

FLOOD DISASTER PREPAREDNESS STUDY IN BANJAR CITY, WEST JAVA

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Abstrak: Banjir merupakan bencana alam yang sering terjadi di Indonesia. Oleh karena itu, perlu adanya program manajemen risiko bencana. Penelitian ini bertujuan untuk mengetahui kesiapsiagaan bencana banjir masyarakat di Kota Banjar, Jawa Barat. Data dikumpulkan dari Pemerintah Kota, Badan Penanggulangan Bencana Daerah, Lembaga Swadaya Masyarakat, BPS, Peta Rupa Bumi dari InaGeoportal, data peta kerentanan, peta kerawanan, dan peta risiko dari Badan Nasional Penanggulangan Bencana, serta literatur berupa jurnal dan buku. Teknik pengumpulan data yang digunakan oleh peneliti antara lain kuesioner, dan dokumentasi. Metode analisis data menggunakan deskriptif persentase dan analisis skoring untuk menganalisis distribusi frekuensi tingkat kesiapsiagaan masyarakat dalam menghadapi bencana banjir, dengan data yang diperoleh dengan cara memberikan kuesioner kepada masyarakat, yang diisi oleh responden, kemudian menghitung jumlah frekuensi jawaban yang benar dari setiap responden. Hasil penelitian menunjukkan bahwa Kota Banjar memiliki tingkat bahaya, kerentanan, dan kapasitas banjir yang tinggi, sehingga perlu dilakukan upaya kesiapsiagaan untuk mengurangi dampak buruk dan mengantisipasi terjadinya banjir yang berulang.

Kata kunci: Banjar, Banjir, Kesiapsiagaan

Abstract : Flooding is a very common natural disaster in Indonesia. It is necessary to have a disaster risk management programme. This study aims to determine the disaster preparedness of the community for flood in the city of Banjar, West Java. Data were collected from the city government, regional disaster management agency, non-governmental organisations, BPS, earth shape maps from InaGeoportal, vulnerability map data, vulnerability maps and risk maps from the National Disaster Management Agency, and literature in the form of journals and books. The data collection techniques used by the researchers included questionnaires and documentation. The method of data analysis used was descriptive percentage and scoring analysis to analyse the frequency distribution of the level of preparedness of the community in the face of flood disasters. The data was obtained by providing questionnaires to the community which were filled in by the respondents and then calculating the total frequency of correct answers from each respondent. It can be seen that Banjar city has a high level of flood hazard, vulnerability and capacity, which means that it is important to take preparedness measures to reduce the adverse effects and anticipate the increase of recurrent floods.

Keywords : Banjar, Flood, Preparedness

A. INTRODUCTION

Disasters are natural and/or non-natural and human-caused events that threaten and disrupt people's lives and livelihoods, resulting in human casualties, environmental damage,

property loss and psychological impacts (Indonesia, n.d.). One type of natural disaster that occurs repeatedly in Indonesia is flooding, which can cause losses and casualties.

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Flooding is a very common natural disaster, especially in the West Java region. According to the Indonesian Disaster Data and Information (DIBI), flooding is the most frequent disaster in Indonesia for the period 2010-2020 (Azizah et al., 2022). Floods can have negative impacts on social, economic and environmental life, such as damage to infrastructure, loss of property, health problems and death. According to the Indonesian Disaster Risk Index data in 2022, flood disaster in Indonesia has a disaster index with a high risk class category, especially in the Banjar region, West Java, the flood disaster risk index in Banjar City in 2022 with a high disaster risk index value of 27.91 (BNPB, 2023).

Banjar City is one of the cities in West Java that is prone to flooding. This is caused by several factors, including high rainfall, land conversion, land use that is not in accordance with its designation, and low public awareness of environmental issues (Qodriyatun, 2020). Banjar City has an area of 113.97 km² with a population of approximately 203,420 thousand people (Badan Pusat Statistik Kota Banjar, 2022). Banjar City is an area drained by the Citanduy River, which has a moderate water flow but can cause flooding when it rains. The area consists of valleys interspersed with hills. It can be interpreted that the area has a high level of disaster vulnerability

to environmental problems, one of which is flooding, although there is no high impact management to deal with the disaster (Kasmila et al., 2019).

