MANIFESTATIONS OF THREAT PERCEPTION IN LOCAL-LED ADAPTATION STRATEGIES:

An examination of livelihood resilience at the frontline of climate change in Galle, Sri Lanka

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July 19, 2023

MSc Thesis
International Development Studies

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Source cover image: Eats and Retreats Guide, 2019

Abstract

This research set out to explore mechanisms that underlie the relationship between threat perception and adaptation strategies in increasing livelihood resilience in the face of climate change in Galle, Sri Lanka. Galle is a coastal city located in the southwest of Sri Lanka. Being situated in a tropical wet zone while being surrounded by the Indian Ocean makes its geographical position vulnerable to a variety of climate threats. Moreover, with an absence of coastal flood protection measures and being exposed to an annual monsoon while many depend for their livelihood on direct climate consequences, adapting to these changes to increase livelihood resilience is crucial. The complexity of livelihood resilience strategies requires a synthesis of theories and approaches to adequately analyze which mechanisms lie at the foundation of such strategies. An analytical framework is provided which centers around the core concepts of threat perception and livelihood resilience through climate change adaptation strategies. To examine these notions and their relationships, qualitative data was collected on-site through in-depth interviews, supported by small talk, participant observation and photo narrative. Findings show that a relationship can be established in which individual threat perception leads to climate adaptation strategies, thereby increasing livelihood resilience. However, variables shaping this interconnection between the respective mechanisms were found to be highly affected by unfavorable circumstances in which individuals were positioned. Threat perception was impacted by a lack of public awareness and education on climate change. Additionally, the degree to which residents in Galle could adapt to changing climate conditions was severely hampered by the economic crisis and lack of governmental support or incentives at the time of research. This research therefore argues for a nuanced approach in researching climate change adaptation, considering the gravity of societal circumstances that shape the frame in which individuals can choose to engage in livelihood resilience strategies.

Key words: climate change, threat perception, adaptive capacity, livelihood resilience, climate change vulnerability, Protection Motivation Theory, Values-Belief-Norm Theory

Acknowledgements

I want to dedicate this chapter to express my gratitude to all those who have contributed to the completion of my master's thesis. Writing this thesis has been an adventure of many learning opportunities, challenges, and new experiences far outside my comfort zone. This would not have been possible without the valued support and motivation from many.

First of all, I want to start by expressing my deepest gratitude to my supervisor, Bishawjit Mallick for his support, invaluable feedback and constant enthusiasm for this research. The fact that he was always available for discussions on certain research issues and angles showcased his dedication and mentorship. He pushed me to constant reflect critically on my own work.

I am thankful for my family and friends whose encouragement, critical feedback and support really pushed me to get the best out of myself. Also, during challenging and lonely moments, their presence and motivation have been indispensable.

My deepest gratitude goes out to the participants of this research. The research aim was greatly contingent on their trust and openness to share their experiences, ideas, and perceptions with me. It is through their stories that I gained a deeper understanding of the complexities and nuances of the research topic.

Finally, a very big thanks goes out to the friends I made and the generous strangers I encountered during my fieldwork in the city of Galle. It was not always easy to be alone in a new city, far away from home. So, having local friends definitely made it easier. In specific, I would like to thank my host family in Galle for their hospitality, generosity, and support with my research. Their devotion to spend their free time exploring the city with me, and trust and openness in sharing memories of difficult moments they have endured is very humbling and valuable. All these experiences have truly changed my perspective on life.

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1. Introduction

1.1 Background, research objective, and questions

Climate change has been widely acknowledged as a significant threat to ecosystems created by humans and nature, as well as to human civilization in the twenty-first century and beyond. It extends to every aspect of the socio-ecological environment, including agriculture, human settlements, biodiversity, and health (World Bank Group & Asian Development Bank, 2020). Although different regions of the world are expected to experience the effects of climate change to varying degrees, many of its drivers and implications are global. No country or region is immune to climate change (De Costa, 2008). Evidence, however, indicates that some of the severest effects of climate change will be felt in developing nations, where the population is most vulnerable due to their high dependency on livelihood options that are climate-sensitive and their limited ability to adapt to climate variability and extremes (De Silva & Kawasaki, 2018; Nianthi & Shaw, 2015; Thathsarania & Gunaratne, 2018). Especially vulnerable to the effects of climate change, such as an increased intensity of extreme weather events, rising temperatures and rising sea levels are densely populated low-lying tropical coastal communities (Cinner et al., 2018; Nianthi & Shaw, 2015). With the rapid urbanization of coastal towns and cities, the coast's population is rapidly rising in many countries. Concurrently, sea levels are rising globally, which is cause for higher flood risks in these areas. As a result, coastal vulnerability is growing as such risks could result in building damage, forced resettlement and loss of job security (Birkmann & Fernando, 2007; Nianthi & Shaw, 2015). Especially coastal communities that depend on natural resources such as fishery and agriculture are vulnerable to the implications of climatic changes (Cinner et al., 2018; Nianthi & Shaw). One of these low-lying tropical coastal cities is the city of Galle, located in southwestern tip of Sri Lanka. Considering its vulnerable low-lying geographical location, its topical wet climate, and the ongoing restorations from the 2004 Indian Ocean tsunami (Rathnayake et al., 2020), it is the central geographical focus of this research.

For individuals facing climate change-induced risks, enhancing individual adaptive capability to increase long-term resilience is essential (Bullock, Diduck, Luedee & Zurba, 2022; Cinner et al., 2018). Hereby, the emphasis is shifted from adopting a specific action to improve adaptation against one particular risk to considering climate change and other disruptions as a chance to strengthen socioecological systems (Tsuchida & Takeda, 2021). Climate change has an impact on the larger socio-ecological systems, which to an extent affects how communities perceive risk and respond to climate change. This research contends, however, that the extent to which natural hazards, aggregated by climate change or not, are perceived as such is not a natural consequence, but rather the result of cognitive mechanisms and subjective knowledge and experience. In addition, the nature of the hazard itself, the degree to which individuals are vulnerable to the implications of the event, and the severity of exposure of a person or landscape are all significant in determining the perception of the event as hazardous.

Specifically, this research argues for the significance of threat appraisal, i.e., values, norms, and beliefs, and knowledge and experience in establishing individual threat perception. In line with Ives and Kendal's (2014) modification of the Values-Belief-Norm (VBN) Theory, this research asserts that values, basic beliefs, attitudes, and norms shape behavioral intentions and behaviors. The synthesis of these cognitive mechanisms determines how individuals trust they can reduce the threat to the things they value. These threat perceptions influence the degree to which individuals engage in adaptation strategies. Therefore, the main objective of this research is to understand threat perceptions of climate change and how local-led adaptations are made as livelihood resilience strategies. The main research question is: *How are individual perceptions of environmental threats caused by climate change manifested in local-led adaptation strategies?*

This research hypothesizes, specifically, that if an individual regards their livelihood at risk, they will engage in adaptation strategies within their coping rage to increase their livelihood resilience. To do so, individuals rely on their coping appraisal, adaptive capacity, and assets and capabilities. Thereby, the Protection Motivation Theory (PMT) is adopted to research the interaction between the aforementioned threat and coping appraisal in establishing self-protective behavior. Overarching, a livelihood resilience approach is adopted which stresses specifically how individuals, as opposed to homogenized groups, perceive risk, and respond to it (human agency), and how a system can adapt to change and absorb stress while maintaining fundamentally the same structure (resilient system) (Tanner et al., 2014). Based on these key notions and theories, the established analytical framework asserts the iterative process of the aforementioned core mechanisms of threat perception and adaptation strategies in increasing livelihood resilience in the face of climate change.

Drivers and aspects of risk perception need to be explored to comprehend social and individual responses to climate change (Schneiderbauer et al., 2021). Research on livelihood resilience in the face of climate change can be crucial for understanding individual mechanisms that lie at the foundation of the capability to adjust to both slow- and rapid-onset events. To understand the relationship between these mechanisms, three specific sub-questions were formulated in support of the main research question:

1. *How do residents of Galle perceive environmental changes caused by climate change?*
2. *To what extent do residents of Galle perceive their livelihood at risk due to climate risks caused or aggravated by climate change?*
3. *In what ways do residents of Galle engage in climate change adaptation strategies?*

1.2 Significance, methodology, and ethical guidelines

Since the Intergovernmental Panel on Climate Change (IPCC) identified adaptive capacity as a crucial aspect of vulnerability in 2001, research on adaptive capacity has increased greatly (Siders, 2018). Similarly, research on resilience in the Sri Lankan context has increased alongside its increasing exposure and vulnerability to climate change and its natural consequences (Tsuchida & Takeda, 2021).

However, researchers have identified various knowledge gaps. This research focuses on understanding livelihood resilience through the interaction between individual threat perception and adaptation strategies in the face of climate change. While ample research is available on each of the above-mentioned ideas, theories, and frameworks, there is a knowledge deficit regarding explorations of the interdependence between these specific mechanisms. To be more precise, as of this writing, no research has been done synthesizing these processes within the setting of the study site. Furthermore, systematic review conducted by Siders (2018) presents a gap between what is theoretically explored and practically feasible in terms of adaptive capacity. Meaning that ample research on adaptive capacity does not reflect its practical value in local in situ environmentally threating scenarios. Finally, as of this writing, this research pioneers in applying the PMT in a qualitative research design, in which its variables have been constructed to fit an in-depth interview guide (see Appendix A).

Besides its vulnerability to extreme weather natural hazards such as the 2004 Indian Ocean tsunami following the Sumatra–Andaman earthquake, according to the Global Climate Risk Index, Sri Lanka is considered one of the nations most susceptible to the effects of climate change (Hettiarachchi & Madhavie, 2019). The increasing temperature trend leads to a rise in the projected sea level to 1.0 m by 2070 and changing precipitation patterns lead to an increasing occurrence of floods and landslides (Jayawardena, Darshika & Herath, 2018; Nianthi & Shaw, 2015; World Bank Group & Asian Development Bank, 2020). Consequently, Galle is severely affected by both slow- and rapid-onset events. The former referring to gradual environmental changes such as temperature and sea level rise, whereas the latter refers to extreme weather events such as tsunamis and flash floods (Mallick, Rogers & Sultana, 2022). Although its exposure to various (potential) climate risks, according to several studies, there are knowledge gaps concerning abovementioned key notions (Eriyagama & Smakhtin, 2010; Nianthi & Shaw, 2015). It is believed therefore that this research contributes to closing this knowledge gap.

An extensive literature review provides the base of the established analytical framework used for data analysis. The fieldwork of this research covered six weeks in Galle, in which the primary data collection method was through semi-structured in-depth interviews. Topics and central questions were decided upon beforehand following the literature. However, there was freedom during the interview to dive into subjects and issues raised by the participant (see Appendix A for the interview schedule) (Clark, Foster & Bryman, 2019). The population of this research encompasses Galle residents between the ages of 22 and 84. All were found either through convenience sampling (approaching in public spaces) or via a snowball method in which participants' personal connections were used. In addition, a key component besides conducting interviews was establishing friendships with locals and obtaining information through small talk and participant observation. The value of small talk lies in forming relationships, determining one another's reliability, and building enough rapport to engage in more in-depth or prolonged conversations. Additionally, having earned their trust and established friendships, locals invited me to hang out with them and showed me places which they found relevant to my research.

Indirectly, small talk thus provided access to knowledge that would otherwise have been difficult to obtain, yet that has been essential to understanding the cultural context (Driessen & Jansen, 2013). Data collected from in-depth interviews and small talk conversations are supported by visual storytelling in the form of photo narrative. This entails that photographs were taken throughout the fieldwork, from which a selection of the most relevant photographs was made. Visual storytelling was chosen as a supporting method as photography is specifically powerful in conveying a deeper understanding of a person, event, or specific setting (Shurbaji, 2014).

To uphold ethical standards, the research design encloses confidentiality and anonymity of participant information. Prior to the interviews, the participants were made aware of the objectives of the research, granted their consent to participate in it and to the use of the data they provided, and informed that they may withdraw from the study at any time. Each participant gave oral consent, and all data was treated in confidence. Throughout the research, anonymity was crucial. As a result, no names or particular settlement locations were recorded or disclosed. Age, gender, and a rough geographical zone of residence are the only variables declared in the study as these are considered significant concerning the research objective. Throughout the thesis, pseudonyms are used to emphasize the humanity of the participants and the research objective. These pseudonyms were chosen carefully and are all of Sri Lankan origin. It is acknowledged that Sinhala names bear significant meaning. Hence, pseudonyms were not selected randomly, but recognition was given to the meanings of each name. Although adhering to these principles, it is recognized that complete anonymity cannot be guaranteed. This results from some participants being related to one another through friends or family.

1.3 Organization of the study

The first chapter following the introduction, the literature review (chapter 2), specifies key notions, theories, and frameworks. It lays a theoretical foundation of the key mechanisms and theories used in the analytical framework. The sub-chapters cover threat perception, climate change vulnerability, the livelihood resilience approach, adaptive capacity, and the Protection Motivation Theory. To situate the research, a geographical contextual framework will be given (chapter 3), which covers a detailed description of the study site, including a climate profile, and a concise reflection of the knowledge gap in which this research is positioned. Further, the methodological section presented in chapter 4 encompasses the research design, main and supporting research methods, a reflection on the positionality as a researcher in the field, and limitations of the research. The following three chapters (chapter 5, 6 and 7) systematically present the empirical results, according to each sub-question. These chapters encompass a detailed discussion of the findings, as resulting from the data collection and analysis. Chapter 8 covers a discussion of the findings in the context of the analytical framework. In addition, it includes a critical reflection on personal biases and on the results in relation to the field of Development Studies. Finally, chapter 9 presents the conclusion of the research and the general implications of all the findings beyond this research.

2. Literature review

To establish the link between individual threat perception and livelihood resilience to climate change, various key concepts, frameworks, and behavioral theories are explored. First, the way personal values, norms and beliefs affect, and shape threat perception is illustrated, following the Value-Belief-Norm Theory (2.1). These cognitive mechanisms and climate change vulnerability fundamentally shape adaptive behavior and livelihood resilience. A foundation is therefore laid for the key notion of adaptive capacity as connected to climate change vulnerability. A livelihood resilience approach, which encompasses the significance of human agency, lies at the relationship's core (2.2). Next, the Protection Motivation Theory is discussed in light of achieving self-protection through the assessments of threat perception and adaptive behavior (2.3). The operationalization of the analytical framework, which comprises the mentioned characterized notions, frameworks, and theories, will be presented in the final section (2.4).

2.1 The implications of values and beliefs in threat perception

Despite its significant implications for the environment, society, and the economy, climate change is a phenomenon that the general population cannot readily and accurately identify using their typical means of observation and deduction (Weber, 2010). Even when people recognize short-term seasonal and/or annual variability, slow-onset environmental changes like desertification, droughts, or water/land salinity are not typically regarded as extreme enough to be significant. This is because these events are likely to have a less immediate impact on people's well-being. Additionally, because these environmental events develop gradually, they are less distinct and less likely to be recalled as components of elements in a larger category of events (Koubi, Stoll & Spilker, 2016). However, individual perceptions of climate change are not only shaped by the palpability of a climate phenomenon. It is also argued that values play a vital role in how individuals engage with environmental threats and establish a natural link between place and decision-making. Ives and Kendal (2014) assert that “people's underlying values influence general beliefs about the environment, and specific beliefs about the consequences of environmental change on the things they value” (Ives & Kendal 2014, p. 69). These views in turn determine how people believe they can reduce the threat to the things they value. This approach is referred to as the Values-Belief-Norm (VBN) Theory (See Figure 1). First established by Stern et al. (1999) to research the basis of support for social movements, significance is given to the role of values, basic beliefs, attitudes, and norms in shaping behavioral intentions and behaviors. It was later applied and modified by Ives and Kendal (2014) to research the role of values in the management of ecological systems.

The notion of values, as distinguished from economic (product) value, holds various connotations. It is frequently used in sociology, psychology, and philosophy to indicate an individual's preferences for certain means (e.g., bravery) or ends (e.g., freedom). Accordingly, values shape the way individuals

perceive the world and how and why certain individuals or social groups act as they do. They are not merely mental static constructs but are profoundly embedded in ecology and culture (Ives & Kidwell, 2019). This category of values has been classified as *held values* or *underlying values* (Brown, 1984; Ives & Kendal, 2014). When considering the relationship between individual environmental behavior and held values, environmentally impactful behavior is most often greatly influenced by circumstances outside an individual's control. Dietz, Fitzgerald and Shwom (2005) exemplify how the presence or absence of public transportation affects commuting decisions, regardless of an individual's values. Additionally important are interactions with others and the social environment in which they are set. For instance, the behaviors we see in our neighbors are likely to impact us substantially, especially if we interpret those actions as standards that describe how we should behave (Dietz, Fitzgerald & Shwom, 2005). Thus, environmental decision-making does not take place in a vacuum but is often affected by the context in which these decisions are set and allows for space to reflect upon our values.

