

CHAPTER II

LITERATURE REVIEW

This chapter undertakes a comprehensive review of extant literature on the subject, with a view to achieving the objectives of this research in the context of the extensive body of knowledge relevant to the topic. The initial two sub-chapters are designed to provide a fundamental understanding of the environment, with a particular focus on the complex interplay between socio-environmental challenges and coastal urban environments. The third sub-chapter provided an explanation of the phenomenon of land subsidence and the compounded hazards that result from it. The subsequent sub-chapter (Sub-chapter D) provides a comprehensive overview of place attachment, encompassing the theoretical underpinnings of the socio-environmental challenges that ensued, as well as the imperative for its integration into coastal urban environment-related planning. The subsequent sub-chapter provides a comprehensive explanation of the definition of integration in the context of coastal planning. Sub-chapter F provides a comprehensive overview of the extant literature pertaining to the development of an integration framework, with particular emphasis on the delineation of the principles underpinning such a framework. Finally, Sub-chapter G presents the current policy landscape, explaining the possibility and urgency of integrating place attachment into coastal urban environment related planning.

A. Coastal Urban Environment

The coastal urban environment can be understood as a place of intertwined socio-environmental challenges, formed by the continuous interaction between coastal ecosystems, urban development, and human life. In the Indonesian regulatory context, this understanding can be derived from three key legal concepts: *lingkungan hidup*, *wilayah pesisir*, and *kawasan perkotaan*. The following paragraphs explained each term from regulatory perspectives and academic literatures.

Law No. 32/2009 and its subsequent regulation which is Article 1 of Governmental Regulation No. 26/2025 defines *lingkungan hidup* or the environment as a unity of space consisting of objects, forces, conditions, living beings, humans, and human behavior that influence nature, life continuity, and human and non-human welfare. Law No. 27/2007 defines *wilayah pesisir* or coastal areas as transitional zones between terrestrial and marine ecosystems that are affected by changes occurring on land and at sea. Meanwhile, Law No. 26/2007 on Spatial Planning defines *kawasan perkotaan* or urban area as a region whose main activities are non-agricultural, with functions as urban settlements, centers and distribution nodes of government services, social services, and economic activities.

Understanding those three key legal concepts portrays the coastal urban environment as a land–sea interface that is also shaped by urban functions and spatial planning processes. In this sense, coastal urban areas include not only beaches, tidal areas, mangroves, estuaries, rivers, and nearshore waters, but also settlements, ports, roads, industries, drainage systems, land reclamation, housing markets, public services, and economic centers.

Furthermore, from this regulatory perspective, the coastal urban environment is both an ecological space and a governance space. Law No. 32/2009 frames environmental protection and management as systematic and integrated efforts to preserve environmental functions and prevent pollution or degradation through planning, utilization, control, maintenance, supervision, and law enforcement. Law No. 27/2007 similarly positions coastal management as an integrated process across sectors, levels of government, land and sea ecosystems, scientific knowledge, and community interests. Therefore, a coastal urban environment includes not only physical environment and social aspects but also institutions that govern, drive, and influence change.

Academic literature in modern environment discourse also supports this integrated understanding of coastal urban environment. Through an ecological perspective, environment defined as a space where organisms interact with one another and with their physical surroundings, natural or manmade, to fulfill their

needs to survive (Odum, 1975). Miller and Spoolman (2012) similarly emphasize that environment is a space of a complex interaction between living and non-living beings. Meanwhile, Goudie (2018) highlights that the environment is increasingly shaped by human activities, meaning that discourse about changes in environment must consider both natural processes and anthropogenic transformation.

More specifically, literature from socio-ecology, urban political ecology and coastal management also stated the intertwined anthropogenic forces and natural environment processes in coastal urban environment settings. Berkes and Folke's (1998) social-ecological systems perspective argues that environmental problems cannot be adequately understood by separating ecological systems from social systems; instead, environmental management requires attention to the linkages between ecosystems, institutions, knowledge, and human practices. Urban political ecology explains that urban environments are shaped by the interaction of political, economic, and ecological processes, meaning that cities are not separate from nature but are produced through socio-environmental transformations (Heynen et al., 2006). Furthermore, integrated coastal management literature defines coastal management as a continuous and dynamic process for the sustainable use, development, and protection of coastal and marine areas, emphasizing the interrelationship between human uses and the environments they affect (Cicin-Sain & Knecht, 1998).

According to those regulations and influential academic references, the coastal urban environment can therefore be defined as an interconnected socio-environmental system in which terrestrial and marine ecosystems, urban infrastructure, human settlements, livelihoods, place meanings, governance institutions, and environmental hazards continuously shape one another. This definition is especially relevant for this research, as it allows coastal urban environment to be analyzed not only as physical challenges, but also as a matter of social vulnerability, spatial justice, institutional coordination, livelihood security, and place attachment.

B. Slow-onset and Multi- hazards in Coastal Urban Environment

1. Slow-onset and Rapid-onset Hazards

According to the duration and process of their occurrence, hazards are divided into two categories; rapid-onset and slow-onset. Rapid-onset hazards are defined as a major event that takes place in a short period of time, while slow-onset hazards occur in a very long process and period of time (Cole et al., 2021; Joyner & Orgera, 2013; Knowles, 2020; Nguyen et al., 2020; Nguyen-Trung et al., 2020; Stehrenberger, 2020). UNDRR (2017) defined slow-onset hazards as disasters that emerge gradually over time. Some examples of phenomena that are part of this slow-onset hazards are climate change (Joyner & Orgera, 2013; Knowles, 2020), pollution (Knowles, 2020), seawater intrusion (Nguyen-Trung et al., 2020), sea level rise (Knowles, 2020), drought (Cole et al., 2021), erosion (Baruah, 2022), and pandemic (Cole et al., 2021).

The fundamental difference between rapid and slow onset hazards is that rapid disasters are identified as an event, whereas slow hazards are a process or result of unsustainable decisions that negatively impact the environment (Knowles, 2020). Understanding hazards as a process makes the impact of this disaster difficult to perceive and recognize (Joyner & Orgera, 2013; Saputra, 2020). The severity of the harm also accumulates and gets worse over the years (Handmer, 1995; Knowles, 2020; Nguyen-Trung et al., 2020; Stehrenberger, 2020). This complex process and its impacts illustrate how this slow-onset hazard is also described as an environmental change that is very difficult to stop (Handmer, 1995).

On the one hand, the length of this process gives communities and stakeholders more time to prepare for losses that could occur at any time. On the other hand, it can eliminate the sense of urgency so that the community, government and other development actors tend to be ignorant of the slow-onset hazards' consequences (Joyner & Orgera, 2013). Slow-onset hazards as an anthropogenic process (of decisions and development) are very close to denial or the assumption that these disasters are not important or even not considered

to occur at all/negligence (Baruah, 2022; Knowles, 2020; Priester, 2016). In addition, from developmental politics point of view, the unwillingness to deal with the root cause of the slow disaster is due to the short-term periodical development and governmental regime that often requires result in a very short time (Knowles, 2020). Such perspective also discussed that overlooking slow disaster is a manner to deny the fact that the slow disaster is a consequence of unsustainable development decisions and process as well as how it could affect the economic development or the investors (Knowles, 2020).

Slow-onset hazards could also be understood as environmental degradation processes exacerbated by anthropogenic pressures (Baruah, 2022). These include processes of colonization, development and landscape change, social and economic dynamics, etc. This terminology was chosen to define this environmental phenomenon because the cumulative impacts are so severe, even surpassing the severity and complexity of impacts of commonly understood rapid-onset settings of hazards (Baruah, 2022; Knowles, 2020; Nguyen-Trung et al., 2020).

Based on the description above, the definition of a slow-onset hazards used in this research is a hazard which: (1) the process is slow and occurs over a very long time; (2) occurs due to the interaction of socio-political processes with a complex environment; (3) the impact is difficult to feel in a short time; so that (4) it is considered not to exist or not to occur by the community and stakeholders.

2. Slow-onset Hazards and Multi-hazards in Coastal Urban Environment

Understanding multi-hazards is important as it is part of the cumulative long-term consequences of slow-onset hazards. UNDRR (2017) defines multi-hazard as multiple major hazards and the specific contexts in which hazardous events may occur simultaneously, cascadingly, or cumulatively, including their interrelated effects. Multi-hazards can be understood as a consequence of slow-onset hazards, because gradual environmental changes often create the conditions for multiple hazards to accumulate and interact. Unlike sudden-onset

hazards, slow-onset hazards often operate through progressive environmental degradation, making their impacts less visible in the short term but more complex in the long term as explained by UNDRR (2015) Baruah (2022), Knowles (2020), and Nguyen-Trung et al. (2020).

The relationship between slow-onset hazards and multi-hazard conditions is particularly evident in coastal urban environment. The IPCC (2021) states that sea-level rise and land subsidence might jointly lead to increased flooding in Asian delta areas, showing how multiple gradual processes can combine to intensify coastal risk. This means that multi-hazards are not always produced by dramatic extreme events; they may also emerge from the accumulation of slow, interacting pressures.

Therefore, multi-hazards as a consequence of slow-onset hazards can be defined as compounded hazardous conditions produced by the gradual accumulation, interaction, and spatial overlap of multiple environmental processes over time. This definition is relevant for coastal urban environment research because it emphasizes that risk is not only generated by individual hazards, but also by their interdependencies, temporal progression, and interaction with social vulnerability (De Angeli et al., 2022). Furthermore, understanding the compounded hazard and socio-economic complexity is influential as the basis for coastal cities' environmental governance (Dewi et al., 2023; Hamdani et al., 2020).

3. Disaster Management in Addressing Slow-onset Hazards

Slow disaster had been included in the most recent disaster management framework, the Sendai Framework for Disaster Risk Reduction 2015-2035 (SFDR) (UNISDR, 2015). This framework had mentioned slow disaster, which is defined as a gradual event which give unprecedented impacts to community with general objective of the risk management to reduce the loss. This is a major upgrade within the international disaster understanding as the Hyogo Framework Action 2005-2015 (UNISDR, 2005) and the Yokohama Framework for Safer World did not discuss this type of disaster. This argument also aligns with

disaster experts saying that slow disaster had being explicitly stipulated in the later global framework (Staupe-Delgado, 2019). However, both frameworks still phasing the disaster management stages such as the pre, during, and post disaster phase. Consequently, tackling slow disaster in recent days commonly postponed or waited until a sudden disaster or visible impact occur (Staupe-Delgado, 2019).

The challenges in managing slow-onset hazards through period phasing is also relevant to the land subsidence problems. Land subsidence occurrence and impact happened gradually and worsen people's conditions and vulnerability along the process, with no clear end point. That definition highlighted that slow disaster does not follow conventional disaster management phase. As widely recognized by disaster scholars and practitioners, disaster management cycle divided into four phases. The linear phases are pre-disaster, during disaster, and post disaster. Shocks or the disaster event acted as the period divider. From the perspective of slow disaster where the event is continuously occurring, following such linear phase means that it would always in the "during disaster".

"Slow disaster, on the other hand, is a nonlinear approach that does not use the pre-/post-threshold parameter to define an environmental disaster. Instead, it posits that certain slow-onset environmental phenomena are, in toto, disastrous, even though the cumulative impacts of such disasters may be visible only at a later stage" (Baruah, 2022).

This type of disaster requires proactive disaster management (Staupe-Delgado, 2019; Staupe-Delgado & Rubin, 2022). They explained that proactive disaster management requires political willingness on: (1) acknowledging the slow disaster as disaster; (2) acknowledging development process failure; and (3) taking actions to intervene the slowly degrading process through various policy flexibility beyond current disaster management practices (see Table 2.1).

"Hence, rather than seeing preparedness as a reactive stand-by function aimed at securing effective response once adverse impact are a fact, as in the disaster phase model (mitigation, preparedness, response, and recovery) [...], we need to re-conceptualize preparedness for effective response (ex-post) more in terms of preparedness for proactive response (ex-ante)." (Staupe-Delgado, 2019)

Table 2.1 Difference between conventional and slow disaster management

Distinction Category	Conventional Disaster Management	Slow Disaster Management
Type of hazards	Mainly natural hazard	Human-induced hazards
Approach	Event-based	Process-oriented
Phase	Pre disaster, During disaster, post disaster	No clear-cut phase/events (uncertain end)
Actions	Reactive	Proactive
Impact	Clear evident	Hardly detectable and gradually worsening

Source: Synthesized by Author (2023) from various sources (Baruah, 2022; Staupe-Delgado & Rubin, 2022)

In terms of reducing disaster casualties as aimed by the disaster risk reduction framework, proactive disaster management shall deal with the root problems and choose a long-term sustainable measure instead of choosing a band-aid and temporary solutions. In nature, proactive disaster management choose actions that is cost-effective in long-term framing (Nanthini, 2023). Integration between various sectors, stakeholders, and actions is also influential to create a proactive disaster management plan. Such as integrating reliable and updated data (Cole et al., 2021), mental health (Gray et al., 2021), anticipatory action (Nanthini, 2023), into the plan. People need to be well-informed by the disaster risk data to be able to proactively take appropriate actions (Cole et al., 2021; Nanthini, 2023). Shift in managerial and governance also required to enable implementation of disaster-focused development actions as it is one of the main barriers of the proactive disaster management implementation (Staupe-Delgado, 2019; Staupe-Delgado & Rubin, 2022).

C. Land Subsidence as Slow-Onset Hazard and Its Compounded Multi-Hazards in Coastal Urban Environment

1. Land subsidence: Definition and Causes

Land subsidence is a sudden or gradual change in the height of the land surface. Geologically, subsidence is caused by the void dynamics in the subsoil (Kuehn et al., 2010; Marfai & King, 2007; Pipkin et al., 2008). This process can

be categorized as both natural and human induced. Natural subsidence occurs in young sediment layers that are still in the process of compaction (Chaussard et al., 2013; Khoirunisa et al., 2015; Soedarsono & Marfai, 2012; Wu et al., 2022; Yastika & Shimizu, 2016; Yuwono, et al., 2019). Human-induced subsidence is a consequence from unsustainable human-interaction due to over-exploitation of subsoil resources that is not followed with adequate recharge.

