

CHAPTER I

INTRODUCTION

This section introduces the empirical, normative, theoretical and methodological gap considered in this study. This section elucidates the research objectives and the intended contribution to the existing body of knowledge by conducting a novel or state-of-the-art review. In addition to the intended efforts on knowledge production, this section also presents the intended axiological impacts of the study on the wider community, including on coastal urban environment communities and development actors.

A. Background

Slow-onset hazards such as land subsidence is threatening current and future life of urban coastal communities. Land subsidence occurred in low-lying coastal areas around the world is exacerbating the consequences of climate change-induced flooding (Catalao et al., 2020; Erban et al., 2014; Johnston et al., 2021; Le, 2019). In some coastal cities, land subsidence has been reported to be higher than the climate change-induced sea level rise. The most recent report from the Intergovernmental Panel on Climate Change/IPCC (2023) stated that global sea level rise has reached up to 3.7 mm/year (2006-2018). This rate could increase and reached up to tripled current sea level rise change rate. On the other hand, land subsidence rates have been reported to be more than ten times higher, such as ~40 mm/year in Tianjin, China (Zhao et al., 2020); ~50 mm/year in Hanoi, Vietnam (M. Nguyen et al., 2022); ~60 mm/year in Jakarta, Indonesia; and ~140 mm/year in Semarang, Indonesia (Abidin et al., 2010; Abidin et al., 2013; Khoirunisa et al., 2015).

Land subsidence is a vertical movement of upper layer soil. This phenomenon caused by soil compression due to natural compaction process or underground natural resources over-extraction. On the low-lying coastal cities, the subsidence generally caused by the groundwater over-extraction due to increment in urban development, population, and industrial activities (Babaei et al., 2020; Erban et al., 2014; Sun et al., 1999; P. Wu et al., 2022; Yang, 2014).

This anthropogenic subsidence could increase the natural subsiding rates by 10 times (Wu et al., 2022).

Coastal planning in this context therefore require to incorporate place-specific aspects. Conceptually, dealing with this slow-onset coastal hazard could be done in three complementary ways; protection, accommodation, and planned relocation if needed (IPCC, 2023). In addition to land subsidence case, water management including better freshwater provision and groundwater restriction, or regulation shall also be incorporated in the coastal planning (Ingebritsen & Galloway, 2014; Tzampoglou et al., 2023; Wu et al., 2022). On top of that, any measures taken shall base on the local community values, beliefs, and knowledge (IPCC, 2023; UNISDR, 2015). Within the climate adaptation planning theories, such approach defined as place-based adaptation which narrowed into integrating place attachment into the planning process. Place attachment itself is value and perception tied to a place that reciprocally shaped human identity as well as shaping the place itself (Creighton et al., 2008). This could influence people's willingness to sacrifice to take and choose their most-preferred actions towards their place (Feitelson, 1991; Stancu et al., 2020). Place attachment consideration could also deconstruct the global climate change concept and challenges and make it more relatable and relevant to local context (capacity, experience, conditions) which consequently could create a more effective adaptation plan and measures as well as prevent maladaptive actions (Bott et al., 2019, 2021; Groulx et al., 2014; Iskandar, 2016; Murtagh & Lane, 2022).

However, such place-based discussion in slow-onset hazards context of coastal city is still limited. Current research in land subsidence of coastal city still predominantly developed by geology and geodetic scientists which focused more on its measurement and finding its causes through geology, geodetic engineering, and geographic information system (Abidin et al., 2013; Chaussard et al., 2012; Sarah et al., 2021). Some urban planner and social scientists had involved in this body of knowledge by adding the value of community knowledge and perceptions towards such environmental challenges (Beune,

2019; Bott et al., 2021; Steimanis et al., 2021). However, integration to planning and development policy is still out of their scope.