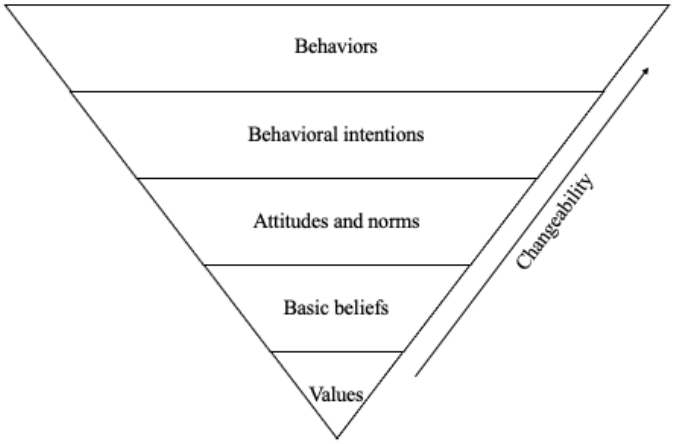

Figure 1. Diagram illustrating cognitive hierarchy within the VBN framework. Concepts closer to the bottom are more stable than those closer to the top. Modified from Ives & Kendal (2014).

Held values must be distinguished from the related notions of norms and beliefs. Norms can be applied to a person or a group and represent the general consensus of how people should act in a particular situation. Beliefs are assertions of a person's worldview; they are a collection of narrative perceived as facts by the individual (Dietz, Fitzgerald & Shwom, 2005; Ives & Kendal, 2014; Ives & Kidwell, 2019). Specifically influential is religion, as it permeates everything, from behavior and livelihoods to customs and cuisine (Schipper, 2010). Research demonstrates that views about human-nature links and perceptions of climate change are a collection of interrelated notions, reinforced and formed by one another (Sachdeva, 2016). Humans' perceptions of their place in the world are influenced by their religious beliefs, and vice versa do environmental factors influence religious beliefs. However, although there has been a lot of discussion about how Christian beliefs affect how people perceive climate change, Sachdeva (2016) asserts how there is a lack of theological or social science literature that describes how 'Eastern' religious doctrine affects how people perceive climate change. There is some indication that the more common religions in this area, such as Buddhism and Hinduism, may encourage people to accept climate change more readily (Sachdeva, 2016). As within these religions, themes of human-nature interconnectedness and interdependence are more prevalent (ibid.). Following the principles of Buddhism, Hinduism, and Islam – Sri Lanka's three largest religions with respective percentages of approximately 70, 13 and 10 % (Encyclopædia Britannica, 2023) – reducing suffering is

a fundamental theme. The search for a solution to human suffering was even the stated cause of the birth of Buddhism (Schipper, 2010). Further, both religions assert themes of human-nature interconnectedness and interdependence (Sachdeva, 2016). Buddhist teachings, for instance, emphasize the interconnectedness between humans and the environment as more than a mutually beneficial relationship, but emerging out the same source (Harrap, 2022). Research by De Silva (2006) among Sri Lankan Buddhists illustrates how Buddhist views on impermanence (*anicca*; everything is perpetually changing) and karma (*kamma*; one receives the results of their choices) appear to have influenced individual disaster perceptions on the tsunami that struck the country in 2004. De Silva indicates that some people in Sri Lanka who were impacted by the tsunami found a partial justification for the tragedies and losses in the concept of *karma*. Religious beliefs can thus in part determine how individuals perceive risks and interpret natural hazards. This can affect the extent to which one chooses to make changes that will reduce both present and future risk or not because of the fatalistic believe that one cannot change their fate or because of the reliance on prayer and good behavior (De Silva, 2006). Environmental threats are thus assessed through one's threat perception, within which individuals rely on their beliefs and values in making sense of their surroundings (Wiegel et al., 2021). Additionally, individual threat perception is affected by the person's level of vulnerability to climatic changes and the extent to which they can adapt to and cope with the changing climatic conditions.

2.2 Climate change vulnerability, resilience, and adaptive capacity

Climate change vulnerability, resilience, and adaptation are three intrinsically interconnected concepts which are more progressively assessed in terms of subjective values. They are context-specific and can change over time, between social groupings and individuals, as well as from country to country. In these systems, in which human agency is key, individual threat perception and adaptive capacity are essential in having the motivation to achieve livelihood resilience. Arguably, the synthesis of threat perception and adaptive capacity promotes livelihood resilience in a climate change vulnerability context.

Climate change vulnerability can be defined as the extent to which a system is susceptible to damage by an external ecological threat, as well as the likelihood of suffering harm in the event of an extreme occurrence, such as injury, death, loss of life, or disturbance of one's livelihood. Moreover, it encompasses resilience and coping mechanisms determining the (in)ability to recover from the risk. It is thus a result of exposure, sensitivity to impacts, and the capacity—or lack thereof—to cope with or adapt (Thathsarania & Gunaratne, 2018). In addition to the negative material effects of climate change, vulnerability also refers to how these effects are valued differently and how they affect both human and animal lives and well-being. According to this viewpoint, humans are vulnerable to the degree to which climate change affects both their subjective interior and objective exterior worlds (O'Brien & Wolf, 2010). Vulnerability therefore encompasses exposure and susceptibility to risk and the capacity to adapt.

How challenging it will be to adapt is determined by one's resilience or coping capacity (Birkmann & Fernando, 2007).

Resilience is commonly defined as "the ability of an entity or system to return to normal condition after the occurrence of an event that disrupts its state" (Hosseini, Barker & Ramirez-Marquez 2016, p. 47). In the social sciences, it characterizes the capacity of communities or groups to respond to external pressures and disruptions resulting from political, environmental, and social change (Adger, 2000). This research specifically adopts a *livelihood resilience approach*. This approach distinctly recognizes and emphasizes how individuals perceive risk and respond to it, either individually or collectively, as well as how they perceive risk differently (Tanner et al., 2014). People and their lives are all too frequently reduced to susceptible, homogenized communities or nations (Weichselgartner & Kelman, 2014). However, all people, across generations, have the ability to maintain and enhance their livelihood possibilities and well-being in the face of environmental, economic, social, and political upheavals (Tanner et al., 2014; Weichselgartner & Kelman, 2014). The livelihood resilience approach thus counters the common perception of communities or nations being homogeneous. It asserts human agency as essential for building resilience in contrast to other studies explore individuals who are the beneficiaries of established adaptation policies or top-down governance.

According to Walker et al. (2006) resilience is rooted in three qualities: (1) anticipating and managing the effects of natural disasters; (2) adapting to change; and (3) taking an active role in one's own destiny rather than relying solely on external factors. Human agency, empowerment, individual and communal action, and human rights, all of which are embedded in dynamic social change processes, serve as the foundation for such resilience. The livelihood systems of the most vulnerable and poorest people are affected by climate change and related stressors, either supporting or destabilizing them (Tanner et al., 2014). Accordingly, destabilizing systems incentivize individuals to adapt, fostering livelihood resilience. A resilient system, therefore, is one that can adapt to change and absorb stress while maintaining fundamentally the same structure, function, and identity. Further, the importance of resilience is not evaluated in terms of particular actions or changes, but rather in terms of how different actions and changes affect the system over time, either favorably or adversely (Tsuchida & Takeda, 2021). Adaptive capacity hereby is a key component of resilience in the sphere of climate change adaptation (Dapilah, Nielsen & Friis, 2019).

Adaptation is defined in this research as the often value-based changes made to the social, ecological, and economic systems to reduce vulnerability to climate-related consequences (Adger, 2003; O'Brien & Wolf, 2010; Yamane, 2009). The conditions that allow individuals to foresee change, adapt to it, limit its effects, recover from it, and seize new chances is referred to as *adaptive capacity* (Cinner et al., 2018). At the local level, the extent to which an individual can undertake adaptations is influenced by personal and societal factors such as infrastructure, political influence, access to financial, information and technological resources, kinship networks, and the institutional environment within which adaptations occur. These determining factors are interdependent and cannot be isolated: the

concerted action of factors that vary in time and space produces adaptive capacity (Smit & Wandel, 2006). For instance, a strong kinship network may boost adaptive capacity by facilitating easier access to financial resources and supportive labor to undertake physical adaptation measures. Further, an individual's or household's ability to deal with climate threats relies in part on the community's supportive environment, and the community's capability to adapt reflects the local resources and systems (ibid.). In this sense, an individual is part of a larger system on which they rely for favorable circumstances and conditions to adapt. This whole includes ecological thresholds and can be analyzed besides individual adaptive capacity, defining this factor as *coping range*. This notion encompasses the range of climate conditions in which a system can manage, embrace, adjust to, and recover from (Smit & Pilifosofa, 2003). Following an example provided by Smit & Wandel (2006), a warm, rainy year can be favorable for agricultural growth and provide big yields. However, subsequent warm, rainy years may promote the growth of fungus and pest outbreaks, reduce yields, and hence narrow the coping range. This external condition thus allows the adaptive capacity framework to look at an individual's motivation and ability to adapt according to a variation of climate conditions.

Many adaptations are made by individuals, without deliberate planning or as result of policy interventions, and these are frequently anticipated to have the ability to lessen the negative effects of climate change or to decrease vulnerabilities, alleviating worries about the threat of climate change. Another manner of adaptation in the context of climate change is as a carefully planned reaction to expected impacts or vulnerabilities of climate change, either reactively or anticipatorily (Smit & Pilifosova, 2003). This can be achieved through (inter)national policy response whereby the country establishes legislation to facilitate adaptation, or through human driven adaption initiatives. Cinner et al. (2018) argue for the importance of human adaptive capacity in response to the impacts of climate change. They state that there is a need to bolster adaptive capacity in communities which heavily rely on the natural resources that are vulnerable to the effects of climate change. Especially tropical coastal communities are at risk due to their vulnerable geographical position in the face of sea level rise, coral bleaching and decreasing agricultural and fishery capacity (Cinner et al., 2018). Therefore, Cinner et al. (2018) assert that adaptive capacity could specifically be built across five key domains: (1) the resources that people may utilize in times of need; (2) the adaptability to change tactics; (3) the capacity to unite and take action; (4) learning to detect and respond to change; and (5) the agency to decide whether to change or not. The impact, however, of climatic changes differs from place to place and even from person to person, contingent upon the local manifestations of climate change (i.e., exposure), the extent to which individuals rely on affected resources (i.e., sensitivity), and their capacity to adapt to or benefit from the changes they experience (i.e., adaptive capacity) (Cinner et al., 2018). Essentially, adaptive capacity tells us something about why some people and groups can innovate and adapt more thoroughly and rapidly to mitigate harm and take advantage of opportunities than others (Siders, 2019). An approach used to analyze individual adaptive and coping behavior is the Protection Motivation Theory (PMT). The PMT variables encompass a synthesis of key notions such as climate change vulnerability, adaptive

capacity, and threat perception. For this reason and for its current relevance in the adaptive and coping behavior in the socio-ecological sphere, the PMT it is deemed highly significant in this research' data analysis.

2.3 The Protection Motivation Theory

First introduced in 1975 by Rogers, PMT provided a framework for analyzing the effects of fear appeals that places a focus on the cognitive mechanisms mediating behavior change (Norman, Boer & Seydel, 2005). Its basic idea is that people use the two primary cognitive processes of 'threat appraisal' and 'coping appraisal' to take adaptive behaviors when faced with hazards. Threat appraisal refers to a person's evaluation of a threat's seriousness and perceived severity. An individual's susceptibility to the current threat is reflected in their perceived vulnerability. An individual's evaluation of their capacity to react to the perceived threat and so avoid a particular risk is referred to as a coping appraisal (Mallick, Rogers & Sultana, 2022; Regasa & Akirso, 2019). In general, when threat severity, susceptibility, self-efficacy, and reaction efficacy are high and response costs and maladaptive response rewards are low, a person is most likely to want to engage in a behavior to defend oneself from threat (see Figure 2) (Kothe et al., 2019). Kothe et al. (2019) use the example of a farmer experiencing drought to illustrate self-protective behavior. Suppose a farmer believes the threat of drought is high (severity). In that case, they are highly susceptible to drought on their land (susceptibility), there are positive incentives for drought to occur (maladaptive response rewards), they are confident they can implement the drought mitigation behaviors (self-efficacy), they believe their adaptive practices will be effective in countering negative effects of the drought (response efficacy), and have enough financial resources to implement the drought adaptation strategies (response cost), they may adopt sustainable farming practices to lessen the threat posed by drought. Thus, the fundamental idea behind the PMT is that attaining self-protection requires a process that includes evaluating the threat and one's capability to cope with it (Mallick, Rogers & Sultana, 2022).

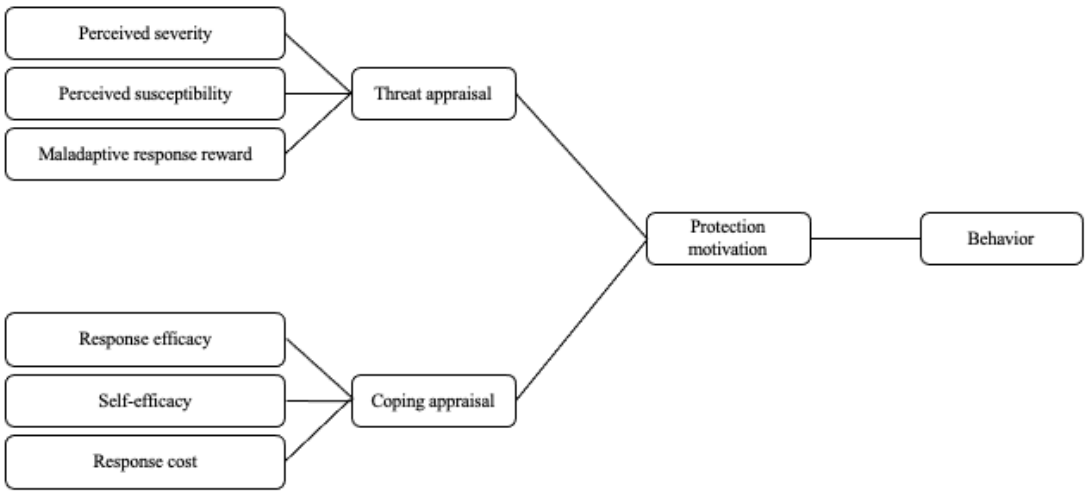

Figure 2. Processes, constructs, and relationships in the PMT. Modified from Kothe et al. (2019) and Sommestad, Karlzén & Hallberg (2015).

The PMT was initially established in social and health psychology and only later expanded to study a broader spectrum of behavioral decision-making (Norman, Boer & Seydel, 2005). Although a shift has taken place wherein the PMT is used as a framework to cover a vast scope of behavioral mechanisms besides social and health psychological themes, its methodological model has stayed static. The PMT methodology always encompasses research of quantitative nature. Meta-analyses specifically exclude reports of qualitative research (e.g., Floyd et al., 2000; Kothe et al., 2019; Sommestad, Karlzén & Hallberg, 2015). Even though its research design often relies on questionnaires of the PMT variables (see Figure 2), I argue that threat and coping appraisal variables and relationships can also be examined through qualitative data analysis. Various qualitative research methods allow inductive reasoning when assessing the PMT variables utilizing a discourse of individual ideas, opinions, aspirations, perceptions, and experiences. These variables are not necessarily restricted to a measurement on numerical scales. The PMT might then be used as framework to research a wider range of topics, not just in quantitative studies with an exclusive reliance on numerical scales for its research design. Interview guides might just be as well adapted to include the PMT variables in its semi-structured line of questioning. As follows, the variables are encompassed in a discourse of threat and coping appraisal, in which the in-depth interview allows for more context and details than potentially a survey would.

In essence, a PMT framework is thus employed to research individual adaptive capacity, while considering threat perception influences, within various contexts and themes. Especially expanding its methodological scope to include research of qualitative nature could greatly contribute to the understanding of individual variations in threat and coping appraisal when achieving self-protection. Increased adaptive capacity, then, contributes to the sustainability and growth of one's livelihood resilience.