In coastal cities context, land subsidence often related with anthropogenic causes, including groundwater exploitation and infrastructure overload. Groundwater over-exploitation is the main problem that causing land subsidence in coastal cities such as in Tokyo, Japan; Beijing, China; etc. (Arimoto et al., 2013; Firdaus et al., 2018; Gumilar et al., 2013; Kasfari et al., 2018; Kuehn et al., 2010; Marfai, 2003; Prasetyo, Firdaus, et al., 2019; Sarah et al., 2018; Sarah & Soebowo, 2018). Other underground resources exploitation such as natural gas might also causing land subsidence (Baü et al., 2000; Fouladi Moghaddam et al., 2010). In addition, building and infrastructure planning that exceed the soil load could also exaggerate land subsidence rates (Gaffara et al., 2017; Hadi, 1993; Koch et al., 2019; N. Rahmawati & Marfai, 2013; Sarah et al., 2011, 2021; Sophian, 2010).

This phenomenon, which is also defined as an environmental irreversible degradation occurs in a very slow rate (see Table 2.2). Based on some empirical observation natural land compaction process might took around ~1-2 mm/year (Sarah et al., 2020; Tosi et al., 2013). As shown in Venice, Italy natural land subsidence only occurred below 0.9 mm/year (Tosi et al., 2013). However, the observed rates in this city may reached up more than 10 mm/year (Wu et al., 2022). Similarly, natural land subsidence in Semarang City only reached up to 8 mm/year; while the anthropogenic subsidence could reach more than 30 mm/year (Sarah et al., 2021 and Wu et al., 2022).

Table 2.2 Comparison between natural and anthropogenic land subsidence
from various research

Observation Location	Natural Land Subsidence	Anthropogenic Land Subsidence	Ref.
Venice, Italy	0.9 ± 0.7 mm/year	-10 mm/year	(Tosi et al., 2013)
Demak, Indonesia	9-22 mm/year	24-30 mm/year	(Sarah et al., 2020)
Semarang, Indonesia	~8 mm/year	20-50 mm/year	(Sarah et al., 2021a; P. Wu et al., 2022)

Source: Synthesis from various literature

Cumulatively, the consequences of land subsidence might only be seen in a very long time. It needs more than three decades (1974-2010) to see the four meters difference due to land subsidence (Rahman et al., 2018). Even more, in San Jose, the 4-meter decrease in surface soil level needed more than eight decades (1910-1995) (Holzer & Galloway, 2005). Consequently, this environmental phenomenon often considered “unseen” or a “silent” disaster (Saputra, 2020).

2. Land Subsidence as Slow-onset Hazards

Land subsidence in Indonesia was defined for the first time as a natural disaster in the 1990s (Dahuri, 1996). As described previously, land subsidence happened in a very slow rate (less than 1 cm soil level lowering per year). In addition, the impact would only be visible in more than decades. With that being said, land subsidence aligned with the first characteristic of slow disaster.

In the second characteristic, it is stated that there is a socio-political process that causing the slow disaster. Land subsidence is a result of complex political development decision of urban development by the government or private developers (Batubara et al., 2023; Belland et al., 2023; Saputra et al., 2017). This could be explained as the political decisions to develop high-rise building or ground water-intensive activities in the prone to subsidence area (Batubara et al., 2023; Su, 2016). The sociospatial-socionatural (Batubara et al., 2023) or political ecology (Su, 2016) theory could be utilized to deepen the understanding of this particular criterion. The political ecology is a study to detangle the influence between political interest (by any stakeholders such as

community, government officials, private sector) in development that shapes or contributes to ecological phenomenon, as well as how ecological phenomenon influence political actions of development stakeholders (Baruah, 2022; Su, 2016).

The third characteristic is the impact of the slow disaster is often difficult to feel in a short time make it is become hardly considered as an existing problem by the community and city officials (Baruah, 2022). Differ with the rapid-onset disaster, land subsidence requires plenty of time for the evidence/impact to be seen or easily known by human sensory. Land subsidence requires at least a decade for the submergence process to be seen. Oftentimes, it required more severe rapid-onset disaster as the entry point to discuss the role of land subsidence in creating such conditions, as how the earthquake in Alaska (Zong et al., 2003) or tidal flooding in Semarang (Pujiastuti et al., 2016). It is also required historical analysis to comprehend such long-term relation between subsidence and its impact. The limited public participation within the knowledge production of land subsidence impacts could hinder such comprehension process (Belland et al., 2023). The political willingness of public authorities in acknowledging the problems, impacts, and taking appropriate action towards land subsidence also found influential in land subsidence discourse in Indonesia (Saputra et al., 2017; Siriwardane-de Zoysa et al., 2021).

Despite the fact that Semarang City had experienced land subsidence is occurring since 1980s (Marfai & King, 2007), there is no clear development restriction and even the government chose to deny this fact since it might hinder the development investors to come to this city. Consequently, the impact of land subsidence had become more severe in recent years. Therefore, understanding land subsidence as a slow disaster mainly defined as understanding the socio-ecology-political process behind the land subsidence occurrence which also requires historical process to comprehend (Baruah, 2022; Batubara et al., 2023). Furthermore, this comprehension also requires socio-political approach to explore the relevant proactive solution (Belland et al., 2023; Siriwardane-de Zoysa et al., 2021).

3. Land Subsidence-induced Coastal Multi-Hazards

Land subsidence in coastal urban environment had caused unprecedented negative externalities. Land subsidence is a negative externality from disturbance in groundwater (Warren et al., 1975; Yoo & Perrings, 2017). Externality is defined as an impact other than oneself, or the one who caused the environmental degradation (Underdal, 1980). The land subsidence negative externalities are shown not only to private property such as house damage, but also to common property, such as disturbance in ecosystem, public infrastructure damage, etc. Land subsidence induced surface faults had been destructing many houses and roads in five cities in the United States (Holzer & Galloway, 2005). Worsened tidal flooding is also significant impact of land subsidence in coastal city (Abidin et al., 2015; Fiaschi & Wdowinski, 2020; Irawan et al., 2021; Johnston et al., 2021; Le, 2019; Rodolfo & Siringan, 2006).

Land subsidence also affecting the wetlands and other natural ecosystem. Coastal land subsidence disrupts the sediment balance in the coastal environment dynamics. Such disruption leads into land loss through various coastal environment degradation processes such as coastal erosion, accretion, surface lowering and permanent flooding, etc. Land subsidence in coastal areas could impacting to coastal environment morphology through changing the coastal sedimentation and sediment deposition rates and patterns (Arhatin et al., 2024; Muhammad et al., 2022).

Consequently, land subsidence could also give impact to coastal erosion or the loss of coastal land. The co-occurrence of coastal land subsidence and sea level rise could increase the severity of the coastal erosion as it is also increasing the coastal inundation risks (Lambert et al., 2021; Q. H. Nguyen & Takewaka, 2020; Shibata et al., 2019). Several evidence had proof the interlinked problems between land subsidence and coastal erosion which also manifests in the shoreline change (Nguyen & Takewaka, 2020 and Marfai et al., 2008).

This morphological impacts had shown the threat of land subsidence to the coastal lives. The damaged houses, infrastructure, more severe flooding, and eroded land could potentially increase the living expense in such area. At the

same time, those complex externalities of land subsidence also reduce the property values (Utami et al., 2021; Wade et al., 2018; Willemsen et al., 2020). Consequently, anytime the cost is higher than the benefit they could get by living in the subsided area, this is when people are being displaced from their previous living environment, planned or voluntary as well as permanently or temporarily (Abidin et al., 2013; Bott et al., 2021; Kuehn et al., 2009; Wahyudi et al., 2017).

Globally, it was estimated in 2009 that there are roughly 500 million populations in this world are being threatened by land subsidence (Syvitski et al., 2009). Years later, the estimation started to show its relevance with the actual cases. Land subsidence, together with various environmental degradation drivers, had been predicted to contribute to the loss of 2,300 km² of the coastal-tidal area (Murray et al., 2022). South Louisiana, also loss 5,179 km² of its coastal wetlands (Lambert et al., 2021). In several cities, individuals also reported to be experiencing life disruption due to land subsidence such as in Mexico City, 1 million individual that have experienced damaged house due to angular distortion as induced by land subsidence (Fernández-Torres et al., 2020). Similarly, research in 32 coastal cities in the United States, also shown the massive disappearance of the area 1,389 km² due to severe land subsidence (Ohenhen et al., 2024). The principal conclusion of Ohenhen et al., (2024)'s research is that there is a discernible relationship between land subsidence and the potential for coastal land loss. Consequently, the displacement of people from such areas is inevitable.

Land subsidence is also increasing the risk of seawater intrusion, or the alteration of common water source quality and damaging public water infrastructure such as drainage and sanitation. This is related to the common property dilemma where people in general and development actors in particular might hardly be accountable and responsible to the water quality degradation (Hadi, 2001). Consequently, these brought health risks (itching and skin diseases, fever and malaria) for the community and vulnerable groups such as elderly and children (Beune, 2019; Bott et al., 2021; Brus, 2012; Hadi, 2009, 2014; Putri & Setiadi, 2020; Saputra et al., 2019). The negative externalities of

land subsidence as shown in Table 2.3 below, followed environmental impact classification of land subsidence by Abidin et al. (2015).

Table 2.3 Negative externalities of land subsidence

Impacts Category	Direct	Indirect
Natural Environment	1. Earth faults/fissures (Ghafoori et al., 2012; Holzer & Galloway, 2005) 2. Seawater intrusion (Arimoto et al., 2013; Hartawan & Wahyudi, 2020; Irawan et al., 2021; N. Rahmawati & Marfai, 2013; Supriyadi et al., 2017; Widada, Zainuri, Yulianto, Satriadi, & Wijaya, 2020)	1. Worsening tidal flooding exposure (Abidin et al., 2013; Andreas, et al., 2019; Beek et al., 2019; Chaussard et al., 2013; Irawan et al., 2021; Ismanto et al., 2009; Kahar et al., 2010; Karondia et al., 2019; Maimunah et al., 2011; Marfai, et al., 2008; Marfai, 2011; Nandika et al., 2020; Putranto & Rüde, 2011; Sejati & Buchori, 2010; Sophian, 2010) 2. Shoreline and landscape change (Marfai, Almohammad, et al., 2008; Sumaryo et al., 2004)
Built Environment	1. Permanently flooded land (Andreas, et al., 2019; Chaussard et al., 2013; Koch et al., 2019; Marfai & King, 2008; Masvika et al., 2019; Suripin & Helmi, 2015; Yuwono et al., 2019) 2. Damage in building, road, drainage system (Abidin et al., 2015; Andreas et al., 2018; Gumilar et al., 2013; Kuehn et al., 2010; Marfai et al., 2008; Tazakka et al., 2021; Wahyudi et al., 2017; Yastika et al., 2019)	Abandoned houses (Abidin et al., 2013; Bott et al., 2021; Kuehn et al., 2009; Wahyudi et al., 2017)
Economic	1. Increasing cost of maintenance (housing,	1. Land and property value decrease (W. Utami et al.,

Impacts Category	Direct	Indirect
	building) (Abidin, et al., 2015; Hartawan & Wahyudi, 2020; Kuehn et al., 2010; Wade et al., 2018)	2021; Willemsen et al., 2020)
	3. Burdened household economy (Beune, 2019; Ley, 2017)	2. Disrupted economic activities (Azeriansyah & Harintaka, 2019; Marfai, 2008)
Social	Disrupting local people's day-to-day activity (Abidin et al., 2013; Hadi, 2017; Marfai & King, 2008; Saputra et al., 2019)	1. Increasing harmful sanitation-related diseases such as Malaria, Dengue, Labtoferosis, etc. (Beune, 2019; Bott et al., 2021; Brus, 2012; Hadi, 2014; Marfai, 2014; Miladan, 2016; Putri & Setiadi, 2020; Saputra et al., 2019) 2. Lowering quality of life (Abidin et al., 2015; Andreas et al., 2017; Bott et al., 2021; Ismanto et al., 2009; Wahyudi et al., 2017; Yuwono, Awaluddin, et al., 2019)

Source: Author Analysis (2024)

D. Place Attachment

1. Place Attachment as Socio-environment Analytical Lens

Understanding the concept of place attachment can be done through defining “place” and “attachment”. Place represents the geographical and environmental aspects of a place, also known as the environmental setting (Low & Altman, 1992). In this setting, place also defined as an ordinary spaces that are commonly used in daily activities. In addition to tangible concept of places, some experts also mention that place in this concept can mean an intangible thing, such as a historical story, name, experience, or belief in other noble values (Altman & Low, 1992; Belk, 1992; Riley, 1992). This kind of categorization was

also explained by Scannell and Gifford (2010) who divided place into two, namely place as a physical and social entity.

Place attachment is defined as the cognitive-emotional bond between people and places (Altman & Low, 1992; Groulx et al., 2014; Lewicka, 2008; Manzo & Devine-Wright, 2019; Murtagh & Lane, 2022; Scannell & Gifford, 2010; Stancu et al., 2020). The bond can be identified from a collection of values, symbols, meanings, or feelings that are subjectively perceived by place users and attached to a place (Creighton et al., 2008; Hummon, 1992). Place attachment is an integrative concept in which interacting aspects are embedded (Altman & Low, 1992). Place attachment is not only very dependent on time and place, but also influenced by factors and formation processes that vary depending on the context and conditions that exist in society (Creighton et al., 2008; Hummon, 1992; Manzo & Devine-Wright, 2019; Riley, 1992).

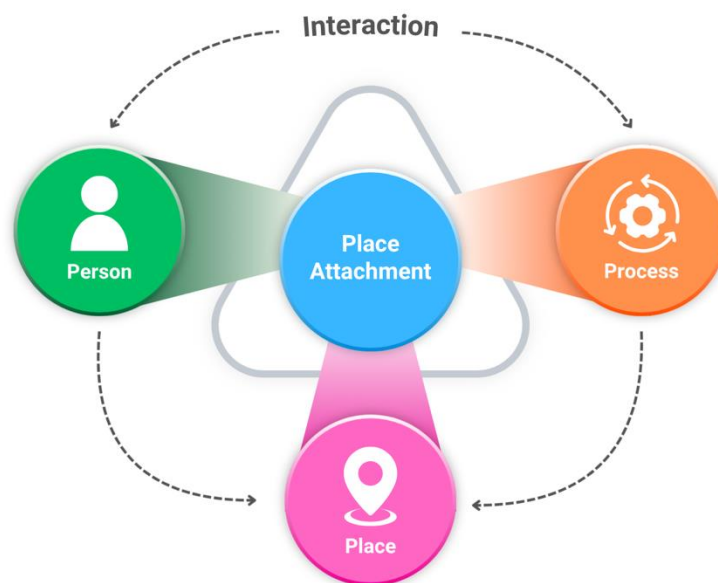


Figure 2.1 The three-P tripartite framework in the basic concept of place attachment

Source: Synthesized from (Creighton et al., 2008; Groulx et al., 2014; Pred, 1984)

These theories are then understood within the tripartite framework of people/person, place, and process. Some other scholars refer to the latter component as activity, climate change (Groulx et al., 2014), or politic (Creighton

et al., 2008). This can be seen in the Figure 2.1 above. Where the connecting line between one P and another P indicates interaction and mutual influence. The interaction between places and their users is explained as a process where the behavior of space users is influenced by how people perceive the space and how the space affects them, vice versa, where the dynamics of the space are also influenced by the space users (Creighton et al., 2008; Pred, 1984).

