

# Operationalizing resilience: A content analysis of flood disaster planning in two coastal cities in Central Java, Indonesia

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## Operationalizing resilience: A content analysis of flood disaster planning in two coastal cities in Central Java, Indonesia



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### 1. Introduction

Resilience is an emerging terminology discussed across various perspectives, and its meaning continues to be interpreted, re-interpreted, and contested. Because of its complexity, Davoudi et al. [1] believe that resilience will be no more than another “buzzword” if the definition is not clarified and put in the right context. Meerow et al. [2] and Jabareen [3] further highlight the ways that resilience is a multi-faceted term, characterized differently depending on the discipline. Urban resilience offers one important emerging study area. Given that more people now live in urban areas, much of the future resilience gap will occur among medium sized cities, across the Asia-Pacific region [4,5]. Scholars emphasize the importance of defining urban resilience comprehensively, which is done in an integrative approach to accommodate urban complexity.

Despite the continuing interest in resilience and the continuing conversation about its definition, there are global movements seeking to convey urban resilience for policy mainstreaming. Therefore,

repeated calls are being made—especially among administrators who must implement resilience plans—to be more practical in implementation. Beginning in 2008, the Asian Cities Climate Change Resilience Network (ACCCRN) provided groundbreaking work to bring resilience into the global conversation in the context of climate change and promoting efforts for climate adaptation approach. ACCCRN has developed a framework to promote urban resilience through an inclusive process involving government, communities, and other stakeholders to empower people and member cities (<https://www.acccrn.net/about-acccrn>). Following the establishment of the ACCCRN program in 10 Asian countries, in 2013, the Rockefeller Foundation also established the 100 Resilient Cities (100RC) program to promote urban resilience in a more comprehensive way by providing a framework for resilience. The foundation's approach presented a lens to examine the major drivers of vulnerability, which is called the blue wheel, providing an impetus for member cities across the world to become more resilient (<http://www.100resilientcities.org/about-us/>). The Hyogo Framework for Action 2005–2015 [6] and Sendai Framework for Disaster Risk

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Reduction 2015–2030 [7] have connected the importance of resilience with disaster risk reduction. The frameworks introduce disaster resilience as a global commitment. In Indonesia, global action is interpreted and enacted through the establishment of the Indonesian National Board for Disaster Management (INBDM) at the national level, and, in turn, regionally as Disaster Management Boards (DMB). Since 2007, INBDM publishes a *National Progress Report on the Implementation of the Hyogo Framework for Action* in Indonesia every two years.

Among global disaster resilience frameworks, resilience is defined as the capacity or ability of a system, community, or society exposed to hazards to be able to adapt and recover in the minimum possible time [6]. Accordingly, some scholars conceptualize disaster resilience as any adaptation approach to address emerging hazards or initiatives that seek to reduce high-risk areas and address disaster recovery [8–11]. Focusing on flood resilience, Hegger et al. [12] has translated disaster resilience by combining Flood Risk Management (FRM) principles with particular forms of capacity.

In an effort to reinforce the implementation of resilience initiatives/plans, some scholars develop a conceptual framework showing that urban governance is an elementary aspect that requires further investigation [2,3,13]. Urban governance is suggested as the mechanism for managing urban resilience because it encompasses efforts to improve quality of life, spatial organization, environmental management, and economic activity [14]. Urban governance concepts may include decision-making process, inclusivity, and collaboration to address resilience challenges. Accordingly, urban policy serves as guidance for translating governance principles of resilience, and therefore, can influence approaches for creating a resilient city.

Nevertheless, some studies show evidence of challenges in addressing disaster resilience in development planning policies. Moloney and Fünfgeld [15] revealed the important role of local government in their examination of multi-level climate governance and adaptive capacity building in Melbourne, Australia. River et al. [16] investigated policy integration as critical for disaster management in Nicaragua. Based on the study in Shah Alam City in Malaysia, Khailani and Perera [17] revealed a proposition to improve the capacity of local authorities, including elements engaging local communities to promote disaster resilience. Focusing on disaster management, Madan and Routray [18] also did a study on Delhi, India, and reached a similar conclusion as Khailani and Perera [17], to focus on building key capacities. However, there is still a lack of studies on the amalgamation of disaster resilience into planning policies, particularly in Asian countries. Some research has elaborated resilience approaches to be more operationalized. Wardekker et al. [19], examined how local actors in Rotterdam applied resilience principles to shape policy discussions and develop options for maintaining delta areas that are prone to emergent effects from climate change. Hegger et al. [12] operationalizes the term “flood resilience” and links it with Flood Risk Management (FRM) approaches in some European Countries. The limited research available has utilized content analysis as a way to examine particular policies related to resilience, climate change adaptation, and disaster resilience. Torabi et al. [20] examined local government policies in two Australian cities. Forino et al. [6] have also unpacked development policies among three Australian local governments. In the UK, White and Richards [21] elaborated on the link between planning policy and flood risk at the national and local levels, and Chmutina et al. [22] further examined 30 policy documents in the country to understand how resilience is understood, and what kind of actions are executed to make areas more resilient.

Considering the critical role of urban policies to promote resilience in disaster risk reduction and resilience as a policy goal to reduce vulnerability and minimize risk compels us to more closely examine the operationalization of resilience policies among development plans, including aspects related to programs, budgets, and responsible agencies in Indonesian cities. We address four key research questions herein: (1) to what extent are planning policies accommodating the terms resilience to address flooding in planning documents? (2) How are they

connecting local action with global, national, and regional priorities? (3) what kind of resilience approaches are applied in the proposed programs? Could such approaches be categorized as a transformative resilience approach geared towards a long-term perspective or are they more re-active and of shorter-term orientation? Finally, (4) what are the important lessons for future planning policies and how can they be geared towards a more holistic resilience orientation? The research aim is to contribute to literature and practices of resilience by conducting a content analysis of disaster policies in Central Java, Indonesia. In an effort to connect global commitments to local action, this paper examines local development plans in two coastal cities in Central Java: Semarang and Tegal. Another benefit of this analysis is the overall examination of how local commitment is connected to regional and national policies and priorities. Accordingly, we focus the unit of analysis of the research on the policy document at different scales, from the national to local level.