2.4 Operationalization of the analytical framework

The analytical framework presented in Figure 3 integrates and links mentioned theories and frameworks related to threat appraisal, adaptive capacity, and livelihood resilience in the context of climate risk and vulnerability. The socio-ecological elements of environmental hazards are determined, according to the IPCC (2019), by vulnerability and exposure to climate risks. **Vulnerability** concerns the extent to which individuals are or could be impacted by environmental hazards, and **exposure** indicates the severity of exposure of a person or landscape to environmental risks. In essence, this risk framework addresses how the severity of environmental threats can be reduced by adaptation strategies based on individual adaptive capacity and capability. This research argues that the extent to which individuals are exposed to these risk factors influences their threat perception and livelihood resilience. However, solely exposure and vulnerability to risk factors is not sufficient to determine the extent to which individuals perceive threat and increase their livelihood resilience. The PMT is essential to the analytical framework and is built upon two cognitive processes (threat and coping appraisal), which are subdivided within the framework. **Threat appraisal** is defined and measured by the perceived severity

of the threat and perceived vulnerability to the threat, as modified from Mallick, Rogers and Sultana (2022). This leads to a **threat perception** wherein an emphasis is placed on the influence of individual's climate risk knowledge and experience, and **values, norms, and beliefs**, in line with Ives and Kendal's (2014) VBN Theory. Therein, it specifically incorporates religious values and beliefs as studies mention the importance of religious identity in coping mechanisms (religious coping) and contextualizing climate risks (e.g., De Silva, 2006; Sachdeva, 2016; Schipper, 2010). **Knowledge and experience** encompasses the whole spectrum of knowledge and experiences pertaining to and creating an individual's understanding of natural hazards and climate change. This can range from, for instance, religious to scientific knowledge. Knowledge thus shares an interdependence with values, norms, and beliefs, as knowledge shapes one's values, norms and beliefs, and vice versa. The same can be accounted for experience. In fact, all determinants shaping threat perception cannot be isolated but are interdependent. This research argues that all these mechanisms are at play, although to various extents, determining the degree to which individuals perceive environmental threats as such.

Threat perception then leads to livelihood resilience strategies. The extent to which these strategies are implemented is determined by **coping appraisal** (as modified from the PMT). This is included as to measure an individual's assessment of their ability to respond to the perceived threat and so minimize a certain risk. Coping appraisal is affected by assets and capability, and adaptive capacity. This research follows the IPCC definition to describe **adaptive capacity** as: "the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities" (IPCC 2019, p. 678). This process includes making use of one's capacity, commitment and will to adjust. Adaptive capacity includes context-specific factors that affect the extent to which an individual can adapt. These can be for instance, as mentioned earlier, infrastructure, political climate, or access to financial resources. Further, it naturally includes a coping range factor, meaning that individuals can

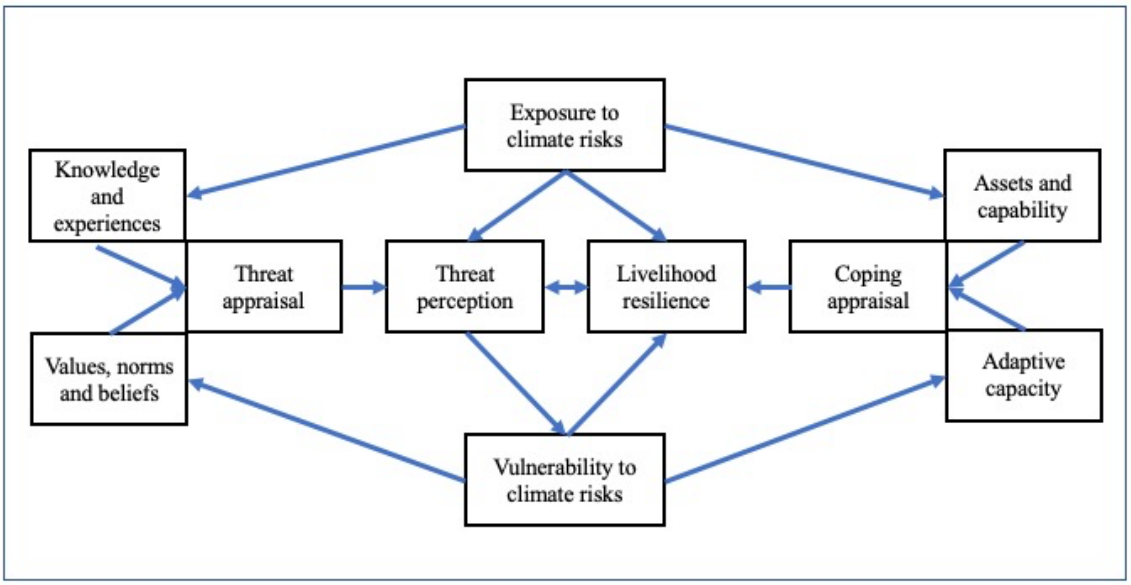

Figure 3. Individual level perception and adaptation to climate change.

only adapt to a certain range of climate conditions. It is recognized that some climate risks are severe to the degree that individual adaptation is unattainable or unachievable. The larger the climate conditions deviate from the norm, the harder and unlikelier it is for a socio-ecological system to be able to adapt to its new circumstances. **Assets and capability** are, unlike adaptive capacity, less context-dependent, but rather focus on individual specific factors. It includes, for instance, financial assets as well as (dis)abled physicality. In essence, these distinctive factors affect a person's coping appraisal, in combination with their position in the societal sphere. Specifically, this research asserts that cognitive, identity, circumstantial and capacity factors influenced by climate risk (knowledge and experience; values, norms, and beliefs; assets and capability; adaptive capacity), threat perception and livelihood resilience share an interdependence and cannot be isolated.

Vice versa, this research contends that a high level of livelihood resilience as a result of fitting and beneficial made adaptations reduces threat perception. It is assumed that structural improvements made to enhance livelihood resilience makes people feel less threatened by possible future environmental threats. These livelihood resilience strategies make people less vulnerable and exposed to environmental hazards. Additionally, these systems are not static, but rather dynamic as they are influenced by unpredictable individual and social events. Thus, whether a person achieves a certain level of livelihood resilience is not a reliable indicator of stable livelihood resilience. For instance, one's level of financial security, which influences one's assets and capability, may be influenced by their country's economic (in)stability. Livelihood resilience is in that sense thus not necessarily an end-state, but rather a back-and-forth process.

3. Geographical context

The geographical context is presented to contextualize the conducted research and relevance of the adopted theoretical framework. Firstly, the geographical setting of the fieldwork is described (3.1). This includes the relevant climate profile of the study site. After that, a description of climate change in the Sri Lankan context is presented, followed by a concise description of a state-of-the-art research gap (3.2).

3.1 Study site

Galle is a relatively large city located on the southwestern coast of Sri Lanka, a small island nation in the Indian Ocean (see Figure 4). It is situated between latitudes 6° and 10°N and 80° and 82°E and measures roughly 65,000 km² (World Bank Group & Asian Development Bank, 2020). Galle serves as the administrative center for the Galle District, is the largest city in the Southern Province (one of Sri Lanka's nine provinces) and is the provincial capital. It lies 116 kilometers south of Colombo, Sri Lanka's capital city (Dissanayake, 2020). According to a 2012 census, the Galle district had a population at the time of 101,159 people (Department of Census and Statistics, 2012).

Sri Lanka knows a wide range of climatic variations despite its small size. It is one of the warmest nations in the world, with an average temperature of roughly 27°C to 28°C (World Bank Group & Asian Development Bank, 2020). The country knows two primary seasons: *Maha*, which runs from September

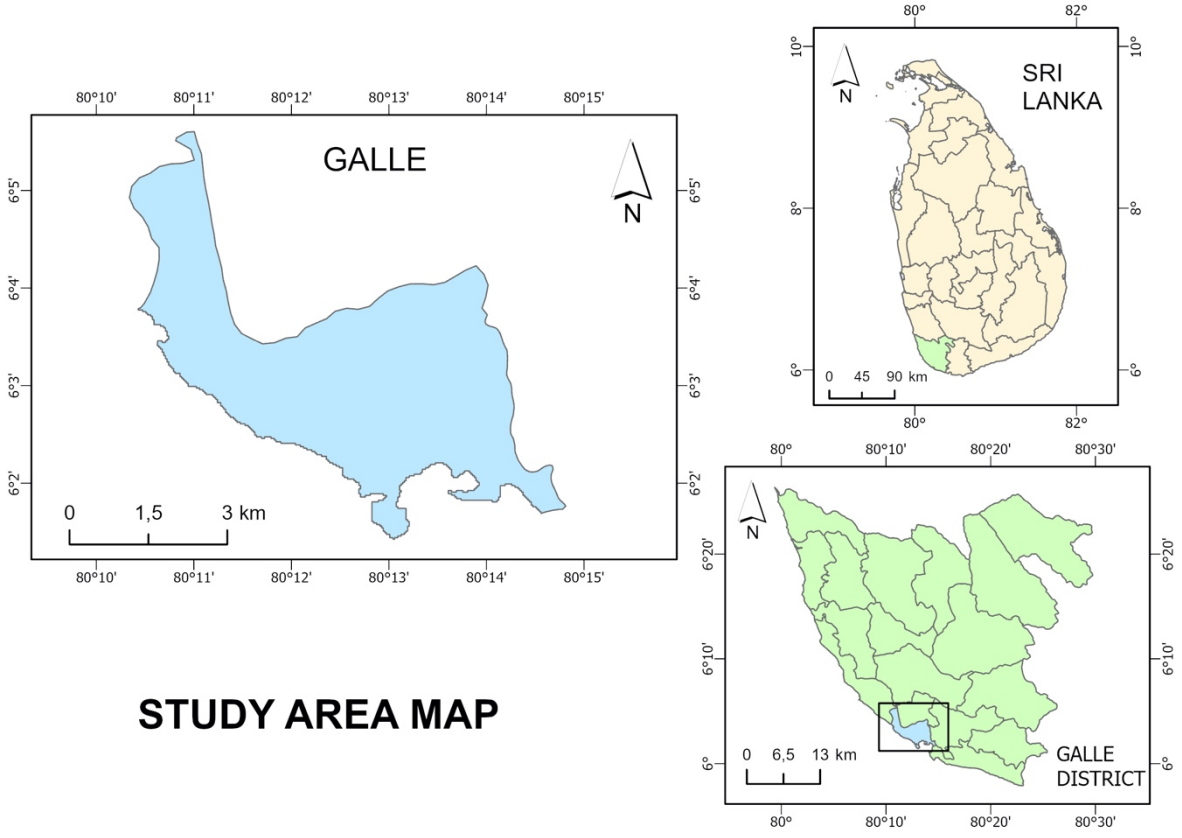

Figure 4. Study area map demonstrating the geographical position of Galle in Sri Lanka.

to March and corresponds to the northeast monsoon, and *Yala*, which runs from May to August and corresponds to the southwest monsoon (Marambe et al., 2015; World Bank Group & Asian Development Bank, 2020). Galle is situated in a wet zone and has a tropical rainforest climate. It suffers from heavy rainfalls during the *Yala* season (World Bank Group & Asian Development Bank, 2020). Its geographical position makes the city vulnerable to a variety of climate threats. Being situated in a low-lying coastal area and being exposed to extreme weather such as these heavy rainfalls, the city occasionally suffers from floods (see e.g., Ahmed & Charlesworth, 2014; Chandrasekara, Uranchimeg, Kwon & Lee, 2018). Flashfloods and mudslides caused by heavy rainfall are practically an annual problem in Galle during the *Yala* season. Galle has a vulnerable city center which is at various locations surrounded on three sides by the Indian Ocean (see Figure 4). At the same time, the city center is composed of a highly urbanized bay area with various important roads situated right next to the beach. At many places along the coastline, flood protection measures such as dunes, overflow areas or flood plains are absent. With various rivers flowing through the city and the absence of flood protection measures, the consequences of heavy rainfall are severe and aggregated.

3.2 Climate change context

Temperature measures over the last one hundred years detail the rise in mean, maximum and minimum temperature in Sri Lanka. It can be established that in a relatively short timeframe, the mean temperature has risen 1.02 degrees, with mainly a rapid rise from the 1970s onwards (World Bank Climate Change Knowledge Portal, 2021). These predictions of extreme heat pose a severe hazard to Sri Lanka, threatening living standards and human health (World Bank Group & Asian Development Bank, 2020). In addition, past sea level measures and future predictions show a steady increase in projected sea level rise of coastal Sri Lanka (World Bank Climate Change Knowledge Portal, 2021). Apart from these identified impacts of climate change, Sri Lanka is frequently affected by cyclones, landslides, droughts, and coastline erosion (Wickramasinghe, De Silva & Dayawansa, 2021).

In 2004, the country was hit by the Indian Ocean tsunami. Eastern, southern, and southwestern Sri Lankan coastlines were severely affected by the tsunami, leaving behind catastrophic destruction and a high death toll. With more than 30,000 fatalities and 500,000 displaced people, Sri Lanka was the second worst-affected nation by the Indian Ocean tsunami. This devastating event exposed Sri Lanka's coastal residents' extreme vulnerability (Birkmann & Fernando, 2007). Specifically, Galle was hit hard by the tsunami with the number of deaths and missing rising to 4214 (Sathiparan, 2020). Damage done by the tsunami is present-day still visible in Galle with graves of tsunami victims at the side of the roads and at the sight of abandoned, damaged buildings, scattered throughout the landscape.

Considering the geographical and topographical location, climate, and exposure to environmental hazards such as landslides and floods, it could be argued that Galle is in an environmental risk zone. Considering its high temperatures, irregular and complicated hydrological cycles, and sensitivity to catastrophic weather events, the city is vulnerable to both slow- and rapid-onset environmental changes

and events. Without appropriate adaptative action, the expected rise in the frequency and intensity of such climate change-induced extreme weather events might endanger lives, livelihoods, and infrastructure (World Bank Group & Asian Development Bank, 2020), which is why further research on this issue is crucial.

Taking its mentioned vulnerability and history of natural hazards into consideration, extensive research has been conducted on the implications of climate change in the Sri Lankan biodiversity, socio-ecological and socio-economic spheres. However, specific research on climate change perceptions, threat perception, adaptation strategies or livelihood resilience in Galle is scarce. Research on (residents of) Galle focuses mainly on the aftermath of the 2004 tsunami or individuals' perceptions on this event, biodiversity, or prevalent health issues. Studies conducted on climate change risks in Galle focus mainly on the implications of water hazards such as sea level rise, extreme rainfall patterns, floods and the 2004 tsunami (Manawadu & Wijeratne, 2022; Nianthi & Shaw, 2015). Conducting a literature review on the objective of this research thus indicated a present knowledge gap. Research on the key notions and mechanisms of threat perception, adaptive capacity and livelihood resilience in the Sri Lankan context is available but is mainly centered on the agricultural sector. Research of these themes in the context of Galle is particularly scarce and feature mostly a unilateral approach; how the city itself is (economically or physically) vulnerable to natural disasters or climate change induce risks. Particular research on the relationship between individual threat perception, local-led adaptation strategies and livelihood resilience in Galle is absent.

4. Methodology

This chapter gives an overview of the techniques and methods used for data collection and analysis (4.1). The research design and methodology were adapted to fit the research objective and the established primary and sub-questions. A systematic summary of the methodology, analytical stages and an explanation of the rationale are provided (4.2). The researcher's positionality is critically discussed, as well as various biases that could be present (4.3). Lastly, limitations of the research as shortly presented (4.4).

4.1 Research design

The research objective of the study is to build an understanding of threat perceptions of climate change and how local-led adaptations are made as livelihood resilience strategies. To answer the main and sub- questions, the research was designed to be qualitative, as the objective encompasses subjective perceptions, experiences, and strategies. For this research, the method of semi-structured in-depth interviews was established to be used as the primary method for data collection and analysis. Additionally, this method is supported by participant observation, small talk, and visual storytelling through photo narrative. Combining these methods, together with the literature review, the research was designed to be holistic of nature. Meaning that dimensions influencing the main concepts of threat perception, adaptive capacity and livelihood resilience have been researched from different angles, encompassing personal experiences, identities, and visual materials. Data were collected during a fieldwork period encompassing six weeks in Galle. Considering the COVID-19 situation in Sri Lanka, with the virus is at a low point with a deficient number of new cases reported per day by the Sri Lankan government (HPB | New Coronavirus (COVID-19) outbreak, 2023), no issues were expected nor experienced considering possible new government measures during the fieldwork period.