Place attachment formed through the interaction between how a person's personal identity, goals, and life fulfilment be influenced by living in a certain place. The deepening process of the attachment begins with the reason why a person chooses a particular place to live, as a goal that the person is willing to achieve (Anton & Lawrence, 2014). This could be chosen through the perceived place values, the social values, ecosystem services, and landscape values (Brown et al., 2020; Brown & Raymond, 2007). As they live in, through years, the goal achievement would determine how the place attachment would be developed. This relates on the place satisfaction, explained as how a person is satisfied with the relationship between place and themselves particularly in achieving their life goals (Lee & Lin, 2022). The more goals are achieved, the stronger and more satisfied and positive the feeling of attachment will become (Florek, 2011).

The place satisfaction also relates with social interaction which influences individual's trust to the others, including the community and government (Hummon, 1992; Ma et al., 2022), or also mentioned as community trust. This also explains the influence of the length of residence in shaping one's attachment to a place, as people tend to stay more on the location that served their personal reasons (Anton & Lawrence, 2014; Devine-Wright, 2013a; Florek, 2011; Lewicka, 2008; Shin & Yang, 2022). Place satisfaction could also be developed into a sense of belongingness towards a place, which is the home ownership (Elliott & Wadley, 2013). This notion covers both the psychological and emotional ownership and also the legal ownership of a place (Shin & Yang, 2022). Therefore, place attachment could grows into place dependence.

Place dependence could be related to several factors such as livelihood, recreational, or family and other social ties. Place dependence manifested

through livelihood represents how place's services are utilized by the inhabiting residence and thus create such dependency (Kokorsch et al., 2025). This dependency could be more prominent when the livelihood relates to the natural resources utilization (Miller et al., 2022). The disruption to a place due to environmental degradation which impacting the sustainability of the resources could also hamper the livelihood options and therefore, disrupt one's place dependence (Kokorsch et al., 2025; Miller et al., 2022). Closeness with family is also regarded as one influential factor in determining the housing location (Lambert et al., 2021). Upon disaster induced place disturbance, such needs is portrayed important (Miller et al., 2022).

As the place satisfaction and the dependence grows, the more the person felt a place is part of their personal identity. This is where place attachment becomes place identity (Anton & Lawrence, 2014; Proshansky, 1978), where could also influence how a place is becoming meaningful for a person (Gottwald et al., 2021). Such understanding stemmed from the expectancy-value theory stating that goal orientation is related to the development of place meaning, sentiment, and therefore shaping place attachment, and therefore, place dependence (Gibbons & Ruddell, 1995).

Furthermore, such grown attachment could brought people to an emotional commitment towards ones' willingness to take actions in making their place to keep as great as they know in order to maintain their place (Florek, 2011; Gottwald, 2022; Stancu et al., 2020). This attachment and willingness to sacrifice are also influenced by one's awareness of global phenomenon such as climate change and its close relationship with one's place (Feitelson, 1991).

2. The Socio-Environmental Consequences from the Lens of Place Attachment of Slow-onset Hazards in Coastal Urban Environment Context

Negative externalities of land subsidence as a slow-onset hazard in coastal urban environments have significant consequences for people's place attachment. Rather than being experienced merely as a physical or technical

problem, land subsidence gradually transforms the environmental, social, economic, and emotional conditions through which residents relate to their place. As a slow-onset process, subsidence often operates cumulatively: it lowers land elevation, intensifies tidal flooding, damages infrastructure, disrupts mobility, weakens housing security, and increases the possibility of long-term displacement. These changes affect not only the material safety of coastal settlements, but also the meanings, dependencies, and adaptive capacities that sustain residents' attachment to place. Therefore, the socio-environmental consequences of land subsidence can be examined through three interrelated dimensions of place attachment: place meanings, place dependence, and place-based adaptation.

Land subsidence may alter place meanings, particularly by changing how residents perceive the value, satisfaction, and identity of their coastal urban environment. Place values refer to the functions, roles, and services of a place as perceived by its inhabitants (Brown et al., 2020; Gottwald et al., 2021). In a subsidence-affected coastal area, these values may decline when the place no longer provides reliable housing. A settlement that was previously perceived as a meaningful home, productive coastal space, or socially supportive neighborhood may gradually become associated with flooding, damage, uncertainty, and risk (Abidin et al., 2013; Bott et al., 2021; Kuehn et al., 2009; Wahyudi et al., 2017). This transformation demonstrates that the negative externalities of land subsidence are not limited to physical degradation; they also reshape the symbolic and functional meanings attached to coastal urban places.

Land subsidence-induced coastal environmental challenges might also disrupt place satisfaction, as the affected environment increasingly fails to support residents' personal goals and everyday expectations. Place satisfaction is related to the extent to which a place serves people's personal goals, needs, and aspirations (Anton & Lawrence, 2014; Florek, 2011; Gottwald, 2022; Proshansky, 1978). Place satisfaction in coastal environment often influences by the social, economic, and cultural values (Dada et al., 2021). In coastal urban areas, land subsidence followed with recurrent tidal flooding, deteriorating

housing conditions, damaged roads, poor sanitation, and increased maintenance costs may weaken residents' satisfaction with their living environment as implicitly stated by Bittle (2024). Even when residents remain emotionally attached to their neighborhood, the declining quality of place may produce ambivalence: people may still value the place as home, yet simultaneously feel frustrated by its inability to support safe, healthy, and dignified living (Amin et al., 2019). This condition illustrates how slow-onset hazards may create a gap between emotional attachment and everyday environmental satisfaction.

Place identity might also be disrupted as the environmental transformation induced by the slow-onset hazards can alter how people understand themselves in relation to their place. Place identity concerns the evaluative perception of how well a place meets personal and social needs, which may influence whether individuals choose to maintain, modify, or relocate from their environment (Anton & Lawrence, 2014; Kokorsch et al., 2025). In subsiding coastal settlements, identity may be challenged when familiar landscapes, routines, and social markers are transformed by recurrent flooding, land loss, or infrastructure adaptation (Lambert et al., 2021). The changes to a place might uprooted community from influential parts of their personal life (Lambert et al., 2021). Residents may begin to see their neighborhood not only as a meaningful place of belonging, but also as a vulnerable or neglected area. Such identity disruption is particularly important because relocation or adaptation decisions are rarely based only on objective risk exposure; they are also shaped by how residents interpret the changing relationship between self, community, and place.

The consequences of land subsidence might also relate to place dependence, especially livelihood dependence. Livelihood dependence refers to the functional bonds between people and place through daily activities and the fulfillment of basic needs (Kokorsch et al., 2025; Miller et al., 2022). In coastal urban environments, residents may depend on nearby coastal resources, informal economies, local markets, transport access, neighborhood-based work, or proximity to employment centers. Land subsidence and its associated hazards

can disrupt these functional bonds by damaging productive assets, increasing travel costs, reducing access to workplaces, and creating uncertainty in housing and business activities (Buchori et al., 2018a). When livelihoods are place-based, environmental degradation does not simply reduce income; it weakens the practical reasons why people remain attached to a particular coastal area (Amin et al., 2019; Xiao et al., 2022).

Place-based adaptation by shaping residents' place awareness, adaptive capacity, and willingness to act. Place awareness refers to residents' perception of problems and risks within a particular place (Lambert et al., 2021; Stancu et al., 2020). Because land subsidence is gradual, its risks may become normalized as part of everyday life, especially when flooding is recurrent but not immediately catastrophic. This normalization may increase local knowledge and awareness, but it may also reduce the perceived urgency of long-term adaptation. Adaptive capacity, defined as one's capacity to deal with risk, is influenced by resources, knowledge, institutional support, and the ability to modify or leave a place when necessary (Bott et al., 2021; Devine-Wright, 2013b; Devine-Wright & Batel, 2017; Hummon, 1992; Z. Wang et al., 2021). In this context, residents' willingness to act toward adaptation measures may depend not only on risk perception, but also on whether proposed actions are compatible with their place identity, livelihood needs, and sense of belonging (Proshansky, 1978; Stancu et al., 2020; Takahashi & Selfa, 2015).

The disruption in physical condition of the coastal urban environment due to the slow-onset hazards could possess impacts on the people's place dependence. Coastal environment could experience land loss due to combination impacts of land subsidence, sea level rise, etc (Lambert et al., 2021). Defining land subsidence through the lens of place attachment reveals that its negative externalities are not merely environmental impacts, but socio-environmental disruptions to the relationships between people and place. Land loss, recurrent flooding, declining housing quality, livelihood disturbance, reduced property value, and uncertain adaptation futures can collectively reshape place meanings, weaken place satisfaction, challenge place identity, alter place dependence, and

influence adaptive behavior. This perspective is particularly relevant for coastal urban environmental planning to ensure that technical responses to subsidence, such as drainage improvement, seawalls, land reclamation, or relocation, may could not overlook the emotional, social, and functional bonds that residents maintain with affected places.

The notion of place disruption was initially proposed by Brown and Perkins (1992). The term ‘disruption’ was defined as a process of change that is profound and overwhelming for residents. This sense of overwhelm is further explained as requiring significant emotional and cognitive effort to take steps to maintain their way of life in the face of these changes. This concept was also linked to large-scale projects by Agyeman et al. (2009) and Devine-Wright and Howes (2010), who argued that such projects were often inevitable due to environmental challenges, including climate change.

In the context of coastal cities, these places’ disruption is associated with compounded social and environmental changes. Coastal cities face not only the consequences of coastal dynamics, such as erosion due to changes in ocean currents and sedimentation deficits (Lambert et al., 2021; van der Meulen et al., 2007), but also coastal adaptation projects such as land reclamation (Hayashi & Miyakoshi, 2009; Hidayatno et al., 2017) and the relocation of impacted communities (Agyeman et al., 2009; Ballesteros et al., 2025; Bittle, 2024). Following these concepts, place disruption in this research means coastal landscape change, which includes land loss and man-made large-scale coastal projects such as reclamation.

3. The Role of Place Attachment in Shaping Community's Responses for Addressing Slow-Onset Hazards in Coastal Urban Environment Context

Place attachment in disaster management discourse as the influential factor in determining one’s or community’s response. Place attachment is influencing the disaster management from two perspective: (1) risk perception and awareness; and (2) resilience and coping ability. People’s awareness of the gradual change could influence their willingness to sacrifice and willingness to

take adaptation measures. Place attachment plays a significant role in slow disaster management, most importantly on preparing the anticipatory and social capital readiness to live daily with the hazards or to face the unprecedented impacts in the near future (Wang et al., 2021).

Stancu et al., (2020) states that place attachment developed from one's environmental awareness, which highly relevant in building disaster readiness. This also emphasized by Leahy and Lyons (2021) stating that attached landowners have plenty of intangible knowledge which is influential in planning. In this nuance, the day to day experience as the place attachment is shaped, could also build risk awareness (Lambert et al., 2021).

The development of place attachment may influence an individual's willingness to engage in adaptation actions (Bracken, 1981; Lambert et al., 2021; Stancu et al., 2020). Place attachment is a part of the self-identity (Proshansky, 1978), which is acted as significant factors in shaping individual's pro-environmental behavior or a set of behavior that is environmentally benefiting a particular place (Takahashi & Selfa, 2015), willingness to sacrifice, and other related commitments to adaptation actions (Stancu et al., 2020). In addition to the close relationship between place attachment and willingness to act for adaptation, there is a necessity of a social, economical, and psychological security (Stancu et al., 2020), as well as the positive sentiment or satisfaction towards the place, which could also be mentioned as place satisfaction (Bak, 2018; Y.-J. Lee & Lin, 2022; Ramkissoon, Smith, et al., 2013; Stancu et al., 2020), to facilitate commitment which might leading to effective adaptation actions. Place attachment could influence one's commitment and willingness to take actions as well as willingness to engage in efforts to ensure the environmental sustainability of a place (Peng et al., 2020; Ramkissoon, Smith, et al., 2013).

Several studies have identified a complex yet significant interaction between adaptation measures and place attachment (Amin et al., 2019; Lambert et al., 2021; Stancu et al., 2020), several others had stated significancy of place attachment in influencing a community's risk awareness and perception (Stancu

et al., 2020). The duration of residence in a particular area may be indicative of a robust place attachment, which could subsequently influence the level of commitment to undertake adaptation actions. However, the absence of positive sentiment and the presence of other factors, such as robust socio-economic factors, may contribute to maladaptive actions or adaptation that expose residents in heightened catastrophe risk instead of reducing it (Devine-Wright, 2013a; Devine-Wright & Batel, 2017). In addition, the instability of the residential including the sense of belonging or the home ownership could also influence this willingness (Elliott & Wadley, 2013; Shin & Yang, 2022).

The risk perception and place attachment, then contributed to their decision-making in taking adaptation strategy (see Figure 2.2). Risk perception on the one hand can encourage effective mitigation efforts if the perception of risk and feelings of stress are also high. Effective adaptation and mitigation efforts (positive coping) are taken by people who have high intensity and secure place attachment type. There are cases where having a strong and influential place attachment might leads to ineffective action (Amin, Sukamdi, et al., 2019; Hummon, 1992; Scannell & Gifford, 2017; Stancu et al., 2020; Steimanis et al., 2021; Swapan & Sadeque, 2021).