Furthermore, integrating place attachment into coastal city planning is still in its development stage. Place attachment and policy integration research had only conducted in rural landscape planning (Puren et al., 2018), or be practiced in participatory mapping while recognizing its potential to be integrated into spatial planning (Brown et al., 2015, 2020). Empirically, utilizing people's place attachment perspective in coastal planning practices is still lacking in developing countries. The coastal planning is still limited on physical and structural measures (e.g. sea wall). Despite the need for infrastructural protection, such measures often overlooked the intertwined socio-environmental aspect of the directly impacted community (Le, 2019; Purnama, 2023) as well as controlling the land subsidence rates (Hadi, 2017).

Empirically, coastal planning still predominantly by technical measures overlooking the place attachment aspects. In Indonesia, for instance, one of the reasons for the new capital relocation plan is the risk of Jakarta, their current capital being submerged due to land subsidence (Allen, 2022; Ratcliffe, 2022; Saputra, 2020; Takagi et al., 2021). A country with high disaster exposure (CRED, 2022; Guha-Sapir et al., 2013), chose this top-down plan that implicitly shows the indication of neglecting the subsiding land in the coastal planning (Saputra, 2020). Furthermore, the measures to tackle land subsidence and coastal issues, particularly in Northern Coastal Java where land subsidence occurred (Deltares, 2019), were not as progressive as the capital relocation plan implementation. Despite the occurrences, land subsidence and its persistent socio-environmental consequences are still limitedly considered in current planning practices (Hamdani et al., 2020; Suroso & Firman, 2018) and local community self-initiated adaptation measures (Saputra, 2020; Saputra et al., 2017).

Normatively, considering place attachment and the slow disaster land subsidence in planning is still inadequately regulated in Indonesia. Integrating social aspect into environmental impact assessment is still broadly mentioned as

an analysis that shall be included in environmental impact assessment (Article 47 Point 1, PP 22/2021), with limited details on what and how to analyze. Indonesia's latest controversial omnibus law (Law Number 11/2020) also stated the importance of integrating social aspect into development planning (Article 22). Despite its unconstitutionality issues¹, spatial planning regime had derived more detailed regulation on the new regime of spatial planning in the governmental (PP 21/2021) and ministerial regulation (Permen ATR 11/2021). Both regulations had also mentioned the demographic and socio-culture analysis to be included in the planning, but the place attachment is missing from the detailed guidance of those analyses (analysis on Permen PU 20/2007, PP 21/2021, Permen ATR 11/2021). In addition, slow disaster such as land subsidence and many other slow disasters is not considered as a disaster in Indonesia's current law on disaster management.

Consequently, coastal communities continue to live under the constant danger and risking their future life. Local people had suffered from permanent and more severe tidal flooding in recent years (Irsyadullah, 2023; Makdori, 2022; Utami, 2022). The communities have to also elevate the house every five years on their own expenses (Beune, 2019; Maimunah et al., 2011). The degrading coastal environment due to persistent land subsidence-induced floodings also degrade their quality of living due to the building and road damage, trapped water due to uneven road and building elevation, uneven surface, that could threaten their place's livability, decreasing land value, and land insecurity due to the loss of the land and unclear land policy (Beune, 2019; Hadi, 2009, 2014; Lambert et al., 2021; Mahya et al., 2021). Currently, some of the coastal cities are already experiencing permanent flooding (Ng, 2020). In the future, the land subsidence occurrence is estimated to increase inundation impacted area by 25% (Catalao et al., 2020; Johnston et al., 2021), increase

¹ According to Constitutional Court Decision Number 91/PUU-XVIII/2020, the Job Creation Law or Law Number 11/2020 about Job Creation is declared unconstitutional conditionally declared unconstitutional conditionally or means that it is considered formally and procedurally flawed. Therefore, this law does not have binding legal force, and if improvements are not made within 2 years, it will be considered permanently unconstitutional (Suryani, 2021)

exposed population by 61% (Johnston et al., 2021) and add inundation depth reached up to 2 meters (Erban et al., 2014).