Semarang represents a metropolitan area with global engagement to promote resilience, supported through the ACCCRN network and 100RC programs. Tegal, on the other hand, is a medium-sized city that has grown rapidly in recent years despite the area being prone to flooding. Unlike Semarang, Tegal has never engaged in collaborative work with external partners to address flooding in the city, much less to develop a resilience framework. All programs related to flooding in Tegal are the responsibility of government at the local, provincial, and national levels. As noted, the scope of this research revolves around the examination of flooding as the most commonly experienced hazard. In line with local development planning documents in Indonesia, there are three basic elements to cover with regard to flood management policies: i) the scope of the programs, ii) budget allocation, and iii) the role of government, including its capacity to expand collaboration.

This paper is organized in seven sections. Following an introduction to provide some context and rationale for the study, section 2 elaborates the definition of resilience and apply a framework for a theoretical grounding of the study, mostly in the context of urban resilience and disaster resilience. Section 3 describes types of development planning policies in Indonesia, providing context for framing the content analysis. Section 4 briefly explains the content analysis method including a list of the examined documents from National, Regional, and Local levels. Section 5 presents findings, including results of the content analyses. This includes further examination on local development plans, budgets, stakeholder involvement, and the implication of global commitments on national/local initiatives. In section 6 the paper shifts to a discussion on operationalizing resilience. The paper concludes with some remarks on how global commitments are operationalized into resilience actions at local levels, as well as key areas that other contexts might learn from.

## 2. Defining resilience, urban resilience, and disaster resilience

Increasing interests in resilience as a concept has led to numerous definitions. Meerow et al. [2] for example, reveal that there are at least 25 definitions of resilience from different disciplines. In the initial resilience definition, Holling [23] applied a framing of socio-ecological systems, defining resilience as the ability of a system to “bounce back” from a disturbance. However, mostly in the context of urban resilience, the capacity to bounce back is not as simple as the ability to return to equilibrium in addressing a disturbance. Indeed the recovery process highlights how the capacity of a system might persist or maintain inherent vulnerabilities, and thus present the possibilities of reaching a new threshold relative to a disturbance. Davoudi et al. [1] have differentiated the resilience concept into two categories: “engineering resilience;” and, “ecological resilience.” Engineering resilience is rooted in Holling’s [23] classic definition of resilience and focuses on singular equilibrium, while ecological resilience may capture a non-static definition of equilibrium. White and O’Hare [24] further differentiate resilience in the planning perspective to incorporate

evolutionary resilience, characterized as a broader notion of socio-ecological resilience that can guide planning principles. This notion aims to achieve a new, proactive normality, striving for improved thresholds focusing on medium-to long-term achievements.

Despite these developing concepts and definitions, there is now more evidence showing application of the resilience concept to the urban context [2,3,25–27] and in disaster resilience terms [12,26–28]. Furthermore, disasters from hydrometeorological hazards affected by climate-related stressors are likely to occur in low-lying urban areas located in the coastal zone [2,4]. More than 50% of people categorized as living in urban areas worldwide are vulnerable to these climate-related vulnerabilities [29]. Floods are the most common manifestation of these urban vulnerabilities in Asia [30], and applies to Java as riverine, coastal, and as flash flood events [31]. Floods occur not only because of changing rainfall and sea level rise but also due to uncontrolled development [32]. Urbanization has created more built-up areas, and combined with expanded informal communities, create corresponding challenges on governments to provide safety relative to costly infrastructure improvements.

Based on this literature, there is an urgent need to operationalize resilience to support more practical applications. Some scholars explore resilience-oriented actions based on adaptation approaches. Lonsdale et al. [11] for example, differentiates three different types of approaches: coping; incremental adaptation; and transformational adaptation. Similarly, Chelleri et al. [9] categorizes three types of actions/responses under the headings of recovery, adaptation, and transformation. These various stages of resilience are based on their temporal horizons. Focusing on flood, Hegger et al. [12] has translated disaster resilience into three types of capacities: those with the capacity to resist; capacity to absorb and recover; and, capacity to transform and adapt. Fig. 1 further illustrates evolving disaster resilience concepts, highlighting the move from theoretical to operational.

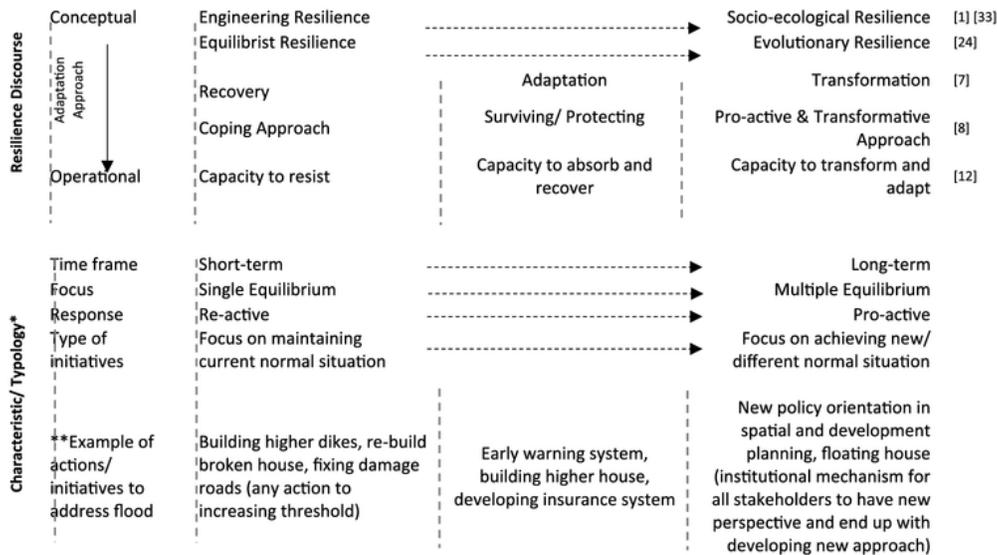
By further elaborating resilience as a term across perspectives that range from the conceptual to the operational, five main aspects help to

differentiate the characteristic/typology, explaining three types of resilience approaches (see Fig. 1). Based on the time frame for example, there are resilience initiatives which are short-term and others that have a longer time horizon. Accordingly, the response on short term initiatives are re-active and very much focused on maintaining normalcy and the status quo. These will most likely lead to single equilibrium resilience. On the contrary, there are types of initiatives which focus on long-term perspectives to achieve ‘new’ normal conditions. These examples are much more proactive and therefore strive for various indicators that seek to achieve multiple guiding equilibrium. These temporal extremes highlight that the application of the resilience concept is multi-faceted, differs greatly from one to the next, and depends on the types of actions being proposed, as well as the adaptation perspective being pursued.