“[...] adaptive coping strategies (e.g., positive coping) are more likely chosen in high flood risk situations by people identifying with the secure place attachment style, and less likely to be chosen by people identifying with the fearful-avoidant place attachment style.” (Stancu et al., 2020, p. 12)

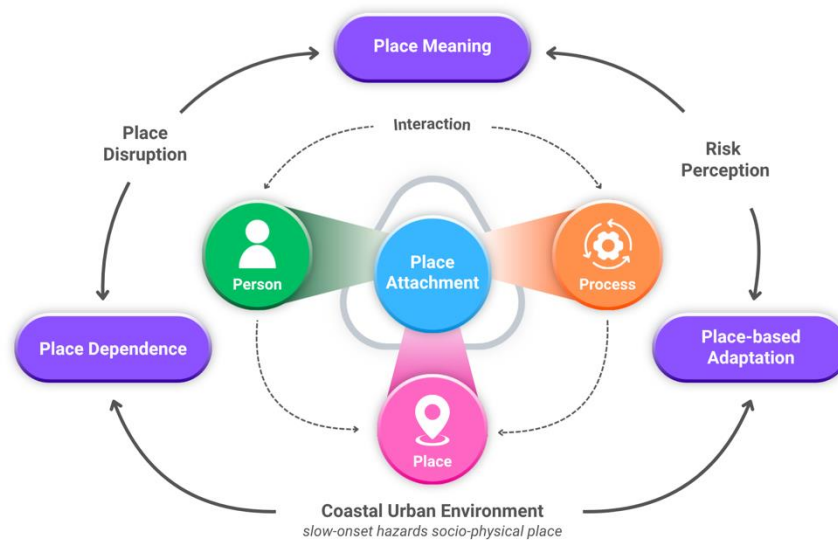


Figure 2.2 The dimension of place attachment in coastal environment context
 Source: Synthesized from various sources (Creighton et al., 2008; Groulx et al., 2014; Lambert et al., 2021; Murtagh & Lane 2022; Pred, 1984; Stancu et al., 2020)

Place attachment, together with social security and community trust, has been empirically shown to be a significant factor in determining the community's willingness to engage in the collective action or any decision-making process at the local level (Ma et al., 2022; Peng et al., 2020). The extent of people's attachment to a particular place is of significant consequence in influencing their behavior and perceptions (Bittle, 2024). This disruption could be very influential to one's personal condition. Moreover, they could lose several parts of their identity if the displacement is long-term near to permanent, and their previous living space is completely lost (Lambert et al., 2021). The inability to reconnect with their homeland, their primary identity, could possess a significant social well-being distress (Sajit et al., 2018). The disruption towards one's place attachment could also influence socio-economic conditions, social cohesion, civic engagement, which might lead to civic conflict (Lambert et al., 2021). In addition, the place uprooting could also influence their future

generation through a distress in place identity and history association (Lambert et al., 2021).

The place attachment could also increase people's reluctance to leave their homes in disaster-prone areas, thereby increasing their exposure to disasters (Amin et al., 2019; Buchori et al. (2018b, 2021); Hummon, 1992; Scannell & Gifford, 2017; Stancu et al., 2020; Steimanis et al., 2021; Swapan & Sadeque, 2021). In this context, the urge to move or engage in housing mobility is more likely to occur in communities with low attachment intensity (Costa et al., 2022).

On the other hand, several studies also mentioned that the disrupted place attachment could have the potential in influencing the community's capacity to conduct collective actions (World Bank, 2022). This phenomenon can be attributed to the process of reconnection and reattachment, driven by a shared interest in empowering themselves to navigate psychological distress, particularly among those who have experienced prolonged environmental challenges (Tellez & Balcells, 2022).

E. Integration in Coastal Environmental Planning

1. Environmental Management and Spatial Planning

Spatial planning is an integrative tool to achieve sustainable development and most importantly in dealing with complex climate change challenges. Spatial planning is a process system comprises of the management of land utilization activities (Nadin et al., 2021). Through this process, the optimum benefit for the community shall be achieved along with ensuring the sustainable interaction between human activities and natural resources (Nadin et al., 2021; Wilson & Piper, 2010). It enables the integration of various aspects in planning such as environment, disaster, social, economics, etc., as well as the integration as the involvement of multi-stakeholders (Nadin et al., 2021; Wilson & Piper, 2010). In dealing with climate change, spatial planning acted as an influential tool in allocating land for adaptation, mitigation, and related green investment needs (Wilson & Piper, 2010).

Spatial planning in coastal context played influential role in managing various environment users to avoid conflict and ecological destruction (Wilson & Piper, 2010). It served as comprehensive tools through the land-based spatial planning ranging from zoning plan, participatory process as well as the monitoring and evaluation of the effectiveness of the plan as a regulatory tool in mitigating adverse impact of conflicting land/natural resources utilization (Wilson & Piper, 2010). The plan could be strategically made based on ecological boundary such as marine spatial planning and shoreline management plan or based on the planning objective such as coastal adaptation plan (Wilson & Piper, 2010).

According to the Hyogo Framework for Action (UNISDR, 2005) and its following guidance, the Sendai Framework (SFDRR) (UNISDR, 2015), spatial planning, specifically land-use planning, contribute to the disaster risk reduction. Spatial planning acted as a problem solver for the poor urban land management that increasing vulnerability and the disaster risk. The later framework stated that the land degradation assessment and the disaster risk assessment shall be incorporated into the land-use planning. Degraded land due to slow or rapid disaster shall be assessed and be included in the land management plan including the spatial and aspatial management of disaster-prone human settlements. In response to this, the change in land use policies such as building codes standards shall also be implemented and enforced. Both frameworks also stated the importance of aligning the land-use planning regulations with local conditions such as socio-economic values. This measure is mandated to mitigate disaster induced change and disruption.

The planning process shall also be participatory where involving all stakeholders, including the vulnerable communities. All stipulated plans would be strategically deal with land subsidence causes and mitigate the impacts through adjusting the plan with the land degradation assessment results, knowledge management (aligning best practices with local's values and needs), and ecosystem preservation. The latter frameworks also add the urge to consider the post disaster learning, which is closer to participatory planning approach

through social learning theory. Spatial planning shall also be locally relevant and used consensus-based decision-making. In addition to this, the Sendai Framework also defined the spatial planning under disaster management shall also involve the basic services provisions for the displaced persons/communities, which could only be fulfilled if the planning is participatory enough and be able to collect and accommodate the people's needs.

According to environmental management regulations in Indonesia, spatial planning is part of prevention and control (see Figure 2.3). Environmental management can be defined as a systematic and integrated effort to protect environmental functions while preventing pollution and environmental degradation. In the Indonesian regulatory context, Law No. 32/2009 defines environmental protection and management as efforts that include planning, utilization, control, maintenance, supervision, and law enforcement. This definition is important because environmental management is not only about responding to environmental damage after it occurs, but also about organizing development activities so that they remain compatible with environmental carrying capacity. In academic literature, environmental management is similarly understood as a process of making and implementing decisions to regulate human interactions with the environment in order to maintain ecological integrity and human welfare (Barrow, 2006; Mitchell, 2002). Therefore, environmental management combines scientific assessment, policy instruments, institutional coordination, and public participation.

The first required step in environmental management planning is environmental planning, which establishes the baseline conditions, problems, carrying capacity, and long-term direction for environmental protection. Under Law No. 32/2009, environmental planning is institutionalized through the Environmental Protection and Management Plan (*Rencana Perlindungan dan Pengelolaan Lingkungan Hidup*/RPPLH) and is supported by environmental inventories at national, provincial, and district/city levels. In planning theory, this stage corresponds to problem identification, baseline assessment, objective setting, and scenario analysis (Glasson et al., 2012). For coastal urban

environments, this means that planning should begin by identifying interacting pressures such as land subsidence, tidal flooding, shoreline transformation, groundwater extraction, land-use change, housing vulnerability, and livelihood dependence.

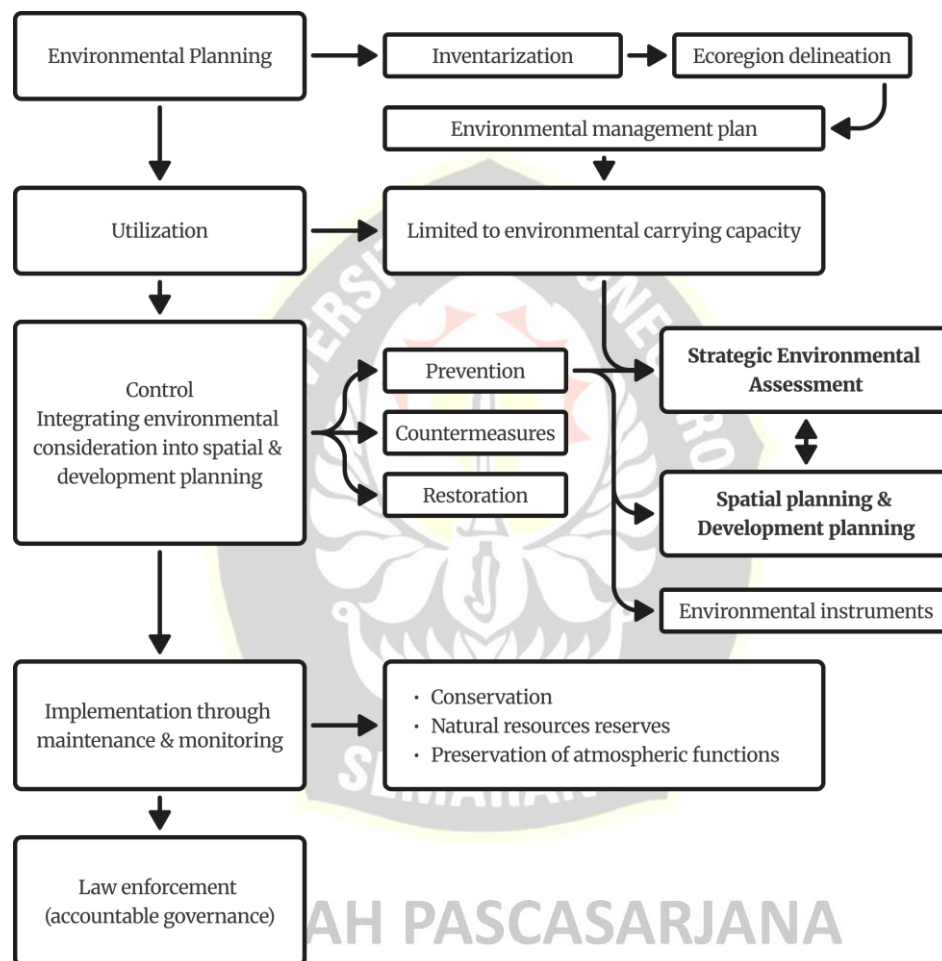


Figure 2.3 Environmental Management

Source: UU 32/2009; PP 21/2021; PP 26/2025; Barrow (2006); Mitchell (2022); Glasson et al., (2012); Therivel (2010);

The second step is integrating environmental considerations into spatial and development planning. Indonesian regulation provides several instruments for this integration, particularly Strategic Environmental Assessment (*Kajian Lingkungan Hidup Strategis/KLHS*), environmental impact assessment (*AMDAL*), and environmental approval mechanisms. Law No. 32/2009 requires

KLHS to ensure that sustainable development principles become the basis for policies, plans, and programs, while Government Regulation No. 22/2021 further regulates environmental approvals, protection and management of water, air, sea quality, environmental damage control, waste management, environmental information systems, supervision, and administrative sanctions. This step is consistent with academic environmental planning literature, which emphasizes that environmental management should be anticipatory, preventive, and embedded within development decision-making rather than treated as an afterthought (Therivel, 2010; Glasson et al., 2012).

The third step is implementation through control, maintenance, monitoring, and adaptive management. In Indonesian environmental law, management does not end with planning; it continues through utilization control, environmental maintenance, supervision, and law enforcement. This is crucial because environmental problems are dynamic and may worsen when policies are not continuously evaluated. Academic references on adaptive environmental management argue that management should be treated as a learning process in which monitoring results are used to revise strategies, correct mistakes, and respond to uncertainty (Holling, 1978; Walters, 1986). In the context of land subsidence and coastal slow-onset hazards, this implies the need for continuous monitoring of subsidence rates, flood frequency, groundwater extraction, infrastructure performance, community vulnerability, and adaptation outcomes.

The final step is participatory and accountable governance, because environmental management involves multiple actors, interests, and knowledge systems. Law No. 32/2009 recognizes public rights to environmental information, participation, and justice, which means that communities should not only be treated as affected populations but also as stakeholders in environmental decision-making. Academic literature similarly emphasizes that effective environmental management requires stakeholder engagement, institutional coordination, transparency, and social learning (Reed, 2008; Mitchell, 2002). For coastal urban planning, this means that environmental management should combine scientific evidence with community knowledge,

place attachment assessment, local values, and lived experiences of environmental change. In this sense, environmental management planning is not only a technical process for reducing degradation, but also a governance process for ensuring that development remains ecologically sustainable, socially just, and responsive to people's relationship with place.

2. Integrated Coastal Environment Planning

According to various dictionaries, the meaning of the word “integration” is a join and mixture from various aspects to be one, such as one system, information, components, programs, etc. Practically, this word has many other different meanings (see Table 2.4 below). There are at least seven meanings of the word integration, they are (1) merging; (2) simplification; (3) connectedness; (4) consideration; (5) synchronization; (6) authority centralization; and (7) centralization of system and information.

Within the planning discourse, integration had risen attention by practitioners as the need of it is also rising due to more complex climate change-induced challenges. As listed in the Table 2.3. below, integration in spatial planning could be understood as a consideration, synchronization, or connectedness. However, as this research would focus more on integration slow disaster and people's place attachment into planning, it would be more relevant to focus on integration as a consideration. Through this understanding, integration could be defined as consideration or as a way to involve/include non-conventional indicators or aspects in planning (Ko & Chang, 2012); such as climate change (UNDP, 2023; Wilson & Piper, 2010), public perception (Batudoka, 2005), psychometric analysis (Nabila, 2019), socio-environmental network (Lien et al., 2021), etc.

