



## Policy Brief

# Community-Based Flood Risk Management in Urban Areas to Build Systemic Resilience

Agustus 2021

This policy brief results from a rapid ethnographic study using immersion and solutions mapping methods that rely on informal conversation, empathy, and active listening. The study, supported by a public survey, was conducted in May-June 2021 in 7 cities in Indonesia and involved low-income urban communities affected by floods. The content of this policy brief is based on the perspectives of the affected community regarding the aspirations, needs and solutions of flood infrastructure. The Directorate for Water and Irrigation of the National Development Agency (DIPI BAPPENAS) commissioned the study to accommodate the perspectives of affected communities in formulating infrastructure policies.

## A. Background

Resilience is the capacity of a system to absorb disturbances and reorganize while undergoing change to still retain essentially the same function, structure, identity, and feedbacks (Walker et al. 2004). The resilience thinking approach investigates how socio-ecological systems can be well-managed to ensure a sustainable and resilient supply of essential ecosystem services. Systemic resilience within the scope of urban ecosystems is determined by the resilience of urban ecological infrastructure in the face of internal and external presses and pulses. The urban ecological infrastructure is a combination of physical infrastructure

(biophysical template) and social infrastructure (socio-cultural-economic template). These two templates consist of various elements that influence each other.

For example, water dynamics, which are included in the function of the biophysical template, are mutually influenced by other biophysical templates such as biodiversity, elements of the quality of built infrastructure, and socio-cultural-economic templates such as design planning and government regulations. The critical problems that affect various elements in both templates will weaken the resilience of urban

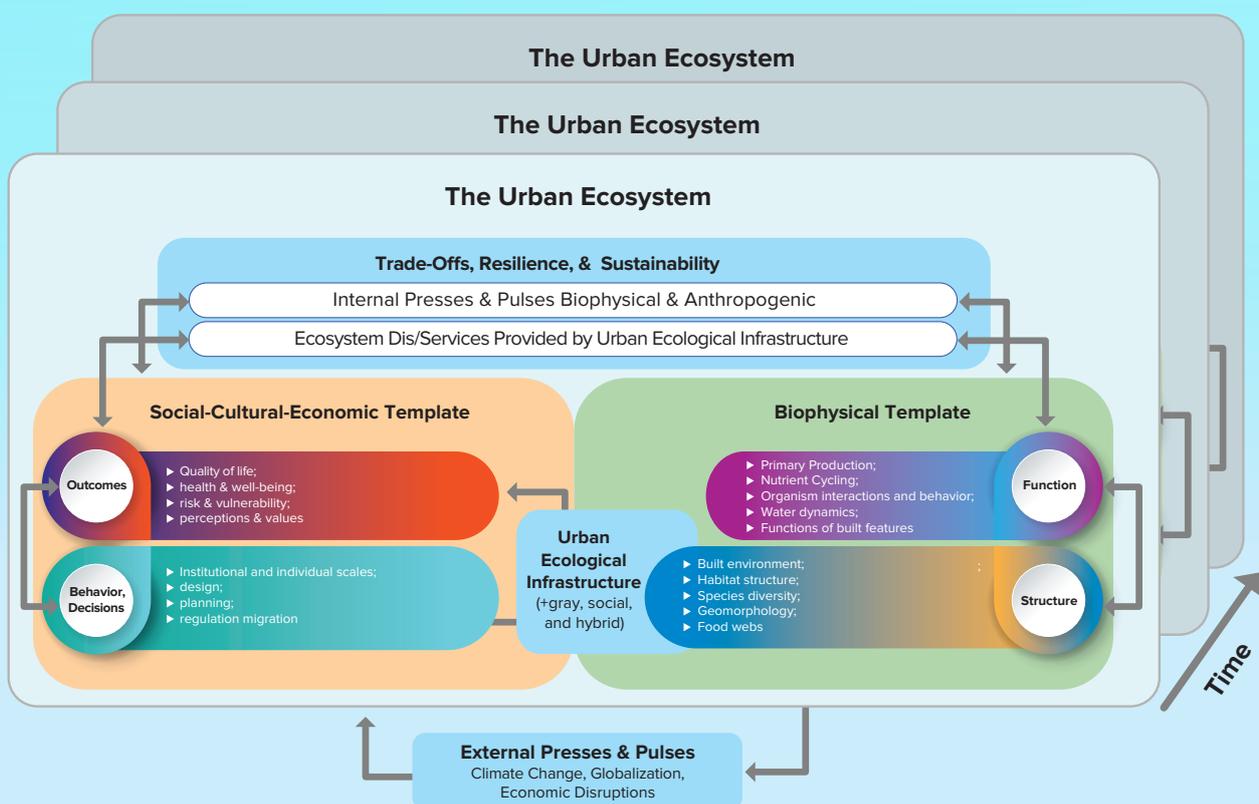


Figure 1. Urban Ecological Infrastructure Adapted from Childers et.al. (2019)