In order to reduce the risk of disasters occurring, there is an urgent need to improve understanding through knowledge. One of the ways to improve understanding is to reduce the risk of disaster through preparedness. If the community's knowledge of disasters is good, it can create a generation that is resilient and prepared to face disasters (Hildayanto, 2020). Given the frequent occurrence of natural disasters in Indonesia, it is necessary to have a disaster risk management programme. Disaster risk management is a better and more systematic way of dealing with disasters, such as a series of preparedness programmes (Fitriani et al., 2021).

Flood disaster preparedness in Banjar city is important for the identification of the level of vulnerability and institutional capacity in flood disaster management. This study can provide recommendations to improve mitigation, prevention, preparedness and flood disaster management in Banjar City (Suprpto et al., 2023). Disaster preparedness is a basic need for any region to reduce risks that can occur anytime and anywhere. This explains the need for disaster prevention through proper, to minimize

the risk of subsequent events, especially human casualties (Syarif et al., 2022).

Therefore, to reduce the impact that occurs in terms of efforts to reduce the impact of flood disasters that can be done is to prepare for disasters ranging from early warning to increased community vigilance to prepare for refugee management (Muhlisin, 2022). Therefore, the problem of flood disaster threats can be addressed through a series of preparedness activities. Based on the above description, the researcher's purpose is to determine community flood disaster preparedness in Banjar City.

B. METHOD

The research method used in this study is descriptive quantitative. The research location is in the area of Banjar City, West Java. The population in this study were the people of Banjar City and some government institutions. The sampling technique used was purposive sampling technique. Purposive sampling technique is a random sampling method based on certain predetermined objectives or criteria. In this method, samples are taken randomly but with certain objectives or criteria so that the samples taken are representative of the population with the desired characteristics (Darmanah, 2019).

Data were collected from the City Government, Regional Disaster Management Agency, Non-

Governmental Organizations, BPS, Earth Shape Maps from InaGeoportal, Vulnerability map data, vulnerability maps, and risk maps from the National Disaster Management Agency, as well as literature in the form of journals and books. Furthermore, the data that has been obtained is analyzed by weighting and scoring. Data collection techniques used by the researchers included questionnaires and documentation. The sampling criteria used were affected people and flooded areas. The number of samples was calculated using the Slovin formula with a margin of error of 15%, so the number of research samples obtained was 45 respondents. The data analysis method used descriptive percentage and scoring analysis to analyze the frequency distribution of the level of preparedness in facing floods in Banjar City, West Java (Aji, 2015).

The analysis of the preparedness index in this study uses the Disaster Preparedness Index to measure the level of community preparedness in the face of flood disasters, with data obtained by providing questionnaires to the community in Banjar City, which are filled in by the respondents, and then calculating the total frequency of correct answers from each respondent. In determining the index value for each parameter, the formula is used as follows:

$$\text{Disaster Preparedness Index (DPI)} \\ = 35(KA) + 10(P) + 15(ERP) + \\ 25(EWS) + 15(RM)$$

Description :

KA : Knowledge and Attitudes

P : Policy

ERP : Emergency Response Plan

EWS : Early Warning System

RM : Resource Mobilization

The maximum parameter score is obtained from the number of questions in the indexed parameter (each question is worth one). The total actual score of the parameter is obtained by summing the actual scores of all questions in the

parameter. With values ranging from 0-100, the higher the value, the higher the level of preparedness (Dewi Kartika Jati, 2013).

The parameters were calculated by asking several questions to the respondents, namely the people of Banjar City, using the weighting method. The questions were grouped into parameters such as knowledge and attitudes, emergency plans, disaster warning systems, policies and resource mobilization. The questions grouped into parameters are then multiplied by the weight given (Mellenia et al., 2022).

Table 1 Preparedness Parameters

| Parameter | Score |
|---------------------------|-------|
| Knowledge and Attitude | 35 |
| Emergency Response Plan | 15 |
| Disaster Warning System | 25 |
| Policy | 10 |
| Mobilization of Resources | 25 |

Source: (Hidayah Nur Damayanti, 2015)

The frequency of correct answers from each respondent was then calculated from the data obtained from the questionnaires given to the community in Banjar City and completed by the respondents. The following formula was also used for descriptive percentage analysis:

$$DP = \frac{n}{N} \times 100 \%$$

Description:

DP : description of percentage

n : empirical score (score obtained)

N : ideal score (maximum score)

The response to each parameter is then calculated by multiplying the number of responses by the existing weight and then multiplied by the existing weight. The value obtained from the weight calculation is then adjusted to the class level of the readiness index value in the table 2.