Table 2.4 Compilation of various definition of integration

Meaning	Explanation	Ref.
Merging	As a merging, integration defined as a way to combine all aspects into one. Some scholars furtherly defined the merging as integration considered as merging different planning methods to be more participative.	(V. Lee & Davis, 2019; Nicolletti et al., 2020; Putra et al., 2022)
Simplification	Integration is interpreted as an effort to simplify the process, one of which is through efforts to merge procedures/documents/etc.	Article 17 and 42 Law 11/2020
Connectedness/ Connectivity	This meaning related to spatial integration which mostly understood as the connection between points and locations in the planning locus, including how connectivity between regions is organized.	Article 17 and 42 Law 11/2020
Consideration	Inclusion of one of the indicators/discussions as an aspect of consideration in a planning process, such as considering social aspect in development.	(Ko & Chang, 2012; V. Lee & Davis, 2019; Mehrotra et al., 2020)
Synchronisation / Harmonization	In the more general context of spatial and environmental planning, integration can be understood as a process of synchronisation/harmonisation and consideration where each planning document is not only combined, but also are considered by inter-agency programmes and policies	(Cicin-Sain, 1993; V. Lee & Davis, 2019) Article 19, Article 22, Article 55 Law 11/2020
Centralisation of authority	Integration can be interpreted as the unification/centralization of responsibility and authority in the context of the unification of public service institutions and other government institutions.	Article 29, Article 118, and Article 121 Law 11/2020 (Mehrotra et al., 2020)
Information centralisation	Integration as a unification of systems and information is also mentioned in various articles in regarding electronic systems for licensing and information that need to exist and be combined into one.	Article 14, Article 31, Article 150, and Article 176 Law 11/2020

Source: Author Analysis (2024)

World Bank as reported in Mehrotra et al. (2020) defined integration in planning categorized into four different types, they are: (a) vertical integration; (b) horizontal integration; (c) social integration; and (d) natural-human system integration. Mehrotra et al. (2020) stated that natural-human system integration is where “the built environment of the city and the natural ecosystem services

that the city relies on [...]”. Through review from various integration definition, integrating place attachment into spatial planning could be included in the definition of natural-human system integration. The latter discussion would elaborate more on this matter.

Learning from the perspective of integrated coastal zone management, integrated planning refers to a comprehensive, dynamic, and coordinated decision-making process to managing and developing coastal areas that takes into account the interdependencies between human activities (some researchers explicitly mentioned as development) and the environment (Cicin-Sain, 1993; McFadden, 2008). The concept of integrated planning recognizes that coastal areas are complex and dynamic systems (Cicin-Sain, 1993; McFadden, 2008). It involves the integration of various sectors and stakeholders, including government agencies, local communities, and environmental organizations as well as various nations, to ensure sustainable development and conservation of coastal resources (Cantasano et al., 2017; Cicin-Sain, 1993; Wilson & Piper, 2010).

Integrated coastal planning also emphasizes the need to consider the social, economic, and environmental dimensions of coastal management in a holistic manner (Cantasano et al., 2017; Cicin-Sain, 1993). This approach aims to balance the competing interests and demands of different stakeholders while protecting the ecological integrity of coastal ecosystems (Dao et al., 2019; Wilson & Piper, 2010).

Integrated planning also involves the integration of scientific knowledge and data into decision-making processes (Kusuma-Atmadja & Purwaka, 1996; Strain et al., 2006; Wilson & Piper, 2010). It emphasizes the importance of evidence-based decision making and the use of tools such as geographic information systems (GIS) and decision support systems (DSS) to facilitate the integration of information from various sources (Gumbira & Harsanto, 2019). This enables stakeholders to make informed decisions that take into account the potential impacts of their actions on the environment and the well-being of coastal communities.

Furthermore, integrated planning recognizes the importance process oriented, which is the stakeholder engagement and participation in the decision-making process (Cicin-Sain, 1993; Gillgren et al., 2019; McFadden, 2008). It promotes collaboration and cooperation among different actors to ensure that the diverse perspectives and interests of stakeholders are taken into account (Yuan & Chang, 2021). This participatory approach helps to build consensus and ownership of the planning process, leading to more effective and sustainable outcomes (Plink et al., 2021), as well as promotes for transformative changes (Gillgren et al., 2019). The integrated planning from coastal management perspective also highlighted that coastal management is a management of common property, which consequently, brought urgency to consider public's socio-cultural value, as well as other stakeholders' (government, private developers, etc.) interests (Cicin-Sain, 1993).

Cicin-sain (1993) in her influential article of integration coastal management, stated that integration in coastal context requires at least five integration they are: (1) multi-sector integration; (2) land-sea integration; (3) cross-level integration; (4) multi-nations integration; and (5) multi-disciplines integration. She later defined that integration is more than synchronization or harmonization, where sectoral ego shall be lessened, and all stakeholders were personally willing to collaborate, and the integrated platform is well established.

Cicin-Sain (1993) also stated that integrated planning is also considered as a continuum. She proposed the five continuums of integration as shown in the Figure 2.4 below. According to her, the most integrated planning occurred as indicated by the formal procedure of harmonization between planning cross-sector and cross-level, which is being strengthen by the re-organization of the relevant instutions in making this integration happened. The integration here also defined as the lessened sectoral ego which plays crucial role in aligning trans-sectoral planning.

“One of the keys to achieving better integration in policy, in my view, is good research on the links between different sectors in a policy area as well as with other policy areas, the problems they cause or do not cause,

and assessments of the costs/benefits of fragmented and sectoral policies versus more integrated policies.” (Cicin-Sain, 1993)

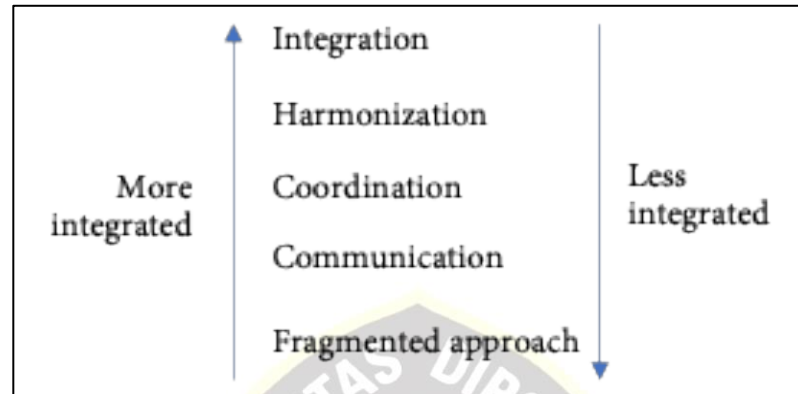


Figure 2.4 The Integrated planning spectrum

Source: Cicin Sain (1993)

Integrated planning in the context of integrated coastal zone management is a comprehensive and coordinated approach that considers the interdependencies between human activities and the environment. It involves the integration of various sectors and stakeholders, the use of scientific knowledge and data, and the promotion of stakeholder engagement and participation. This approach aims to achieve sustainable development and conservation of coastal resources by balancing the competing interests and demands of different stakeholders while protecting the ecological integrity of coastal ecosystems.

F. Integrating Principle: Slow-onset Disaster Management, Place Attachment, and Coastal Spatial Planning

1. The Importance of Integrating Place Attachment in Spatial Planning for Coastal Urban Environment

Integrating place attachment into spatial planning for coastal urban environment context is important from several planning aspects. This integration could provides comprehensive socio-environmental evidence, managing socio-environmental challenges, and ensure equity through participatory process. This local-specific approach also prevents further maladaptation which put the impacted community to increased exposure to complex slow-onset hazards

rather than reducing it (Murtagh & Lane, 2022). Furthermore, this integration also leverage the stronger place attachment which might be experienced by the impacted community (Bittle, 2024). Developing initial conceptual understanding of this integration is therefore crucial as the foundation of this research.

Understanding people's place attachment in coastal urban environment experiencing slow-onset hazards allows environmental planners to recognize the meanings and bonds through which people negotiate and connect with the gradually changing of a place. Coastal urban environment transformation and degradation has the potential to be disruptive, affecting people's livelihoods and daily activities (Bittle, 2024). Integrating place attachment into planning process may serve as part of measures to provide rigorous evidence-based estimation analysis in order to anticipate and address the potential tangible or intangible consequences of complex coastal land subsidence, sea level rise, and other hazards to the coastal communities (De La Hoz-Del Real et al., 2019; Sarah & Soebowo, 2018)

The integration of place attachment therefore could also contribute to the risk management of the socio-environmental challenges posited by the complex slow-onset coastal hazards. Conventional environmental management often prioritizes technical measures such as drainage improvement, embankments, seawalls, land elevation, or infrastructure repair. While these measures are important, they may be insufficient if they do not address how residents experience environmental degradation in their everyday lives. The integration of place attachment to coastal planning ensures the alignment between the community's material and emotional needs and the provided planning programs/interventions. This integration could enhance the provision of social support and ensuring a structured livelihood transition plan for the impacted communities whom their livelihood dependence is disrupted (De La Hoz-Del Real et al., 2019). Integrating place attachment into spatial intervention could also provide sense of familiarity between their new place and their previous

living environment, thereby reducing the stress associated with the transition to a new dwelling (Nabila, 2019).

From the perspective planning as a process, such integration also embedded in the importance of public participation. Participatory planning enables residents to engage not only as recipients of technical interventions, but also as knowledge holders of their changing environment (Sarah & Soebowo, 2018). Furthermore, participatory planning process is also facilitate the acceptance and ownership of the plan by the community (Gray et al., 2021). Most importantly, this participatory process could serve as a collaborative learning and monitoring platform in acknowledging the complex understanding of slow-onset hazards (Sarah & Soebowo, 2018). This is crucial because place awareness, adaptive capacity, and willingness to act are shaped not only by scientific information, but also by residents' trust, resources, identity, and perceived ability to influence planning outcomes (Bott et al., 2021; Devine-Wright, 2013b; Devine-Wright & Batel, 2017; Stancu et al., 2020; Takahashi & Selfa, 2015; Wang et al., 2021).

Overall, integrating place attachment into coastal planning is essential because the negative externalities of land subsidence are experienced through both environmental degradation and disruption to people–place relationships. Technical measures may reduce certain forms of physical exposure, but they may also create new socio-environmental trade-offs if they neglect people's place meanings, livelihood dependence, family networks, social trust, ownership security, and adaptive capacities. All of these principles underscore the importance of involving communities meaningfully in the planning process. Meaningful participation can enhance acceptance and ownership of adaptation plans, while also ensuring that planning decisions are grounded in the lived realities of affected residents (Gray et al., 2021). In this sense, coastal planning for slow-onset hazards should move beyond protecting land from water; it should also protect the social, psychological, and place-based conditions that enable coastal communities to adapt with dignity, security, and continuity.

2. Place-based Adaptation as An Umbrella Theory in Integrating Place Attachment into Coastal Urban Environmental Planning

Place-based adaptation can be understood as an umbrella integration theory that connects environmental adaptation, local context, community values, and place attachment. It refers to adaptation efforts that are socially and ecologically appropriate to the specific characteristics of a place. Rather than treating adaptation as a universal technical response, place-based adaptation emphasizes that effective adaptation measures must be developed through careful consideration of local values, beliefs, needs, ecological conditions, and everyday experiences (Duijndam et al., 2022; Groulx et al., 2014; Krauß & Bremer, 2020; Murtagh & Lane, 2022). This is particularly important in coastal urban environments, where environmental challenges such as land subsidence, tidal flooding, sea-level rise, and shoreline transformation are deeply intertwined with livelihoods, place meanings, and governance.

As an integration theory, place-based adaptation provides a conceptual bridge between physical environmental assessment and social aspects consideration in planning. It recognizes that adaptation cannot rely solely on hazard maps, infrastructure design, or exposure analysis, even though these forms of evidence remain important. Adaptation measures also need to reflect how people understand their environment, what they value about their place, and what kinds of change they are willing or able to accept. In this sense, place-based adaptation aligns with the argument that effective adaptation depends on the consideration of local values, beliefs, and needs (Duijndam et al., 2022; Groulx et al., 2014; Krauß & Bremer, 2020). By doing so, it helps prevent adaptation policies from becoming socially detached, externally imposed, or insensitive to the lived realities of affected communities.

The ecological dimension of place-based adaptation is equally important. Murtagh & Lane (2022) emphasized that adaptation must be responsive to ecological context in order to avoid producing further environmental harm. This means that adaptation measures should not only protect communities from immediate risk but also maintain or restore the ecological functions that support

long-term resilience. In coastal urban contexts, poorly designed adaptation interventions may generate unintended consequences, such as disrupting sediment flows, damaging wetlands, intensifying flooding elsewhere, or encouraging development in hazardous areas. Therefore, place-based adaptation requires planners to understand the specific ecological dynamics of coastal environments while also considering how communities depend on these environments for livelihoods, safety, mobility, identity, and everyday life.

The use of place attachment within a place-based adaptation approach is particularly influential for planning purposes. Place attachment helps explain why people may choose to remain in environmentally risky areas, why they may resist certain adaptation interventions, or why they may support collective environmental action. Peng et al., (2020) argue that place attachment and trust are important for increasing community participation in development programs and environmental management. Social, interpersonal, and institutional trust can strengthen place attachment, and stronger place attachment may in turn influence community participation. This suggests that adaptation planning should not treat attachment to place as a barrier to change, but as a potential resource for building collective responsibility, participation, and locally legitimate adaptation strategies.

Therefore, place-based adaptation can function as an umbrella theory for integrating place attachment into coastal planning. It allows planning to connect three key dimensions: the physical assessment of environmental risk, the ecological appropriateness of adaptation measures, and the social-psychological relationship between people and place. For land-subsidence-affected coastal urban areas, this integration is crucial because adaptation is not only about reducing exposure to flooding or preventing physical damage, but also about sustaining place meanings, livelihood dependence, social trust, adaptive capacity, and willingness to act. Through this lens, coastal planning can move beyond technically oriented adaptation toward more contextual, participatory, and socially grounded strategies that respond to both environmental transformation and the lived experiences of communities.

However, integrating place attachment into spatial and coastal urban environmental planning as posited by place-based adaptation theory remain in exploratory stage. Initially, the study of this integration is in nature tourism planning research particularly in finding balance between environmental protection and human activities (Creighton et al., 2008; Iskandar, 2016). This integration grows into the development of planning tools and qualitative narrative research.

Several researchers such as Brown et al. (2015, 2020), Rall et al. (2019), and Gottwald et al. (2021) argued that integrating place attachment into planning could be started with participatory mapping the meaningful places, or the place values. They explored place meaning and place value analysis through various participatory mapping tools (Creighton et al., 2008; Iskandar, 2016). However, this method was criticized due to its inability in capturing personal interaction processes (Gunderson & Watson, 2007).

Gunderson & Watson (2007) recommended using qualitative techniques to analyze people's attachment to their place of residence and integrating it into relevant policies/programs rather than relying on tools. This qualitative method has become dominant in place attachment research as reported by McLain et al. (2013). Recent research by Lambert et al (2021) also utilized qualitative approach to derive key place attachment insights and deriving it into future adaptation planning recommendations. Therefore, this research utilizes such approach to explore epistemological approach in assessing people's place attachment while also providing integration framework to the planning policies.