4.2 Data collection

The data collected for this research encompasses 30 in-depth interviews, two of which were follow-up interviews, a selection of on-site photographs, and experiences and stories through interactions with locals. Moreover, the theoretical backdrop of this research relies on a literature study to develop the analytical framework used for the data analysis. The methodological decisions will be explained and further justified in the following sections.

4.2.1 In-depth interviews

Building an understanding of perceptions and capabilities, qualitative interviews, and especially semi-structured in-depth interviews, were deemed very suitable for the data collection of this research. Central to this research are the concepts of threat perception, adaptive capacity, and livelihood resilience which comprise feelings, experiences, and aspirations. Because they involve subjective perceptions,

interviews were deemed the best way to study this subject. All research sub-questions refer to personal experiences and feelings and have thus been studied through semi-structured in-depth interviews. This entails that topics and central questions have been decided upon beforehand, following the literature. Still, there is freedom for the discussion to dive into subjects and issues raised by the participant (Clark, Foster & Bryman, 2019). See Appendix A for the interview guide. Participants were found through a snowball method (coming in contact via another participant) and via convenience sampling (persons encountered in public spaces who fit the target group are asked to participate) (Clark, Foster & Bryman, 2019). The target group is in this research defined as residents of Galle. Data analysis comprised the transcription of all recorded interviews and manual coding, both through inductive and deductive coding (see Appendix B for the established coding tree).

As mentioned, 30 in-depth interviews have been conducted with residents of Galle, of which two were accounted for as follow-up interviews. To enhance representability, the research aimed to interview a wide variety of individuals in terms of age, profession, gender, living situation, and neighborhood of residence. However, achieving a 50-50 man-woman ratio posed challenges. In Sri Lanka, a highly patriarchal society, men predominate in the work force while many women remain at home and do primarily unpaid labor-intensive duties like parenting and cooking. Due to lack of access to private residences, it wasn't easy to encounter and interview women. As men predominated in public areas, finding men willing to be interviewed was easier.

6 women and 22 men, ages between 22 and 84 years, with an average participant age of 48 have been interviewed. To include how people in different natural environments (e.g., living next to the coast, rivers or surrounded by paddy fields) are affected by climate change, prior to the fieldwork, the neighborhoods were divided in three geographical zones: coast (C), transition (T), and islands (I). 13 people living in the coastal zone, of which 7 lived inside the fort, 6 living in the transition zone, and nine living islands have been interviewed. All had lived in Galle for a considerable amount of time at the time of the interview, albeit not all were natives of Galle in the sense of being born there. Moreover, the participants covered many professions to encompass as many different perceptions as possible. Some examples are crime scene investigator, student, software engineer, jobless, hairdresser, primary school teacher, government official, paddy farmer, and fisherman. This has resulted in coverage of many different perceptions on environmental threats and livelihood resilience strategies. Interviews have not always been conducted inside in a seated position, but also outside and on several occasions while standing or walking beside the participant. These walking interviews mainly functioned for the participant to show an object or site that was considered relevant to the research. To illustrate, fishermen showed their boats and the fish market, and paddy farmers showed their paddy field and yields. In three occasions help was received from a translator, and with some other interviews, an online translation app was used when certain questions were perceived as incomprehensible.

4.2.2 Participant observation and small talk

When being in the field, participant observation and small talk are two methods for eliciting important information, which naturally occurs. Neither was prior established as the primary method. However, during the fieldwork, it was found that establishing friendships with locals and obtaining information through small talk and participant observation was a key component of gathering essential data. Small talk is frequently described as irrelevant conversation, with its primary goal of avoiding silence. However, in line with Driessen and Jansen (2013), the ability to develop and sustain positive connections with interlocutors plays a significant role in the effectiveness of fieldwork. Engaging in small talk, often in informal settings, is essential to this process. Having earned trust and established friendships, locals invited the researcher to hang out with them and showed her places they found relevant to the research. This was part of the participant observation practices, which "involves both participating in and observing, everyday life as it happens" (Clark, Foster & Bryman 2019, p. 219). It aims to capture the variety of experiences and rich detail in the human world (ibid.). Both small talk and participant observation provided new information that otherwise would not have been collected through in-depth interviews. As in-depth interviews have been drafted to gather data that was deemed relevant based on the established theoretical framework, small talk, and participant observation led to conversations outside the interview guide and away from the theoretically dense data, into the 'real world'.

4.2.3 Visual storytelling

Visual storytelling encompasses the method of photo narrative. With this method, the researcher takes pictures of what they consider significant concerning the research (Clark, Foster & Bryman, 2019). A selection of the photographs deemed most relevant in supporting findings from the in-depth interviews and small talk conversations has been selected from these pictures. Photo narrative has been chosen as a supporting method as, in contrast to written or spoken language, photography may convey a distinct, frequently deeper, knowledge of a person, location, event, or narrative. Unlike text, film, or maps, photos can capture a precise moment in time (Shurbaji, 2014). This may be especially powerful in the case of natural disasters, for which pictures can convey the gravity and impact of the event better than text can. Personal feelings and experiences can be challenging to put into words. Therefore, pictures allow visualization of these subjective experiences without trivializing or misinterpreting emotional or sensitive discourse. As pictures can explain what words cannot, visual storytelling is a valuable complement to the in-depth interview method. In this research, photos do not present new data but are used to visualize some data gathered from the in-depth interviews.

4.3 Reflection on the positionality as a researcher

Positionality refers to a researcher's perspective within a specific research endeavor. It affects the methods used in research, as well as the findings and conclusions (Holmes, 2020). Generally, in

qualitative research, the researcher is often regarded as the custodian of expertise on the significance of a research subject's experiences, and the relationship between the researcher and the researched is one of unequal power relations (Råheim et al., 2016). By taking a reflexive approach, potential biases should be reduced (Holmes, 2020).

From 17th century until the late 18th century, Sri Lanka was under Dutch governorate established by the Dutch East India Company (The Editors of Encyclopaedia Britannica, 2018). Until the present day, remains are still visible from this period. Especially in Galle, which acted as a fortified trading post, Dutch churches, graveyards, street names, signs and the central fort are notable in the Sri Lankan landscape. Being born and raised in the Netherlands, the researcher was concerned that researching Galle locals could reify (neo)colonial sentiments. She understands that her Eurocentric background, social environment, and prejudices could influence how she relates to and portray the participants, who, for example, might not want to contribute to the research (Caretta & Jokinen, 2017). More specifically, being raised in a politically active family with a high awareness of climate change and activism, she relied on this direct social environment in establishing a dominant (political) framework. Reflecting upon this framework before entering the field, she encountered some presumptions about local climate change awareness. She is aware that in qualitative research, or any research of that matter, there will always be some degree of subjectivity or bias (Holmes, 2020). For the researcher, this entailed the extent of engagement in Dutch political and climate discourse that shaped the way she believed others would also be engaged in the same societal themes. When she entered the field, she quickly discovered this is not the case and had to be reflexive of this bias. Even when drafting the interview guide, she assumed that the notion of climate change is well recognized in Galle. She had to be critical and aware that her assumptions were not naturally valid and reconsider the questions in the interview guide. Her fieldwork in Galle has broadened the framework and made her more critical of biases and subjectivity.

To not distance herself from the position as a researcher, as opposed to the assumed role of tourist by many locals, she rented a house from a Galle local, placing herself in a neighborhood at a distance from the tourist area. She got to experience life as being lived by locals instead of catered to tourists. Engaging in small talk, establishing friendships, and joining locals with their friends or around the neighborhood (participant observation) contributed to creating more equal positions and locals not regarding her simply as a researcher. She is aware that research cannot be wholly biased and value-free. However, being conscious and reflexive of the established framework and position in Galle is essential in minimizing the gravity of her biases and subjectivity in research. Additionally, on the positive side, her work allowed to research an issue currently receiving little attention in Galle. Considering her background and education, and her established frameworks can contextualize and give the body to a pressing issue that will become even more prevalent in the nearby future.

4.4 Limitations of the research

Considering the short fieldwork period and limited number of participants, (possible) limitations of this research are acknowledged. Data analysis is based upon 30 in-depth interviews and casual conversations. It is recognized that this is not nearly enough to capture a complete and detailed insight into Galle's residents' livelihoods. Especially when addressing various sectors and professions of which only a handful of individuals are interviewed. To a certain extent, this limits the full understanding of the presented key notions in the Galle context. Specifically considering gendered perceptions, only six interviewed women does not suffice to draw gendered conclusions, which this research will therefore abstain from. Furthermore, a language barrier could have made it difficult to convey a deeper understanding of experiences, ideas, and emotions. It is therefore acknowledged that this research could potentially have limitations or non-intended exclusions of individuals on the array of perceptions, experiences, and livelihoods in the context of the key frameworks.

5. Exposure and vulnerability to climate risks

Although climate change is a scientifically proven global phenomenon, people's perception and knowledge of its implications vary greatly. Galle is exposed to both rapid- and slow-onset events, of which most were accurately identified by most participants (5.1). Moreover, in recent years, Galle has undergone some critical seasonal and general climatic changes, directly affecting resident's livelihoods. Although being able to identify changing weather conditions and one's livelihood directly affected, the notion of climate change is not well known in Galle. In general, education and public awareness on climate change was and still is scarce. The extent to which participants were knowledgeable on this topic thus varied greatly (5.2).

5.1 Climate change perceptions

As established in the geographical context (chapter 3), Galle is vulnerable to both rapid-onset events such as floods and tropical storms, and slow-onset events such as temperature and sea level rise. Most participants identified both events. Of course, the 2004 tsunami was recalled by all participants, both living in- and outside of Galle at the time (see how the main bus terminal looked in Figure 5). Furthermore, Galle has several rivers flowing through its city, culminating in the ocean. Participants living inlands recalled various childhood memories of regular flooding of the riverbanks and how it impacted their families' paddy field, before a dam was built in 1977. Now, they don't experience these specific river floodings anymore, where their crops were damaged by carried salt water. Besides these rapid-onset events, participants also recognized a rise in temperature and extreme fluctuations in weather pattern. Many participants noticed how the temperature had risen to extreme heights compared to their childhood, and how the weather had become more unpredictable. Mohamed[1], a 70-year-old jeweler, describes this change as:

Figure 5. A picture of the bus terminal taken during the tsunami, shown by a participant.

> […] [P]eople know [previously] at this time it is raining, at this time is hot sun, and all these things, dry weather and wet weather. But now of course, it's suddenly, it rains. No one knows what is happening in which time.

[1] All names in this report are fictitious, to protect the participant's privacy and ensure anonymity. Participant's real names are only known to the researcher.

Making comparisons to his childhood, Mohamed thus describes a drastic change in weather pattern, accelerated by climate change. How the seasons in Galle were formally divided in wet (monsoon) and dry season, they are now characterized by tropical storms the whole year round. Throughout her fieldwork in Galle, the researcher has also experienced a lot of rain and some tropical storms, despite being present during dry season. In fact, not a week went by when it didn't rain. Another participant, Kasun, a 41-year-old house manager, observed: "When I was a child, the climate is not this much hot. Yeah, but now, uh, step by step it increase, increase I mean now a little bit hot, more than my childhood". He has noticed how the temperature has risen over the years, and proceeded to tell me how physically uncomfortable the heat made him feel. Almost all participants had the same experiences with the heat.

Figure 6. The fish market on the beach, adjacent to the fort.

Figure 7. The wall blocking the beach view parallel to the Colombo Main Road, built by a private investor. Here, no coastal flood protection is present.

Sea level rise was not mentioned by any of the interviewed participants. Research points out that, since 1880, global mean sea level has risen approximately 210–240 millimeters (World Bank Climate Change Knowledge Portal, 2021). It is acknowledged that these numbers are visually difficult to in-situ identify in Galle, where the beach is mainly used by fishermen to store boats or sell fish (see Figure 6) or made less visible by man-made structures such as the fort or concrete walls (see Figure 7). In addition, half of the participants did not live at the coast, therefore not necessarily seeing the sea on a regular basis.

5.2 Participants' knowledge of climate change

When initially asking participants to describe climate change in Galle, many would describe the daily weather and seasons. Using the concept of climate change in questions often thus provoked detailed descriptions of the weather forecast and monthly seasonal climatic variations. Most participants would only characterize longitudinal climatic changes when asked directly, without mentioning the term climate change. Specifically, a few participants expressed how they were uninformed on the processes

behind the described climatic changes. Achala, a 40-year-old primary school language teacher explained, right after describing how the temperature has risen since her childhood, that she did not understand why this had happened and if she could ask for some clarifications on this topic. She didn't possess the knowledge on what exactly sets in motion and accelerates climate change, and in fact never heard of the term before. Notably, participants from older generations or without a post-secondary degree could meticulously describe the effects of climate change on their life and direct environment, without ever having heard of the term or its global consequences. However, other participants who didn't possess a college degree were knowledgeable about the climate change debate. They gained this information through other sources, such as books or people in their immediate social environment. According to Eromi, the branch executive of a charity organization, education on climate change is a relatively new subject in both public and private schools' curricula. So, there may be a sizable knowledge gap regarding climate change among Galle residents. For instance, a participant's 16-year-old nephew expressed interest in the climate change debate and shared what he had learned about it in school, while his elder uncle was unable to provide much information on the subject. Thus, although almost all participants were able to identify both rapid and slow-onset environmental changes, not all were familiar with the conceptual idea of climate change.

A minority of participants concretized how they were familiar with the mechanisms of climate change; what caused it to happen on both a large and small scale. Specifically mentioned in the Sri Lankan context was the cutting of trees and rapid decline in biodiversity. Multiple participants expressed concern with the high rate of tree cutting, specifically inlands. Inesh, a 22-year-old student, explained how there are "no tough rules to protect the environment". As he explained, tree cutting is not yet regulated. Therefore, trees are regarded as an obstacle in a space that could be used for economic purposes and gain such as building hotels or as a fuel. People or companies are then free to cut the trees to their liking. Other mechanisms that were mentioned was the thinning of the ozone layer, pollution by the motorized vehicles, the absence of recycling options for single-use materials and the dumping of garbage. Participants mentioned how these mechanisms are aggravated by the absence of government involvement or regulation to stop or minimize pollution.

Climate change is an unpalpable but perceivable change in natural circumstances. This process reflects how participants were able to accurately identify established climatic changes, but how many have never heard of the conceptual idea of climate change, its consequences, or its mechanisms. Lack of education or awareness on the subject is only emphasized by governmental lack of environmental protective policies or regulations. In agreeance on its effects, most participants were otherwise not aware of further (global) debates on climate change. However, some participants were very knowledgeable on the topic. The degree of individual knowledge and perceived exposure to climate change thus varies highly. The following chapter will give a more thorough account on this understanding that ultimately shapes threat perception.