### 3. Development planning policies in Indonesia

Development planning policies in Indonesia are divided into two categories: development planning policies (non-spatial) and land use planning policies (spatial). Accordingly, integration and coordination between these two types of policies are very important as they accompany one another. Law No. 26, 2007 provides details about the spatial planning system in Indonesia, and Law No. 25, 2004 explains strategic development planning policy. Fig. 2 shows the three levels of policy for both categories, classified as National, Regional (Provincial), and Local Policies. Each level includes long-term policies (20 years), mid-term policies (5 years), and planning implementation guidelines (1 year).

Some considerable challenges have emerged in the implementation of spatial and strategic development planning policies. Challenges include approaches to integration between spatial and non-spatial plans and vertical integration between national, regional, and local development policies. Furthermore, decentralization policies applied in 1999 provided more authority to local governments and reduced the role of



Note:

\*is used to further examine the programs applied in the research area (Semarang and Tegal) in Table 5.

\*\*according to the Indonesian policy framework, list of actions/initiatives can be traced in the development planning document in the local level (see Fig. 2). They include name of the actions/initiatives stated as program, allocated budget, and the responsible agency to execute the program.

Fig. 1. Resilience notions: From conceptual to operational.

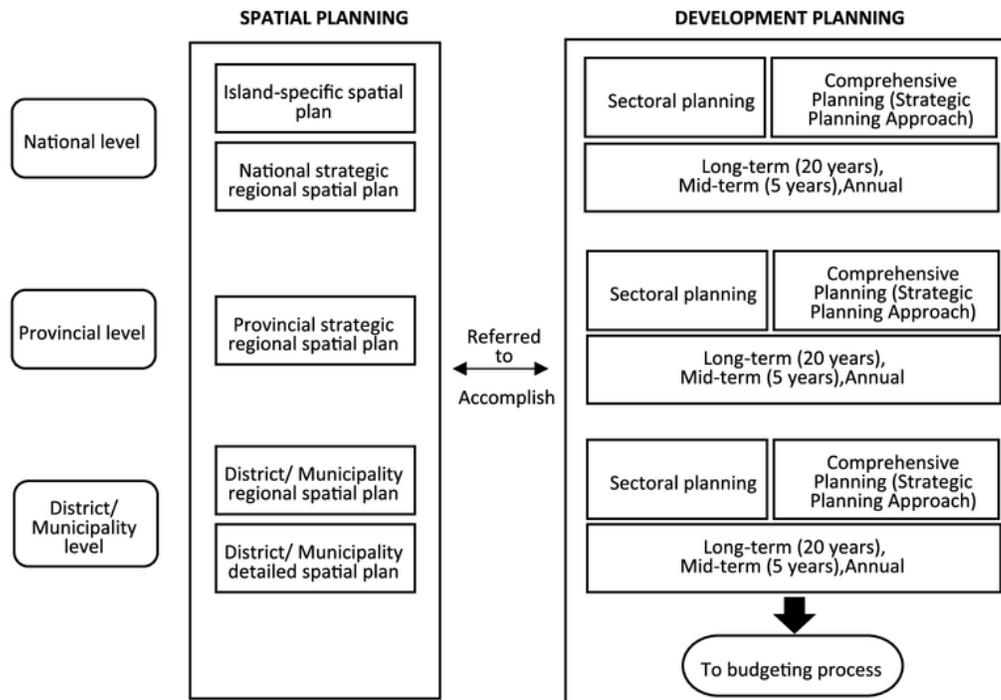


Fig. 2. Planning policies in Indonesia.

the provincial and national government. Upon decentralizing authority to the local government, institutional capacity challenges were evident, including lack of qualified human resources, weaknesses in policy implementation, and unclear accountability mechanisms. The authority changes also created substantial challenges regarding conflict of interest among sectors to address particular cross-sector problems, especially in addressing the complexity of disasters. There are at least five important leading agencies included in disaster-related issues. The Planning Board is the coordinating agency, the Public Works Agency is responsible for infrastructure provision (to reduce/control flooding events), the Disaster Management Agency is responsible for early warning and preparedness, the Spatial Planning Agency for land use management, and the Environmental Agency is mostly responsible for waste management and other environmental impact approvals.

#### 4. Methods

##### 4.1. Applying content analysis

This study applies content analysis as the main method to capture inferences and logic of interpretation from selected documents. There are three types of inferences: (1) Deductive, that is, from general to particular, (2) Inductive, which is from particular to specific, and (3) Abductive, which is from one kind of particular to another kind of particular [34]. This study focuses on abductive inference since the term resilience is new as a policy in the Indonesian context. Therefore, content analysis is applied to investigate how the term is articulated in the selected documents. According to Carley's [35] explanation on applying content analysis, investigating a manuscript may focus on counting the number of particular word(s) or terms used in the selected documents. The number of particular/chosen word(s) used in the documents indicates how important the term is from the government's perspective and may also indicate how the terms/words are comprehended.

Content analysis is applied to address the concept of resilience to

further clarify the operationalization of resilience articulated in the planning documents. In line with the developing notions on disaster resilience (see Fig. 1), there are three approaches to accommodate resilience in the planning process [10]: (1) the coping approach to reduce disaster risk, (2) the adaptation approach that involves protecting the existing system, and (3) the proactive initiative for longer-term and transformational action. In terms of the type of capacity [11], resilience is categorized as (1) capacity to resist, (2) capacity to absorb and recover, (3) capacity to transform and adapt. Accordingly, this study includes both development planning and spatial planning documents for the short-, mid-, and long-term to further examine the ability of the document to capture the sustainability and dimension of disaster resilience of the chosen cities.