3. Integration Principles: Expanding Place-based Adaptation Theory in Coastal Urban Environment Context

According to previous reviews, there are at least four aspects that needs to be considered while developing integrating framework of place attachment to coastal urban environment planning. These four principles are shown in Figure 2.5, particularly by operationalizing place-based adaptation theory as an integrative framework for incorporating place attachment into coastal urban

environmental planning. These integration principles expand place-based adaptation theory proposed by Murtagh & Lane (2022) to be more relevant with coastal urban environment context.

The circular structure suggests that adaptation should not be treated as a linear or sectoral process, but as an interconnected system in which planning, environmental management, disaster management, place dependence, and place identity continuously influence one another. The rotating arrows at the center emphasize this reciprocal relationship: adaptation planning affects how people experience and depend on place, while people's place-based needs and meanings should also reshape the planning and management process.

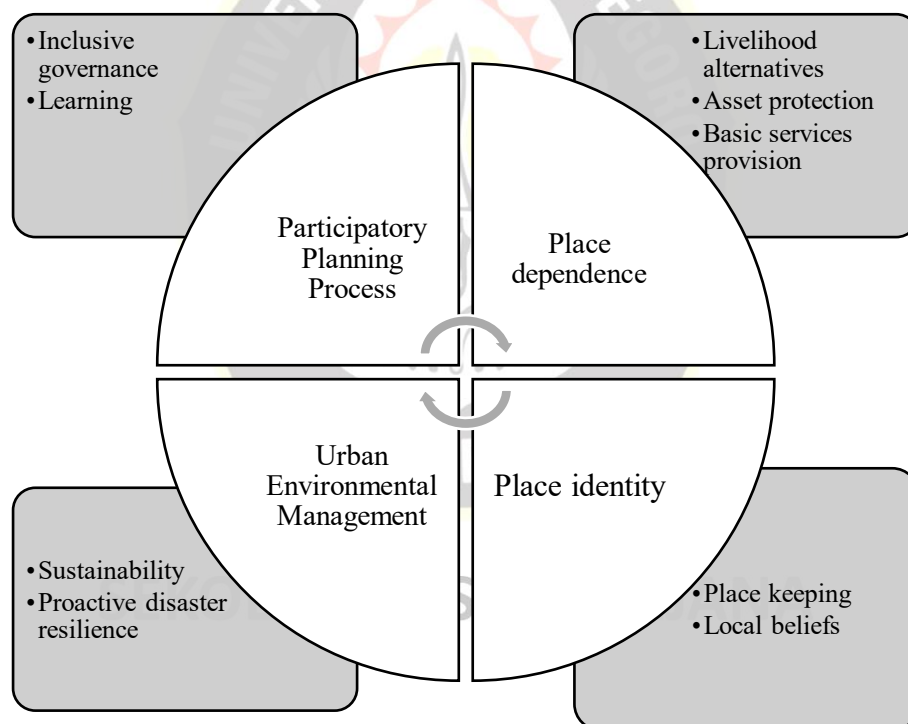


Figure 2.5 Operationalizing place-based adaptation theory for integrating place attachment into coastal urban environment context

Synthesized from (Bittle, 2024; Dodman et al., 2022; Miller et al., 2022)

The first component, participatory planning process, represents the procedural foundation of integrating place attachment into coastal urban environment planning (De Vreese et al., 2016; Pert et al., 2015; Rall et al., 2019). In the figure, this component is connected to inclusive governance and learning,

indicating that coastal adaptation should be developed through collaborative processes involving affected communities, government institutions, experts, and other relevant stakeholders (Sarah & Soebowo, 2018). This figure also emphasize that participatory planning shall not only focusing on assessing place attachment but also as a place for collaborative learning (Verbrugge et al., 2019). Furthermore, this principle also emphasize the role of participatory as a multi-stakeholder governance platform to negotiate between plenty of interests in coastal urban environment context (Belland et al., 2023). This is important because coastal urban hazards such as land subsidence, recurrent flooding, and shoreline transformation are not only technical problems, but also lived experiences (Amin et al., 2019; Beune, 2019; Saputra et al., 2019; Ley, 2021). Through participatory planning, scientific information about environmental risks can be combined with local knowledge, community aspirations, and everyday experiences of environmental change.

The second component, place dependence, highlights the functional relationship between people and their coastal urban environment. The figure links this dimension to livelihood alternatives, asset protection, and basic services provision, suggesting that adaptation must respond to the practical reasons why people depend on a place. This principle is clearly stated in the place-based adaptation theory (Duijndam et al., 2022; Groulx et al., 2014; Krauß & Bremer, 2020; Murtagh & Lane, 2022). However, it is regrettable that this case is still rarely discussed in the context of coastal management (Ohenhen et al., 2024). In land-subsidence-affected coastal areas this principle is required as the slow-onset hazards occurred coastal urban environment might disrupts community's place dependence. Residents may remain attached to their neighborhood because it provides access to work, housing, family support, social networks, public services, or economic opportunities (Amin et al., 2019; Steimanis et al., 2021). Therefore, planning should not only reduce physical exposure to hazards, but also ensure that people's livelihoods, assets, and access to basic services are protected or meaningfully restored.

The third component, place identity, refers to the emotional, symbolic, and cultural relationship between people and place. The figure connects this dimension to place keeping and local beliefs, showing that efforts to intervene local slow-onset hazards in coastal urban environment should maintain continuity between communities and the meanings they attach to their environment, as stated by Murtagh & Lane (2022). In coastal urban contexts, places are not only locations of risk; they are also homes, memories, cultural landscapes, livelihood spaces, and sources of belonging (Amin et al., 2019; Creighton et al., 2008; Lambert et al., 2022). Therefore, integrating it into coastal urban environment adaptation is crucial to respect local beliefs and supports place keeping can help communities maintain a sense of continuity while responding to gradual and cumulative environmental change.

The fourth component, urban environmental management, represents the ecological and institutional dimension of the framework. It is connected to sustainability and proactive disaster resilience, indicating that place-based adaptation must also address the environmental systems that shape risk (Murtagh & Lane, 2022; Miller et al., 2022). In coastal urban areas, this includes managing land subsidence, tidal flooding, drainage systems, land use, coastal protection, and ecosystem degradation (Bittle, 2024; Dodman et al., 2022; UNISDR, 2015).

Integrating place attachment into coastal urban planning requires a balanced approach: participatory governance ensures legitimacy, place dependence ensures functional support, place identity ensures socio-cultural continuity, and urban environmental management ensures ecological sustainability and disaster resilience. Together, these four dimensions provide a holistic basis for integrating place attachment in coastal urban environments affected by slow-onset hazards.

G. Indonesia's Policy Landscape in Integrating Place Attachment for Addressing Slow-onset Hazards in Coastal Urban Environmental Planning

1. Indonesia's Spatial Planning Policy History and Its Relevance with Integrating Place Attachment into Planning

Indonesia had a long history of spatial planning policy and regulation. The importance of incorporating local socio-environmental behavior in preparing a new housing area had been showing since the late period of the Dutch government's era. The historical evolution of spatial planning policies and paradigms in Indonesia can be traced back to the era of the Dutch colonial administration. Under the influence of ethical politics, moral obligations and the improvement of the quality of life in the colonized territories were emphasized. One of the implementation of this politics in development and planning is that the Dutch colonial government started to create a well-developed housing area, initiating land lease, ownership, and business, along establishing several laws including the Law Agrarian Act/*Agrarische Wet* (1870), Decentralization Law/*Decentralisatie Wet* (1903), and City Planning Act/*Staadsvorming Ordonnantie* (1938). The locally oriented development started to take place afterwards.

Around the 1910s, Dutch architect and local leaders started the *kampung* improvement program to improve the local housing's environmental health condition. The *kampung* improvement program also an act of preventing the place demolition, along with the development of building codes regulation. Those policies were developed to ensure current and future development could comply with the standards of livable and healthy housing environment. However, the implementation of that building codes remains a challenge since the Agrarian Act allows individuals or businesses to own a land/building which in turns they also have the right to utilize and personalize their property. The highlight of this period is the rise of local housing improvement with the aim related to health, hygiene, and sanitation.

The story of local housing improvement policies continued in 1920s era. The *kampung* improvement program keeps on growing specifically on the increase of local authority and power. One of the is the subsidy allocation for this kampung level project. A significant milestone in this development occurred with the urban planning advocacy of Thomas Karsten in the early 20th century. Karsten adopted a modern psychological approach, emphasizing the incorporation of psychological, social, and cultural dimensions into urban planning (Coté, 2014). His work positioned him as a pivotal figure whose ideas continue to influence spatial planning policies in Indonesia. Karsten's perspective was rooted in the notion that spatial environments should be designed in alignment with social transformation mission to achieve a modern community but be based on local behavioral and socio-psychological considerations.

A critical case study discussed by involves the development of the Taman Sari settlement in 1913, which failed to account for the local community's socio-cultural context, rendering the area underutilized as originally intended (van Roosmalen, 2011). In response to such shortcomings, Herman Thomas Karsten in 1920 later proposed a community-based spatial planning approach in the Decentralization Congress in Bandung. This approach was exemplified through the "*kampung* improvement program" which emphasized planning at the village level. This localized focus was chosen to maximize the authority and funding available through decentralized policies, thereby ensuring that the planning process remained relevant and closely aligned with the needs and preferences of the community.

Notwithstanding Karsten's endeavors in this regard, he also advocates the creation of mixed social-class housing and the imposition of restrictions on Indonesian planners and architects in the planning of their *kampungs*, on the grounds of their limited capacity. Therefore, after the 1945, planning paradigm brought the spirit of Indonesian independence into housing planning. Borrowing Silver (2023)'s term, he explained this period as the "Indonesianization" of the Dutch Government planning and development.

Karsten's influence on the community-based development seems to influence the rest of local planning approach in Indonesia. His vision in utilizing local community's social culture in self-help and *gotong royong* shall be incorporated into planning. This approach also showed in the kampung improvement program 4 decades later, initiated by Ali Sadikin, Governor of Jakarta in 1980s, who is inspired by the 1920s kampung improvement program (Silver, 2023). The locally based planning approach also implemented into several other local development program under the Integrated Urban Infrastructure Development Program in the 1980s. The developed scheme in this period is that the community empowered to conduct their *gotong royong* efforts while the funding might be come from various sources such as government, international donors, NGOs, and bank loans (Silver, 2023). Although Karsten's spirit in influencing local planning practices had been started since 1920s, the formal regulation in ensuring public participation had just stipulated 70 years later in the 1996 through the Government Regulation (PP) Number 69 of 1996 on the Implementation of Rights and Obligations, as well as Forms and Procedures for Community Participation in Spatial Planning. Further review on Indonesia's regulation and policy with regard to integrating place attachment is explored in the following sections.

2. Relevant Sustainable Development Goals

Relevant SDGs indicators for addressing slow-onset hazards in coastal urban environments can be positioned under the broader principle of risk-informed, inclusive, and place-sensitive sustainable development. At the global level, slow-onset hazards such as land subsidence, sea-level rise, recurrent tidal flooding, coastal erosion, and salinization are closely related to SDG 11 on sustainable cities and communities and SDG 13 on climate action. SDG 11.5 aims to reduce deaths, affected people, and economic losses caused by disasters, including water-related disasters, while SDG 13.1 emphasizes strengthening resilience and adaptive capacity to climate-related hazards and natural disasters

(United Nations, 2015). These indicators are relevant because slow-onset hazards rarely occur as isolated events; rather, they gradually produce multi-hazard conditions that affect housing, mobility, livelihoods, infrastructure, public health, and social well-being in coastal urban areas.

From a place attachment perspective, SDG implementation should not only focus on reducing exposure to hazards, but also on protecting the social and emotional relationships that enable people to live meaningfully in place. SDG 1.5 is particularly relevant because it focuses on building the resilience of the poor and people in vulnerable situations to climate-related extreme events and other social, economic, and environmental shocks (United Nations, 2015). In land-subsidence-affected coastal settlements, vulnerability is not only reflected in physical exposure, but also in the weakening of place dependence, including livelihood security, family networks, access to services, housing assets, and social trust. Therefore, integrating place attachment into SDG-oriented coastal planning can help translate the global resilience agenda into locally meaningful indicators, such as whether adaptation programs protect livelihoods, maintain community networks, preserve place identity, and strengthen residents' willingness to participate in environmental management.

The integration of place attachment into planning is also strongly connected to SDG 11.3.2, which measures whether cities have direct structures for civil society participation in urban planning and management that operate regularly and democratically. This indicator is important because place-based adaptation depends on the involvement of communities as knowledge holders, not merely as recipients of infrastructure or relocation policies. For coastal urban environments, participatory planning can help reveal how residents interpret land subsidence, which externalities they experience most severely, what places they consider socially or economically irreplaceable, and what forms of adaptation they perceive as acceptable. SDG 11.7 on access to safe, inclusive, accessible, green, and public spaces is also relevant because adaptation should protect not only private assets, but also the public and shared spaces that sustain everyday social life, collective memory, and community identity.

At the national level, Indonesia's SDGs implementation can be linked to the legal principle of environmentally sound sustainable development. In regional development planning, Article 262 of Law No. 23/2014 emphasizes that regional development plans must be prepared based on several principles, including being "*berwawasan lingkungan*" or environmentally oriented. In this context, environmentally oriented development means realizing fair and prosperous lives without causing continuous environmental degradation, by optimizing the benefits of natural resources while harmonizing human activities with the carrying capacity of the natural systems that support them. This principle is consistent with Article 1 of Law No. 32/2009, which defines sustainable development as a conscious and planned effort to integrate environmental, social, and economic aspects into development strategies in order to ensure environmental integrity, safety, capacity, welfare, and quality of life for present and future generations. Therefore, in addressing slow-onset hazards in coastal urban environments, SDGs implementation should not be treated merely as a global development agenda, but as part of Indonesia's legally mandated approach to regional development and environmental protection.