6. Threat perception

Fieldwork diary entry *March 6, 2023*

We are driving inlands, through the paddy fields, away from the coast. It is a cloudy day, and it looks like rain is coming this way. My befriended tuk-tuk-driver talks about how I can recognize paddy fields and how people are now manually harvesting the rice (see Figure 8). We drive past the many fields and old houses when he enthusiastically points out: "Look Julia! Right side, this is my old school!". He is in a very happy mood, as he always is. After 20 minutes or so, we reach a sizable traditional house in a very quiet, small neighborhood. I see my translator already waiting for me. We enter the house and I see that the whole family is present; grandparents, children and screaming grandchildren. Everybody is curious to see what is going to happen. I sit down on the couch, situated in a large open space, with my translator beside me and the participant opposite of me. I am thinking about how thankful I am for the fan on the ceiling blowing some cool wind on us; it is again very hot today. In the meantime, the tropical storm breaks loose. Rain and thunder overshadow our conversation and we have to talk louder to understand each other. While going through the questions on my interview guide, the family offers me food and tea. Everybody is in a happy mood and not concerned at all that they can't harvest their paddy today. The participant explains that their machine will get stuck in the mud, so they have to postpone harvesting to another day. Perhaps tomorrow if the weather is better. I start to feel guilty that because of this interview, they have to wait with harvesting, and now it rains so they can't harvest today. My translator explains how this situation is not stressful to them and I shouldn't worry. The participant is a government official primarily, and a paddy farmer secondarily, which alleviates his financial stress. When the interview is over, the translator and I walk through the storm to the other side of the road. We go to interview another paddy farmer. We enter a very old, shed-looking house. In the entrance I see four enormous white bags of harvest piled up. An old, fragile-looking man appears in the living room. He takes a seat in a big chair next to an older lady, who he explains is his mother. The participant has a warm smile and expresses how he has just dried his harvest and is ready to sell, even though he only has half the amount to sell than usual. When I ask my translator to ask the

Figure 8. Workers manually harvesting rice on a paddy field. Dark clouds indicate rain is coming our way.

participant about the impact of climate change on his harvest, he starts to smile. The translator already knows what the participant is about to say, namely that he doesn't understand my question. He has never heard of climate change, but rather starts to explain to me the seasons and his corresponding planting-harvesting scheme. Inside, there is no fan present and I feel myself starting to sweat. We talk about his life, how he has lived in the house his whole life, has inherited his family's paddy field, and now financially depends on it. With his earnings from the harvest, he wanted to buy a new cow to sell its milk, but with this little harvest, he doesn't have enough money to do so. After an hour, I receive a call from my tuk-tuk-driver that he is waiting on me outside. I thank the participant and my translator and head back to my house. In the tuk-tuk, I think about the enormous livelihood differences between the two paddy farmers, living only about 50 meters apart. Giving me a small insight in their complex lives made me to understand how kindness, acceptance, and gratitude allows them to lead a satisfied life, although constantly dealing with hardships.

Threat perceptions are highly subjective and appear in all shapes and colors. It is challenging to reflect upon a diverse palette of individual perceptions. However, as argued in the literature review, identity-related and cognitive mechanisms allow for more understanding and insight into the process of factors that shape threat perception. The established analytical framework indicates that the process that encompasses evaluation of both the threat and a person's capability to cope with it, in which an individual relies on their values, norms, beliefs (6.1), and knowledge, and experience (6.2), lies at the foundation of achieving livelihood resilience. In line with this framework, participants expressed varying degrees of reliance on all these factors. All mechanisms will be discussed, emphasizing that each factor does not function in a self-contained space, but constantly in interaction with other factors, influenced by exterior circumstances such as the economic crisis that has hit all sectors in Sri Lanka (6.3).

6.1 Norms, values, and religious beliefs

The majority of people that were interviewed identified as Buddhist, and a small minority as Muslim. Although there is no specific question in the interview guide about religion or religious identity (see Appendix A for the interview guide), participants' degrees of reflection on events in their socio-ecological surroundings were significantly influenced by their religious values and beliefs. Additionally, when interviewing participants at their home, often a Buddhist shrine would be present in the main living space (see Figure 9). Many participants expressed their Buddhist beliefs when being asked about environmental changes. To illustrate, Nuwan, a 67-year-old paddy farmer, expressed how frequent rainfall in dry season affects all the necessary steps in the paddy cultivation process. Rain washes the planted seeds away, makes the ground too wet for cultivation and leaves no room but inside his house for drying the harvest. In addition, the paddy plants are sensitive to extreme temperatures. Consequently, the heat also negatively affects his harvest. This year, he had lost half of his harvest on which he depends

for his livelihood. He wanted to buy another cow to sell its milk but considering this great loss he had not earned enough money to do so. When being asked on how he feels about this he says:

> […] [I]t's okay […] I'd say that normally Buddhism, they say it is how it is it is. Please what you have. So, he [Nuwan] says, the view there is God is so it's like that. It's, it's like karma like that[2].

Reflecting on his Buddhistic beliefs, like other participants, Nuwan details how he lives by the principle of karma. As Chaturi, a 30-year-old family restaurant owner explains: "If you do good, then good will come to you […] [E]verything you do have consequences". Nuwan accepts that he sometimes loses his harvest due to environmental changes for which the paddy plants can't adapt to. He expresses that as long as he has enough to eat, he has nothing to complain about; "he gets less harvest, and he just accepts it", as the translator explains. He is not worried, as he already received a bad harvest this year, he assured me next year will be better. In line, Chaturi referred to her Buddhist beliefs when reflecting upon the 2004 tsunami. Although her parents' house was damaged, and their business was put at a halt, her values established a certain acceptance of this loss of livelihood at the time. Laying her values upon natural hazards, such as the tsunami she experiences, she found the principle of karma guiding her through the emotional and physical aftermath. Believing that you get what you give, gave her a sense of control through her actions and way of treating others. Having this control over her actions, she perceives hardship not as sudden and surprising, but more as a consequence of one's actions. Establishing this, she considered a future tsunami not necessarily a realistic risk, but its realization collectively laying in our own hands. Of course, this is not to say that Chaturi rejected the feeling of threat for the possibility of another tsunami solely based on her Buddhist beliefs. These feelings are subjective and composed by an interplay of multiple mechanisms, of which religion is only one part. For Chaturi, religion thus plays a significant role, besides other identity-related and cognitive mechanisms. This accounts for all the mechanisms described below. For instance, her knowledge on her house being protected by the fortified walls, her previous experience with the tsunami in which she and her family luckily only dealt with minimal damage, and her positive mindset on the nurturing human-nature relationship were also significant in establishing threat

Figure 9. A participant's Buddhist shrine, as typically found in many houses in Galle.

[2] This interview was conducted with the help of a translator, which is why some information is in the third person.

perception. Besides norms, values and beliefs, participants relied greatly on their cognitive archive of (traditional) knowledge in shaping threat perception, which will be discussed next.

6.2 Knowledge and experience

Religious values thus play an important role in evaluating participant's relationship to their ecological environment. However, these are not the sole determinants for participant's reflection on their livelihood risk. Other participants expressed their Buddhist beliefs, but also demonstrated knowledge on climatic changes and its effects on their socio-ecological environment. Participants who expressed clear concerns about the effects of climate change on their future tended to be more knowledgeable about this topic than those who did not. Lack of education on climate change and general lack of information on this topic made many participants unaware to the risk these changes could pose to their livelihood. So, participants who were aware of this lack of information on the topic indicated they read about climate change online or in books. Self-education was thus found crucial in attaining knowledge on climate change as, with the average age of participants around 48 years-old, most had not received any education on this topic. Lack of knowledge resulted in a low threat perception, as it is challenging to feel threatened by something that is unknown. For instance, Pamu, a 56-year-old fisherman, expressed not any awareness about any climate change consequences on his direct ecological environment nor on his future financial security. He told me how "I just do my job, every night I go out to the sea, fishing. In the morning, I sell the fish here on the fish market". Pamu had no knowledge on climate change and therefore expressed no threat perception regarding the climate. He did express some livelihood concerns in relation to government policy, which was unrelated to climate change. In line, Oshan, a 61-year-old paddy farmer, expressed no concerns about the fact that the changing precipitation pattern and the continuing temperature rise could pose threats to his paddy plants. For instance, he mentioned how the rainfall makes all the new sowed seeds flow to the lowest point of his field. This means that all the plants are bundled in a small space, and many are likely to die as they struggle to all receive enough nutrients. Oshan, however, felt no need to stress about this situation as he planted according to traditional ways, which has worked for hundreds of years. "So, why change now?", according to the translator.

Although linked together in the analytical framework, experience with climate change thus does not necessarily correspond with knowledge on the topic. As detailed in chapter 5, almost all participants expressed experiences with both rapid- and slow-onset events, but of that group, many had no to little knowledge on climate change. In turn, the absence of knowledge was found to be a stronger indicator of threat perception than personal experience of climate change. Experience does not necessarily translate to threat perception. This is especially strongly present when locals recollected their personal tsunami experiences.

When specifically focusing on the most powerful rapid-onset event in Sri Lankan history, the 2004 Indian Ocean tsunami, most participants have told me that they are not really worried about living in an area prone to environmental hazards as such. Even though the aftermath of the 2004 tsunami is still very

much physically visible in the landscape of Galle (see Figure 10) and lively present in stories told to me by locals. A factor that could contribute to this absence of threat perception could be a general lack of knowledge. The development and occurrence of a tsunami has various steps. First, the sea retreats as huge waves develop further at sea. When this happened, residents were confused as to why the beach suddenly was this big and went there to explore and mark their new territories. Nowadays, what a tsunami is, is nationally known and has left a great collective trauma. However, participants often asked me how a tsunami originates as many were unfamiliar with this. Lack of knowledge on this rapid-onset event causes a certain ease in perception of threat. Similar feelings translate to the climate change induced slow-onset events such as the temperature rise and changing precipitation patterns. Other reasons that were mentioned were the small change of another tsunami happening, knowledge on how to survive a tsunami and the passing of time which made this event less prominent in memories.

Through her gatekeeper, the researcher met the 20-year-old Yuvani, who supports her parents in their restaurant. She had no personal recollections of the tsunami herself but could show the researcher up to which height the water had reached in her parental home. She expressed how, luckily, their house was only slightly damaged and could be fully repaired. Upon asking if they ever considered to move to an area away from the coast, she was taken aback. She paused for a moment to think and then replied that this wasn't ever an option to them as they depend on tourism for their livelihood. Likewise, Suvik, a police officer who was on duty on the day of the tsunami, answered smiling upon the question of he was ever scared of experiencing another tsunami in Galle that "we don't think about now, we forget it". The narrative of forgetting about such an impactful event was followed by many participants. Many participants—though not all—expressed how they had moved on with their lives and that it was pointless to continually dwell on the tsunami. Most participants, apart from a few, indicated they were not afraid of the potential of ever experiencing another tsunami, since the chance another will occur is minimal and it would be a waste to live in fear. Thus, reflections of their tsunami experiences did not necessarily translate into feelings of anxiety or threat. Only a small minority of participants clearly expressed their fear towards the possibility of another tsunami happening in the future.

Figure 10. An abandoned house, damaged heavily by the tsunami. Many of such abandoned houses can still be found around Galle.

6.3 Livelihood vulnerability

Since early 2022, Sri Lanka is struggling with an unprecedented economic crisis (Yeung, 2022). Its consequences affect all participants in different ways and to various degrees. The most noticeable effects that locals experience are daily power cuts, shortage of basic goods and inflation. Although all participants felt the crisis in some aspect of their livelihood, some were affected to an extra extent through economic dependence on climatic circumstances. Especially affected were those working in agriculture, tourist, or fishery sectors. These participants, with exceptions such as Nuwan and Pamu, experienced higher stress levels than participants with secure climatically unaffected job positions (e.g., IT, retail, or beauty sector). Some participants recognized climate change as aggravator of their future economic insecurity. Two participants, both working as tourist guides, worried that more extreme weather would make Sri Lanka an unattractive tourist destination. At the same time, climate change already makes these participants economically vulnerable. For instance, Manil, one of the tourist guides, explained that he regularly has to cancel his walking tours due to heavy rainfall or extreme temperatures. He explained that:

> The weather pattern affects my business, because if it is too hot, I can't take the Europeans out and walk in the daytime […] especially the Europeans with their white skin. They can't tolerate this weather […] So these things you can't predict now. Sometimes, all of a sudden, it might rain.

The weather and climate thus directly affects his economic position and job security. Manil cannot fully rely anymore on his walking tours alone for providing him a stable income. He therefore recognizes climate change as a risk to his financial security and livelihood. These negative climate effects on their financial security occur on top of the economic crisis, making it extra difficult for many to make ends meet.

Besides economic factors, demographic characteristics are also determinants of feelings of risk. Nuwan, for instance, is economically dependent on the climate, but has never received any (formal) education on climate change due to his age, economic position and follows his family traditions of passing down plantation work through generations. Acting upon his learned traditional knowledge and traditional methods of paddy farming, he relies on these methods and knows no other way although having to deal with new climate circumstances. In addition, his age (67) makes him less invested in making long-term decisions, as current life expectancy in Sri Lanka for males is around 73 (World Bank Open Data, 2022). He expressed awareness of this and told me he doesn’t often think too far into the future, but rather lives day by day. Manil, on the other hand, is younger (48-years-old), owns a tourist business, and has educated himself through the news and other information sources on climate change. He is more affected by climatic changes over the long term, which makes him concerned about his financial security.

Whether a person believes, or not, that their way of life is in danger as a result of climate change isn't always indicative of a direct correlation. As demonstrated, participants base their assessment of whether their livelihood is at risk on a variety of identity-related factors, as well as their knowledge about and experiences with climate change (cognitive factors). Education, age, economic (in)security, and religious values and beliefs, in particular, play a significant role. Individual livelihood risk is not ultimately established by one single aspect, but rather by the interaction of factors that weigh importance to various degrees, depending on the participant. Some participants drew more on their religious beliefs, when making assessments of environmental changes whereas others relied more on their scientific knowledge. Although all participants had, to various extents, experiences with climate change and slow- and rapid-onset events, experience was found insignificant in relation to other factors such as knowledge and economic position. Consequently, the factors that individuals rely on substantially are subjective and, to some extent, are contingent on how they perceive and are informed about climate change. In addition, these mechanisms were found to be affected by exterior circumstances in which the participants are positioned. These will be discussed in the following chapter.

7. Livelihood resilience

The presumption of perceiving one's own livelihood at risk when it essentially is, does not necessarily hold a clear correlation. Likewise, having established that one's way of life is in danger, does not naturally correlate with the extent to which individuals engage in climate adaptation strategies. This is dependent on three mechanisms: coping appraisal (7.1), adaptive capacity (7.2), and assets and capability (7.3). To achieve livelihood resilience, individuals decide whether to engage in certain strategies and to what extent. The degree to which Galle residents employed measures varied, but participants agreed that climate adaption strategies were seen as a side concern or rather as a general survival tactic without a need for a climate-specific focus.

7.1 Coping with climate change

When researching adaptation measures implemented by locals, it was difficult for participants to delimit what exactly this notion entails. For most, adaptation to changing circumstances is not necessarily primarily because of the climate as vulnerability to climate change intersects with other societal issues, which will be discussed in a later section. Palpable adaptations measures were most easy to identify, although hardly encountered. Most participants showed me how they have installed fans or air conditioning to counter the heat. Today, fans can be found in most private homes and indoor spaces designed for tourists (see Figure 11), but this is a relatively new development. Other participants emphasized the importance for them of increasing the number of plants in their garden with the hope to make a very small but meaningful difference in reducing the temperature and creating extra shade. Moreover, in reaction to commercial tree cutting, participants hoped to counter its effects by planting more trees and plants in their backyards. Kasun, mentioned that "we can only grow plants. That's only with what we can do". He regarded growing plants as one of the only ways to counter these effects.

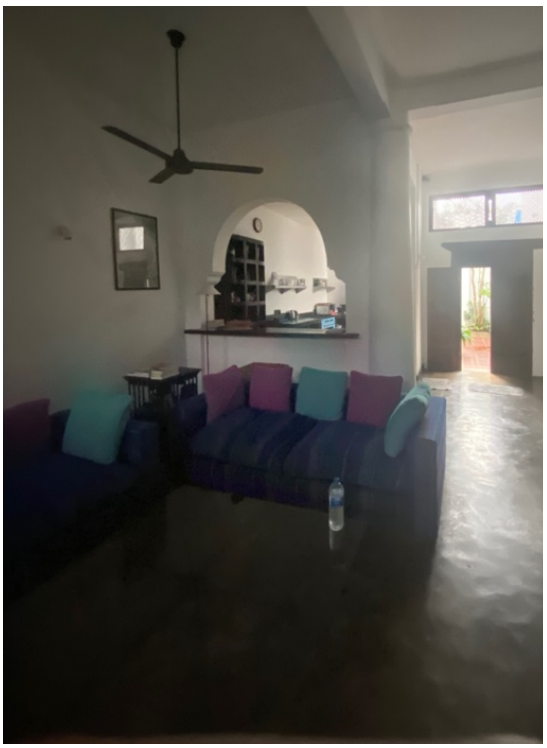

Figure 11. Houses often have ceiling fans above or close to sitting areas.

Other resilience strategies, such as having more than one income source or cultivating food in a vegetable garden, were also mentioned among several participants. For instance, Manil, who was mentioned in the previous section describing how he had lost one of his primary sources of revenue—guiding tourists through the fort—had begun investing more in his tourist shop selling souvenirs and food for a consistent flow of money. Likewise, Oshan, a

government employee and paddy farmer has two income sources and his own harvest on which he can rely for money and food. To counter bodily discomforts due to the extreme heat, one participant specifically stated that he showers more often than he used to, as the heat makes him feel uncomfortable. Others mentioned they sometimes travelled to family members living inlands to escape the heat, as these zones have a rather temperate climate.

