

HOW CAN THE STATE OF TUVALU KEEP ITS HEAD ABOVE WATER?

*Exploring the preparation for the transitional process from
the current state to a condition of uninhabitability and
ultimately full territorial loss due to sea-level rise*

JET WINDHORST & SALOME GNANN |
DIVISION OF RISK MANAGEMENT AND SOCIETAL SAFETY |
LTH | LUND UNIVERSITY, SWEDEN

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Abstract

Tuvalu, a sovereign island state in the Pacific, faces an unprecedented threat: entering a condition of uninhabitability and losing its land territory due to sea-level rise (SLR). While its inhabitants fight passionately to preserve their home, their remarkable culture, and statehood, existing scientific and legal frameworks remain fragmented to address the situation. The thesis aimed to develop a transitional model of a possible worst-case scenario of full habitable land loss due to sea-level rise in Tuvalu. Additionally, it aims to identify how Tuvalu is currently preparing for this worst-case scenario.

The thesis adopts an abductive approach, following a scoping study framework and including five expert interviews. The findings of both components are synthesised in the model, chronologically tracing the worst-imaginable scenario. Key findings arranged on the model suggest anthropogenic pressures, changing weather and oceanic conditions - with SLR leading the way - as main drivers of Tuvalu's challenges. The influence of SLR runs through various disciplines, eroding habitability-determining factors: reliable freshwater and food supply, habitable land, safe settlements, economic activities, and community life. Beyond, the pace of the possible transition is influenced by atoll morphology, media representation, power asymmetries and the Tuvaluans' strong land attachment. Adaptation measures, including resolving legal questions surrounding the continuation of statehood and the maintenance of maritime entitlements, are part of Tuvalu's preparation for the future. Tuvalu does everything in its power to keep its head above water - literally and figuratively. The question is whether research, the international community, and law will rise to meet the challenges.

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Riskhantering och samhällssäkerhet
Lunds tekniska högskola
Lunds universitet
Box 118
221 00 Lund

<http://www.risk.lth.se>

Telefon: 046 - 222 73 60

Division of Risk Management and Societal Safety
Faculty of Engineering
Lund University
P.O. Box 118
SE-221 00 Lund
Sweden

<http://www.risk.lth.se>

Telephone: +46 46 222 73 60

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"When you pass through the waters, I will be with you; and through the rivers, they shall not overwhelm you; when you walk through fire you shall not be burned, and the flame shall not consume you." — Isaiah 43:2 (ESV)

Abstract

Tuvalu, a sovereign island state in the Pacific, faces an unprecedented threat: entering a condition of uninhabitability and losing its land territory due to sea-level rise (SLR). While its inhabitants fight passionately to preserve their home, their remarkable culture, and statehood, existing scientific and legal frameworks remain fragmented to address the situation. The thesis aimed to develop a transitional model of a possible worst-case scenario of full habitable land loss due to sea-level rise in Tuvalu. Additionally, it aims to identify how Tuvalu is currently preparing for this worst-case scenario.

The thesis adopts an abductive approach, following a scoping study framework and including five expert interviews. The findings of both components are synthesised in the model, chronologically tracing the worst-imaginable scenario. Key findings arranged on the model suggest anthropogenic pressures, changing weather and oceanic conditions - with SLR leading the way - as main drivers of Tuvalu's challenges. The influence of SLR runs through various disciplines, eroding habitability-determining factors: reliable freshwater and food supply, habitable land, safe settlements, economic activities, and community life. Beyond, the pace of the possible transition is influenced by atoll morphology, media representation, power asymmetries and the Tuvaluans' strong land attachment. Adaptation measures, including resolving legal questions surrounding the continuation of statehood and the maintenance of maritime entitlements, are part of Tuvalu's preparation for the future. Tuvalu does everything in its power to keep its head above water - literally and figuratively. The question is whether research, the international community and law will rise to meet the challenges.