##### 4.2. Data collection and analyses

Following the development planning system as illustrated in Fig. 2, Table 1 describes the list of documents examined. The documents are classified into three levels based on government hierarchy: national, regional (provincial), and local. The development planning documents are divided into two categories: development policy (long-term, mid-term, and short-term) and spatial planning document. Nineteen documents were analyzed from the national to the local level, and most of them are development planning policy documents (15 out of 19). Apart from the listed documents, four reports of Resumé were also incorporated, which were obtained from National progress reports on the implementation of the Hyogo framework. These revealing documents are released every two years (since 2007), and helped this study identify references to verify content analyses results.

Two main approaches are used, namely: examining the vocabularies and contrasting/comparing the selected documents. Two FGDs (Focus Group Discussions) were also conducted in Tegal and Semarang to further clarify the findings from the content analysis. Based on literature related to resilience operationalization and urban policy implementation, three questions provide the basis for the FGDs. These

**Table 1**  
Selected documents.

No	Title of the document	Year	Type		Level			Planning Period		
			DP*	SP**	National	Regional	Local	Long	Mid	Short
1	National Long-Term Development Plan (RPJPN)	2005–2025	*		*			*		
2	Long-Term Development Plan of Central Java Province	2005–2026	*			*		*		
3	Regional Long-Term Development Plan of Semarang City	2005–2027	*				*	*		
4	Regional Long-Term Development Plan of Tegal City	2005–2028	*				*	*		
5	National Mid-Term Development Plan	2015–2019	*		*				*	
6	Mid-Term Development Plan of Central Java Province	2013–2018	*			*			*	
7	Mid-Term Development Plan of Semarang City	2016–2021	*				*	*		
8	Mid-Term Development Plan of Tegal City	2014–2019	*				*	*		
9	National Government Work Plan	2017	*		*					*
10	Annual Plan of Central Java Province	2017	*			*				*
11	Annual Plan of Semarang City	2017	*				*	*		*
12	Annual Plan of Tegal City	2017	*				*	*		*
13	National Spatial Plan	2007–2027		*	*			*		
14	Spatial Plan of Central Java Province	2009–2029		*		*		*		
15	Spatial Plan of Semarang City	2011–2031		*			*	*		
16	Spatial Plan of Tegal City	2011–2031		*			*	*		
17	National Disaster Management Plan	2015–2019	*		*				*	
18	Indonesia Disaster Risk (RBI)	2016	*		*					*
19	Flood Contingency Plan of Central Java Province	2011	*			*				*

\*DP: Development Planning Policy (non-spatial)  
\*\*SP: Spatial Planning Policy

were issues of (i) policy integration, (ii) equity principle in implementation, and (iii) consideration accommodating environmental problems and economic value. The participants were from government agencies (see Table 1.) that have programs related to flood and/or disaster issues as the scope of this research is limited to examining the operationalization of flood resilience initiated by the government. Referring to the typology of resilience illustrated in Fig. 1, further examination was conducted at the local level (i.e., Semarang and Tegal) within their development planning documents. This was conducted in order to identify types of actions promoting disaster resilience. The investigations focused on programs, budgets, and responsible agencies.

#### 4.3. Case study sites: Tegal, Semarang, flooding, and resilience planning

Creswell [36] states that a case study is an approach in qualitative research in which the researcher focuses on a particular program, activity, or process to be investigated. This case study is focused on investigating the development plans of two study areas: Semarang City and Tegal City. The two cities are located on the northern coast of Central Java Province. Semarang is a metropolitan city with 1,500,000 inhabitants, and Tegal is an intermediate or medium-sized city of around 250,000 people. Semarang as a large city experiences higher rainfall compared to Tegal. The rainfall ranges between 550 and 750 mm/month in the rainy season in Semarang while Tegal experiences 450–650 mm/month in the same season. Semarang also has more significant flood events. It almost reached 70 flood events in 2013 taking place across 47 urban villages, mostly located in coastal areas, while Tegal experiences 17 flood events [31]. Both are growing and important cities located in low-lying and flood prone areas in coastal Java. However, due to its involvement in two global networks (i.e., ACCCRN and 100RC programs), Semarang is more advanced in addressing such disasters, and more adept to addressing climate change and resilience issues compared to Tegal.

There are at least three types of floods that occur in the two cities. As they are both coastal areas, they both experience tidal flooding. Tidal floods occur mostly in the coastal villages because of land subsidence and rising sea levels. However, as low-lying areas, they also experience flash flooding and inundation from local rainfall and poor drainage maintenance infrastructure. Flash flooding can take place when there is a high rainfall event in the upstream areas that surpass the capacity to absorb rainfall into the ground and overflows the limits

of rivers and drainage infrastructure to direct water to the sea. Villages prone to flash floods are mostly located along the riverbanks in mid-stream and downstream areas. The last type of flood inundation takes place in dense urban areas, where drainage is inadequate and poorly maintained. Poor waste management from settlement and commercial areas and inadequate collection systems also contribute to clogging the system.

## 5. Findings

### 5.1. Flood resilience programmes: from national to local development policies

Following the content analyses applied in the previous section, Table 2 helps to identify the breakdown of shows the word(s) list related to flood resilience used in the planning documents listed in Table 1.

Table 2 presents several notable findings. The word “resilience” and other similar words are used in all documents but not necessarily in the context of disaster.<sup>1</sup> Disaster resilience appears only six times out of 98 words related to resilience in the national documents and two times out of 99 words in provincial documents. Even for Semarang and Tegal, the word resilience is applied in various contexts (food, economy, and infrastructure) but not directly in addressing disaster. Hence, the idea of resilience as emergent in urban studies and climate adaptation is somehow implied in the documents under the theme of sustainable development. Sustainable development and resilience are mostly applied in the discourse of food security and economic resilience. Food security is the most frequently-used term to have the closest context to resilience. It is in line with national regulation, Law No. 7, 1996 which states that food security is “the fulfillment of food for every community that is reflected from the availability of adequate food, both in quantity and quality, safe, equitable, affordable, and base on the diversity of local resources.” This definition is also closely related to the word vulnerability, as it can also be applied to address vulnerability to food

<sup>1</sup> The translation of resilience into the Indonesian context remains a debate and highlights a unique challenge of translation. The most commonly agreed upon term is “ketangguhan” but certain fields of study insist on translations of “ketahanan”, “keluwesan”, “kekokohan”, and even some that use that anglo-form “resiliensi”.