In the agricultural sector, climate change has a lot of direct negative impacts on every step from the cultivation to harvest and drying process. However, this did not necessarily mean that farmers made thorough changes or expanding their agricultural knowledge according to changing climate circumstances. Some farmers use their natural environment to adapt to the changing climate, rather than implementing technological measures or tools. For instance, after the harvest, farmers need to dry the paddy in order to store and sell it. In the past, farmers often left the yields in the field immediately after harvesting to let it dry there. Nowadays it is risky to leave the harvest in the field as rainfall is unpredictable and interferes with the drying process. Farmers prefer to dry the yields in a dry area such as inside their house or on the side of the road, as asphalt heats up quickly and accelerates the drying process. Kosala, a tourist guide whose family owns a paddy field, explained that rather than installing a costly irrigation system, many farmers make use of water provided by the rivers and streams flowing through the land. Leading these streams into their field, whenever there are long periods of drought, farmers can open them by removing mud, making water flow into the field. Whenever the plants have received sufficient water, they simply put the mud back to block the exit of the streams. Kosala also explained that when it rains after seeds have just been planted, they are likely to wash away. To counter this, he said that:

> Some people used the method that we grow the seeds in, in in a little place. We grow the seed to like, three or four inches […] then when it comes to three or four inches, we get it and then plant it […] it is good because it will protect the seeds from the washing away.

Whenever seeds are immediately planted in the paddy field, they risk the chance of flowing away during heavy rainfall. The strategy of letting seeds sprout, often in a smaller, protected patch of land, and then planting them in the paddy field thus leads to a lower loss of crops. However, Kosala also noted that not many farmers do this as it costs them much more time. This way of planting is also more labor-intensive as the crops are planted manually. The muddy soil prevents farmers from being able to use machines, which are only used in a shared manner, and when the soil is dry enough. These restrictions of using machines leads farmers to often employ cheap labor or family members to work in the fields (see Figure 8). This strategy being more financial and labor-intensive is thus not adopted by many farmers. Rather, the interviewed farmers accepted their loss.

7.2 Adaptive capacity

As mentioned, Sri Lanka is currently struggling with an unprecedented economic crisis. In Galle, and Sri Lanka as a whole, some sectors economically suffer more than others. Climate change is not an

issue affecting individuals in isolation from other societal factors. Looking holistically at adaptive capacity, the extent to which individuals can make adaptations is severely influenced by their position in the socio-economic context. An accumulation of the COVID-19 aftermath, the economic crisis, political riots, and climate change affects every corner of the Sri Lankan landscape, to different extents. Especially sectors such as agriculture, tourism, and fishery have suffered under these crises and societal tumult. Eromi, the branch executive of a charity organization, explained how the economic crisis affects the economical position of fishermen in Galle:

> That means they are given fuel, not unlimited because of that these two years that people are suffering for that. […] Because they don't have that experience previously because we're getting the unlimited facilities of the fuel and those things. But nowadays it's too costly for them. The fishermen, they forgot their jobs because no fuel, they can't stay in the months and years in the sea, because they didn't have that much of fuel. The government is not issuing.

Eromi acknowledges how many individuals in the current crisis-ridden society are suffering due to their precarious economic situation, and she makes it clear that she is not referring to the climate crisis. Not solely fishermen, but everyone who is dependent on fuel is affected by this shortage. As lack of fuel is a palpable and severe issue, fishermen acknowledged that this hampered their business. However, when asking about the impact of climate change on their fisheries, none stated they were suffering in any way. In addition, as mentioned earlier, most of them were not aware of the global issue. Therefore, they did not specifically adapt to climate change and some still relied on traditional practices and knowledge such as the use of traditional fishing boats (see Figure 12). Similar contrasts in awareness of societal impacts and adaptation strategies take place in the agricultural sector. The government imported less fertilizer this year, resulting in less (quality) harvest. Being aware of this issue, farmers expressed acknowledgement of this issue, whereas most showed no awareness of climate change.

Figure 12. A traditional Sri Lankan fishing boat, which are still used by some fishermen today.

Besides a lack of fuel and fertilizer, the most prevalent and severe impact among participants was the daily struggle to make ends meet. One participant, who had become a good friend, explained that prices for basic goods are rising while his salary is not, making it more and more difficult to get food on the table every day. He said his dream was to migrate to Europe and asked what the immigration rules

for The Netherlands were. Another participant raised this question as well, highlighting how the urgency of their financial issues caused them to consider moving to a different region of the world in order to survive. Other participants mentioned how they sometimes thought about moving to another region of the country where the temperature is lower and with lesser flood risk. However, their lack of financial resources withheld the participants to relocate to another region or country. In addition, most participants who expressed migration aspirations were born and raised in Galle, had family in Galle who financially depended on them and other responsibilities which tied them to the city. The accumulation of factors made it, on top of a lack of financial resources, challenging for participants to think about the realization of their aspiration. However, an increasing distrust in the government and high stress levels about finances still made participants consider leaving their families behind to support them from another place.

In order to increase their resilience in the face of the economic crisis, locals thus must participate in resilience strategies in order to meet their most basic physiological needs. Consequently, climate change is reduced to a negligible issue. On top of this, many participants never received any education on climate change. Consequently, participants were not aware of its implications nor what their role could be in adapting or counteracting. However, this did not necessarily mean that all participants considered their role in the climate change issue as passive. Some participants had ideas about changes they would like to see in the current Sri Lankan political landscape. One participant, Kasun, explained how he wants to counteract climate change:

> We can use solar power for the vehicles. Also, we can use sort of uh for the house, but government don't use solar power. Because they don't get commission in that way […] they don't care about such a thing.

Kasun acknowledged the contribution Sri Lankans could be making to the environment by converting to solar power, but he also noted the necessity for the government to participate in this process. Another participant, Manil, explained that:

> I saw one of the main supermarket has introduced a vending machine that you put your plastics and you get a kind of a bonus or like kind of that you can use supermarket in Colombo. Few places they have put a kind of recycling machine. Put few plastic bottles and you get a kind of a coupon or a kind of discount that you can redeem inside the supermarket. […] You know, there's Sri Lankan cricket jerseys, some jerseys made out of recycled plastics, right? So, this kind of trends are happening in the world and in Sri Lanka is a good opportunity because it's like a small island. We have lots of opportunities.

Manil recognizes that slowly but surely, Sri Lanka is introducing more environmentally friendly products and projects such as the recycling option and the reusage of plastics. However, he also acknowledges this transition is still in an early phase and that people do participate in these recycling products, but not necessarily because they think about climate change. Rather many participate for the financial benefits. Although Manil mentioned a recycling program in the capital city of Colombo, the

government is currently hardly engaged in climate change adaptation strategies. In addition, listening to stories told by participants and travelling through the landscape makes it clear that individuals are neither informed nor encouraged by the government to engage in adaptation strategies. Residents are not informed by the way they could effectively deal with changing climate patterns and not encouraged to engage in adaptive or sustainable behavior. So, even if participants expressed the desire to make changes to contribute to combatting or adjusting to climate change, they are held back by their adaptive capacity to do so. In this sense, that means that they lack the financial resources or subsidies provided by the government to do so.

In the aftermath of the 2004 tsunami, the government relocated residents who had lost their house inlands. Upon their relocation, many people decided to sell or rent their new home and rebuild their previous house again at the shoreline. Many residents chose to live there rather than inlands, even though their former neighborhood had been shown to be vulnerable to environmental dangers. This information was gathered from participant stories and interviews the contacted charity organization conducted; no interviews have been conducted with these residents. However, not only these residents who had been forced to relocate, but also interviewed participants whose house had been damaged by the tsunami demonstrated great place attachment as was illustrated in the previous chapter. Although recognizing that their area of residence is vulnerable to environmental hazards, they indicated that they rather not move to a different, safer area. The same accounts for the interviewed fishermen. Even though Sri Lanka not officially maintains a caste system anymore, social stratification is still persistent through informal caste barriers. Having them relocated to an inland area by the government, fishermen especially experienced a lot of discrimination as they traditionally belonged to a lower caste. Not only dependent on the sea for livelihoods, but also for social acceptance, feelings of belonging and place attachment, they quickly moved back to the coast.

7.3 Assets and capability

In Galle, locals demonstrated great coping appraisal to both slow- and rapid-onset events. In an event of a tsunami, participants referred to their mobile alarm system and the tsunami alarm tower that was put in place, although currently out of function. Moreover, most participants had an evacuation plan ready and were aware of the highest, and thus safest, point of the city to go to. Slow-onset events, such as temperature rise and changing weather (precipitation) patterns mainly affected participants financially. Dealing with unpredictable weather whilst being dependent on the weather almost always resulted in a loss of financial security. However, participants demonstrated the capability in alleviating their financial stress by seeking alternative income sources, growing their own food, or having strategies for saving money when their principal income sources were impacted by climate change. Physically, participants dealt with bodily discomforts due to the extreme heat by having installed fans or air conditioner, showering more often, planting trees for extra shade or occasionally travelling to colder regions of the country (inlands). Although participants thus demonstrated their capability in adapting to

climate change in resourceful ways, many were withheld by their adaptive capacity to invest in structural long-term livelihood resilience strategies. Being motivated to adapt but lacking the financial resources, as instigated, and aggravated by the economic crisis and climate change, participants found themselves in a dichotomy of their aspirations and means to achieve them. On top of that, governmental absence of a social security net or financial incentives to adapt to climate change leaves participants with no choice than primarily focusing on basic necessities, even at the expense of their natural surroundings.

Being trapped in a vicious circle, financial security must primarily be ensured before being able to consider adapting to, for many participants, the less urgent and palpable issue of climate change. In addition, climate change is heavily overshadowed by other societal issues, resulting from the economic crisis. A lack of fuel and fertilizer are immediate, palpable issues, affecting participants short-term. Feeling the consequences of these issues immediately, participants are urged to make quick adaptations or accept the results of lacking government policy. As climate change is a long-term issue, which causes conditions in which participants can still, for the most part, live as they used to, it is regarded non-urgent by many. In line with these perceptions, wherein climate change is often seen as non-threatening to their livelihoods, many participants adapt to climate change in accessible ways, indirect of their personal awareness of this phenomenon. Meaning that participants for instance choose to install fans, because it is too hot nowadays, and not necessarily because of a direct awareness of linking the heat to climate change. Only a minority of participants demonstrated awareness of climate change when choosing to implement adaptation strategies as such.

8. Discussion

No nation or individual is exempt from climate change. However, the extent to which individuals choose to adopt climate resilience strategies is dependent on how, and if, climate change is perceived as a livelihood risk. In turn, people's attitudes and assessments of climatic events are shaped by a variety of cognitive and identity-related factors. In this chapter, the results concerning these key mechanisms and approaches, as presented in the previous chapters, will be interpreted, and analyzed in relation to the established analytical framework (see Figure 3). This analysis is divided to suite the analysis on the main mechanisms of threat perception (8.1) and livelihood resilience (8.2). Finally, an analysis of how personal and research biases may have impacted the outcomes is presented, in which a critical reflection is given of the implications of the results in reference to the field of Development Studies (8.3).

8.1 A threat perception analysis

Having established an analytical framework incorporating various well-established key approaches and theories, data collection through mainly in-depth interviews encompassed framework variables in a qualitative manner. This means that collected qualitative data could be analyzed through thorough reflection of the interview discourse and content in relation to the PMT variables and other incorporated theories. Asserting a synthesis of these various theories as the foundation of threat perception and livelihood resilience, data analysis has acknowledged that there are indeed interconnections to be found through various concepts. It is also important, however, to note that this research relies on qualitative data consisting of subjective experiences, ideas, and interpretations. Drawn conclusions are therefore in essence nuanced and specific to this research.

According to Rogers (1975), two cognitive mechanisms operate in establishing adaptive behavior when faced with hazards: threat and coping appraisal. Placing these mechanisms in the context of natural hazards, threat appraisal is established through its subjection by other cognitive mechanisms and identity-related factors. Especially influential were found to be the degree of knowledge individuals possessed on the implications and consequences of climate change and the extent to which climate change impacted their financial security. Generally, the more knowledge a person would exhibit on the phenomenon, the more stress they would express concerning the development and possible aggravation of climate change on their livelihood. This resulted in a higher evaluation of a threat's seriousness and perceived severity, in line with the PMT. In essence, participants who were knowledgeable on climate change through their job, education or other information sources generally had a higher livelihood threat appraisal and perception. However, unlike the IPCC risk model (2019) asserting that physical exposure is a crucial factor in shaping climate risk perception and adaptation, it was found that exposure and experience did not necessarily seem to lead to a higher degree of threat perception.

Although not many participants were aware of the notion of climate change, most were aware of long-term changing weather conditions in their natural environment. Most mentioned changing weather

conditions were seasonal changes such as changing precipitation patterns, droughts, and a steep temperature rise. In addition, most participants had firsthand experiences of the 2004 tsunami and other annual floodings during the monsoon season. However, these experiences and direct exposure to slow- and rapid-onset events, most aggravated and induced by climate change, did not naturally translate into a higher evaluation of a threat's seriousness and perceived severity. In fact, many participants who demonstrated awareness of climatic changes showed no feelings of threat or fear when being asked about their current and future livelihood at risk. A reason can be that individuals do not necessarily regard these environmental changes as threatening to their livelihoods due to a lack of knowledge, conflicting beliefs or prioritizing other livelihood risks. An exception to this low threat perception would be if the individual's physical exposure to climatic changes would impact their financial security. Individuals who were directly reliant on climate conditions for their income, mainly in the tourist and agricultural sectors, demonstrated more financial stress leading to a higher threat perception. However, financial stress is, in the context of Galle, the result of the interplay of numerous factors. It can't be stated that climate change operates in a vacuum, resulting in financial insecurity. For instance, financial insecurity also depends on the current economic state of the country or region, the level of education, the type of job, and the degree of resilience strategies. Thereby, financial insecurity does not in all cases naturally lead to a high threat perception. As established in chapter 6, some participants whose income directly depended on climate conditions did not exhibit a significant threat perception when climate change caused a loss of income. Specifically, understanding threat perception from a financial aspect, other contextual factors, both circumstantial and individual-related, have to be taken into account. Significant in realizing why individuals whose finances suffered under climate change exhibited large differences in threat perception was due to their degree of understanding of climate change. Again, the degree of knowledge on climate change risks is deemed more significant in establishing threat perception than direct experience or exposure to climate risks. Thus, in line with Kothe et al. (2019), a low perceived severity and susceptibility of the climate risks, and high maladaptive response rewards (e.g., money can be better used to invest in direct short-term issues or no substantial changes have been made to still be able to live normally), result in a low threat appraisal. Even if individuals are in fact susceptible to climate change, if they did not perceive it as such, it would indicate a low threat perception.

Similar conclusions can be drawn for values, norms, and beliefs. Participants who valued sustainability, environmental conservation, and generally environmentally friendly behavior, expressed significantly more climate change concerns than participants who did not. Repeatedly, these values coincide with the degree of knowledge participants possessed on the environment and climate change. These findings fall in line with Ives and Kendal's (2014) modification of the Values-Belief-Norm (VBN) Theory. Participants who expressed specific threat perceptions through their beliefs and values on their natural environment often demonstrated more environmentally friendly behavior or consciousness. This will be discussed more thoroughly in the next section. Moreover, participants who expressed significant

religious beliefs, specifically Buddhist values and beliefs, asserted a lower threat perception. A reason for this, as discussed in chapter 6, could be that these participants consider themselves having an active role in climate change consequences. As Schipper (2010) argues that religious beliefs shape one's worldview, the principles of Buddhism articulate the aim of being free of suffering. Building one's worldview upon these beliefs could result in a certain acceptance of one's changing surroundings (*impermanence*) and their own active role in this environment through the principle of *karma*. Although not explicitly questioned, a believe that it is one's ultimate goal to be free of suffering could result in a low threat appraisal, as the acknowledgement of a livelihood threat could result in stress and (mental) suffering. However, this research abstains from drawing strict conclusions based on individual religious beliefs as these are most often subjectively interpreted and practiced in a myriad of ways. Nonetheless, the fact that participants alluded to their religious beliefs without the interview guide explicitly mentioning religion makes it unequivocally important that these beliefs contribute to shaping threat perception. These findings also fall in line with research by De Silva (2006) that individuals who identify as Buddhist rely heavily on their religious values and beliefs in coping with climate risks.