Table 2 Flood Preparedness Index

| Interval Score | Percentage (%) | Class | Level |
|----------------|----------------|-------|-----------------|
| 346 – 520 | 68 - 100 | 3 | Highly Prepared |
| 174 – 346 | 34 – 67 | 2 | Prepared |
| 0 – 173 | 0 – 33 | 1 | Less Prepared |

Source: Analysis of the primary data, 2023

C. RESULT AND DISCUSSION

C.1. RESULT

a. Flood vulnerability

Banjar City is located in West Java Province, which has a topography and climate that contribute to flood risk. Some of the factors that can affect the city's vulnerability to flooding are high rainfall, which can cause the Citanduy River and its tributaries and waterways in Banjar City to overflow, resulting in flooding. Poor or inefficient drainage systems can then result in rainwater not being channeled properly, increasing the risk of flooding. In addition, rapid urban growth is leading to development and land-use changes that reduce the absorption capacity of the soil, exacerbating flooding.

According to BNPB data, the flood vulnerability of Banjar City ranges from moderate, with an area of 2,460 ha, to high, with an area of 3,330 ha. To overcome flood vulnerability, the government and related parties need to take measures such as improving drainage systems, organizing urban spatial planning wisely, improving weather and river monitoring, and

raising public awareness on safe practices in dealing with floods.

b. Flood Risk

Based on the data on the results of the level of flood hazard, vulnerability and capacity, it can be seen that the level of flood risk in Banjar City has a high category. It is known that the entire area of Banjar City has a high level of flood risk. Flooding in Banjar City occurs frequently every year, including a high level of risk as almost every sub-district experiences the disaster.

Flood disaster risk in Banjar City, West Java, causes damage, loss and even loss of life in flood-affected areas. The community experiences loss of property, loss of safety, displacement, and disruption of community activities if immediate action is not taken to deal with the flood disaster. Floods can also cause other disasters that can affect the community around the flooded area, namely landslides. Community institutions, the government and the community need to work together by gradually overcoming and socialising flood disaster management to reduce the risk of such disasters.

Sourced from BNPB data that the area of flood risk in Banjar City is 5,982 ha, with 123,996 people exposed, then has a physical loss impact of around 523,323 billion. So it can be seen that as

a result of the flood disaster, Banjar City has a high risk, therefore it is necessary to take preparedness measures to reduce the adverse effects and anticipate the increase in repeated flood disasters.

