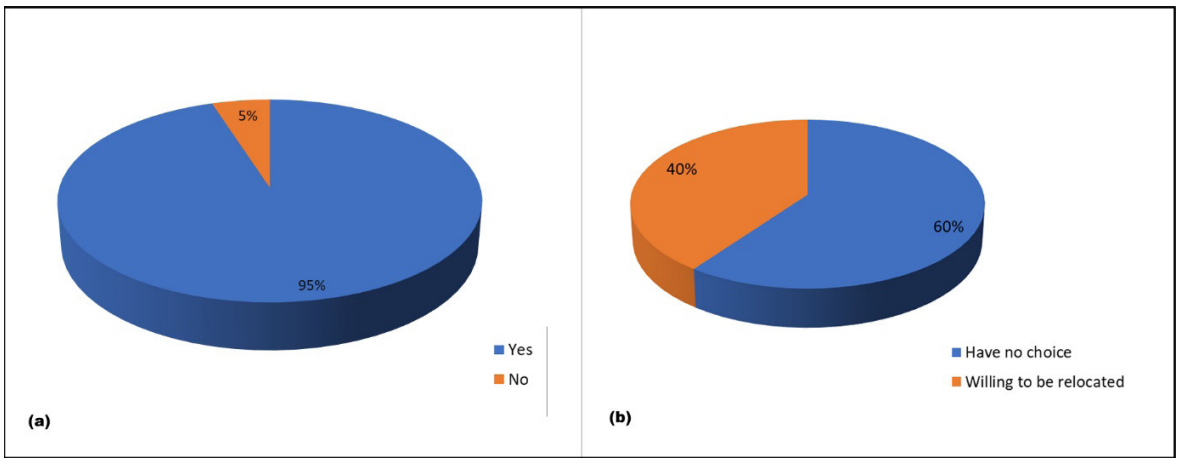

Figure 2. Opinion of respondents on the relocation programme. (a) Relocated occupants' satisfaction with the social conditions in the new residence. (b) The reasons for relocation residents to stay in their houses

Figure 3. Condition of relocation area. (a) A resident's house being used as a place of business. (b) A mixed garden owned and managed by people living in a relocation area. (c) Relocation houses abandoned by the owners after they moved elsewhere.

However, they also went further than adjusting to fit the environment. Relocated communities have also been known to adapt with reactions (that is, adaptation by reaction) by introducing slight changes to the environment in which they live. According to the Head of the Reconstruction and Rehabilitation Division of the Garut Regency BPBD, in an in-depth interview conducted on 10 June 2020, people who were relocated as flash flood victims were given full rights to residential buildings and the land around their homes:

> *"People who have been moved to relocation houses by the Garut Regency Government are also given the right to manage the land around the new residence and the right to manage their residence."*

Therefore, many residents have installed fences and painted their houses a different colour. Relocated people have also taken advantage of the vacant land available in their neighbourhood. This is often managed as a mixed garden containing medicinal plants and staple food plants, which are cared for jointly by the residents, as shown in Figure 3b. The existence of this type of mixed garden helps to build closer relationships between residents as they are obliged to be responsible and mutually care for the land used for this common purpose. Meanwhile, local community leaders reported

that other people had adapted by withdrawing or leaving their houses. This occurs mostly when the relocation housing is far from both public facilities and the individuals' previous workplaces. As a result, various government-provided relocation shelters now stand empty and have become unkempt, as shown in Figure 3c. Communities with sufficient alternatives and options therefore choose to leave the relocation houses and move to other, more strategic places in the city or close to their places of work. Looking at the income data of people living in this relocation area, as shown in Table 1, the majority of the flash flood victims are classified as middle- to lower-class people who do not have the option to live elsewhere; as such, they choose to stay because of the guaranteed housing.

Table 1. Income of head of family before and after relocation

Resident Income Before Relocation			Resident Income After Relocation		
Income	Number	%	Income	Number	%
<1.000.000	11	27.5	<1.000.000	5	12.5
1.000.000-1.500.000	11	27.5	1.000.000-1.500.000	14	35
1.500.000-2.000.000	3	7.5	1.500.000-2.000.000	4	10
2.000.000-2.500.000	7	17.5	2.000.000-2.500.000	7	17.5
2.500.000-3.000.000	4	10	2.500.000-3.000.000	5	12.5
>3.000.000	4	10	>3.000.000	5	12.5

Santoso (2002) proposed that middle- to lower-class people have the mindset that a house is a facility. Therefore, the following criteria apply with respect to the housing needed by low-income people (middle to lower class): (1) located not too far from places that can provide employment, at least informal sector jobs such as labouring; (2) the physical quality of the shelter and the environment is not paramount but must be sufficient as a place to carry out life; (3) land tenure rights are not highly valued, as long as the people are not evicted. Purwaningsih (2011) found that middle- and lower-class people typically have little motivation to move from relocation housing as their financial situations do not support such a move.

4. Conclusion

The adaptation strategies pursued by communities affected by flash floods in Garut Kota Sub-District while living in relocation housing can be categorised as adaptation by adjustment and adaptation by reaction. Adaptation by adjustment entails people adjusting to the social conditions in the surrounding housing and replacing their main job with other jobs in the informal sector, such as labourers and traders. Meanwhile, adaptation by reaction involves renovating houses and yards into mixed gardens or a collective animal pen to enhance the surrounding environment. A further adaptation strategy involves people with sufficient options leaving their relocation housing for personal reasons, classified as adaptation by leaving/withdrawal.

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