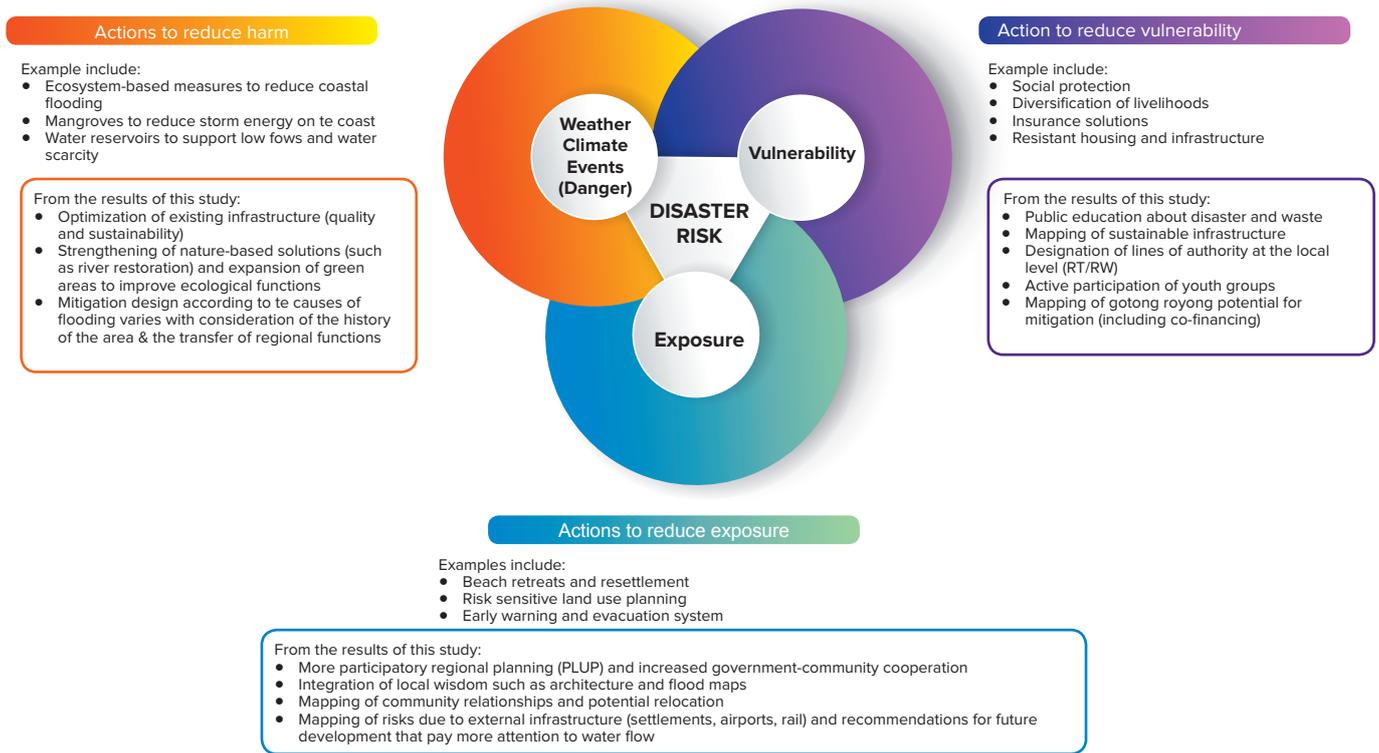


Figure 2. Results of a brief ethnographic review within the framework of risk reduction through adaptation (IPCC)

ecological infrastructure, making the area prone to disasters. Consequently, trade-offs of water dynamics result in water-related disasters (e.g., flooding) rather than benefits. Due to the dynamic nature of urban ecosystems, the characteristic of systemic resilience is also contextual, and its relevantly needs to be reviewed periodically.