With the aforementioned status quo, therefore, risk of living under disrupted place and losing their place still could be increased in the future. Taking this country as the study case is crucial as this country is one of the highest populations that live in low-lying coastal area and is prone to coastal flooding (McGranahan et al., 2007; Neumann et al., 2015), while also one of country where most-rapid coastal land subsidence occurs (Wu et al., 2022). Studying the place attachment integration to coastal planning could be beneficial in addressing socio-environmental challenges of slow-onset hazards land-subsidence.

B. Problem Statement and Research Boundaries

The context of this research would be bounded to land subsidence case in coastal cities in Indonesia. This case was chosen as coastal urban environment area is where the complexity of human interaction and land use and are built on young sedimentary rocks that continue to compress, occurred. Slow-onset land subsidence phenomenon has already occurred in coastal cities in Java Island, Indonesia, such as Semarang (Bott et al., 2021; Wu et al., 2022) as well as several other emerging cities/regions such as Demak, Pekalongan, etc.

Semarang City, in Java Island is strategically located but prone to land subsidence-induced coastal issues. The severe flooding occurrence happened in Tanjung Mas, Semarang on late May 2022, was reported due to lack of land subsidence consideration in the infrastructure development (Utami, 2022). Another severe flooding also happened in early 2023 where almost regions in northern Java Island that experience land subsidence (Makdori, 2022), were flooded reached up to 1.5 meters for more than two days (Irsyadullah, 2023). This island alone contributes around 57% for the country's gross domestic product. Additionally, there are more than 140 million population in this island, or around more than 50% of the country's population. Therefore, research efforts

to solve this problem are considered vital, as it affects not only the interests of millions of urban residents, but also the sustainability of provincial and national life, including business, government, social services, etc.

This research would focus in exploring how does the environmental dynamics and disturbances in subsiding coastal cities would affect people's attachment to a place. Socio-environmental challenges induced by land subsidence such as landscape change, coastal abrasion, and tidal flood brought the community to live under the flood threat in a daily basis (Manan, 2021). Urban coastal communities' living environment is permanently flooded or experiencing daylight tidal flood. Consequently, such disruption could change their dependency towards the place from being primarily rely on the coastal ecosystem natural resources utilization such as fishermen, to not be able accessing the disrupted coastal ecosystem yet shall find other livelihood sources such as be dependent into industrial sector (Manan, 2021). The daylight flooding could disrupt the daily child school as the access towards the school is flooded. Such environmental changes could also degrade the coastal communities housing environment and causing several health risk. The environmental change consequence could later put disturbance on people's attachment or because the loss of place identity of a place (Relph, 1976).

The wickedness of this case is added by the unwillingness to relocate to a safer location. Due to the severe environmental degradation, communities living on the permanently flooded area shall prepare themselves to be displaced. However, most of the people living in such area prefer not to leave their land behind (Amin et al., 2019; Buchori et al., 2018b). According to our preliminary research, such conditions were caused by some reasons such as the land right insecurity, limited financial capacity resources, or the unavailability of governmental support in providing housing alternatives for displaced communities.

The latest problem was often discussed by the experts and researchers due to the absence of land subsidence and other slow disaster problem within the

disaster policy and governance. Consequently, the maladaptation practices² in subsiding coastal cities in Indonesia occurs (Rosalina et al., 2021). In more practical context, the evaluation towards today's city planning resulted in the potential of increase the disaster risk due to the planned activities in the high disaster risk area (Hamdani et al., 2021; Suroso & Firman, 2018).

As the importance of developing research that could be strategically utilized for a particular policy in Indonesia, this research would focus on the context of coastal planning relevant policies. According to current national government effort in dealing with land subsidence, spatial planning is included in the long-term measures to manage land subsidence rates and impacts (Kementerian Koordinator Bidang Kemaritiman dan Investasi RI et al., 2019). However, as stated before, current planning planning still limitedly considered land subsidence although this slow disaster had deeply discussed in the environmental impact assessment (Hamdani et al., 2020). The relevant coastal planning recommendation in this research bounded to procedural and substantive discussion, developed from relevant place attachment key dimensions in this coastal land subsidence context.