Executive Summary

This thesis focused on Tuvalu, a Small Island Developing State (SIDS) located halfway between Australia and Hawaii. The country, consisting of nine low-lying atoll islands, is home to 9400 people and known for its vibrant community and culture. However, on the global stage, it mainly gained familiarity as the first country that will disappear underwater, a threat that is unprecedented for a sovereign state. A combination of a remarkably low land height, a small but remote land area, and a high dependency on international assistance makes Tuvalu one of the countries most vulnerable to sea-level rise (SLR). Nevertheless, the threat of SLR and the disappearance of the entire habitable land area will not happen overnight, but will face various challenges and thresholds during a transitional process, one that has already started today. Frequent flooding, threatened food and water security, and endangered settlements and infrastructure severely threaten the liveability of Tuvalu, making stakeholders wonder how long the island will remain habitable. And with the possibility that the island may not be able to support human occupancy, this question is followed by some remarks about the maintenance and functioning of Tuvalu's future statehood - especially if the full land territory is lost under water. While the consequences of this potential worst-case scenario could thus be detrimental and require a lot of preparation, no visualisation of the process exists today. While a lot of research has been done on the legal, social, economic, and environmental impacts of SLR, no one has connected the dots within a transitional model. Therefore, this thesis aimed to develop a transitional model of a possible worst-case scenario of full habitable land loss due to sea-level rise in Tuvalu. Additionally, it aims to identify how Tuvalu is currently preparing for this worst-case scenario.

To reach the proposed aim, this thesis adopted an exploratory abductive approach, following the scoping study framework of Arksey and O'Malley (2005) in its entirety - including its five core stages and the optional sixth stage 'consultation exercise', realised through semi-structured expert interviews. By combining these qualitative components - namely the scoping study and the consultation exercise - it was possible to explore both the theoretical scaffold for understanding the threats imposed on Tuvalu and their opportunities to prepare for possible uninhabitability, while adding contextual depth and current insights to the thesis.

Starting from exploring what was known in existing literature about SLR in Tuvalu, the thesis reflected on the environmental, social, ethical and economic considerations possibly involved in the transformative process. These findings, summarised in a narrative in Chapter 6, formed the foundation of the worst-case scenario sketched in the model. The scoping study informed which thresholds should be considered in the determination of habitability on the island, and provided potential stressors and influences that could impact this scenario. All this information together led to the draft of an initial simplified model. This simplified draft was presented during the expert interviews, offering participants the opportunity to give feedback and criticism, and refine the elements identified in the scoping study. Moreover, the consultation exercise added insights to the

current state and level of preparedness in Tuvalu, as some of the information in previous literature was lacking, conflicting or inconclusive - as presented in Chapter 7.

The results revealed that the current state already displays changes in weather and oceanic conditions, frequent temporary inundation, and, most significantly, the consequences of SLR. The most threatened habitability pillars were freshwater and food security. While SLR is undeniably a driver of Tuvalu's changing environment, the literature and interviews highlighted the importance of considering the anthropogenic impacts as well. A nuanced assessment of the impacts of climate change in Tuvalu is necessary, acknowledging that both human and environment are mutually reinforcing each other. Within this assessment, special attention should be given to the correlation between atoll morphology and SLR, as current research and data have not yet been able to answer the question of whether the natural processes will keep up with future rising sea levels.

For the determination of uninhabitability, the results demonstrated a need for the broader conceptualisation of habitability as a continuum rather than a binary state. Literature and experts agreed that the assessment of habitability cannot be reduced to one point in time, accepted and applicable to everyone. Instead, it required individual contextualisation to account for different risk tolerance thresholds and to capture the importance of individual agency and self-determination. Additionally, it displayed that external influences have a significant effect on the determination of habitability threshold, such as the media representation, and unequal underlying power relations. However, as a red thread, it showed that the Tuvaluan identity and land attachment, resulting in very strong social cohesion and community capital, could push this habitability threshold further into the future than some external experts would suggest. The results thus highlighted that habitability goes beyond the basic needs of food, water, and land - it encompasses the safety of settlements and infrastructure, economic opportunities, availability of critical societal functions, ties to the community and land, and individual adaptive capacities. It requires an open mind to the living conditions people are willing to accept and adapt to, as long as they can stay connected to their land and waters.

In terms of preparedness, this thesis found that Tuvalu is doing everything in their power to keep its head above water, both literally through adaptation measures and figuratively through diplomatic and legal avenues. Current preparedness measures mainly consisted of adaptation plans and the development of the digital state. Freshwater collection and desalination efforts, adjustments of agricultural practices, and land reclamation projects so far have proved successful in extending the habitability threshold. However, it remains unclear whether these measures will be able to cope and keep up with future climatic changes. Furthermore, declarations and bilateral agreements have been drafted indicating regional consensus that Tuvalu will be able to preserve the maritime zone and gain virtual sovereignty, in case of complete loss of habitable land. Nevertheless, little has been prepared for a potential future relocation, both due to a lack of local support and the governmental refusal to acknowledge relocation as a solution to the climate crisis.