**Table 2**  
Number of related vocabulary used in the selected documents.

No	List of vocabulary	National		Regional		Local			
						Semarang		Tegal	
		DP <sup>a</sup>	SP <sup>b</sup>						
1	Resilience <sup>c</sup> , Resilient <sup>c</sup> , Resilience, Resilience, Resilient	94	4	96	3	89	3	33	4
2	Sustainable development <sup>c</sup> , Sustainable development	22	0	3	0	10	1	8	1
3	Climate change <sup>c</sup> , climate change, climate change adaptation	55	1	22	1	26	0	1	0
4	Disaster <sup>c</sup> disaster, disaster management, disaster control, disaster prevention, disaster mitigation, disaster anticipation, disaster risk, disaster risk reduction, impact of the disaster, post-disaster, recovery, preparedness, early warning system	131	20	141	23	305	97	72	43
5	Flood	17	6	45	4	139	30	31	7
6	Vulnerability	33	1	25	0	8	0	5	0
7	Local government, community capacity, Government capacity, institutional capacity, infrastructure capacity	132	5	107	21	129	45	183	38

<sup>a</sup> DP: Development Planning Policy (non-spatial).

<sup>b</sup> SP: Spatial Planning Policy.

<sup>c</sup> Stated in English.

and disaster. Economic resilience is applied to address some socio-economic issues, namely poverty, and unemployment.

Even though the term resilience is uncommonly raised in the context of disaster among current planning documents, disaster is recognized as the major issue mentioned in all documents. There are 300 instances of disaster specified in the Semarang city planning document, which is much higher than the national document, where it is stated only around 150 times. Additionally, it is important to note that Semarang also expanded the discourse on disaster in the context of climate change adaptation while there is still no attention on climate change or climate change adaptation in Tegal City. As elaborated in Reeds *et al.* [26], the involvement of Semarang city in ACCRN has led to mainstreaming of programs into city policy documents. Following mentions of disaster, Semarang also identifies flooding as a major challenge at all policy levels (appearing more than 130 times).

Another emerging issue is that spatial planning policies have not accommodated disaster-prone areas and climate change as a critical problem that should be carefully addressed. This is indicated by comparing the related words used in development policy and spatial planning policy. All those words are considered to be related with disaster resilience are used less frequently in spatial planning documents in comparison to development planning documents for all government levels (see Table 2). However, there are many scholars who have been calling for further attention on the importance of spatial planning to address flood and disaster resilience [7,10,21].

Table 3 further summarizes the articulation of disaster resilience across planning documents at the three different levels of government between the two cities.

## 5.2. Local development plan elaboration: comparing Semarang and Tegal

### 5.2.1. Programmes and budget allocation

As a big city, Semarang has a much larger financial capacity compared to Tegal. In 2017, the total development budget for Semarang was US\$340,000, much higher compared to Tegal, which is around US\$190,000. Table 4 displays programs in the mid-term planning process and government budget executed in 2017 in Semarang and Tegal related to flooding. There are 14 programs listed in Semarang and 7 programs in Tegal. The budget allocated for flood disaster-related programs is 8% of the total allocation for Semarang and only 1% for Tegal. Table 4 also indicates that Semarang distributes the budget allocation slightly more evenly compared to Tegal.

In examining the naming of programs, this research identified that most budget allocation for flood disaster-related programs focus on infrastructure. Flood control has the highest allocation for both cities. Even for Tegal, more than 70% of the total budget is allocated only for irrigation development and flood control. There are four actions

identified for the flood control program in Semarang. They are constructions of polders, development of a coastal embankment, river normalization, and drainage improvement and maintenance. In Tegal, the actions are similar to Semarang as they include polders, pool retention, and dike construction, river normalization, seawall development, as well as drainage improvement and maintenance. However, despite the direct infrastructure programs, Semarang also allocated large amounts of its budget to maintain green open space and waste management, and the allocation is much higher as a percentage when compared to Tegal.

After the largest allocation of infrastructure funds, a very small amount of budget is allocated for disaster risk reduction and/or disaster management. In 2017 there was less than 5% of total budget allocation for disaster risk reduction and/or disaster management for both cities. Allocation in Tegal is slightly higher compared to Semarang. All disaster-related programs in Tegal are the responsibility of the local government. Meanwhile, due to the involvement of the ACCRN and 100RC programs in Semarang, support from external partners provided additional support to local government to address flooding. The Zurich Flood Resilience Program supported by the Zurich Foundation is also recognized as one of the programs conducted in Semarang in 2017 to improve community preparedness in addressing flooding (<https://www.acccrn.net/blog/improving-community-preparedness-along-semarang-flood-canal>).

### 5.2.2. Stakeholder involvement

Fig. 3 further illustrates the responsible agency executing programs listed in Table 3. The distribution of responsibility between Semarang and Tegal is rather similar. The Public Works and Spatial Planning Agency have the greatest responsibility to conduct disaster-related programming. Unfortunately, most of the allocation of the program is closer to the area of public works than spatial planning, highlighting tendencies to conduct more reactive budgeting allocations such as rebuilding the same dikes every year rather than more comprehensive strategies. Even as the responsible agency for the disaster risk reduction program, the Disaster Management Agency has a very small responsibility, indicating lower commitment from the local government to address flooding from the perspective of disaster risk reduction.