C. Research Questions

Based on the problem statement above, the questions in this research are:

- a. How has the complexity of slow-onset hazard induced multi-hazards in coastal urban environment of Semarang City unfolded?
- b. How is the place attachment of the community impacted by slow-onset hazards in coastal urban environment of Semarang City?
- c. What are the key dimensions and aspects of place attachment that need to be incorporated into the coastal urban environment planning in response to the case of Semarang City?

² Maladaptation is theoretically defined as the ineffective response to environmental challenges which instead of creating more resilience community, the taken measures might increase the vulnerability of a city (Torabi et al., 2018)

- d. How can place attachment be integrated into coastal urban environment planning related policy?

D. Research Objectives

The objectives of this research are:

- a. To examine the historical slow-onset and multi-hazard complexity in the coastal urban environment of Semarang City.
- b. To investigate the place attachment of the community impacted by slow-onset hazards in coastal urban environment of Semarang City.
- c. To analyze the key dimensions of place attachment's context and policy relevance in urban coastal urban environment planning in response to the Semarang City case.
- d. To explore the policy framework of integrating place attachment into coastal urban environment planning related policy.

E. State-of-the Art Review

The state-of-the-art review was conducted through two steps. The first is the quantitative bibliometric review, which was used to analyze productivity and research evolution based on a particular topic from a particular academic database (Andres, 2009; Herrera-Franco et al., 2020; Sweileh, 2018). Secondly, we conducted qualitative review to analyze and identify conceptual, methodological, axiological, and empirical gaps within the current body of knowledge. This review focused on integrating place attachment into planning policy in response to urban coastal environment slow-onset issues.

To conduct the bibliometric analysis, Scopus database was used as it is one of the most reliable sources of data that often used by other bibliometric researcher (Baas et al., 2020). This database also enable researcher to adjust the search query into the research topic. The data criteria and the search query used is as shown in the Appendix 2. This research used keywords related to place attachment integration into planning. According to that, we retrieved 1,036

metadata of published journal articles and conference proceedings. The screening stage were conducted to remove the metadata with missing author and digital object identifier information. The remaining 910 articles was utilized for bibliometric analysis.

The bibliometric analysis resulted that the topic proposed in this research is still in an exponentially growing phase. As shown in Figure 1.1. below, the exponential trendline had higher R^2 coefficient than the linear trendline. According to the Price's Law (Andres, 2009; Herrera-Franco et al., 2020), such condition showed that this topic is new and still growing in the future.

The qualitative analysis was conducted to deepen the gap analysis. The first qualitative review is from the keywords network analysis generated by VosViewer. Based on Scopus data retrieved on 25th September 2023 analysed using Vosviewer with two occurrences as the threshold resulted in 349 keywords items. As shown in Figure 1.2, there are many new emerging topics (yellow circle) that is connected to the place attachment keywords. In addition, the light green colored in the "place attachment" circle also indicates that this topic is still relatively new. The closeness between keywords "place attachment" and "urban planning" also showed that research in this topic had been emerging. Further investigate the newly developed relationship between place attachment and climate change and adaptation also showed that research in such topic is still a relatively new avenue (see Figure 1.3).