List Of Abbreviations

ASLR.....	<i>Accelerated Sea-level rise</i>
COP.....	<i>Conference of the Parties</i>
EEZ.....	<i>Exclusive Economic Zone</i>
ENSO.....	<i>El Niño Southern Oscillation</i>
GDP.....	<i>Gross Domestic Product</i>
ICJ.....	<i>International Court of Justice</i>
IPCC.....	<i>Intergovernmental Panel on Climate Change</i>
MCRDS	<i>Montevideo Convention on the Rights and Duties of States</i>
PSIDS.....	<i>Pacific Small Island Developing State</i>
RQ.....	<i>Research Question</i>
SDD.....	<i>Statistics for Development Division</i>
SIDS.....	<i>Small Island Developing State</i>
SLR.....	<i>Sea-level rise</i>
TCAP	<i>Tuvalu Coastal Adaptation Project</i>
UN.....	<i>United Nations</i>
UNCLOS.....	<i>United Nations Convention on the Law of the Sea</i>
WoS.....	<i>Web of Science</i>
WPR	<i>World Population Review</i>

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1 Introduction

Located halfway between Australia and Hawaii lies the island nation of Tuvalu - nine low-lying islands where the highest point barely rises above the water (Islam et al., 2023; Vaha, 2025). Tuvalu is home to 9400 people (Statistics for Development Division [SDD], 2026), sharing an extraordinary sense of community and an exceptionally rich culture (Madaleno, 2011; Talia, 2025). Particularly remarkable is the unique bond of Tuvaluans between community, the land, water and ancestors - a relationship that cannot be captured in words (Stratford et al., 2013; Kitara et al., 2024).

Yet, this idyll is increasingly overshadowed by an existential threat: rising sea levels, resulting from anthropogenic climate change, undermine the livelihoods of Tuvalu's population (Fornalé et al., 2016; Jain, 2014). As a Small Island Developing State (SIDS), Tuvalu is particularly vulnerable to sea-level rise (SLR) due to its small size, remoteness and dependency on international assistance (Kelman, 2010; Sjostedt & Povitkina, 2017). According to some models, Tuvalu may be completely submerged as early as 2050 (Islam et al., 2023; Balesh, 2015) - a scenario that would make Tuvalu the first sovereign state in history to be completely buried beneath the waters (Fornalé et al., 2016). However, this scenario is not a sudden event, but a creeping process that has already begun to unfold (Duvat et al., 2021). Houses and gardens are frequently flooded, freshwater supplies are contaminated by intruding seawater, and the cultivation of crops is becoming more and more difficult due to increasing soil salinity (Islam et al., 2023; Duvat et al., 2021; Singh et al., 2022). This deterioration of the living conditions and consequently Tuvalu's uninhabitability begins long before the last piece of land is covered by water (Spencer et al., 2024; Balesh, 2015; Fisher, 2008; McAdam, 2010).

While historically several islands have been completely inundated due to SLR, for example, Holland Island or New Moore/South Talpatti, none of these islands were sovereign states (Fornalé et al., 2016). In contrast, the sovereign state of Tuvalu is facing the threat of losing the basis of its statehood, as SLR erodes the traditional foundations of the understanding of statehood (Costa & Simões, 2025). Consequently, Tuvalu's possible uninhabitability and complete inundation raise uncertainties about what it means for a state to lose physical territory - an unprecedented situation (Fornalé et al., 2016; Kittel, 2015). It raises the question whether Tuvalu will - literally and figuratively - be able to keep its head above water.

Previous literature

As the effects of climate change and SLR have been known for decades, many articles have been written on the topic. Even in the specific context of Tuvalu, the notion of SLR has been studied extensively since the 1990s (Lewis, 1989; Roy & Connell, 1991; Lewis, 1999). From this initial correlation between climate change and SLR, a multidisciplinary research field has evolved: Legal scholars started to raise questions about the implications of SLR on future statehood (e.g. McAdam, 2010). Environmental scientists studied atoll morphology and examined what solutions could be

applied to the rising water problem (e.g. Barnett & Adger, 2003; Fletcher et al., 2013). Social scientists explored whether the local population is aware of these problems (e.g. Madaleno, 2011). As the severity of SLR impacts continued to amplify, the topic of migration became popular (Blitz, 2011; Marino & Lazrus, 2015; Smith & McNamara, 2015). Migration scholars started recognising diminishing habitability as one of the crucial factors in the complex correlation to migration (Horton et al., 2021). This gave rise to the first habitability scholars, performing assessments that indicated which places and livelihoods were most threatened by climatic changes and identifying possible indicators of the transition from habitability to uninhabitability (e.g. Duvat et al., 2021; Kench et al., 2018; Stege, 2018). In recent years, there has been a considerable increase in articles on habitability specifically, reflecting the growing urgency of the topic (e.g., Badillo-Interiano et al., 2025; Boas et al., 2025; Magnan et al., 2026).