This national principle is also operationalized through spatial planning and Strategic Environmental Assessment (Kajian Lingkungan Hidup Strategis/KLHS). Article 19 paragraph (1) of Law No. 32/2009 requires that spatial planning be based on KLHS, meaning that environmental carrying capacity, environmental risks, and sustainability considerations must be integrated into spatial planning decisions. This is particularly relevant for coastal urban areas affected by land subsidence, tidal flooding, sea-level rise, and shoreline transformation, because spatial planning decisions may either reduce or intensify long-term socio-environmental risks. Integrating place attachment into KLHS and spatial planning can strengthen SDGs localization by ensuring that planning does not only assess environmental carrying capacity and physical exposure, but also considers livelihood dependence, community values, local identity, social trust, and residents' adaptive capacity. In this sense, environmentally sound development, KLHS, and spatial planning provide

national legal instruments for translating SDG 11 and SDG 13 into place-sensitive coastal adaptation policies.

The national SDGs principle also emphasizes localization through regional action plans and sub-national implementation. Studies on SDGs implementation in Indonesia note that provincial governments are expected to develop Regional Action Plans (Rencana Aksi Daerah/RAD) as derivatives of the national SDGs action plan (Wahyudi, 2024). In the context of coastal urban hazards, this localization is crucial because the impacts of land subsidence, sea-level rise, and tidal flooding are highly place-specific. National indicators such as disaster-affected population, climate resilience, safe housing, access to basic services, and participatory urban planning need to be translated into local planning instruments, such as RPJMD, spatial plans, disaster risk reduction strategies, climate adaptation plans, and coastal management programs. Integrating place attachment into these instruments can strengthen SDGs localization by ensuring that local targets address not only infrastructure resilience, but also the continuity of livelihoods, local values, social support systems, and community trust.

At the local level, Semarang provides a relevant example of how SDGs-oriented programs can address slow-onset hazards in a coastal urban environment. Semarang's resilience agenda has long recognized flooding, coastal pressures, and urban environmental stress as major challenges; the city's Resilience Strategy was developed through the 100 Resilient Cities program and includes multiple pillars, strategies, and initiatives to improve urban resilience (Semarang City Government, 2016). More recently, Semarang's flood and tidal flood management has been linked to the 2025–2029 RPJMD and the National Urban Flood Resilience Project (NUFReP), which prioritizes integrated flood and tidal flood management, including river normalization, drainage subsystem optimization, increased pumping capacity, retention ponds, and an ecohydrological approach (Semarang City Government, 2026). These programs are directly relevant to SDG 11 and SDG 13, but they can be strengthened by incorporating place attachment into planning: for example, by assessing how

flood infrastructure affects local livelihoods, whether basic services remain accessible during recurrent inundation, how residents perceive protection measures, and whether adaptation programs maintain social networks and place identity. In this way, SDGs implementation becomes not only a matter of achieving resilience indicators, but also of ensuring that coastal urban adaptation protects people's meaningful relationships with place.

3. Relevant Policy Sectors

Slow-onset hazards in coastal urban environment is a multi-sectoral matter. Planning for housing impacted by slow disaster land subsidence mainly put forth the right to live for all the residents (Ohenhen et al., 2024). As Bittle (2024) stated, the impacted community might aspire for a housing with nearly similar with their previous housing. The key-theme summarization of the multi-sectoral policies from all previous literature review is written in this section. Further, this section aims to derive the relevant sectoral policies that shall be considered in exploring the place attachment to policy integration pathway.

Planning for slow-disaster induced displacement shall also consider psychological considerations, beyond physical environment. Karsten's paradigm in disaster planning as described by Coté (2014), could also be utilized in complementing this perspective. He proposed that the infrastructural measures for area protection and risk mitigation shall be incorporated with the traditional and local value beliefs. The slow-onset hazards induced disruption towards the impacted community's place of life, might need a social intervention process. This statement is relevant with Dodman et al. (2022) and Miller et al. (2022), who argued that the importance planning in this context requires incorporation of local values and beliefs. Those considerations could be developed through participatory planning and development (see Figure 2.6). This participatory planning policy sector consideration also explores the possibilities of incorporating the theoretically related place attachment and the community's willingness to do appropriated adaptation actions or any measures related to their

place's future as stated by Peng et al. (2020), Ramkissoon et al. (2013), and Ma et al. (2022).

Governance and politics aspects also included in the relevant policy of the slow-onset coastal urban environment socio-environmental consequences as shown in the Figure 2.6 below. These aspects become one of the most discussed in the social and governance aspect of land subsidence by several researchers (Baruah, 2022; Batubara et al., 2023; Belland et al., 2023; Joyner and Orgera, 2013; Knowles, 2020; Saputra et al., 2017; Siriwardane-de Zoysa et al., 2021; Su, 2016; Staupe-Delgado, 2019; Staupe-Delgado and Rubin, 2022).

Another discussion among land subsidence researchers are the water-related policies that shall be considered when finding appropriate measures in dealing with land subsidence (Warren et al., 1975; Yoo and Perrings, 2017). The water policy mentioned here including the groundwater management and freshwater provisions. Therefore, the water management related policies also being included in the relevant policy sectoral aspects as shown in the Figure 2.6.

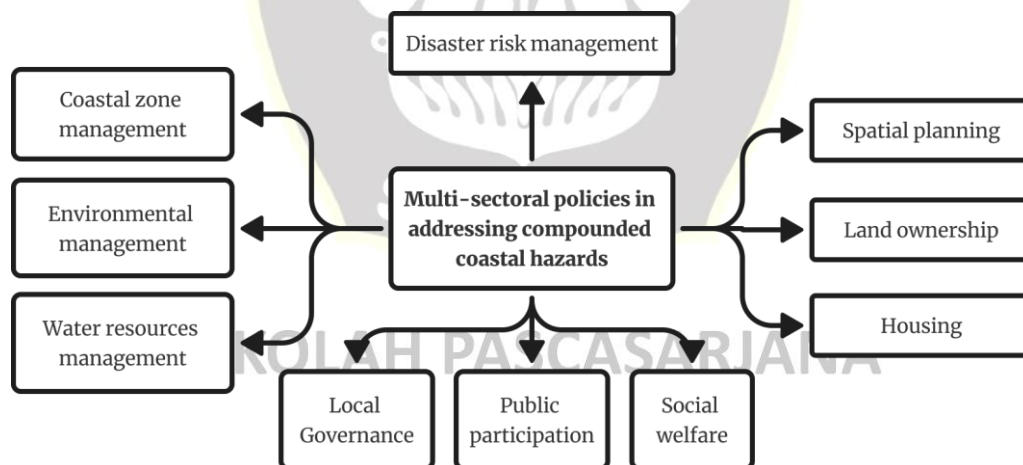


Figure 2.6 Relevant Policy Sectors

Source: Author Analysis (2024)

The coastal management is also included in this relevant policy sectors as it is one of the negative externalities of land subsidence. Policies related to coastal management shall also be incorporated to explore the links between dealing with land-based issues which put significant consequences for coastal

ecosystem. It is also crucial to emphasize that the integration pathway could be initiated from integrated coastal management theories as argued by Lambert et al., (2021) and Cicin-Sain (1993).

The significance of integrating landscape and ecological management into coastal urban environment planning has been highlighted by numerous researchers, including Marfai et al. (2008), Ghafoori et al. (2012), Sumaryo et al. (2004), and Su (2016). Furthermore, the housing policies, including with the land and property ownership policies, shall also be discussed to explore the place dependence of the impacted coastal community. Numerous researchers also stated the housing and land ownership issues are important in discussing urban environment planning context, such as Murray et al. (2022), Lambert et al. (2021), Fernández-Torres et al. (2020) and Ohenhen et al. (2024).

The disaster risk management it is a sectoral policy that is needed to be explored. This is important to explore implementing strategy of the UNISDR (2015)'s aim in incorporating slow disaster risks into conventional disaster risk management. It is also shall be included to explore the way to shift current status quo as presented by Baruah (2022), Pujiastuti et al. (2016) and Zong et al. (2003).

Finally, the spatial planning policy sector shall also be considered in this discussion. Spatial planning is an integrative tool (Nadin et al., 2021; Wilson and Piper, 2010), In theory, all of the aforementioned sectors could be explored in spatial planning, particularly the spatial allocation along with ensuring the lessened ecological deterioration while also providing the people with a better future life aspiration.

4. Indonesia's Current Policy Landscape

This sub-section presented a review of the current policy landscape in Indonesia with regard to the integration of place attachment into spatial planning for slow disaster-induced planned displacement. The review follows the

schematic policy sector that has been identified in the previous section. The policy reviews were divided into three parts. The first part reviews the regulation updates regarding the disaster risk management, which follows by the environment-development integration. Then the review continues with the discussion of the current cross-sectoral relevant regulation. This regulatory review concluded with the discussion on people-centered decision making and how does place attachment could contribute to it.

Table 2.3. List of Analysed Regulation

Policy Sector	Type	Name / Description	Shortened Name
Basic Law	Law	Undang-undang Dasar Negara Republik Indonesia Tahun 1945	UUD 1945
Omnibus	Law	Undang-undang Nomor 11 Tahun 2020 tentang Cipta Kerja	UU 11/2020
Omnibus	Law	Peraturan Pemerintah Pengganti Undang-undang Nomor 2 Tahun 2022 tentang Cipta Kerja	Perppu 2/2022
Omnibus	Law	Undang-undang Nomor 6 Tahun 2023 tentang Penetapan Peraturan Pemerintah Pengganti Undang-Undang Nomor 2 Tahun 2022 tentang Cipta Kerja menjadi Undang-Undang	UU 6/2023
Spatial Planning	Law	Undang-undang Nomor 24 Tahun 1992 Tentang Penataan Ruang	UU 24/1992
Spatial Planning	Law	Undang-undang Nomor 26 Tahun 2007 Tentang Penataan Ruang	UU 26/2007
Spatial Planning	Government Regulation	Peraturan Pemerintah Nomor 21 Tahun 2021 Tentang Penyelenggaraan Penataan Ruang	PP 21/2021
Spatial Planning	Government Regulation	Peraturan Pemerintah Nomor 8 Tahun 2013 Tentang Ketelitian Peta Rencana Tata Ruang	PP 8/2013
Disaster	Law	Undang-undang Nomor 27 tahun 2007 tentang Penanggulangan Bencana	UU 27/2007
Disaster	Presidential Decree	Keputusan Presiden Nomor 43 tahun 1990 tentang Badan Koordinasi Penanggulangan Bencana Nasional	Keppres 43/1990

Source: Author Analysis (2024)

Indonesian Government had just revised almost the whole law regime in this country through its controversial omnibus law, which had also been revised twice from its first launch as UU 11/2020, then being revised in Perppu 02/2022,

to the latest UU 06/2023. This law consists of revision of almost all of regulation sectors, as well as several that is related to land subsidence induced planned displacement as shown in Figure 2.6. Further policy review was taken mainly through those laws including the following regulation. The regulation that was analyzed in this section are as listed in the Table 2.3. above.

Indonesia as an archipelagic country lies in the ring of fire meaning that living with disaster shall be in the top of any of planning and decision-making. The relevant planning and policy shall aims to minimize the disaster negative consequences and preserving its citizen's right to live which stated in the nation's objective in their basic law (Article 27 and Chapter X of the UUD 1945). In addition, the era of climate change also pushed the planning policy into better consider the consequence of manmade activities that increasing the disaster exposure and impact severity.

Indonesia's disaster policy, from emergency response to management, draws on its colonial-era policy (Lassa, 2013). This policy design was followed by detailed, systematic, and level-by-level disaster response, along with the development of an ad hoc team (Lassa, 2013). Following the climate change discourse, particularly the growing recognition of the contribution of anthropogenic activities to today's calamities, the Indonesian government began to acknowledge man-made disasters as disasters with Keppres 43/1990 (Lassa, 2013). However, this mention alone does not transform the disaster response strategy until the awareness of the ineffectiveness of the structured disaster response, which is only be active after the disaster occurs (Lassa, 2013).

The transformation of the disaster management policy in Indonesia most likely influenced by the Hyogo Framework for Action in 2005 (UNISDR, 2005) manifested in the UU 27/2007 about Disaster Management (Lassa, 2013). In this regulation, the manmade disaster is included in the non-natural disaster. More than a decade later, the new terminology of the manmade disaster is introduced.

The infamous controversial omnibus law UU 11/2020, which was amended into UU 6/2023, mentioned the coastal disaster. This refers to both the environmental and anthropogenic intervention that might contributed to the

disruption to the coastal environment. On one side, this seems like a major improvement in Indonesian's disaster regulation, while on the other side, this mention had not been followed by any further explanation or regulation within the omnibus law or any other relevant regulation. However, this major update shed a light for the case in this research, the coastal disruption due to the complex interaction between human activity and natural processes.

“Bencana Pesisir adalah kejadian karena peristiwa alam atau karena perbuatan Setiap Orang yang menimbulkan perubahan sifat fisik dan/atau hayati pesisir dan mengakibatkan korban jiwa, harta, dan/atau kerusakan di Wilayah Pesisir dan pulau-pulau kecil.” Article 1, UU 6/2023

Other problems also found in the integration of slow-onset coastal hazards such as land subsidence, into spatial planning. Of the nearly 200 coastal cities in Indonesia that are at risk of subsidence, all of them do not have effective land subsidence management plans (Rosalina et al., 2021). Moreover, land subsidence itself has not been included in spatial planning in Indonesia, either at national or local level, although it has been extensively discussed in environmental studies (Hamdani et al., 2021). Consequently, the current spatial plan has the potential to increase exposure to environmental hazards in coastal cities by locating urban activities in disaster-prone areas (Hamdani et al., 2021; Suroso & Firman, 2018).

The question arises regarding the extent to which environmental considerations have been integrated into development and spatial planning. The movement toward sustainable development that began in the 1980s with the "Our Common Future" report (WCED, 1987) has significantly influenced Indonesia's environmental management policies. The Indonesian Environmental Management and Pollution Control Law (Law 32/2009) explicitly mandates the creation of a spatial plan based on a strategic environmental assessment (Article 19). Additionally, any activities in the planning process that could exceed the environmental carrying capacity must be adjusted or prohibited (Article 17, Law 32/2009).

In 2015, the United Nations published development goals that were incorporated into Indonesia's formal planning and policy practices. This is reflected in the National Mid-term Development Plan (Rencana Pembangunan Jangka Menengah Nasional) 2015-2019 and the Nationally Determined Contribution, demonstrating Indonesia's commitment as part of the UNFCCC (Yodha, 2018). Another significant shift occurred with the enactment of the omnibus law (UU 11/2020), which emphasized risk-based development planning. These regulations were designed to minimize the negative environmental impacts of development measures. Additionally, the integration of disaster risk reduction into formal governmental development planning was a key aspect of this legislation.