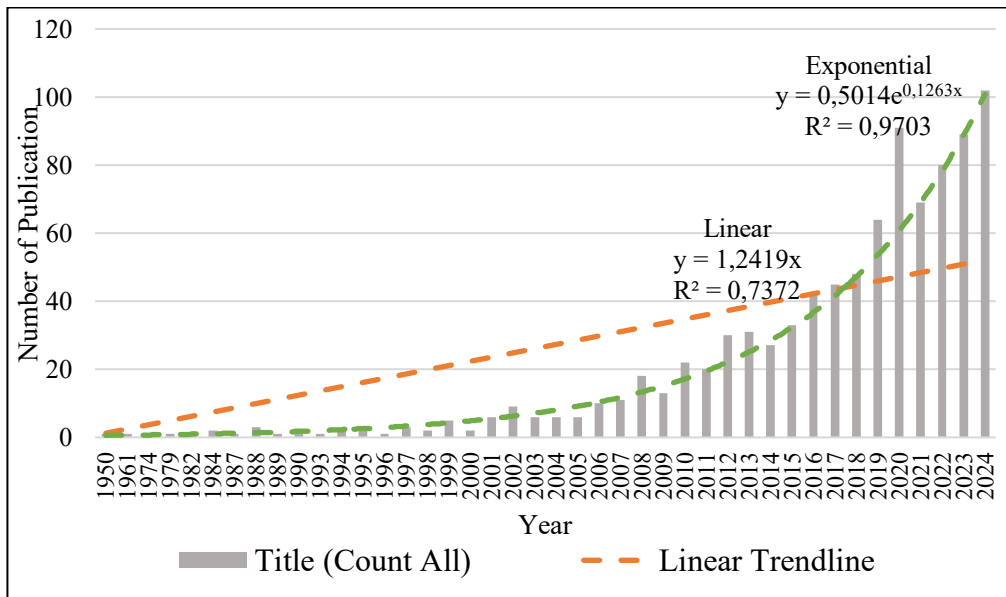


Figure 1.1 Article productivity trend
Source: Researcher Analysis (2025)

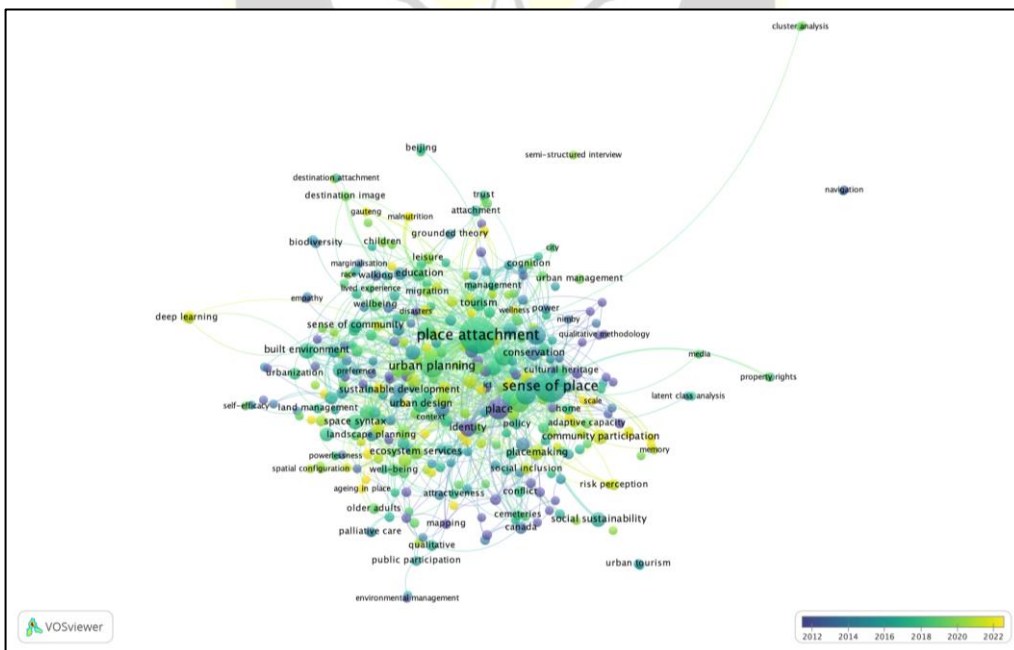


Figure 1.2 Keywords networks visualization

Source: Researcher Analysis (2025)