The urban ecological infrastructure framework implies the importance of interrelationships between social infrastructure and built infrastructure in developing systemic resilience. Traditional approaches to flood risk management have focused on built infrastructure-based flood protection or improvements in flood monitoring and forecasting. This approach tends to overlook the social dimension. DIPI BAPPENAS took the initiative to develop an inclusive infrastructure policy. To get a complete picture of urban ecological infrastructure, DIPI BAPPENAS collaborates with the UNDP Accelerator Lab, RCUS, and communities of seven (7) cities in Indonesia (Banjarmasin City, DKI Jakarta Province, Semarang City, Surabaya City, Cirebon City, Malacca Regency, and Makassar City). A brief ethnographic study was conducted to obtain emic perspectives from at-risk and disaster-affected communities as evidence of public policy (figure 2).

A public survey has also been done by the UNDP Accelerator Lab. There were 353 respondents from 78 cities participating in the survey.

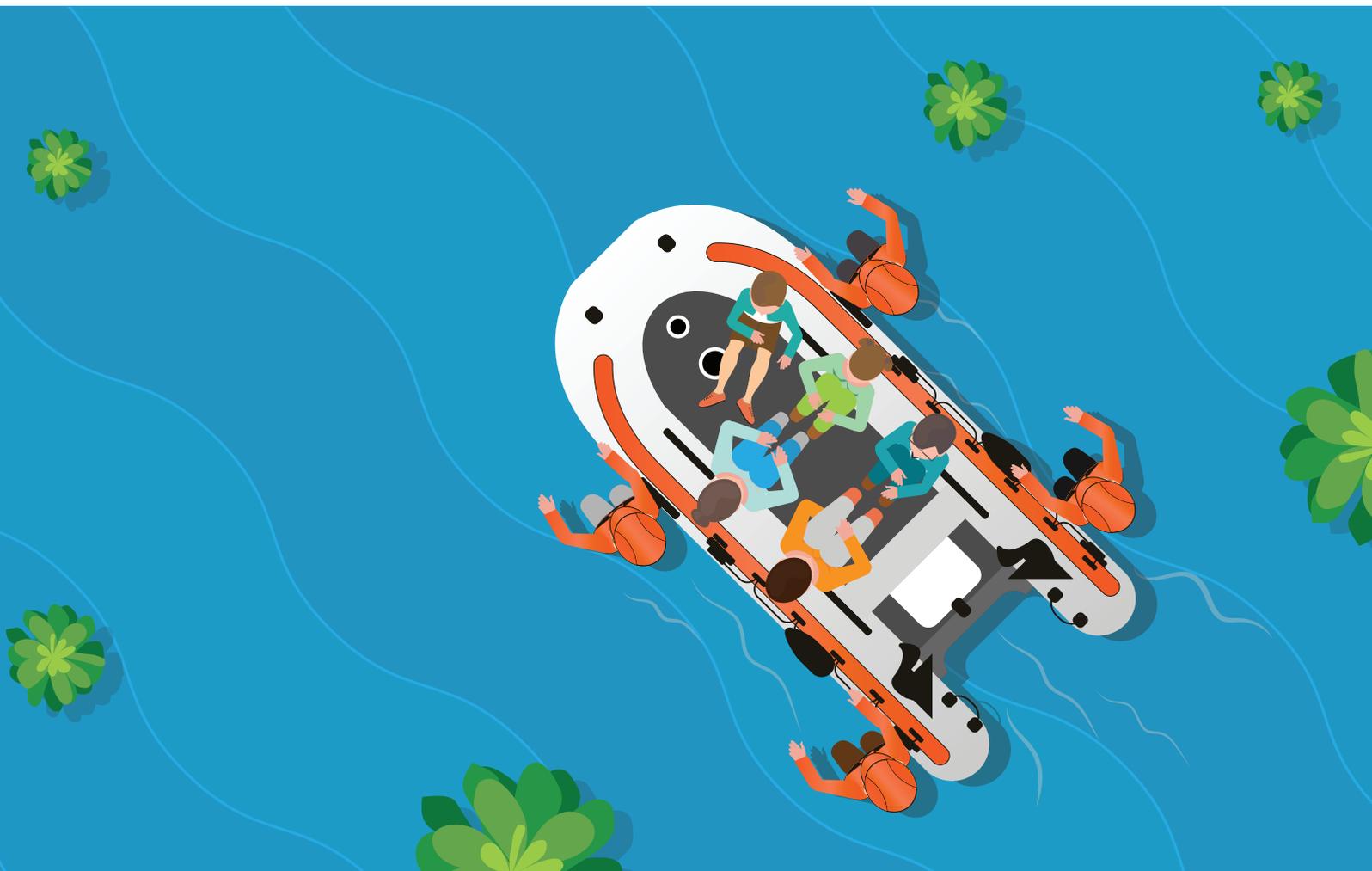
### The Ethnographic study and survey have resulted in an understanding of social infrastructure as part of resilience strategy