A comparison between the number of programs and budget allocation is another interesting aspect for further elaboration. As illustrated in Fig. 3, the number of programs under the Public Works and Spatial Planning Agency is less than the budget allocation, while in other agencies, the situation is the opposite. This indicates that apart from any programs in the area of infrastructure, the allocated budget for each program is relatively low. To further illustrate this point, the environmental agency in Tegal is responsible for 40% of the total program regarding flooding, but the agency only owns 4% of the total

**Table 3**  
Comparing national, regional, and city level of planning documents.

	National	Regional	Local	Tegal
Scope of discussion	Disaster (flood) resilience is not explicitly addressed. Resilient/resilience is stated in the context of food security, national security, socio-economic, and cultural aspect.	Flood is an issue to be addressed. However, similar to the national level, the context of resilience/resilient is applied for different aspects, mostly food security and socio-economic resilience.	Local Semarang Flooding is a big issue for Semarang. Even though there are not any explicit statements on disaster resilience, resilience is mentioned in various contexts (similar to national and regional levels), the closest to flood resilience is community resilience to address disaster.	Flooding is not considered a big issue even though it happens several times a year. Resilience is mentioned only in the context of food security.
Strategies	Disaster issues focus on coastal based disasters considering Indonesia as an archipelago country Three main focuses: (1) disaster risk reduction within the framework of sustainable development; (2) reducing vulnerability; (3) enhancing the capacity of government and communities in disaster management.	Role of community appears to be an important theme to address disaster. There are several strategies such as strengthening local institutions and improving local people's knowledge/awareness to address disaster. Thus, it may lead to the concept of disaster resilience.	There are two main strategies: (1) disaster risk reduction through community participation, and (2) infrastructure improvement.	There is not any specific strategy to cope with disaster. The importance of community participation in addressing disaster is only generally mentioned in the long-term development policy.
Programs/Plans	No specific/explicit statements on flood and/or resilience programs	Infrastructure development/improvement is the program priority. It includes reservoir building and maintenance, river normalization, and coastal area conservation.	There are programs/plans for at least three different topics: (1) infrastructure provision, (2) community engagement, and (3) environment and land use management. However, since Semarang has more adverse flood problems, the city has more varied approaches compared to Tegal.	

budget. The biggest program of the agency is related to waste and environmental degradation. Considering the amount of the budget, the program may not be able to show a relevant outcome/impact for promoting disaster resilience.

5.3. Implications of global commitment to national/local initiatives

Previous sections have examined flood resilience programmes from national to the municipal level, followed by further investigations on actions/initiatives for building flood resilience at the local level. To confirm the connection of global commitment and the resilience actions/initiatives implemented, the following categories help highlight some of the key issues as identified from the Resumé National Progress Report on the Implementation of the Hyogo Framework for Action released every two years since 2007<sup>2</sup>:

5.3.1. Integration/coordination

As follow up to implementing the Hyogo Framework for Action and Sendai Framework for Disaster Risk Reduction, the Indonesian National Board for Disaster Management (INBDM) performs as the coordinator to manage and integrate any disaster initiatives in the national level. The institution is established in INBDM and has Disaster Management Boards (DMB) in regional (provincial), and municipal levels as their main partners responsible for any initiatives stated in the development planning documents. Mostly, DMB agencies were initiated in 2011–2012 and were anticipated to perform as representatives of INBDM in the lower level government units.

5.3.2. Capacity building

Even though the institutional frameworks were set up and supported by regulations to ensure integrative partnerships, there are still challenges resulting mainly from lack of capacity of the institutions. There are at least three main issues: (1) access to information; (2) limited resources; (3) unclear institutional mechanisms [20]. Most of the stakeholders are not familiar with disaster-related issues and therefore, results in low levels of awareness that lack local level initiatives. There are also a limited supply of qualified human resources and financing. DMB are still a new agency in some areas, including in Tegal, and have not been able to identify or assert their role. The institutional mechanisms are still in a transitional phase.

5.3.3. Policy mainstreaming

The Hyogo Framework provides guidance for governments to implement disaster resilience actions. There are some priorities accommodated in the development policies of disaster management. It is important to note that under decentralization, local governments spearhead policy implementation. Guidance from the upper level (National and Regional) is very important to ensure integration, including guidance to accommodate global commitment. However, the content analysis shows that national and regional policies have not provided clear direction on disaster management, despite the fact that disaster is not acknowledged in disaster resilience frameworks.

5.3.4. Budget

There is a special regulation from the national government to ensure that local governments have the budget for Disaster Risk Reduction and other related initiatives. The allocated budget support by the national government is still limited. According to the Resumé of National Progress report, national government allocates only 0,1%-0,38% for disaster risk reduction at the local level. Based on examination of the programmes and budget allocations for each responsible agency in the local level (see Fig. 3), a corresponding problem also arise as unfair

<sup>2</sup>There are four progress reports: 2007–2009, 2009–2011, 2011–2013, 2013–2015.

**Table 4**  
Programmes and budget allocation of Semarang city and Tegal city.

No	Programmes	Semarang City				Tegal City			
		Annual Budget		Proportion to mid-year budget		Annual Budget		Proportion to mid-year budget	
		\$ (000)	%	\$ (000)	%	\$ (000)	%	\$ (000)	%
1	Drainage channel construction	2543	8.97	30,711	9	127	9.32	1837	20
2	Irrigation development and management	2657	9.37	25,214	17	278	20.40	486	20
3	Flood control	8516	30.03	43,259	22	731	53.68	5744	21
4	Drainage improvement and maintenance	1451	5.12	1451	100				
5	Land use controlling	148	0.52	776	19			46	20
6	Spatial planning	998	3.52	941	21	37	2.73	145	20
7	Green open space management	6518	22.98	20,759	18	105	7.71	1264	24
8	Waste management	4766	16.81	18,189	18	6	0.41	2818	31
9	Pollution control and environmental destruction	456	1.61	1337	34	28	2.03	537	21
10	Natural resources protection and conservation	91	0.32	483	19	4	0.30		
11	Climate change mitigation	9	0.03	126	7				
12	Climate change adaptation	27	0.09	142	19				
13	Disaster management	125	0.44	876	14				
14	Disaster prevention and preparedness	55	0.20	486	11	46	3.41	11	20
<b>Total</b>		<b>28,36</b>	<b>100</b>			<b>1361</b>	<b>100</b>		

Note.

- 1–6 under the responsibility of Public Works and Spatial Planning Agency.
- 7 under the responsibility of Housing and Settlement Agency.
- 8–12 under the responsibility of Environmental Agency.
- 13–14 under the responsibility of Disaster Management Agency.

budget allocations. To illustrate this point, the Disaster Management Agency in Semarang is responsible for 14% of total programmes on flood/disaster resilience but is only able to manage 1% of the total available budget. On the other hand, the Housing and Settlement Agency is only responsible for 7% of the total program, but the agency may have 23% share of the budget. Similar conditions also apply in Tegal.