Despite this broad research field, two important research gaps remain: Firstly, while the research exists across disciplines - climate science, international law, habitability, social, and economic studies - the dots are not yet systematically connected. To date, there is no transitional model tracing the possible transition from Tuvalu's current state to a condition of uninhabitability and, ultimately, to full territorial loss, and thus combining all disciplines to a coherent whole (Atapattu, 2014; McAdam et al., 2025). Secondly, limited research has been conducted on how Tuvalu currently conceptualises this transition and prepares for full territorial loss - the worst imaginable scenario. This leaves the intersection of uninhabitability and preparedness as a not-yet-explored field in literature.

This thesis addresses these gaps by making a twofold contribution: First, it synthesises existing research across disciplines that have been studied in isolation and puts it into the context of Tuvalu, particularly the link between uninhabitability and preparedness (Chapters 6 and 7). Secondly, and this constitutes the heart of the thesis, it connects the findings within a transitional model (Chapter 8): a chronological scenario of possible thresholds, underlying influences and stressors that shape the transition from Tuvalu's current state to the loss of habitable land. This model of the possible transitional process does not assume a linear, inevitable static endpoint, but rather a dynamic process, influenced by various factors - something no model can fully capture. Nevertheless, the model visualises a possible transition, supporting the analytical understanding of uninhabitability in Tuvalu.

2 Purpose and Research Question

The aim of the thesis at hand is to develop a transitional model of a possible worst-case scenario of full habitable land loss due to sea-level rise in Tuvalu. Additionally, it aims to identify how Tuvalu is currently preparing for this worst-case scenario. Starting with exploring what is known in existing literature about SLR in Tuvalu, the thesis will reflect on the environmental, social, ethical and economic considerations possibly involved in this transition. It further discusses the potential consequences of SLR and the subsequent loss of land for the legal continuation of Tuvalu's statehood. Finally, it analyses the effects of SLR experienced in Tuvalu today, referred to as the 'current state', and Tuvalu's current preparations for full territorial loss, the 'worst-case scenario'.

Three research questions guide the thesis:

- RQ1:** What is known from the existing literature about the impacts of sea-level rise on Tuvalu's habitability and future statehood?
- RQ2:** What is the transitional process from the current state, to a condition of uninhabitability, and ultimately the full loss of habitable land in Tuvalu?
- RQ2.1:** How is Tuvalu currently preparing for the worst-case scenario of full territorial loss?

A transitional model was selected as it allows the reader to understand the disappearance of habitable land is a process exacerbating different risks over time, something often underrepresented in current literature. Additionally, it acknowledges that an accurate formulation of the problem is required for the design of adaptation measures, and thus serves as a potential solution space.

3 Conceptual Foundation

To address the research questions, this thesis adopted an exploratory approach. Hereby, several concepts guided the research rather than using fixed hypotheses. The concepts - habitability and preparedness - were determined after establishing social and academic relevance in the literature review. While each concept addressed one aspect of the research focus, combined, they provided a comprehensive picture for understanding and exploring the research topic.

3.1 Habitability

In the battle between SLR and diminishing territory, not only the quantitative dimension of lost territory is considered, but also the qualitative dimension of habitability (Burson et al., 2023). Threats to long-term habitability due to climate change were already highlighted in the third assessment report of the Intergovernmental Panel on Climate Change (IPCC) (Barnett & Adger, 2003). Later in a special report, habitability was defined as “the ability of a place to support human life by providing protection from hazards which challenge human survival, and by assuring adequate space, food and freshwater” (Weyer et al., 2019, p. 15).

Over time, the definition of habitability was expanded as several authors made small adjustments. Capisani (2020) argued that - besides basic needs such as access to land, water, and food - the structural component of continued access to infrastructure should be considered in adequate liveability. Additionally, Duvat et al. (2021) stressed the importance of providing economic opportunities, considering their contributions to the population’s health and well-being. Furthermore, authors started to explore the non-material aspects of the habitability definition. Marshall (2020) contended that habitability should be considered from an ethical stance, differentiating between a meaningful life based on your own values and bare physical existence. Sterly et al. (2025) mimicked this importance of a meaningful and dignified life, stressing that it is the quality of the relation between people and a place that dictates the capabilities and resources available. Finally, Spencer et al. (2024) combine both the tangible financial, institutional and technical resources with the intangible resources such as land attachment and cultural identity. They claim that both together determine if and how inhabitants adapt to challenges and thus prolong the habitability of their island.