1. There are public perceptions' differences on the risk and contextual causes of flooding
2. The close relationship between history, terrestrial, land use, and urban infrastructure
3. Diverse interests in the urban ecosystem (community, the private sector, and the government)
4. Variation of public-private-government relations
5. Solutions that have been carried out and offered by the community based on contextual knowledge obtained empirically (living experience in the urban ecosystem)
6. Individual and communal behavior affecting the ecosystem (waste, self-reclamation)
7. The impact of flooding on the daily life, economy, society, and culture of the community, including the loss of potential economic mobility due to large routine expenditures by the affected community
8. Indications of the occurrence of the climate crisis through changes in the frequency and intensity of floods
9. There is no existing set of policies that do not cover the upstream and downstream river areas completely.

## B. Main Findings

**Public Community perception on flooding.** In contrast to the Government, which technically defines a flood as an overflow of water from rivers, the public community understands flooding in general as an excess of water volume that occurs in their land neighborhood. Some communities can see and/or know the location of the origin of the floodwater in a very specific way (Semarang and Makassar cities), while others do not (Jakarta cities). Perceptions' differences on the floods definition between the government and the community ultimately distinguish the descriptions of the causes of floods and differences in perceptions of solutions. The community interprets floods and risks based on the geographical (local) context of their settlements, which cannot be separated from their social, economic, and cultural conditions and their position on rivers and other waterways (Demak-Semarang, Banjarmasin, Makassar). A group of people interprets floods and their risks based on their ecological relationships with nature and beliefs based on culture and religion (the city of Malacca).

**The history of settlements, land status, changes in spatial and land use, and urban infrastructure development** are other determining factors for the community in understanding and identifying the causes of floods. These four factors do not stand alone but are interrelated. The community can identify and associate flood events with the four factors above. Specifically, the community is aware that landscape changes along the river flow cannot be immediately replaced with built infrastructure. Some are also aware that the existing built infrastructure is insufficient, less than optimal and incomplete. The community identified a lack of supervision over the built infrastructure maintenance process that affects the quality and effectiveness of its functions in reducing flood risk. Most communities are not given the opportunity to be actively involved (from the planning process to monitoring) to achieve environmental quality improvements related to planning and land-use change and infrastructure development.



**The relations in the community and with the government vary.**

Even though they live in the same geographical location on rivers and other waterways, spatial and built infrastructure inequalities can still occur. In certain settlement communities, the duration of maturity and the length of people living in a community differ. They are also becoming determining factors in the formation of social cohesion and the quality and quantity of adaptation and mitigation actions at the group and individual levels. Communities place higher trust in local leaders (both formal and informal) than the Government. They also have a dynamic and diverse vertical relationship with the Government and often cannot be separated from the dynamics of practical politics. Communities are also aware of, and experiencing, confusion over the variety, coordination, and regional differences. This happens because of the division of government institutions that are not synergetic in one flood area. Communities realize that social cohesion has a major influence on the level of resilience in preventing, tackling, and recovering from flood disasters.