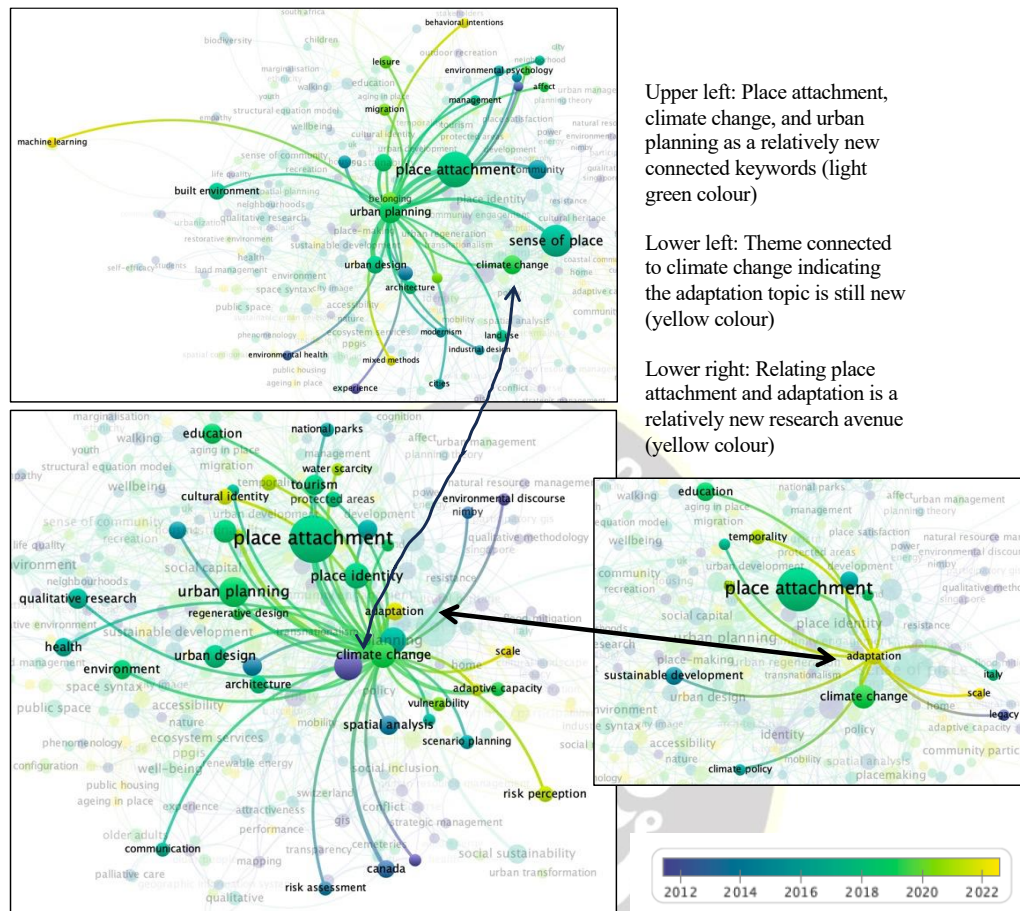


Figure 1.3 In-depth view on keywords networks visualization on the place attachment integration into spatial planning

Source: Researcher Analysis (2023)

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The place attachment to planning integration is still a new research avenue as the co-occurrence link is non-existent yet. To stand on this knowledge giant, the new avenue on place attachment and spatial planning integration research could be connected by cultural ecosystem services analysis as shown in Figure 1.4 below. However, the relationship between all the related keywords is still not directly related such as there is no link between “place attachment-climate adaptation” or “place attachment-spatial planning”. In addition, among all the discussed detailed items and network, there is still limited discussion on

disaster related issues. Those missing links showed the gaps that could be filled by this research.