Lastly, a differentiation in degree of threat perception can be explained through vulnerability to climate risks and related identity factors. Vulnerability, as interpreted by the IPCC, refers to the degree to which individuals are or could be impacted by environmental hazards. It is acknowledged that this is a broad definition, open to interpretation. It encompasses susceptibility to the threat and the capacity to adapt (Thathsarania & Gunaratne, 2018). The degree to which individuals are susceptible to environmental threats is affected by identity-related factors such as age, gender, education, and profession. As already mentioned in chapter 4, this research abstains from making gendered conclusions as it comprises a skewed man-woman ratio. However, when researching education on climate change, it became known that climate change is only recently introduced in Sri Lankan school curricula. In addition, the notion of climate change has increasingly become more widely known and present in public debates since recent years. This means that, generally, participants belonging to older generations were less knowledgeable on this topic than younger participants. Older participants that were knowledgeable on climate change often possessed degrees of higher generation, had to know about the topic for their job or were generally more well-read. However, this cannot be said for all professions that are directly affected by climate change, such as fishery and agriculture. In these sectors people largely rely on passed-down traditional knowledge wherein knowledge on the implications of climate change is absent.

Concluding the analysis on the mechanisms that ultimately shape threat perception, this research asserts that various cognitive and identity-related factors hold an interdependent role, of which some are more influential than others. Taking an intersectional approach, wherein all the different axes of an individual's identity are considered, shaping perception pertains to cognitive developments established by these identity axes. Whether, for instance, an individual is raised in a religious household, has obtained a higher education degree, or is raised with environmentally conscious values influences the degree to which they perceive their livelihood at risk due to climate change. The unification of these

axes and cognitive mechanisms shape the circumstances in which individuals reflect upon their livelihood. These perceptions, which are thus construed by unique identity configurations, shape the foundation for livelihood strategies, which will be discussed in the following section.

8.2 Achieving and aspiring livelihood resilience

Individuals living in socio-economically vulnerable regions, are often more susceptible to the consequences of climate change. Generally, they rely heavier on climate-sensitive livelihood options and have less resources to effectively adapt (De Silva & Kawasaki, 2018; Nianthi & Shaw, 2015; Thathsarania & Gunaratne, 2018). Therefore, according to Cinner et al. (2018), human adaptation ability, especially in these regions, is crucial for coping with the effects of climate change. Residents in Galle are not incentivized by the government or organizations to make climate change adaptations and are already in a long-term national state of crisis. What can be asserted is that Galle residents possess the capability to make climate change adaptations to increase their livelihood resilience within the certain coping range of individual adaptability. This means that it is acknowledged that some climate events transcend the degree to which individuals can cope with or adapt to on their own, without top-down intervention. However, within coping range, there often is a lack of adaptive capacity, and low self-efficacy and high response costs. Although the response efficacy would be high, living in times of economic crisis with high inflation, and having a lack of adaptive knowledge or financial resources are stronger indicators withholding individuals to (be able to) adapt to climate change.

In determining the degrees of adaptive behavior, four categories can be established: persons who are aware and directly affected to the impact of climate change on their livelihoods; persons who are aware but not directly affected to the impact of climate change on their livelihoods; persons who are unaware but directly affected to the impact of climate change on their livelihoods; persons who are unaware and not directly affected to the impact of climate change on their livelihoods. It is important to note that this research recognizes that globally everyone is to some degree (directly or indirectly) affected by climate change. Especially, in a globalized world where many systems are upheld by global value chains, even when unaware of climate change, indirectly individuals could still feel its effects on the other side of the world. Therefore, “not directly affected to the impact of climate change” means in this specific research context that individuals themselves do not experience their livelihood at risk in the climate change context, because of their own agency positioning them in a lesser vulnerable space or the effect of climate change on the position in their direct natural environment. This category specifically excludes the intersection with larger global chains or other livelihood risks due to, for instance, the economic crisis, lack of education, or political instability. These large processes and systems fall out of the scope of this research, as a focus is placed on individual livelihood resilience and human agency. So, individuals could still experience food shortage (livelihood risk), but when falling into the second or fourth category (not directly affected), this issue could be due to a lack of imported fertilizer, lack of financial resources or economic inflation. Another example encountered is that some individuals are

financially comfortable. So, even if climate change would impact national food production, these individuals have the financial space to buy more expensive, imported goods. Thereby, thus not experiencing their livelihood at risk.

Most often, only the first group of individuals were willing or already engaged in adaptation strategies to increase their livelihood resilience as they recognized they were negatively impacted by climate change. These were, for instance, people working in the tourist sector dealing with a decreasing number of tourists due to bad weather conditions. These individuals thus often already had a higher threat appraisal than those not engaged in adaptive behavior. Generally, working in sectors directly affected by climate change means a higher degree of knowledge on this topic. Exempting from this rule are the older generation paddy farmers and fishermen, as they rely on passed-down traditional knowledge. These individuals would fall in the third category, as their livelihoods directly depends on climate conditions. Conversely, not all the individuals that showed awareness of climate change were directly impacted by its consequences. Generally, these would be financially wealthier individuals with secure housing and basic needs. An interviewed software engineer and successful entrepreneur, for instance, were both very knowledgeable on the topic but did not perceive their livelihood at risk due to a certain achieved comfortable and secure standard of living. Most individuals of the last category could identify the changing climate conditions but were unaware of the notion of climate change and its global implications, as thoroughly discussed in the previous section. Therefore, not perceiving climate change as a possible risk to their livelihood, they did not engage in specific climate adaptations. This is not to say that individuals did not adapt to these changing conditions at all but is comprised of a more nuanced perspective. For instance, most participants identified and experienced bodily discomfort due to the rising temperature and had installed fans, planted trees for shade, showered more often or sometimes visited family inlands to escape the heat. However, only a handful of participants identified the temperature rise as due to climate change. Others were not aware of climate change or not necessarily occupied with the question why it has become warmer over the years. Thus, in line with Smit and Wandel (2006), adaptations are seldom carried out in reaction to the impacts of climate change alone.

Although the PMT positions threat and coping appraisal as two parallel cognitive mechanisms, unifying in establishing protection motivation, this research places these mechanisms as linear in affecting behavior. This means that it was found that threat appraisal influences coping appraisal, besides response efficacy, self-efficacy, and response costs. As established in the previous section, individuals often rely most heavily on their contextual climate knowledge, financial (in)stability, and environmental values in determining perceived severity and susceptibility of a climate risk. Although influential, when then determining coping appraisal, it became apparent that there is a hindering dichotomy between individual's aspirations and coping ability. According to Kothe et al. (2019), individuals engage in coping behavior when response and self-efficacy are high and response costs are low. Most participants, when perceiving climate change as a livelihood threat, demonstrated a high response efficacy, but a low self-efficacy and response costs. This means that most individuals that asserted agency in implementing

adaptation strategies with their readily available means and regarded these as efficient. Concurrently, individuals recognized that they would need external help, e.g., through government funding or subsidies, when wanting to implement long-term structural adaptations. Mentioned strategies encompass migration to other countries or regions, switching to green energy, improving recycling options, improving warning systems or receiving financial aid or subsidies. This not only refers to a low self-efficacy but also a low adaptive capacity as a lack of financial means was often regarded as the most prominent reason to not engage in or limit adaptive behavior. Response cost is often thus too high. Smit and Wandel (2006) assert that an individual relies on the larger system which they are part of in providing them with favorable conditions to adapt. In line, individuals in Galle are faced with unfavorable circumstances such as political instability, riots, inflation, and an economic crisis to adapt to climate change. These unfavorable circumstances aggravate individuals' vulnerability and exposure to climate risks when they are obstructed in their capacity to adapt to such risks. In agreement with Smit and Wandel (2006), adaptations are directly related to and indicative of both susceptibility and capability for adaptability. In line, this negatively affects coping appraisal and adaptive capacity, influencing livelihood resilience. Although many individuals have the assets and capability to engage in adaptive behavior, they are impeded by their lacking adaptive capacity and coping appraisal to do so.

As detailed, livelihood resilience not only depends on the person's willingness to adapt but also their ability to do so, as affected by societal and person-specific circumstances. The fact that there is a general low public awareness of climate change and its implications in Galle, results for many vulnerable individuals in an absence of incentives, financial aid, or understanding to increase their livelihood resilience in the face of climate change. In addition, the fact that this research was conducted during a time of severe economic crisis means that individual's adaptive capacity was greatly impacted. These findings accentuate how individuals are positionally dependent on a larger system in which adaptive behavior can take shape. Determining adaptive behavior transcends the PMT framework in not only considering individual perceptions but also their capabilities and external systems that affect livelihood resilience. The analytical framework therefore places capabilities, assets, and adaptive capacity, influenced by exposure and vulnerability, as precursors to coping appraisal. Considering the societal context of history and present result in a holistic perspective that creates understanding, in line with Siders (2019), in why some individuals choose to or can engage in resilience strategies and others don't.

8.3 Research biases and position in the field of Development Studies

As adapted from quantitative research, research biases are often defined as any factor causing the findings of a research to be misconstrued or misinterpreted (Galdas, 2017). As the foundation for this qualitative research is established with a background of European academic training and conducted in a South-Asian island nation, potential biases and resulting limitations were reflected upon prior and posterior to data collection (see chapter 4). It is acknowledged "those carrying out qualitative research are an integral part of the process and final product, and separation from this is neither possible nor

desirable" (Galdas 2017, p. 2). The attainment of validity and rigor therefore lies in the degree of self-reflection and transparency (Holmes, 2020).

This research acknowledges that all major theories, frameworks, and notions used to establish the main analytical framework were coined and founded by white American, Australian, and West-European male scholars. Placing this framework in a South-Asian sphere pointed out an epistemological gap considering the research design. Relying on in-depth interviews as main method, the rigor and validity of data collection depended mainly on the design of the interview guide. As this guide was drafted to embody variables of the analytical framework, it simultaneously epitomized a white, masculine, and a Global North interpretation of livelihood questions and discourse. In addition, in conducting literature study for the foundation of the literature review and the interview guide, the decision to adopt certain theories and frameworks relied heavily on personal education and upbringing. As mentioned in chapter 4, the degree to which personal political and climate awareness was created implied a bias in placing this gained knowledge in the Sri Lankan contextual framework.

On entering the field, difficulties rapidly ensued during the interviews. Relying on both personal knowledge and the analytical framework, a gap presented itself between academically prevalent knowledge and local prevalent knowledge and discourse. As many of the used frameworks in the socio-psychological sphere were established mid or late last century in which white, masculine scholars dominated the academic field (Demeter, 2019), there is limiting research available on coined or founded frameworks outside of this demography. For this research, reliance on these frameworks means that reflecting upon the interview guide, it recognizes that in its provisional version perhaps too little space was given to emphasize the importance of intersectionality and contextuality. In addition, little thought was given to the fact that the notion of climate change is not globally recognized but was coined and is still more prevalent in Western public discourse (Conway, 2008). The interview guide, therefore, had to be adapted to fit the participant's discourse and knowledge. Moreover, some results are, as mentioned in previous sections, limited in terms of gender, religious values, sexuality, and other possible important axes, to avoid misinterpretations or produced by a gap in gathered data. Notwithstanding, this aforementioned bias transcends this research, as Rutazibwa (2019) states that there still exists a "comparatively hegemonic positionality in the analysis of colonial power embedded in international development thinking and practices with a particular focus on the academic context" (p. 163). Likewise, considering the positionality of the academic context in which the research is conducted and the contribution it makes to the field of Development Studies, it's necessary to discuss the implications of biases for the purposes of transparency and self-reflection.

Various studies argue for the need of bolstering to increase adaptive capacity in 'developing' nations, and especially in their vulnerable regions (e.g., Cinner et al., 2018; Reser & Swim, 2011; Tanner et al. 2014). Although slowly shifting, most research proposing this idea is developed through a Global North lens, projecting socio-psychological ideas in the Global South context. For instance, prior to data collection there has been given little attention, neither through literature study nor personal academic

education, to the fact that not all notions, such as climate change, are globally well-known in the public sphere. This research recognizes in that sense its confirmation bias, in that it has regarded literature on these notions as self-evidently transferable in the context of the research. Generally, throughout the field of Development Studies, a lengthy history of colonial and postcolonial texts provides a perspective on the possibilities for diversity and inequity in the production of knowledge throughout the world (Collyer, 2016; Demeter, 2019). Although its history and scope being too lengthy and profound for the scope of this research, it chooses to concisely touch upon this divide as modern-day research is affected by the existing archive of last century knowledge production. Studies point out that Northern scholarship often positions the non-West as a 'passive recipient' of a set of universally applicable claims and generalizations about power, status, and class (Collyer, 2016). General implications of this research therefore are to emphasize and reshape the degree to which development notions are self-evidently considered to be globally known. Specifically in the context of climate change and belonging adaptation strategies, the bulk of studies arguing for bolstering adaptive capacity are published by scholars from the Global North translating their ideas and frameworks onto the Global South. As adaptive capacity, as well as threat perception and livelihood resilience, is contended to be context-specific and dynamic (Smit & Wandel, 2006), this research questions if arguing how adaptive capacity could be built from this prevalent Western lens is sufficient to increase adaptation ability in 'developing' regions such as Galle. Especially due to the gravity of contextual factors in shaping adaptive behavior for residents of Galle. They are not incentivized by the government or organizations to make climate change adaptations, little public attention is given to climate change, and live in a long-term national state of economic crisis. This research, therefore, tries to abstain from this reiteration of unilateral knowledge production by drawing the main conclusions based on and guided by the participants experiences before placing the data in the analytical framework. By letting the research guide itself by local discourse and knowledge, with an emphasis throughout the research on the gravity of contextual factors, it hopes to contribute to local knowledge production in the dynamic field of Development Studies.

9. Conclusion

This research aimed to understand threat perceptions of climate change and adaptive behavior as livelihood resilience strategy of residents of the city of Galle, Sri Lanka, and the relationship between these notions. The research was designed for qualitative data collection through the main method of in-depth interviews in providing valuable insights and answering the main and sub research questions. Based on these interviews with Galle residents, insights were gained in contextual and person-specific factors that lie at the foundation of the aforementioned notions. This chapter will primarily be devoted to answering the main research question based on the analysis of the findings in reference to the developed analytical framework. (9.1). Thereafter, a concise reflection will be given on these findings in terms of general implications beyond this research and future research recommendations (9.2).

9.1 Reflections on the research question

Based on qualitative analysis of collected data in Galle, in this chapter the answer to the main question will be presented. To recapitulate, the main research question is: *How are individual perceptions of environmental threats caused by climate change manifested in local-led adaptation strategies?* Herein, this research explored which mechanisms lie at the basis of shaping threat perception and adaptation strategies of Galle residents in the face of climate change. Based on unique experiences and understandings, various core mechanisms could be distinguished which are fundamental in shaping these notions and their relationships. As discussed in previous chapters, both threat perception and adaptation strategies are formed and affected by contextual, cognitive, and person-specific factors. These include vulnerability and exposure; value, norms, and beliefs; knowledge and experience; adaptive capacity; and assets and capability. These factors, positioned in a specific context, shape threat and coping appraisal, ultimately shaping threat perception and livelihood resilience. Significant in analyzing this relationship was found to be the role of knowledgeability of climate change implications in shaping threat perception. When individuals exhibited a great degree of knowledge on this issue, they expressed higher levels of threat perception, which engendered adaptive behavior or awareness and aspirations of adaptation strategies. This finding demonstrated a relationship between both notions, although in essence nuanced and context specific.