In a certain capacity, **communities also find solutions and innovations** related to flood adaptation and mitigation. The socio-cultural construction of local communities related to water management (e.g., traditional perspectives on “waterways”) has not been

recognized as a social potential. External pressures, namely globalization and the economy, disrupt cultural practices and local traditional values in dealing with floods, such as stilt houses and forest management. Some identified solutions and grassroots innovations have various forms, namely built infrastructure, based on nature and joint initiatives (*gotong royong*). Many grassroots solutions also serve as flood prevention, response, and recovery. These grassroots solutions and innovations are sporadic and small-scale. Some of them are collective, and others depend on individuals/characters. Most of them are part of spontaneous coping strategies and mechanisms and are influenced by socio-economic capacity. A significant contrast in adaptation response was observed between the upper class and the lower middle class. The response in the form of changing or upgrading the physical house permanently (elevating the ground floor and adding the floor of the building) is generally carried out by the lower middle class, while the lower middle class survives and anticipates flooding by making additional devices (dykes and shelves) that are temporary. The grassroots solutions and innovations were found informal and cannot be part of social infrastructure under the government regulatory framework. They have not been able to give impacts structurally and systemically towards flood disaster prevention action.





### Activities and behavior of individuals and groups that affect the ecosystem

include the closure of drainage channels, waste and disposal problems, small-scale private reclamation by the community, closure of water bodies, and so on. Communities are aware that these activities and behaviors are counter-productive to grassroots solutions. They also can identify the causes and origins of these activities and behaviors. These activities and behaviors are related to other urban systems, such as waste management, weak development supervision, and low community participation in spatial planning. Communities' engagement in the development of flood infrastructures, such as canals and river management, has proven effective in flood prevention.

On the other hand, communities are also aware that the lack of participation in the urban system affects the effectiveness of flood infrastructure. The role of the private sector in terms of land use and utilization is also very important to note. By emphasizing more on efforts to increase internal profits, businesspeople should pay attention to the environmental impact on the surrounding community.

Communities are aware of social cohesion or solidarity as a fundamental capital for flood disaster impact management, especially when evacuating vulnerable groups. Communities are also aware that various levels of vulnerability cause various flood impacts. Certain physical and mental conditions (elderly, people with physical and mental disabilities, pregnant women, children) are the most vulnerable groups affected by

flooding, followed by socio-economic status conditions (e.g., informal workers such as farmers, ranchers, casual workers) and location residence (river and coastal residents). Communities are aware of the importance of specific approaches for these various vulnerable groups, starting from flood prevention, mitigation, and recovery. Communities realize that the various levels of vulnerability affect accessibility, opportunities, and physical and non-physical risks (mental, social, and economic health status). Communities, especially those living in flood risk areas and with low incomes, are aware that **floods have an impact on their economic condition to the point that it becomes an obstacle and eliminates opportunities for economic mobility.** Ecological relations, economic pressures, and alternative livelihoods affect communities' risk perception in interpreting these obstacles and the decision to change residence or carry out adaptation strategies.

The impact is not only felt in flood events, but the infrastructure for flood prevention also turns out to negatively impact the social, cultural, and economic life of the community and change the environment. This happens when rivers and water resources are only reduced and viewed from the perspective of the destructive power of water, such as a mere flood.

Partially, communities began to **associate and identify the climate crisis through changes and flood frequency and rain intensity.** This identification and association were followed by the realization that the climate crisis exacerbated classic unsolved problems

(e.g., problems of spatial planning and changes of land use)

Flood risk management plan also often only places community participation on early warning, disaster response and post-disaster response. There is great potential for social cohesion and solidarity that has occurred in communities. If the fundamental elements in flood risk management are 1) flood hazard management, 2) reducing exposure to hazards, and 3) reducing vulnerability, then the study of seven cities shows:

1. There is still a strong tension between political interests and economic interests in controlling living spaces that ignore the ecological aspect.
2. The reason for development that tends to be technocratic has not made ecology an orientation to improve the quality of life sustainably.
3. There have not been opened spaces for meaningful community participation in spatial planning (planning, utilization, and supervision) rather than formalities. This means denying the potential of local knowledge found in this study.
4. There is no integration between spatial planning and flood risk.



### C. Policy Recommendation

The approach to flood risk management according to the Medium Development Plan (RPJMN) 2020-2024 is centered on strengthening resilient infrastructure as part of basic service infrastructure. Focusing on

infrastructure and managing flood risk management as a basic service is risky in “one size fits all” policymaking that ignores communities and cities’ dynamics, dimensions, and complexity. The approach to vulnerable infrastructure is built through a single understanding, which has the potential to cause conflict during implementation and afterwards.