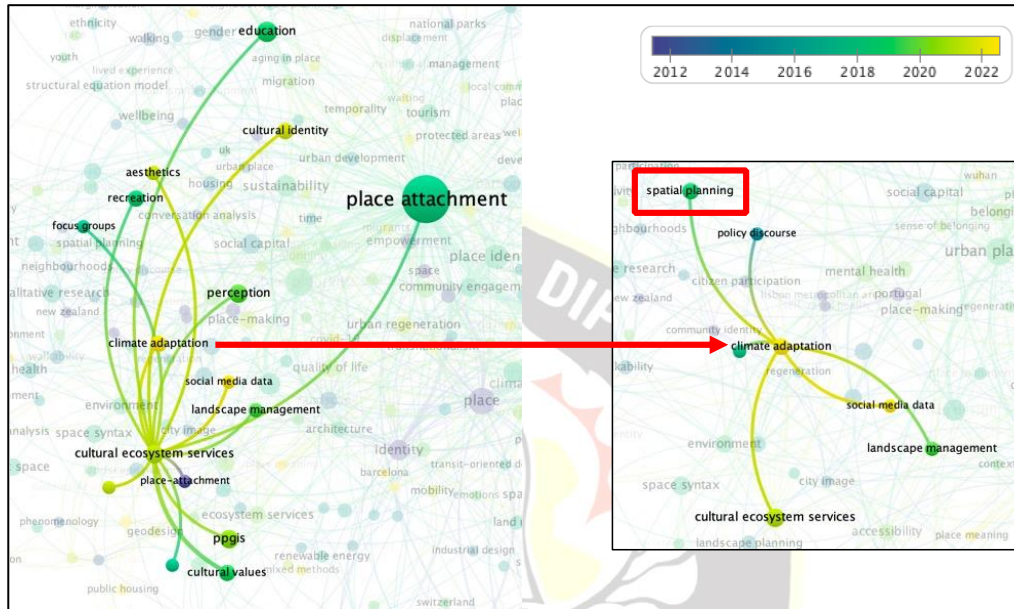


Figure 1.4 In-depth view on the place attachment integration into spatial planning through ecosystem services and climate adaptation

Source: Researcher Analysis (2023)

In deepening this research's novelty discussion, the qualitative review was continued by selecting publications/research that specifically discussed previously observed keyword link: place attachment-disaster/land subsidence-adaptation-spatial planning.

Within the land subsidence topics, there is still limited research on how this slow disaster intertwines with such intangible aspect as place attachment. The current growing body of knowledge in Semarang is developed from geological engineering (Sarah et al., 2011, 2020, 2021; Widada et al., 2018), geodetic engineering (Abidin et al., 2010; Andreas et al., 2019; Chaussard et al., 2012; Istiqomah et al., 2020; Khoirunisa et al., 2015) and geographic information system with main objective in monitoring the subsiding rates (Arimoto et al., 2013; Azeriansyah et al., 2019; Bott et al., 2021; Islam et al., 2017; Firdaus et al., 2018; Koch et al., 2019; Lo et al., 2022; Parwata et al., 2019; Prasetyo et al., 2017; Prasetyo et al., 2019; Yastika et al., 2019).

Social science researchers were also contributed into this body of knowledge of land subsidence but focused on the perspective of how does the people and the government response to this slow disaster. Most of them were discussing the community response to land subsidence (Beune, 2019; Bott et al., 2021; Maimunah et al., 2011; Miladan, 2016; Saputra, 2020). However, there is still gap on what and how those aspects be incorporated into spatial planning or development policy.