**6. Discussion**

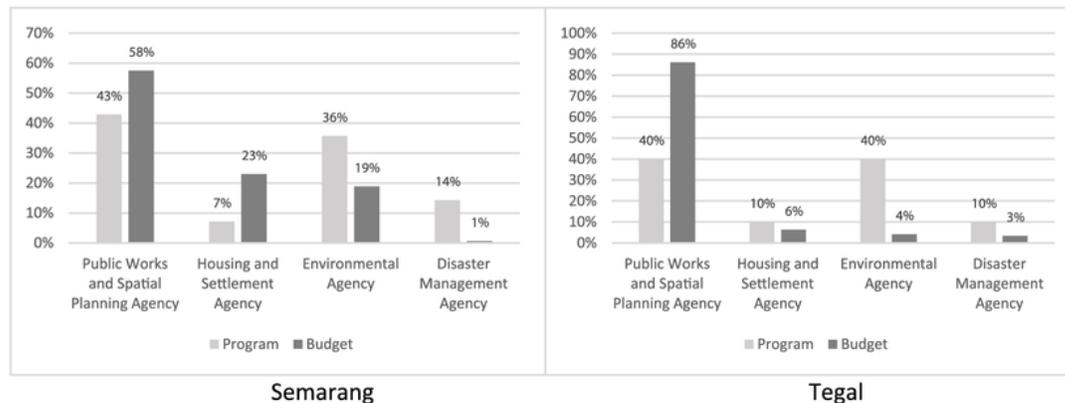
*6.1. Engineering resilience towards socio-ecological resilience*

Mainstreaming disaster resilience into policy is critical to build urban resilience [37,38]. Following a conceptual framework and resilience characteristic/typology as explained in Fig. 1, Table 5 further illustrates the typologies of disaster resilience programs in Semarang and Tegal to address flooding. By classifying the programmes based on some items those indicating different types of resilience, it is identified that initiatives in Semarang and Tegal can be characterized into either the coping approach or surviving/protecting approach. There is still lack of long-term consideration and framework for transformative

action. This is similar to the case of Eko Atlantic City, Nigeria [39] where most of the resilience-related initiatives in the city do not really address the root of the problems, and in some cases have resulted in maladaptation strategies. These findings are also further confirmed by the FGD results which show that the participants mostly consider that all of the programmes implemented in the cities are likely to be reactive rather than proactive. The current initiatives are focused on dealing with pressing problems without further consideration on more holistic approaches to understanding potential future issues. However, as has been revealed by Kernaghan and Silva [40], Semarang, as supported through the ACCCRN program has been successful in including climate change mitigation and climate change adaptation initiatives that at least discursively appear to be more transformative.

*6.2. Business as usual towards opportunity for better planning mechanism*

Another fundamental aspect is the important role of local government [37] as following the decentralization era, municipal governments contribute a very important role in executing any programmes related to flood mitigation, preparedness, as well as adaptation. Lessons learned from Melbourne [15] pointed to the critical role of vertical and



**Fig. 3.** Program and Budget Allocation for Building Flood Resilience in Semarang and Tegal. based on Annual Development Plan, 2017.

**Table 5**  
Disaster resilience typology in Semarang and Tegal.

Programmes	Type of Initiatives		Time Frame		Focus		Response	
	Current Normal Orientation	New Normal Orientation	Short-term	Long-term	Single Equilibrium	Multiple Equilibrium	Re-active	Pro-active
Drainage channel construction Drainage improvement and maintenance Irrigation development and management	Categorized as maintaining current normal (business as usual). The actions dominated by periodic maintenance, and construction in some areas those are not served by good drainage system yet.		No objective and no impact for long-term perspective		Very much focused on single equilibrium.		As the programmes may regard as business as usual, the typology more into re-active rather than pro-active to address flood in particular area.	
Flood control	Apart from daily activities to control flood such as river normalization and utilizing water pumps, there are some big integrated initiatives mostly in coastal area with new normal orientation. They include developing polder system, build retention pond and land use management in the surrounding area.		It may have long-term impact if the programmes supported by good monitoring and evaluation mechanism to ensure good implementation.		Some actions may lead to multiple equilibrium			
Land use controlling Spatial planning	There is national regulation for land use controlling and spatial planning. The local government, however, is likely to 'play save' by focusing on current normal situation.							
Green open space management Waste management Pollution control and environmental destruction Natural resources protection and conservation	Most of the actions categorized as maintaining current normal. Not too much budget on these area as more budget is allocated on more economic orientation program. Waste bank is a good example because it combines economic as well as environment.				Mainly because of lack of commitment from the policy maker to have more awareness on environmental problems, the programs in these areas are very much focused on single equilibrium.			
Disaster management Disaster prevention and preparedness	Most of the actions categorized as maintaining current normal.		Establishment of Local Preparedness Group, Disaster Preparedness Village, and Disaster Discussion Forum (DDF) are good examples of actions that may provide a good framework towards a more long-term perspective of actions and leads to multiple equilibrium.					
Climate change mitigation (solar panel, public transportation improvement) Climate change adaptation (mangrove, floating house)	If the programme could be implemented as planned, this is a good example of initiatives those are focus on new normal situation.		It may have long-term impact and leads to multiple equilibrium if there are sustain commitment from the policymaker, and the programmes are supported by a good monitoring and evaluation mechanism to ensure decent implementation.				Solar panel is one good example of pro-active actions while other programmes are likely more into re-active.	

horizontal coordination of regional networks to address cross-sectoral issues, which helped to operationalize resilience through multi-level government involvement and cooperation. In Indonesia, the national government generally provides guidance, while provincial governments focus on the cross-border and outlying coastal areas. The local government is the vanguard that executes direct impacted policies at the local level. However, with the reference of [3] principles to operationalize resilience in urban policy, there are no established mechanisms for good coordination among different level of government and to ensure that integration principles applied in Semarang and Tegal. Specific to flooding, further integration is needed mostly related to river management. As stated in Law No. 23 2014 on Local Government, there are distributed responsibilities on all matters related to river, making coordination especially challenging. Floods that flow from upstream to downstream areas are likely to cross different jurisdictional boundaries of local government, and involving provincial government that adds an increasing degree of complexity. Accordingly, high levels of cooperation are required to manage the river among the local or provincial government. The *Resumé National Progress Report on the Implementation of the Hyogo Framework for Action* has also confirmed that INBDM may not yet perform optimally as the coordinating agency to manage the DMB in provincial and local levels as there are still challenges in human resource capacity, limited budget, as well as overlapping regulations.