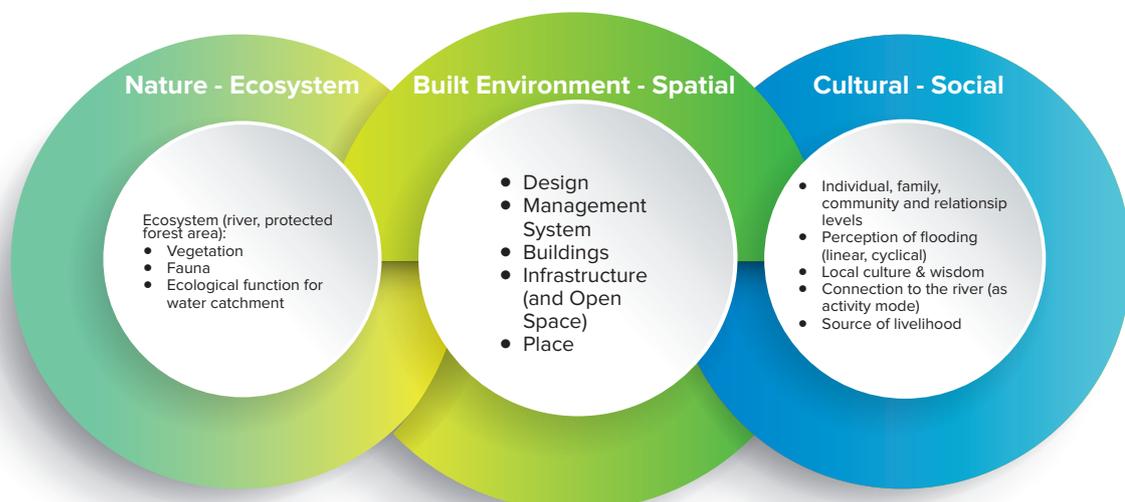


Figure 3. The intersection between artificial-spatial structures, socio-economic and environmental cultural aspects

Cities and communities have an important role in driving the transition to adaptive flood risk management under area and time. The study of seven cities shows that the flooding context in urban areas has interrelated layers of complexity (figure 3). The existing model and approach still develop understanding and resilience in one system without regard to other complex systems. This model does not necessarily encourage systemic change. Resilience in a dynamic urban society is a process that enables learning to occur. The built resilience needs to include diversity, redundancy and meaningful participation, which includes the attributes of honesty, openness, fairness, competence, responsiveness, broad-based and deliberation.

In realizing flood risk management that can encourage systemic change in the community, there needs to make changes at the level of knowledge production and policy production by prioritizing meaningful community participation in the prevention, management, and recovery of disasters due to the destructive power of water. This is done with a Transdisciplinary approach that encourages the process of co-creation with the collective knowledge of the local community about flooding that comes from awareness, experience, and ideas that have stood the test of time. This emphasizes the importance of recognition and legal protection for experiential knowledge.

**Prevention of Disasters due to Water Damage emphasizes** the overall community-based process of regulation, guidance, supervision, and control (upstream and downstream).

The process of regulation, supervision and control can be in the form of a Community-Based Disaster Risk Management Plan (RPRBBK).

The contents of the Community-Based Disaster Risk Management Plan are::

- a. Community mapping of social, cultural, economic, regional, biophysical and hazard aspects (figure 4), as shown in the following chart:

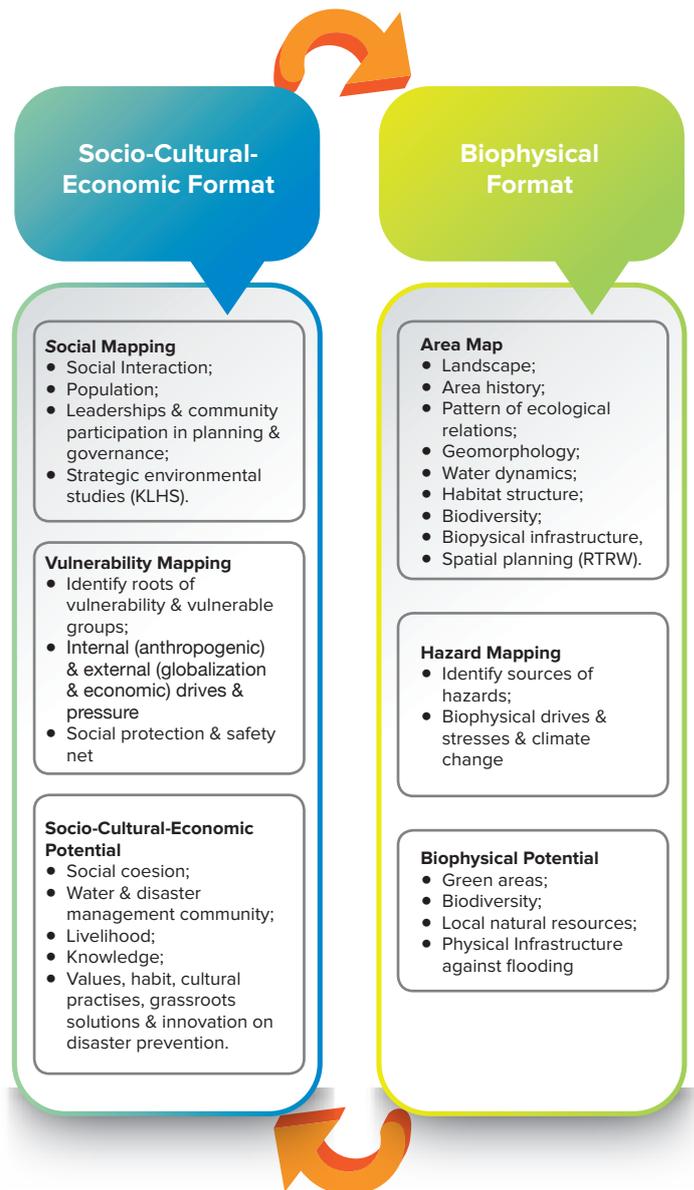
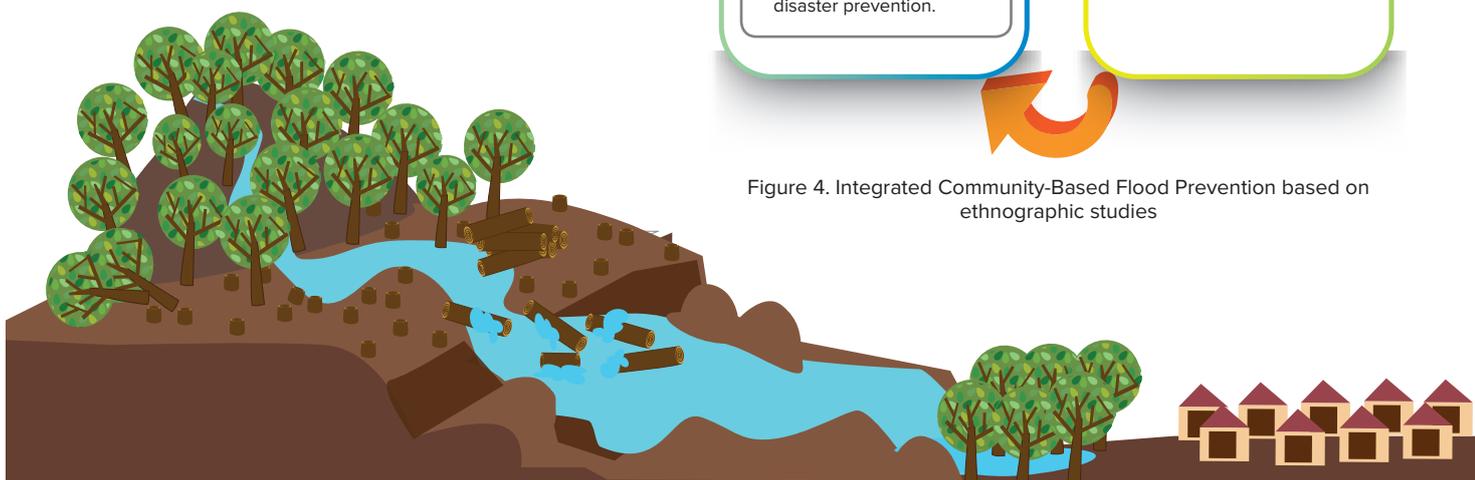


Figure 4. Integrated Community-Based Flood Prevention based on ethnographic studies



- b. Integration of a community-based flood risk management plan and integrated with the Spatial Plan. The differences in the area and complexity of the city allow the formation of several catchment area-based management plans. The form of RPRBBK integration can be a stipulation in the Regional Spatial Plan (for the Regency area) and the Detailed Spatial Plan (for urban areas), or it can be stipulated separately in the City Design Guidelines (Building and Environmental Planning) in certain areas, for example, disaster-prone areas with a high population density. The principle of structuring the area in RPRBBK prioritizes the community's economic, social, cultural, and environmental conditions and upholds human rights.
- c. Community plans for disaster early warning, disaster mitigation and conservation efforts
- d. RPRBBK can identify community-based disaster recovery activities.