Awareness and accessibility of knowledge on climate change in Galle was found to be limited. Not many individuals were familiar with neither the notion nor its global implications. Although exposed and vulnerable to climate change, this knowledge gap resulted for many in a low awareness, reflected in a low degree of threat perception. However, generally it was not deemed necessary for many individuals to perceive their livelihood at risk to engage in climate change adaptation strategies. Bodily discomfort or a threat perception of external circumstances such as the high rate of tree chopping inlands sufficed for individuals to engage in various strategies. In essence, residents of Galle adapt to climate circumstances with their readily available means, but not necessarily with an awareness and threat

perception of climate change. It is thereby acknowledged that there is a substantial difference between these adaptation strategies and approaches to increase livelihood resilience. The former encompasses mostly strategies to counter short-term climate discomforts, not necessarily increasing one's resilience in the face of climate change. On the other hand, individuals that suffered under direct consequences of changing climate conditions *and* were knowledgeable on climate change expressed a higher threat perception of their current and future livelihood and had engaged in strategies to alleviate these pressing risks. Moreover, individuals that were more knowledgeable on livelihood risks of climate change expressed certain aspirations of long-term livelihood resilience strategies. However, many individuals expressing such aspirations were withheld by their lacking adaptive capacity to engage in these strategies. A noteworthy gap was found between what individuals aspired and the extent to which they could adapt with their readily available means. The circumstances that influence individuals in engaging in livelihood resilience strategies are crucial in shaping and influencing adaptive behavior. In Galle, this meant that other issues at the time of the research, such as the economic crisis and its national implications, were considered more pressing or overshadowed the perceived risks of climate change. Consequently, these external factors are of greater significance than cognitive or identity-related ones in shaping livelihood resilience strategies as they frame the boundaries in which individuals have the space to adopt such strategies. Similarly, even when individuals perceive climate change as threatening to their livelihood, the degree to which they adopt resilience strategies is dependent on the system which provides them with (un)favorable circumstances to adapt to climate change.

In sum, although threat perception is not necessarily naturally present in engendering adaptive behavior, it is a crucial factor in motivating individuals to engage in a broad pallet of livelihood resilience strategies. Taking even a step back, threat perception was found to be a necessary factor in creating aspirations, ideas, and plans to increase livelihood resilience. Knowledgeability on climate change was identified to be crucial in shaping threat perception and adaptive behavior. Moreover, the individual's agency to devise and realize such strategies is shaped, bolstered or limited by the socio-economic circumstances in which one is positioned. Therefore, albeit apparent that threat perception is essential in willingness to increase long-term livelihood resilience, its manifestations are deeply nuanced, person-specific, and context dependent.

9.2 Outlook

As climate change is creating increasingly more individual livelihood risks at a rapid pace, it is important to understand what mechanisms lie at the foundation for the motivation to adapt to these changing climate conditions. Increasing livelihood resilience results in the long run in giving people the freedom and opportunity to stay put while not endangering their lives. With climate change being ultimately an issue of justice and politics, it disproportionately affects future generations, vulnerable communities, and has created asymmetries in decision-making power to authority in establishing effective action (Tanner et al., 2014). As the Global North still holds a hegemonic position in academic

knowledge production (Collyer, 2016; Rutazibwa, 2019) and as researched notions, such as resilience and adaptive capacity, are highly context dependent, it is important to reiterate and emphasize the avoidance of making universal claims or generalizing contextual ideas and experiences. Academic knowledge production, essentially influencing policy making, should therefore be sensitive to the shaping factors of livelihood resilience that are embedded within the boundaries of specific societal circumstances. As threat perception and its manifestations in livelihood resilience strategies concern personal feelings, ideas, and aspirations, they are subjective to human experiences and emotions within a socio-economical context. It would therefore be restricting and unsuitable to establish and place a universal set of adaptation strategies onto unique ecological and cultural systems. With this research invigorating the contextual sensitivity of such strategies, it aims to create a more thorough understanding of how the creation of a universal set of top-down adaptation strategies could potentially be threatening people's current livelihoods.

To create a complete and holistic understanding of livelihoods threatened by climate change, recommendations for future research are presented. Considering the established limitations of this research (see chapter 4), it is recommended for future to include a larger scope of intersectionality in their population or sample group. Many comparative studies in South Asia point out that women are particularly vulnerable and disproportionally affected by climate change (Hossen et al., 2021; Patel et al., 2019). As research on women's vulnerable position in Sri Lanka is very limited, it is recommended for future research to fill this research gap by including a gendered perspective on climate change adaptation. In addition, it is recommended to research other marginalized groups, such as homeless persons, unemployed persons, or members of the LGBTQI+ community, as climate disproportionally affects vulnerable persons that 'fall outside' the norms of society (Tanner et al., 2014). In researching the inequal and disproportionate extent to which people and communities are affected by climate change, a more holistic understanding should be created in establishing fitting livelihood resilience strategies. Lastly, upon interviewing a charity foundation in Galle about their climate adaptation program, they expressed concern in relation to the limited contextual data available on climate change, climate change perceptions and global adaptation strategies. It is recommended, therefore, for future research to work together with established organizations in data exchange. As this research is conducted in a limited time span of six weeks, of which prior and posterior desk research is conducted from The Netherlands, a local organization could benefit from the collected data and analyzed results as they are permanently established in the study site. Especially local non-government organizations are positioned closer to residents' everyday lives and reality and are therefore more adept and knowledgeable in creating fitting strategies. In addition, they are presumably more accurate in informing institutions, bodies, and agencies, who are positioned far away from local experiences.

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Appendix A. Interview Guide

Introduction	Thank you for agreeing to do this interview. My name is Julia van den Berg and I am a master student at the University of Utrecht. I am currently studying International Development Studies and doing research for my master's thesis. I am interested in researching perceptions on climate change, feelings of risk and local-led adaptations. As you know, after Sri Lanka was hit in 2004 by a tsunami, it had to rebuild a lot of its infrastructure and buildings, also in Galle. I am wondering, from this point forward, did the perceptions of locals on climate change, change? And to what extent does this influence the sense of feeling at risk? Also, I am interested to what extent did this event set in motion local-led adaptations to potentially prepare for more extreme weather events or climate change. As my research is all about perceptions, experiences, and feelings, I want to ask you some questions about this topic. Your answers are very valuable to my research. This interview will not take more than an hour.
Consent	With your consent, I would like to record this interview to be able to listen back to your answers. As I intend to interview various participants, the recordings help me remember what was said and who said what. Throughout the whole interview and after, you will remain anonymous. This means that any information that could be used by others to identify you will be anonymized. The data will be treated confidentially and stored anonymously as much as possible. The data will be stored on an external hard disc, only available to me and at least until the end of the academic year, which will be in August. You can stop or pause your participation in the interview at any moment. Please do not hesitate to let me know. You can choose to give consent to the mentioned information either verbally or written. Do you give permission to record this interview? And do you give permission for me to use the anonymized data in our research?

	Before starting, I want you to feel free to ask me any questions during the interview, but for now, do you have any questions before starting the interview?
Personal notes	Date Context (weather/situation/stability/housing conditions) In case of making photos > consent and note coordinates
Opening questions	Where in Galle do you live? - Neighborhood - Region [coast/transition/inland] What does a day in your life look like? - Working - Studying - Extracurricular activities
Climate change perception Exposure Vulnerability Severity Susceptibility	What can you tell me about how the weather has changed when you compare your childhood to now? - Observations since living in Galle - Weather/monsoon fluctuations, sea level, temperature
Threat perception Exposure Vulnerability Severity Susceptibility Rewards VBN	How does the way you noticed [climate change/the above-described weather changes] in Galle make you feel? - Also considering the future - Why? When was the last time you felt scared for the future in relation to [climate change] or extreme weather events? - Do you often feel this way? - Did you also feel this way before the tsunami? To what extent has [climate change] made changes to your personal life over the last [age] years? - Do you think your well-being and/or economic situation has changed due to climate change?

	To what extent has [climate change] made changes to your direct environment over the last [age] years? - House/neighborhood/natural environment/school/job
Tsunami experience Exposure Vulnerability Severity Susceptibility	(Where) were you living in Galle at the time of the tsunami? Could you tell me about this event? - Direct [personal/impersonal] impact - Aftermath To what extent do you still experience the consequences from the tsunami? To what extent do you talk about your experiences from the tsunami with others? - With whom? - How often? - Content of discussion How do your family members perceive those experiences?
Adaptive capacity Response efficacy Self-efficacy Response cost Assets Capability	To what extent do you feel that [climate change] now affects your daily live? - How/why To what extent have you taken measures to counter [climate change]? - Adaptation [> what/why/what purpose] [Since when have you started taking measures?] How do these measures impact your life? Are you often mentally/physically busy in taking new measures? Do you share your experience in creating these measures with others? - With whom? - In what ways? - Does this affect the people you discuss this with?

	Do you notice others in your community/environment taking measures to counter changing climate? - If yes, what measures? - Similar design/purpose in nature?
Fading out questions Threat perception Vulnerability Exposure Resilience	What are your expectations for the future regarding the climate in Galle? - Risk perception Demographic details - Age - Gender - Family composition - Income - Housing conditions Is there anything you would like to add that wasn't mentioned before? Would you like to receive a copy of the final version of this thesis? - Not necessary to answer now, also possible to follow-up by e-mail/text Thank you for agreeing to the interview and sharing your experiences with me. As mentioned at the start, your data is stored confidentially, anonymously and in a secure location. You can contact me any time you want regarding the research.

Appendix B. Coding Tree

Themes/concepts	Root codes	Sub-codes	Category	Description
Livelihood	Socio-economic position	Police officer	Profession	Each participant's profession tells something about their level of education, exposure, and vulnerability to effects of climate change, and socio-economic status
		House manager		
		Branch executive officer		
		Jeweler		
		Restaurant owner		
		Tire shop employee		
		Primary school teacher		
		Housewife		
		Hotel owner		
		All-round hotel employee		
		Shop owner and tourist guide		
		Student and waitress		
		Unemployed		
		Hairdresser and masseur		
		Souvenir shop owner and tourist guide		
		Software developer		
		Entrepreneur		
		Souvenir shop owner		
		Tourist pension owner		
		Retired paddy farmer		
		Coconut seller		
		Fisherman		
		Tourist guide		
		Government official and paddy farmer		
		Paddy and cattle farmer		
		Housing	Living situation	Housing situation is linked to profession, level of education, exposure, and vulnerability to effects of climate

				change, and socio-economic status
		Education	Level of education	Level of education is linked to profession, level of education, exposure, and vulnerability to effects of climate change, and socio-economic status
	Neighborhood of residence	Coast (C)	Geographical area	Each geographical zone is affected by climate change or weather events in different ways
		Transition (T)		
		Inland (I)		
	Family	Family composition	Family composition	Important to know with how many people participants lives (do they carry financial responsibility for many people?)
	Age	Age	Age/Generation	To which generation participants belong tells something about their level of education on climate change
	Informal earnings	Vegetable garden	Livelihood resilience	Reliance on ways other than profession for livelihood (AC)
		Paddy field		
Climate change	Temperature rise	Warmer now than prior	Physical geographical and climatic changes	Most mentioned climatic changes
		Uncomfortable		
	Changing precipitation pattern	Rainfall in dry season		
		Unpredictable rain pattern		
	Flora decrease	Plants can't adjust to the heat		
		Cutting of trees		
	Frequent floodings	Urban water surplus		Urbanization makes it difficult for water to flow and drain
		Salinization		Salt water enters rivers (prior to dam)
	Stream evaporation	Certain streams no longer exist		Droughts due to temperature rise
	Drought	Rivers dry up when it's dry for long		
	[Earthquakes]	Frequent earthquakes		Mentioned by many participants as

				belonging to climate change
	Climate change causes/accelerators	Vehicle pollution		Recognized mechanisms accelerating climate change and pollution
		Cutting of trees		
		Lack of recycling		
		Garbage dumping		
	Stable	No perceived climatic changes		No awareness of climate change, possibly due to more pressing issues such as the economic crisis or lack of knowledge
	Weather forecast	Discussion of day-to-day weather pattern and seasonal changes		Language barrier and/or lack of knowledge resulted in the translation of climate change into weather forecast
Threat perception	Financial impact	Less tourism	Strong threat perception	Only a minority of participants expressed a strong threat perception, mainly on economic means and climate prospects
		Less harvest		
	Fear	Future climatic changes		
		More future extreme weather events		
	Neutral	Tsunami alarm tower	Weak threat perception	Reliance on warning systems, even though the tower doesn't seem to work anymore
		Mobile phone warning system		
		Passing of time makes you forget		20 years after the tsunami makes memories less present
		Foreseeable future not at risk		Personal lifetime not in danger
		Buddhism		Religious values. Especially the principle of karma is present in climate discussion (linked to acceptance)
	Little to no communication	No talking about climate change with others		Most participants expressed no or only little communication with others about climate change
		Talking with few others		

	Other priorities	Importance of work, regardless of the climate		Pressure of economic crisis stronger felt
	Lack of knowledge	Not educated on climate change		Older generations had no education on climate or climate change
	Informal knowledge gaining	Knowledge gained besides formal education		Gained knowledge on climate (change) through e.g., the news, the internet or others
	Acceptance	Accepting difficulties caused by climate change		Some choose not to adapt but to accept that they will encounter more hardships
	Traditional knowledge	Traditional knowledge is regarded by some as superior		Climate change does not fit within traditional knowledge (on e.g., agricultural techniques)
		Post-colonialist ideas		Indigenous practice based on traditional knowledge as product of separation from colonialist powers.
		Traditional agricultural and fishery practices		
Tsunami experience	Signal disruption	All communication devices failed	Collective trauma	Increased fear and insecurity during tsunami
	No prior tsunami knowledge	Nobody had any knowledge on what a tsunami was		
	Faced directly	Was hit while driving in his car		Direct experience of tsunami
	Death	Seeing dead bodies		
	On duty	Had to work during and in the aftermath of tsunami		
	Psychological ramifications	Collective trauma post tsunami		Ramifications during the aftermath of the tsunami
	Physical ramifications	Infection due to dirty water		
	Financial ramifications	Shop was damaged		

	Fleeing to safe location	Fleeing to the highest, safest place	Livelihood survival	No direct experience of tsunami
	Not in Galle during tsunami	Living/working somewhere else	Indirect tsunami experience	
	Going to beach during tsunami	The water withdraws exposed the beach	Fatal livelihood decision due to lack of knowledge	None of the participants, but many locals died while going to the beach when the tsunami hit
Tsunami expectations	Fear	Scared of another tsunami happening	High threat perception	Small minority of participants said to be afraid of another tsunami happening
	Neutral	No expectations	Low threat perception or mental space for threat	Most participants are neutral and expressed it has no use to be constantly living in fear, life goes on
		No fear of new tsunami		
		Never thinks about tsunami anymore (forgetting)		
		Reliance on warning systems		
		No (financial) space to adapt		
	Ignorant government	Government has not implemented enough prevention measures	Absent government	Lack of measures implemented from the government causes frustration
	Measures are pointless	There's nothing we can do because the water is stronger		Tsunami is stronger than all measures, so making everything stronger is pointless
Adaptive capacity	No considerable livelihood adaptations made	Similar post-tsunami housing reconstruction	Low adaptive capacity	Many locals refuse to move to other locations due to place attachment, financial dependence (e.g., on tourism or fishery), faced discrimination inlands, established social network
		Resettlement to coastal zone		
		Financial dependence		Financial dependency on their current place of residency or

				profession for income, even though more exposed and vulnerable to climate events
		Lack of financial means		Lack of financial means to adapt to climate change or climate events
		No agricultural changes		Farmers accept changing weather patterns and most still use traditional agricultural techniques (see also acceptance, Buddhism, and traditional knowledge). Some also don't have the financial means to buy 'modern' machines
	Place attachment	Established social life		Even people who live in geographical areas vulnerable to climatic changes and events refuse to migrate due to place attachment, which is composed of various factors
		Family		
		Facilities and social services		
		Profession (financial dependency)		
		The way life has always been		
	Countering bodily discomfort	Need of fans with current heat, unlike prior	Small-scale practical adaptation strategies	On a small scale, participants demonstrated adaptive capacity (also at times unrelated to perception of climate change)
		Taking more showers when hot		
		Air conditioning		
	Supporting biodiversity	Growing plants in garden		
	Creating shade			
	Governmental role	Government has other priorities	Absent government	The current government does little to promote or finance e.g., clean energy sources or measures to counter climate change
		Reliance on other countries to counter climate change		

	Aspirations	Migrating if the climate becomes too extreme	Adaptation aspirations	Even though participants aspired to adapt to climatic changes, most lack the financial means to do so or are restricted by the system (low adaptive capacity)
		Installing solar panels		
		Buying an electric vehicle		
		Normalizing recycling		
Expectations	Temperature rise	Temperature will become warmer	Climatic changes	Most mentioned climate change predictions, most a continuation of current climatic changes
	Weather fluctuation	More unexpected rainfall		
	Drought	More droughts and dry periods		
	Stable	No climatic expected changes		Some expressed a stable continuation of the current climate
	Other priorities	Few actually think about the future		Some had never thought/knew about climate change before and thus had no predictions or headspace to think about the future. For some the topic was too incomprehensible/not palpable