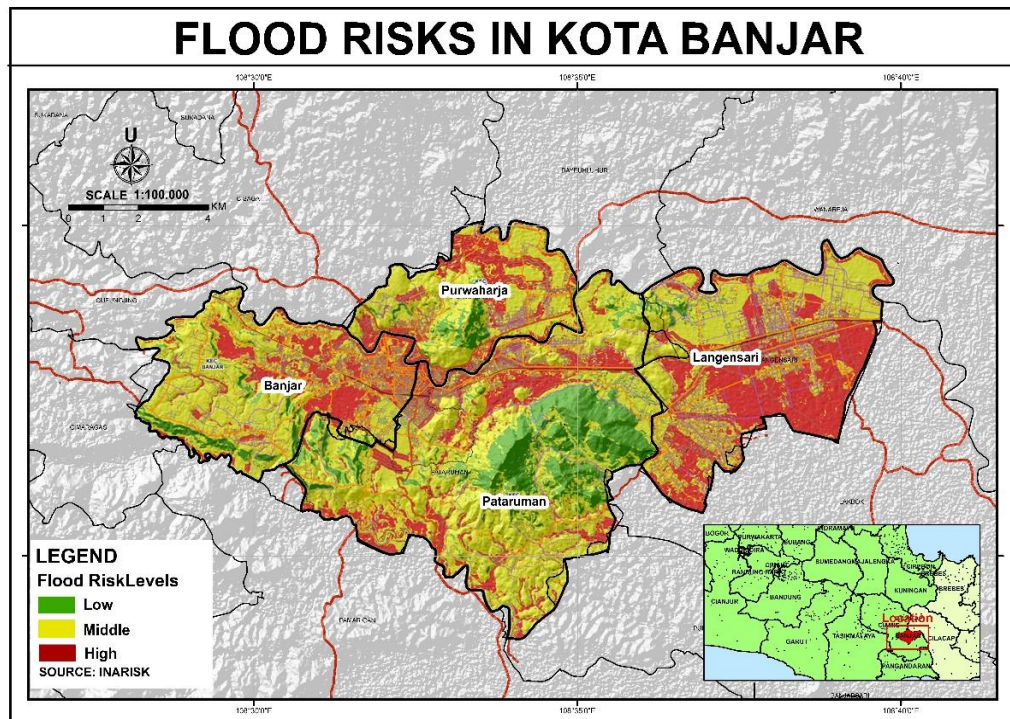


Figure 1.1 Flood Risk Map of Banjar City
(Source: Analysis of the primary data, 2023)

c. Flood Disaster Preparedness

The results of the survey showed that more than half of the respondents (51.1%) were female, dominated by an average age of over 30 years and had lived around for more than 20 years. From the education level, most of the respondents who participated in the survey graduated from Senior High School (82.2%), some graduated from Bachelor College (13.3%) and on average continued as household members. Most worked as traders

(40%), some as freelancers (40%), farmers (6.7%) and on average as household members. With an income of around <Rp. 1,000,000 as much as (80%) is due to the fact that the main occupations of the community are traders, farmers, and freelancers.

The results of the average value of the flood disaster preparedness variable from each respondent are seen from the parameters used in this study. There are five parameters used, namely: Knowledge and attitudes, emergency

response plans, disaster warning systems, policies, and resource mobilization (Noor Diyana et al., 2020). The table shows that all variables have an average that is almost close to the item score. In knowledge and attitudes, disaster warning systems, resource mobilization get a value that is almost close to the item score, while for emergency response plans and policies are somewhat closer to the item score value listed in the table. The disaster preparedness status of the respondents' dwellings was also determined based on their self-assessment (Matunhay, 2022).

According to the situation observed in the areas, the variables of knowledge and attitude, disaster warning system and resource mobilization were widely implemented from before to after the flood event, respondents agreed to seek information about flood risks and to involve local institutions or groups to reduce damage and losses due to floods and to cooperate with local areas to repair the damage caused. Furthermore, the respondents reported that they would communicate and use information provided by the government agencies. They agreed to rely on these agencies for obtaining critical information related to floods.

Based on the results of flood disaster preparedness above, there are several points that explain each

parameter of flood disaster preparedness in Banjar City. Each point of the parameter explains the data contained in the results of the interviews, calculations and analyses carried out in the research.

1. Knowledge and Attitudes

It is critical to have knowledge because it enables individuals to understand their environment better, allowing them to predict environmental changes and develop an acceptable attitude towards managing them. Moreover, people's attitudes towards natural disasters are crucial because these attitudes, along with knowledge, guide their behaviour in dealing with these conditions without feeling anxious or panicked, as explained by (Cvetković et al., 2015).

Based on the data from the graph above, it shows that the average respondents in the banjar sub-district and pataruman sub-district have higher (> 95%) preparedness about knowledge and attitudes towards flood disasters. Meanwhile, the langensari sub-district and purwaharja sub-district have the same percentage of 86% which is also included in the level of preparedness for flood disasters.

2. Emergency Response Plan

Disaster preparedness planning involves identifying organizational resources, defining roles and responsibilities, developing policies and procedures, and planning preparedness

activities to ensure timely disaster preparedness and effective emergency response (Federation & Societies, 2000).

Each region has almost the same percentage results, in the banjar sub-district and pataruman sub-district have a percentage above 80%, which for the emergency response plan indicator in these two sub-districts has the same actions such as closing the floodgates in the event of rainfall to reduce damage due to flood disasters.

Then for the Purwaharja sub-district and Langensari sub-district, the percentage is the same, namely 91%, where the two areas carry out a few emergency response plan actions only to anticipate flooding because the two areas do not experience flood disasters that cause severe damage very often.

3. Early Warning System

The purpose of an early warning system is to detect, forecast and, if necessary, warn of impending hazard events. However, to fulfil its risk reduction function, early warning must be supported by information on the actual and potential risks posed by a hazard, as well as the steps that communities can take to prepare for and mitigate its adverse effects (Federation & Societies, 2000).