Findings from the FGD confirmed the challenge of integration in operationalizing resilience principles:

- The disaster management agency had an initiative to establish a local preparedness group called the KSB (*Kelompok Siaga Bencana, or disaster-prepared groups*), supported by a similar program initiated by

the Provincial Red Cross Organization (PMI) called SIBAT (*Siaga Bencana Berbasis Masyarakat*, or the community-based preparedness group). These activities highlighted overlapping activities without proper coordination and communication.

- infrastructure provision also posed a unique dilemma. The FGD uncovered that some initiative led by the Public Works Agency that seek to elevate roads are prone to flooding other areas that cancel out some of the benefits. The problems become more complicated because there are also a lot of local initiative from the community to elevating the road which are not coordinated with one another, so a type of competition begins for road elevation in order to stay dry.
- River management and land use planning was also regarded as a key challenge as it requires strong coordination of the government in upstream areas, as well as those in downstream areas. As the river is located across administrative boundaries, the involved government stakeholders are also included in the Provincial Government of Central Java, as well as in several offices of the National Government.

Many of these programmatic ideals discussed thus far also spend very little time and effort promoting considerations of the equity principle. Programme rarely develop a comprehensive strategy for addressing targeted vulnerable people/areas. The equity-related issue is also identifiable from the budget allocations as the responsibility of programme implementation is also not distributed proportionally in line with the role and responsibility for each agency. The research also discovered during the FGD that due to the establishment of new national regulation (i.e., Government Regulation No. 18, 2016) regarding the role of particular agencies at the local level, there is also changes in the responsibility of executing a particular programme. Previously,

public works, water management, and spatial planning were established separately as a single agency with specific responsibilities. Following the establishment of the new regulation on new government structure, they are now merge into one agency and therefore, has less authority and fewer responsibilities to execute programmes. Meanwhile, as stated clearly in the mid-term planning (RPJMD), flood is a priority problem to be addressed in both cities (Semarang and Tegal) that needs appropriate level of authority and indeed, requires greater responsibility.

Program prioritization very much depend on the government budget. Accordingly, programme execution which are likely to be more environment rather than economic is not popular as economic problem is still taken as the greatest concern for cities in developing regions like Central Java. Surprisingly, Torabi *et al.* [20] also points to a similar finding from a very different context, in which advance capitalist conditions in Australia also highlight the same economic imperatives. Combining both environmental and economic interests, one program that has sought to accommodate both values has been an innovation for a waste bank program. FGD participants acknowledged that the waste bank program initiated by the environmental agency in both cities (Semarang and Tegal) provided a successful example of both income generating and helping to clean up local environments. Waste is regarded as a big contributor to flooding as there are a significant amounts of garbage that create blockages in the river. People need to be educated not to throw garbage into the river, and correspondingly government collection systems need to be reliable and adequate to local conditions. Through the waste bank program, local people are trained to manage the garbage, so it has economic value by using the 3R principles (Reuse, Reduce, and Recycle), the income generation also helps ensure program sustainability, and government facilitation has been supportive.

Last but not least, there is also a challenge to develop longer time perspectives and sustain initiatives [33,41]. Friend *et al.* [37] believes that there are two models on understanding the planning and implementation of development policy. The first is the linear model where policy is comprehended as a simple cyclical stages. The initiatives are planned based on research and evidence. The main challenge of this model is when sometimes policy formulation is not very much in line with the implementation because of many reasons such as lack of capacity, inadequate communication/information, and bad project management mechanisms. The second is the clumsy and wicked model where policy is regarded as communication, negotiation, and networking processes of different actors/stakeholders with various interests. In the first model, technocratic approaches are critical and regarded as the basis for the policy formulation process. However, it will not lead to sustained implementation if there is lack of comprehension and commitment from the policymaker. Therefore, the clumsy process likely provides more guarantees to have longer-term sustainability. In this model, public dialogue and greater public/stakeholder involvement is regarded as the most critical factor in mainstreaming such development issues/challenges.

## 7. Conclusion

This study has shown the complexity of operationalizing resilience particularly to address flood disaster in two different cities in Central Java. The content analysis results revealed that resilience is not a terminology commonly applied in urban and disaster-related contexts, even though it is very clear that disasters such as flooding are a big issue requiring attention in Semarang and Tegal. The national and regional development policy document has not explicitly stated the concept of resilience as a priority concern. On the other hand, the global commitment stated in the Hyogo framework has forced some priority actions in the area of disaster management and disaster risk reduction. Depending on the local government however, various interpretations may result in different responses. Furthermore, the capacity to access

information, the limited resources, and lack of concern on environmental issues, are significant barriers to ensure local government commitment to promote transformational outcomes on disaster resilience initiatives. In addition, challenges remain across horizontal and vertical coordination lines between National and Regional development policies, which as yet have not provided a clear direction.

Following previous studies of disaster resilience, various literature highlighted throughout this study suggests that the operationalization of disaster resilience should be integrative and comprehensive, requiring both short-term actionable initiatives as well as long-term and transformative frameworks. The scope of these initiatives are also multidisciplinary, and therefore, involves different agencies with various scope of interventions. However, this study has shown that most of the initiatives stated in the development policy are still characterized as having short-term orientations, are re-active, and focus on single equilibrium. Considering the planning and implementation required in development policy therefore, this study shows that meaningful operationalization of contemporary resilience concepts require intensive communication and involvement of different actors to promote more transformative approaches for the future.

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# Operationalizing resilience: A content analysis of flood disaster planning in two coastal cities in Central Java, Indonesia

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