While debating on which exact elements to include within the habitability definition, most of these authors described habitability as a binary condition - habitable or not. However, this binary characteristic has been called into question, as Farbotko and Campbell (2022, p. 189) stated, “there is not necessarily an objectively knowable point at which a place becomes uninhabitable.” Several researchers increasingly advocate that habitability should not be understood as a binary condition but rather as a continuum shaped by environmental and social processes with certain thresholds and stages (Sterly et al., 2025; Boas et al., 2025). In fact, Boas et al. (2025) claimed this understanding is crucial, as a binary conceptualisation could lead to ethical implications. They warned that the way in

which habitability and the future of people vulnerable to climate change is formulated brings along unintended negative consequences and undermines the right of people to self-determination.

To prevent deterministic and victimising narratives, this thesis acknowledges that habitability goes beyond measurable and physical factors and is shaped by social dynamics. Therefore, habitability is not understood as a binary state, but as an individually perceived impression shaped over time (Boas et al., 2025). Although the thesis reveals some indicators to conceptualise possible uninhabitability for some people - referred to as thresholds in the model presented later in the thesis - the transition towards uninhabitability remains up to individual interpretation. Moreover, the thesis emphasises the active involvement and participation of Tuvaluans in the process of conceptualising potential uninhabitability, particularly in the consultation exercise.

In short, this thesis operationalised habitability as a continuum - consisting of the various thresholds retrieved from the above-mentioned definitions and the results - alongside the transitional process from current state to full territorial loss, to create a model. The projections for future uninhabitability or full territorial loss displayed in this created model are interpreted as a possible future, not an inevitable one. As no one can reliably predict the future, the thesis avoided deterministic statements and advocates exploring future scenarios rather than imposing inevitability on climate-induced projections (Boas et al., 2025).

3.2 Preparedness

Closely connected to the determination of uninhabitability is the need for preparedness for the worst-case scenario. First of all, if the state of uninhabitability is reached, a relocation plan has to be prepared to prevent the occurrence of a haphazard displacement (Noy, 2017). Scholars agree that this potential international mass migration event requires a lengthy preparation process starting now (Magnam et al., 2026; Noy, 2017; Sjöstedt & Povitkina, 2017; Stege, 2018). To ensure this relocation plan improves the living standards of inhabitants, community involvement through participatory planning will be crucial for its success (Magnam et al., 2026; Stege, 2018). Moreover, it requires multi-level coordination and agreements on an international scale to secure the financial resources and land for the migration and integration process (Stege, 2018). Additionally, preparedness is necessary for the final stage of the transitional process to full loss of habitable land area, which is defined as the moment the entire land area - including its highest points - has been fully submerged.

‘Preparedness’ in the context of this thesis is operationalised in several ways. Firstly, it refers to the extent to which the worst-case scenario has been portrayed and translated into action by Tuvalu. Secondly, the thesis studies whether the different preparedness needs in the various stages of the transitional process have been assessed. And finally, this thesis questions whether adaptation solutions and coping mechanisms have been proposed for some of the stages.

4 Methodology

The thesis adopted an abductive approach, intending to establish a pattern of meaning after analysing the data (Gray, 2014). Given the limited availability of existing research on the transitional process between habitability and full territorial loss, and the lack of other models of that process, an exploratory qualitative design was chosen. This approach allowed the researchers to gain familiarity with the topic and narrow down the scope over time to the elements required for the final model design, which is described in Chapter 4.4.

To address the research questions, the thesis followed the scoping study framework of Arksey and O'Malley (2005) in its entirety - including its five core stages and the optional sixth stage 'consultation exercise', realised through semi-structured expert interviews. Figure 1 visualises the stages of the scoping study framework.