Integration pathways between place attachment, land subsidence or slow disaster, and spatial planning were had been emerging from environmental planning and geography disciplines. However, current research mostly discussed two aspects only instead of fostering cross-disciplines discussions; such as environmental disaster and planning (De Vreese et al., 2016; Pert et al., 2015), or the place attachment and planning without considering slow disaster (Anand, 2022; Dubois et al., 2021; Gottwald et al., 2021; Puren et al., 2018; Rall et al., 2019), or discussing slow disaster and people/place attachment with gap on proposing practical planning strategies (Batudoka, 2005; Beune, 2019; Bott et al., 2021; Devine-Wright & Batel, 2017; Indayani et al., 2021; Lambert et al., 2021; Ley, 2021; Stancu et al., 2020). There is still gap on how to integrate those three aspects; people's place attachment, the slow-onset hazards, and coastal planning. This observed gap resonates with future research recommendation proposed by Beune (2019).

Despite the identified gaps, previous research had provided various integration pathway that could be the literature foundation for this research. Participatory cultural ecosystem services were mostly become one of the most used integration tools as it is able to transform the intangible place attachment into place-based planning aspirations (De Vreese et al., 2016; Gottwald et al., 2021). This integration evidenced on how place attachment manifested into local ecological conservation knowledge (Pert et al., 2015; Rall et al., 2019). In addition, place attachment indexing and scoring system was also prominently developed (Dubois et al., 2021; Stancu et al., 2020). Most importantly, recent research on place attachment also developed qualitative approach to comprehend

complex nuances of the socio-environmental ties in volatile coastal context (Lambert et al., 2021).

Therefore, this research would try to fill the gap in integrating slow onset hazards management, coastal planning, and place attachment. Ontologically, this research novelties provided push knowledge limit in environmental planning. Epistemologically, this research assessed the possibility of utilizing various or mixed research methodologies that could help the effort in filling the research gap. Axiologically, this novelty seeking research provided valuable insights for coastal communities, development actors, and multi-disciplinary researchers to explore cross-cutting solutions in addressing pressing coastal cities' socio-environmental issues.

F. Research Impact Statement

The research intended impact is particularly on the push for theoretical and practical advancement in coastal urban environment planning. The intended impacts are as follows:

- 1) Advancing slow-onset disaster management perspectives in coastal urban environment planning.

This research aims in facilitating the development of a coastal urban environment planning paradigm based on socio-environmental consequences of the accumulating consequences of coastal slow onset disaster. By focusing on slow-onset hazards, this research aims to provide an alternative perspective on disaster management. It also aims to contribute to the deconstruction of the periodization of disasters, which often fails to recognize that recent disasters, particularly in coastal cities, are the result of an accumulation of decisions and developments. Furthermore, the use of place attachment as the primary conceptual framework in this study is expected to enhance the understanding of social systems research on disaster management, which prioritizes the innate factors of decision making.

- 2) Advancing planning practices by providing integrating framework of place attachment for coastal urban environment planning.

Beyond the contribution to the theoretical advancement, this study is also intended to contribute to the planning practice by providing alternative approach by integrating place attachment in slow-onset hazards context for planning. This study explored the place attachment complexities of the coastal slow-onset hazards impacted communities. This study also intended to develop integrating framework consists of substantive and procedural recommendations. It is the researcher's utmost hope that in the long run, these recommendations could be contributed current planning practices.

This Chapter comprehensively presents the background of this study. This Introduction Chapter provides a comprehensive overview of research gaps, including empirical, normative, and literature gaps. From these gaps, this Chapter also presents the questions and objectives of this study, particularly how this research aims to address them. The intended impact statement also outlines how the answers and achievements to the research questions and objectives could contribute to wider knowledge and practice in the urban coastal environment context.

The following Chapter elucidates the literature foundations of this research, serving as initial efforts to fill those research gaps through a desk review of relevant literature and concepts. Each concept introduced in Chapter I will be elaborated more in Chapter II, covering the coastal urban environment, slow-onset hazards, land subsidence, place attachment, and integration with relevant coastal planning (including disaster management, environmental management, and spatial planning relevant policies). A deeper review of these concepts provided a foundational understanding of current giant knowledge and as the basis for theoretical framework in Chapter III.