The mandate was deemed ineffective due to the influence of various interests, particularly from private industries, which overshadow efforts to conserve the environment (Hadi et al., 2019). This has led to significant environmental degradation in specific regions (Hamdani et al., 2020; Suroso & Firman, 2018). A comprehensive review by Yodha (2018) highlights additional political and governance factors that impede Indonesia's progress towards sustainable development. Key issues include complicated decentralization and widespread corruption at both national and local government levels, along with disparities in economic and educational outcomes. Meanwhile, vulnerability to climate change continues to increase, exacerbated by limited governance and capacity for adaptation (Yodha, 2018).

The next part of this sub-sub chapter captured the prevailing Indonesian regulations concerning coastal urban environment challenges.

The Government of Indonesia had promulgated comprehensive policies regarding housing provision. The fundamental law of the Republic of Indonesia, namely the UUD 1945, stipulates that the selection of one's place of residence is a fundamental right for all citizens. Furthermore, the UU 06/2023 emphasizes that home ownership is a crucial aspect in ensuring social welfare security. The fulfillment of the right to adequate housing and its availability is also intrinsic to

the realization of the rights of Indonesian residents to live and to achieve their full potential as human beings (UUD 1945, UU 11/2020, UU 06/2023).

There are various regulations in place governing the strategy for providing adequate housing for residents of Indonesia. Specifically, the Law on Local Government (Article 12) states that housing provision is a key component of the minimum obligations that local governments must fulfill. This commitment to housing is further demonstrated by a number of technical and ministerial regulations, including those outlined in the General Works and Public Housing Ministerial Regulations: Number 38/2015, 13/2016, 01/2018, 03/2018, 07/2018, 19/2019, and 07/2022. These regulations cover housing assistance and the minimum infrastructure requirements for adequate housing, including self-developed housing (*rumah swadaya*) and other public housing options.

Currently, the regulations regarding housing relocation due to disasters apply only to rapid-onset disasters. Article 7, Points (1) and (2) of Social Ministerial Regulation Number 01/2013 specifies that communities affected by disasters are entitled to housing and/or relocation assistance, which may be provided in the form of direct financial payments or support for physical building. Following this regulation, the Ministry of Social Affairs issued Regulation No. 04/2015, which limits disaster-related housing aid to those experiencing specific, severe housing conditions. Both of these points have been reiterated in the current omnibus law as outlined in Perppu 02/2022. Additionally, the most recent Spatial Planning regulation (PP 21/2022) indicates the possibility of a funding scheme to implement spatial plans in disaster-affected areas.

However, it is important to note that this funding scheme is still limited to cases involving rapid-onset disasters (Dwitama, 2024). Access to these aid schemes depends on the community being affected by a severe disaster, with the disaster's severity determined by the national government in accordance with UU 11/2020 and PP 21/2021. The current disaster severity indicators, as described in UU 24/2007 and further elaborated in Presidential Regulation 17/2018, primarily focus on rapid-onset disasters. These indicators include the

number of victims, the severity of infrastructure damage, and the socio-economic impact. However, assessing slow-onset disasters, such as sea-level rise-induced coastal erosion or flooding from land subsidence and tidal influences, remains challenging based solely on these indicators.

Further issues have emerged regarding housing ownership and property rights for communities that are displaced or at risk of displacement. Land rights and policy regulations, as outlined in Ministerial Regulation No. 5/1974 and Ministerial Regulation No. 3/1987, allow individuals to obtain land rights ownership. This marked the beginning of the issuance of freehold titles (Sertifikat Hak Milik/SHM), which grants landowners considerable autonomy. Provided that they possess the necessary land utilization permits, individuals have significant freedom in determining how to use their land.

However, these regulations do not address the inherent risks of land loss due to coastal flooding or land subsidence. If a dwelling becomes uninhabitable due to coastal flooding and the owner vacates the property for more than one year, the law states that the property may be automatically transferred to the government. According to the omnibus law (UU 11/2024) and its subsequent revisions, the government can assume ownership of a property if the owner has vacated or is not utilizing the property effectively and has not met their responsibilities as a property owner for at least one year. Furthermore, the housing law (UU 11/2011), in Article 55, stipulates that ownership may be transferred to either the central or regional government.

Land ownership of parcels affected by coastal land loss may automatically be transferred to the government under the basic law governing coastal areas. This transfer occurs if the landowner is unwilling or unable to reconstruct or maintain the land's physical condition. According to the Ministerial Regulation from the Ministry of Agrarian and Spatial Planning Affairs, numbered 17/2021, and its subsequent update, landowners facing financial constraints may find themselves unable to restore their land. This situation can lead to injustices, especially since the communities impacted by the erosion are often not responsible for causing it. Furthermore, the regulations

stipulate that property owners affected by land loss will only qualify for compensation or leniency funds (*dana kerohiman*) if their property is included in the public infrastructure plan.

Notwithstanding involuntary displacement resulting from environmental degradation, Indonesian residents, as property owners, are also subject to relocation under prevailing regulations. According to Indonesia's spatial planning regulation PP 21/2021, residential properties or houses that do not comply with the zoning regulations are subject to relocation. Additionally, government may relocate privately owned houses if the land on which they stand is earmarked for public-interest infrastructure projects, as stipulated in the omnibus law UU 11/2020 and its predecessors.

The last part of this sub-sub section discussed about the review on current policy landscape with regard to positioning place attachment integration into coastal displacement and its related spatial planning.

Place attachment, a concept rooted in environmental psychology, is not significantly addressed in current regulations. There are only a few implicit references to its integration into planning and other governmental development processes, including those related to disaster management. The closest relevant consideration that should be included in current planning policies regarding place attachment theories is the social aspect.

Social considerations must be taken into account when preparing spatial plans, as highlighted in Government Regulation 21/2021 on the Implementation of Spatial Planning, specifically in Articles 11(1)(j), 15(2)(k), 18(2)(i), and 21(2)(i). Additionally, housing regulations emphasize the importance of addressing the social needs of the population, based on analyses conducted by expert teams in housing planning, as outlined in the housing provision regulation (Permen PUPR 07/2022) and Government Regulation (PP 12/2022), which updates PP 14/2016.

There is still insufficient evidence to support the conclusion that place attachment analysis has been integrated into existing processes. The socio-cultural analysis outlined in Permen 20/2007 is described as a secondary desk

study and is primarily limited to referencing statistical data. While this approach simplifies understanding of the existing social context for planners, it overlooks rich information on social value dynamics that these statistics do not capture. Additionally, the formal guidelines for socio-cultural analysis in spatial plans outlined in the Minister of Public Works Regulation No. 20/2007 do not clarify how social values should be incorporated into the analysis for spatial planning.

Moreover, there is a mandate to integrate psychological aspects into government practices, as indicated in several regulations governing disaster response. Indonesia's disaster definition, as stated in UU 24/2007, specifies that events disrupting the psychological well-being of the population can also be classified as disasters. This notion is further supported by Article 58 of the same regulation, which mandates that psychological recovery be part of the post-disaster rehabilitation strategy. However, it is important to note that this does not appear to incorporate psychological recovery into physical reconstruction and housing efforts.

Nevertheless, the integration pathway could be built on current policies, with the need for explicit frameworks to better align people's social needs with the identification of their characteristics based on place attachment theories. This approach would facilitate a more efficacious pathway in addressing the psychological disruption experienced by individuals, while concurrently ensuring the place attachment of displaced communities. This would, in turn, promote enhanced living environment transitions and facilitate more long-term, sustained adaptation planning. The concept of place-people interaction analysis is only implicitly addressed in governmental regulation, and PP 14/2016 Article 49 deals with housing plans for village-city areas. The plan for this kind of environment shall include a functional connectivity analysis, including a people-place interaction analysis. This research offers a potentially viable basis for integrating place attachment into coastal displacement adaptation planning. In addition, incorporating place attachment into the current planning scheme is also possible through participatory development processes.

Participatory planning and development mandates are outlined in nearly every governmental sector regulation. In the disaster context, Articles 26, 59, 60, and 69 of UU 24/2007, along with Articles 39 and 45 of Social Ministry Regulation 01/2013, emphasize the necessity of public participation in disaster response efforts, which includes psychological and financial support. Article 354 of UU 23/2014 mandates that every governmental activity must effectively employ a participatory process. This requirement ensures that all decision-making processes within the government are oriented toward meeting the people's needs, with a focus on collecting and understanding their aspirations through participation.

Additionally, Indonesia's foundational law highlights the importance of respecting citizens' rights and needs, including the right to be heard (Article 18B UUD 1945). The omnibus law further elaborates on this by emphasizing the need for not just participation, but meaningful participation. This mandate promotes the enforcement of citizens' rights to be heard, considered, and informed about decisions that affect them. These principles illuminate the potential for integrating place attachment into the planning process, particularly in the context of slow disaster management.

As schematically illustrated in Figure 2.7 below, the overarching regulations and relevant articles discussed in this subsection can be visualized. This schematic representation highlights the connections between various articles and demonstrates how spatial planning facilitates the integration of regulations. A notable observation is the current policy landscape's limited ability to incorporate the socio-psychological aspects of displaced communities into its regulations. However, this does not suggest a lack of potential for further development; rather, this policy landscape serves as a foundation for future policy recommendations.

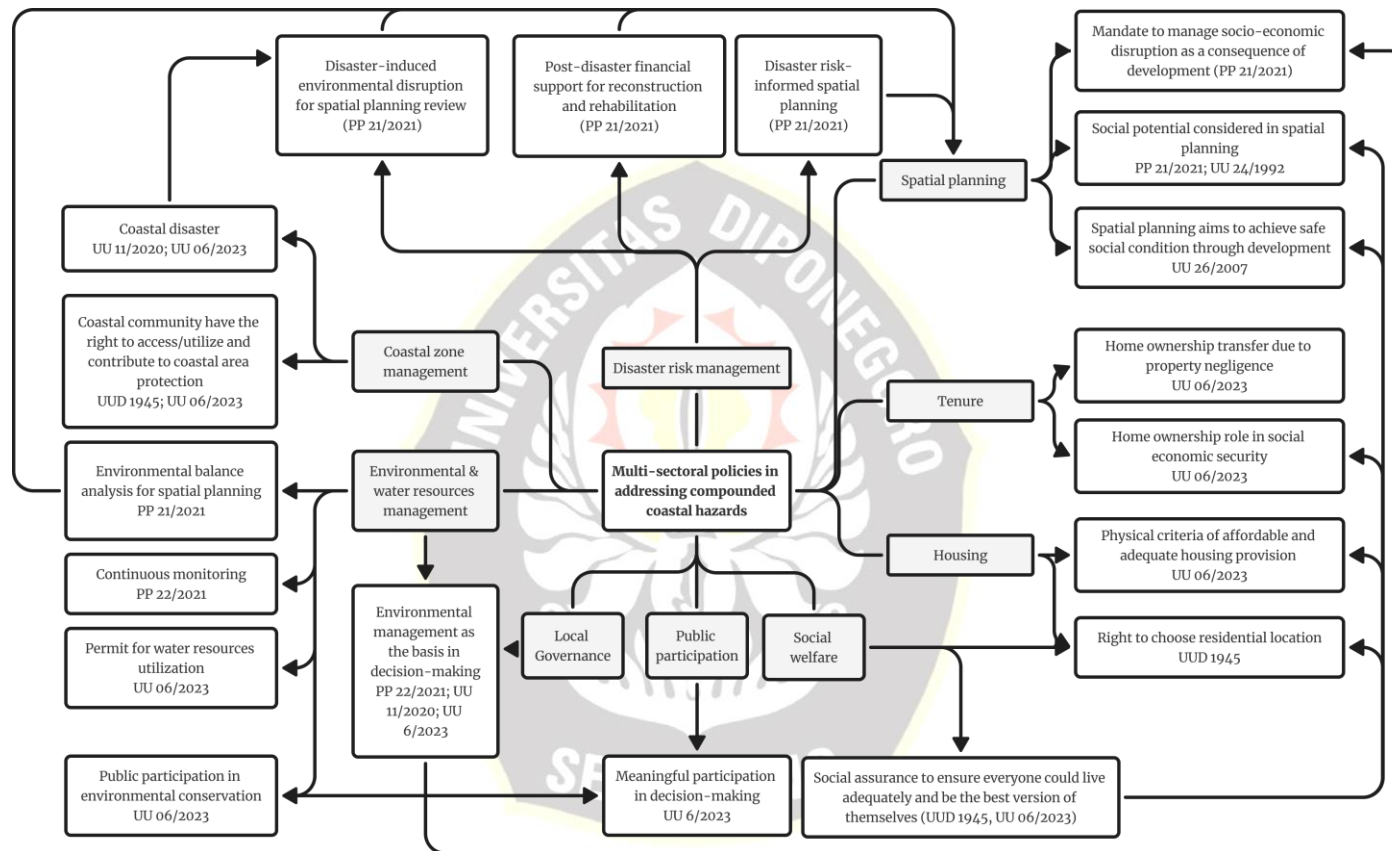


Figure 2.7 Indonesia's Current Policy Landscape in Integrating Place Attachment into Spatial Planning

Source: Author Analysis (2024)

Chapter II outlines the theoretical foundation of the research. Each section not only defines key concepts and theories but also illustrates the connections between them. Sub-chapter A defines the coastal urban environment in this study as more than just a physical entity; it is also an interconnected socio-environmental system. This perspective enables us to understand hazards as processes, particularly focusing on slow-onset hazards (see Sub-chapter B). The empirical-theoretical definition of land subsidence as a slow-onset hazard emphasizes this process-oriented understanding. Sub-chapter C explains that the primary causes of land subsidence are related to unsustainable land use. The negative effects of this slow-onset hazard also lead to multi-hazard consequences in coastal areas.

Most importantly, Sub-chapter D discusses the coastal community affected by this slow-onset hazard. It highlights how place attachment, the relationship between people and their environment, can be disrupted by such hazards. Furthermore, place attachment can also influence an individual's commitment to adaptation efforts. To address these challenges, Sub-chapters E and F explore the integration of planning definitions and relevant theories. The place-based adaptation theory is presented as a key concept for incorporating place attachment into planning strategies. Finally, Sub-chapter G outlines current global and national policies that serve as a foundation for developing integrated policy recommendations.

These theories will be further conceptualized in the theoretical and conceptual framework presented in Chapter III. Additionally, the key dimensions of place attachment that should be integrated into planning will be summarized in the following chapter.