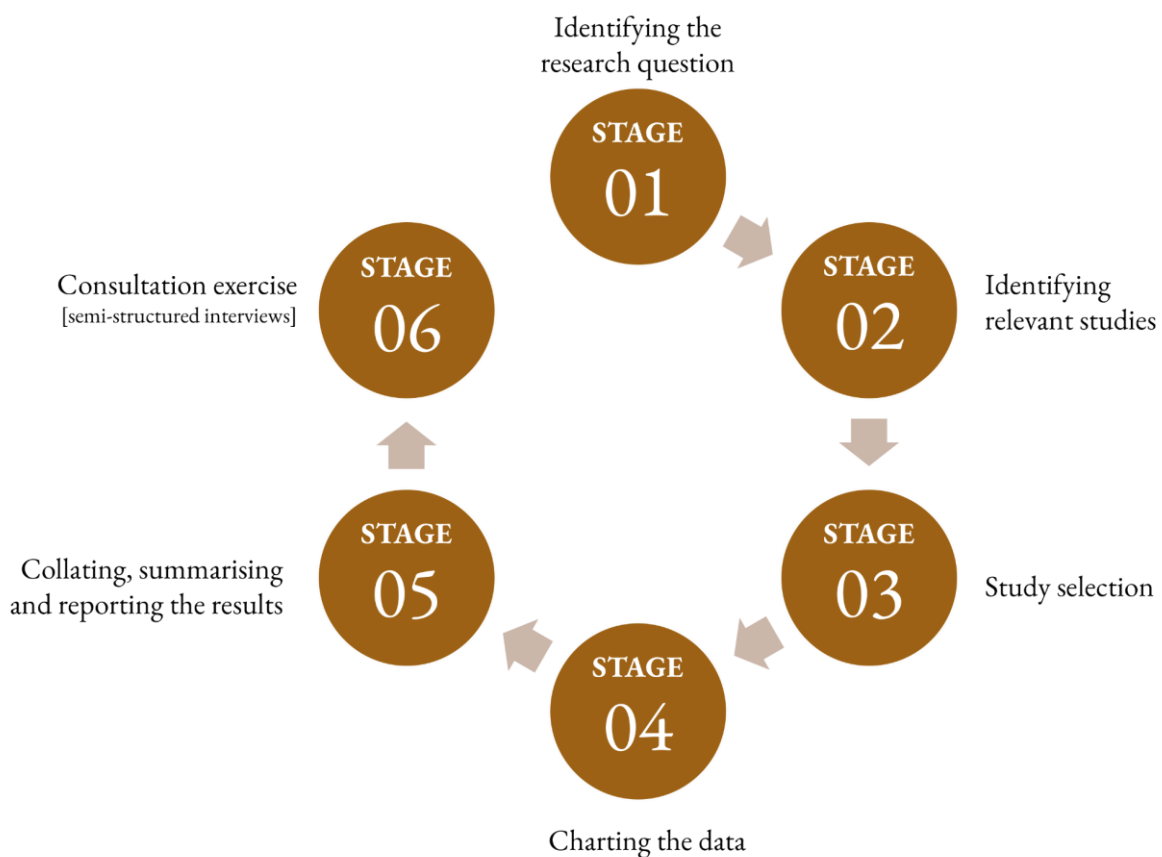


Figure 1: Stages of the methodology used in accordance with Arksey and O'Malley (own figure, based on Arksey & O'Malley, 2005).

Although the consultation exercise differs from the five literature-based core stages in terms of execution and purpose, it is nevertheless part of the scoping study framework. While the first five stages of the framework provided a structured overview of existing research, the experts' insights of the consultation exercise enhanced the quality of the preceding stages and offered the opportunity to include recent developments not yet covered in literature (Oliver, 2001; Arksey & O'Malley,

2005). Throughout the thesis, the term ‘scoping study’ is used for the framework’s core stages 1–5; when specifically addressing stage 6, it is referred to as a ‘consultation exercise’, acknowledging its distinct role within the overall scoping study design. By combining these qualitative components - namely the scoping study and the consultation exercise - it was possible to explore both the theoretical scaffold for understanding the threats imposed on Tuvalu and their opportunities to prepare for possible uninhabitability, while adding contextual depth and current insights to the thesis.

To illustrate how the six stages of the framework were operationalised to answer the RQs within this thesis, Figure 2 provides an overview.