Based on the data in the graph above, it can be seen that the disaster warning system indicator has a high percentage in three sub-districts in

Banjar city, for Banjar sub-district has a percentage of around 85%, Langensari sub-district has a percentage of around 91%, and Purwaharja sub-district has the highest percentage of any sub-district in Banjar city. Meanwhile, Pataruman sub-district has a percentage below these three sub-districts, which is 72%.

It can be seen that almost all sub-districts in banjar city have a good disaster warning system because banjar city has a warning system upstream in the form of warning tools used by institutions and communities in banjar city to reduce flood overflows that occur around the citanduy river area, as well as having floodgates to reduce the intensity of the overflow of the river into each tributary in the area.

4. Policy

Preparation plans must describe rules for collecting and distributing money, the utilization of external equipment and services, and alternate options for obtaining funds in the event of unexpected situations. Governments, communities, and agencies should create processes to apply for financial aid from the central government well in advance to prepare for disasters (Federation & Societies, 2000).

If responsible governments and other stakeholders have an understanding of the level of disaster emergency preparedness among city residents, they can review, reword and

modify KRB plans and policies. This would enable better communication of disaster impacts, prompt response, and faster recovery.

The level of preparedness in terms of policies has a different percentage among the four sub-districts in Banjar city, in Pataruman sub-district and Banjar sub-district have a percentage value of 71% because these two sub-districts experience flood disasters quite often and according to the respondents in terms of regulations and policies in the area have had many good impacts. On the other hand, the Langensari Sub-district and Purwaharja Sub-districts show good percentages, as seen from the field results. These sub-districts have well-implemented policies, and their communities' cooperation is high.

5. Resource Mobilization

Communities should have strategies, agreements and procedures for mobilizing and acquiring emergency funds, supplies and equipment in the face of disasters (Federation & Societies, 2000). The impact of a region on disaster preparedness is also

significant when controlling for socio-demographics, household socio-economic status and adaptations to hazards are taken into account. Adjusting for the influence of community, the region is no longer very significant in the set of preparedness enablers, supporting the idea that community has a strong influence on disaster preparedness (Guo et al., 2021). Based on the figure above, it can be seen that the level of preparedness in terms of resource mobilization is quite good because it has a percentage ranging from 50% - 75%.

For resource mobilization, it does not have a high and good percentage due to many influencing factors such as having a permanent post for evacuation because the flood incident did not take a large number of casualties. However, the government, institutions, and others will work together to increase and evenly distribute the assistance needed in the event of a flood disaster, even not only flood disasters but natural, non-natural, and social disasters if it is an emergency.

Table 1.3 Calculation Results of Preparedness Level

| | Percentage (%) | Level |
|----------------|----------------|-----------------|
| Government | 72 | Highly Prepared |
| BPBD | 67 | Highly Prepared |
| Harapan Rakyat | 47 | Prepared |
| MDMC | 55 | Prepared |
| Eiger | 59 | Prepared |
| Community | 87 | Highly Prepared |

Source: Analysis of the primary data, 2023

The level of flood preparedness is calculated from the number of appropriate respondents' answers from 5 parameters in each statement showing that almost all respondents have a high level of preparedness (>50%) as seen in table 4. Among the five parameters, respondents have preparedness ranging from knowledge and attitudes in the event of a flood disaster, carrying out emergency response plans before a flood disaster, communicating with each other when it has rained to anticipate flood disasters and helping each other institutions and between communities before and after a flood disaster occurs.

C.2. DISCUSSION

Based on the results of the research, the level of knowledge and attitudes of the people of Banjar City is included in a high level with an average of more than 80% seen through the responses of 45 respondents who have knowledge and attitudes about flood disaster preparedness because they understand and know when there is a flood with some characteristics of their respective areas and also how to deal with the disaster. The results of this study in line with research by Fildza Rahma (2022) explains that community knowledge and attitudes about flood disasters are seen from the community's understanding of several disasters that have been experienced such as floods,

landslides and other hydrometeorological disasters.