### The general arrangement of activities in the preparation of the plan are:

- a. Identification of existing community actors, drivers, and organizations, including their accompanying interests in water ecology.
- b. Arrangement of institutions, teams and working groups
- c. Preparation of the history of the area
- d. Setting Vision and Milestones
- e. Identifying Problems and Possible Solutions
- f. Preparation of Work Plans and Priority Locations
- g. Sharing of responsibilities, coordination, and financing
- h. Preparation of Management and Monitoring Plan

Models that might be done, for example, are charrette designs or mini studios.



### In realizing the RPRBBK, the roles of the Central and Regional Governments include:

- a. The determination of the distribution of the catchment area is determined jointly through consultation with the community.
- b. Division of agency or task force tasks based on the catchment area
- c. Opening and providing space for participation by establishing cooperative relationships based on equality or delegation of authority to local communities.
- d. Preparation and determination of KAK Activities carried out with the community. It is worth noting that the consultant tender process has a negative impact on the quality of participation.
- e. Capacity Building and Knowledge Production Collaboration (knowledge co-creation) with the community
- f. Enabling multi-year activities and programs
- g. Settlement of agrarian problems as part of the implementation of the plan





Realizing the RPRBBK requires structured and organized community involvement in implementing the plan (pre-plan phase to post-control and sustainability function phase). Such involvement can be in the form of a Flood Risk Management Community Task Force. The contents of the Task Force were also identified as part of the RPRBBK.

There are already similar models that carry the Jogo Kali (Jaga Kali) principle, such as in the Kali Kali Stren in Surabaya, the Ciliwung River Children's Community in Jakarta, and the Winongo Asri Communication Forum.

**The Guidance Function in Disaster Prevention** can emphasize collaboration in knowledge production for mutual understanding:

1. Flood risk and the understanding of the changes that may occur.

The type of mutual understanding that needs to be built is

- a. Illustration of flood risk has a major impact on communities and individuals' economic, social, and cultural life.

- b. Various kinds of understanding can encourage people to see the possibility and variety of futures different from the ones they are facing now.

2. Understanding of the inseparable relationship and solidarity between upstream and downstream areas in the context of spatial and landscape planning.

The coaching function can be in the form of:

- a. Solutions and Innovation Campaign
- b. Cross-sectoral and cross-regional public dialogue forum (upstream and downstream)
- c. Shared knowledge repository
- d. Concrete actions that have a direct impact on the local environment, economy, society and culture

To support disaster prevention, the Government and the community need to organize a Water Resources Information System on a local scale, following the regional context and the scope of the RPRBBK. The information system can use the information in Article 113 of the RPP on Water Resources Management and add the spatial context, such as the Basic Coefficient of Buildings and Coefficients of Building Floors built and the percentage of the existing Green Basic Coefficient.



**Recommendation Matrix for Water Damage Control**

No	Water Damage Control		Policy Recommendation
1	Prevention	Arrangement	1. Community-based flood risk management plan 2. A Cross-Sectoral Public Dialogue Forum
		Coaching	1. Knowledge production collaboration 2. Local/Region Flood Information System 3. A Cross-Sectoral Public Dialogue Forum
		Supervision	1. Community-based flood risk management plan
		Control	1. Community-based flood risk management plan
2	Management		-
3	Recovery		1. Community-based flood risk management plan 2. Gugus Tugas Komunitas Pengelola Risiko Banjir
4	Institutional		1. Flood Risk Management Community Task Force



## D. Proposed Follow Up Plan

The Ethnographic Briefing Activity also identified cities and communities that could be partners in short-term follow-up plans, focusing on:

1. Formation and strengthening of Community/ Urban Task Forces
2. Preparation of a community-based flood risk management plan and related spatial products.



## Reference

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