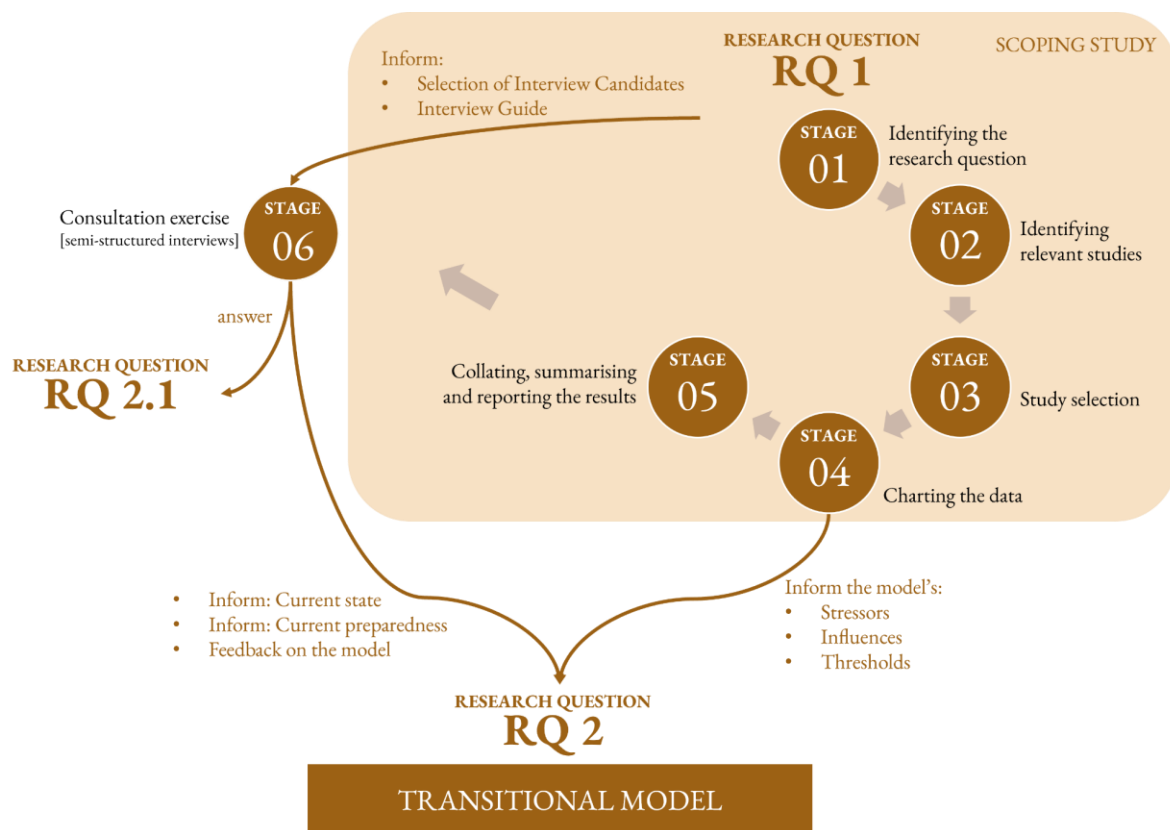


Figure 2: Application of the framework developed by Arksey & O'Malley (2005) in the thesis (own figure).

As shown in Figure 2, the scoping study was used for several purposes. Firstly, it provided additional background information and revealed possible research gaps, which have been discussed in the introduction. Secondly, it was used to answer RQ1, as it familiarised the authors with the various fields of research within the scope of Tuvalu and the impacts of SLR. Ultimately, the findings were summarised in a narrative - later presented in Chapter 6 - which was used as the foundation for the scenario development of the model. It informed which thresholds needed to be considered in the uninhabitability continuum, and which stressors and influences impacted this scenario. Finally, it informed the interview guide and identified possible interview candidates for the consultation exercise.

This consultation exercise was used to answer sub-research question 2.1 on the current preparedness of Tuvalu, and to refine and verify the transitional model - the so-called ‘simplified draft model’ - which has been drafted based on the scoping study findings available to that date. The development of the final model thus followed an iterative process across both the scoping study and the consultation exercise: The experts provided feedback and criticism on the simplified draft model, allowing the refinement and review of the scoping study’s results until the final model was created. The development process of the model is described in more detail in Chapter 4.4. Therefore, the consultation exercise effectively answered RQ2 on the transitional process. As the information on the current state was limited and inconsistent within the literature, the results of the scoping study were considered equal to those of the consultation exercise, which exceeded its original function of confirming the findings of the previous literature.

In the following sections, the used method will be described in more detail. Instead of following the frameworks’ six stages in sequential order, the description is organised thematically and differentiates between the scoping study and the consultation exercise.