Furthermore, the disaster preparedness plan that the people of Banjar City have put in place is good. The results of the research show that the community has a fairly high level of preparedness of over 80%, as evidenced by the community closing the sluice gates when it rains to reduce the overflow of river water due to flooding. The availability of temporary shelters and community assistance such as tents, medicines or first aid kits and emergency food supplies. The findings of the study are supported by research by Fildza Rahma (2020) that emergency plans are very well prepared because personal and community preparedness and local governments have a good response to emergency plans in the event of a flood disaster, such as evacuation from flooded areas to higher ground, installation of disaster signs and evacuation routes in each area where flooding is common.

The local government and community of Kota Banjar have a good disaster warning system. For some areas in Kota Banjar, each sub-district has complex flood impacts and different problem factors when floods occur. However, it appears that Kota Banjar has a disaster warning system in the form of a warning device in the upper

reaches of the Citanduy River, namely the Leuwikeris Dam, which is used by the local government and community to reduce water discharge into the Citanduy River, and the availability of flood gates to reduce the intensity of the river's overflow into each tributary that flows into several areas in Kota Banjar. The results of Fildza Rahma's research (2022) show that the community and the government have prepared traditional tools for early warning, and the affected community is aware that their environment has the potential for disaster.

The next parameter related to resource mobilization in Banjar City can be seen based on factors such as limited training or simulation activities due to the frequent occurrence of disasters, therefore socialization related to flood disasters is carried out during and after floods. Community participation still needs to be increased as flood disasters can occur at unexpected times, as some settlements are still located on the banks or close to the dam, and the community is expected to be prepared in the event of a flood disaster. Contrary to Fildza Rahma's research (2022), the community is very willing to mobilize resources as evidenced by the community having emergency funds and enthusiasm to participate in flood disaster preparedness training. Resource mobilization includes the participation

of communities in disaster preparedness, and the allocation of funds or savings to deal with disasters. Disaster preparedness and the allocation of funds or savings to deal with disasters, and an agreement to monitor disaster preparedness equipment and supplies. An agreement to monitor disaster preparedness equipment and supplies on a regular basis (Sakdiah & Zuhra, 2022).

Regarding the level of preparedness in policy, the government has established several regulations and studies that invite all parts of society as well as communities and institutions between stakeholders to take action to reduce flood disasters that occur in Banjar City. The role of regulations and studies on flood preparedness is very influential, starting before a disaster occurs and after a disaster occurs. The community of Kota Banjar does not have a good understanding of the existing flood preparedness regulations and studies, in addition the community is unfortunate to participate in or carry out a series of trainings to prevent flooding from occurring, the government, institutions and communities have prepared good trainings as it is known that there have been several trainings in several areas in Banjar City.

Based on the five parameters above, it can be seen that the level of flood preparedness in Banjar City is

very high. The level of flood preparedness is calculated from the number of appropriate responses from the respondents to the 5 parameters in each statement, which shows that almost all respondents have a high level of preparedness (>50%). Among the five parameters, the preparedness of the respondents ranges from knowledge and attitudes in the event of a flood disaster, carrying out emergency plans before a flood disaster, communicating with each other when it has rained to anticipate flood disasters and helping each other institutions and between communities before and after a flood disaster occurs.

The results of the research on the level of flood disaster preparedness are in line with the research of Diyani N, (2020) with the result that among the preparedness actions taken by respondents are placing important documents in watertight containers, identifying evacuation routes and evacuation centres nearby, and packing clothes and clothing items and basic necessities in case of evacuation. Preparedness measures such as purchasing additional insurance for property and cars and cars and learning CPR were the least undertaken by respondents. In addition, public awareness by participating in preparedness actions such as attending training and understanding existing

policies are also included in flood preparedness.

D. CONCLUSION

Based on the results and discussion of the above research on flood preparedness in Banjar City as stated, it can be concluded that the preparedness in Banjar City in facing flood disasters is classified as ready (47%) to very ready (87%). The availability of various flood disaster preparedness equipment is still relatively limited and tailored to the needs at the time of a disaster such as special evacuation shelters, early warning devices, emergency tents and so on. Nevertheless, the community and stakeholders of Banjar City have organized strategies and have the potential to develop flood preparedness.

The community, assisted by the local community, will always communicate, coordinate to monitor river conditions and environmental cleanliness, and prepare equipment to save themselves in the event of a flood. On the other hand, more frequent disaster training and socialization with expanded coverage by the government is needed, so that all communities have high disaster preparedness.

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