4.1 Data Collection

Scoping Study

The framework’s first stage formulated RQ1: “What is known from the existing literature about the impacts of SLR on Tuvalu’s habitability and future statehood?” In order to identify relevant literature in the second stage, selectively combined search prompts (Appendix A) were used in academic databases, including Scopus, ScopusAI, Web of Science (WoS) and EBSCO. Given the high variety of search prompts, the searches were divided between the two authors to ensure a systematic and efficient screening process. The initial focus of the searches was on Tuvalu. When this did not reveal relevant results, the scope was expanded to Small Island Developing States in the Pacific (PSIDS). Overall, making use of the exploratory nature of the research process, search prompts were occasionally revisited and redefined as familiarity with the topic increased. Additionally, resources were identified through cross-referencing literature.

For the third stage of study selection, the papers’ titles and abstracts were screened. Subsequently, the papers considered to be relevant based on the inclusion and exclusion criteria (Appendix B) were uploaded to the systematic review software Covidence. The criteria were adapted, as the scope focused over time, to exclude disciplines outside of the transitional scenario. For example, studies focusing on adaptation were left out of the scoping study, as it intends to describe the impacts, not necessarily focus on how those impacts can be fixed. Nevertheless, some papers proved useful in later stages, such as the discussion, so exclusion from the scoping study did not have to mean removal from the entire thesis. Within the article selection process, relevant information about the analysed papers was documented in a data charting form (Table 1) using Google Sheets, according to the proposed

framework by Arksey and O'Malley (2005). Via Covidence, both authors independently screened each other's pre-selected papers for the fourth stage of full-text screening.

Table 1: Overview of the data charting form (based on Arksey & O'Malley, 2005).

Search Number	Retrieval date	Database	Search prompts	Search results	Included

Consultation exercise: Expert interviews

The consultation exercise entailed conducting five semi-structured expert interviews using the platform Teams. Semi-structured interviews were chosen to allow comparability between the interviews while being flexible in addressing emerging themes. The interview guide provided a scaffold for the interviews (Appendix C), yet the sequence of the questions was adjusted to match the interview dynamics. Additional questions were asked if unanticipated issues arose, as well as follow-up questions for clarification or elaboration to deepen points raised by the interviewee (Gray, 2014). Furthermore, all interview participants were shown the simplified draft model (explained in Chapter 4.4) from the current state to full territorial loss, to guide the conversation for potential thresholds and gather feedback for possible improvements.

4.2 Sampling Method

Purposive sampling was used for the selection of interview participants, informed by the scoping study (Creswell, 2009). In particular, by the themes and concepts identified, the area and type of expertise required, experience in the Pacific region, and the number of times authors were included in the literature selection. Beyond the scoping study, interview candidates were identified by searches for recent policy developments in Tuvalu as well as the official governmental website, ensuring that local voices and perspectives were reflected in the study.

In this thesis, the term expert refers to “any person who has specialized information on or who has been involved in the political or social process of interest” (Von Soest, 2023, p. 278). Experts in this sense “might be academics, practitioners, political elite, managers, or any other individuals with specialized experience or knowledge” (Maestas, 2018, as cited in Von Soest, 2023, p. 278). By this understanding of the term experts, the study captured recent insights on both practical and theoretical perspectives on the transitional process and the current preparedness measures for potential uninhabitability.

In total, 13 people were contacted to request an interview, of which six accepted. Initially, half of the accepted interviewees were Tuvaluan. Unfortunately, one candidate from Tuvalu did not turn up for the interview, leaving a total of five participants. The expertise of the various interviewees is presented in a participant profile in Appendix D.

4.3 Data Analysis

Scoping study

For the fourth stage of the scoping study, the selected articles proceeded to a full-text examination in Covidence, as visualised in Figure 3. For efficiency purposes, the papers were split evenly among the researchers. To keep track of the papers examined and to include information about the key issues addressed in the literature, the data charting form was expanded (Table 2). The full data charting form is attached in Appendix E.

Table 2: Overview of the expanded data charting form (based on Arksey & O'Malley, 2005).

Search Number	Search prompts	Retrieval date	Reference (APA 7)	Study location	Aim of study	Important results	Codes	Reader (S/J)

Arksey and O'Malley (2005) explain that the fifth stage of the scoping study intends to present a narrative overview of all reviewed materials and thus requires a method for grouping the articles. Accordingly, open coding was used and related or overlapping codes were subsequently grouped into broader themes. In Chapter 6, these themes will be presented in a narrative to complement the phases of the conceptualised transitional process from the current state to possible full territorial loss. Structuring the findings along possible transitional stages supported the development of the transitional model.

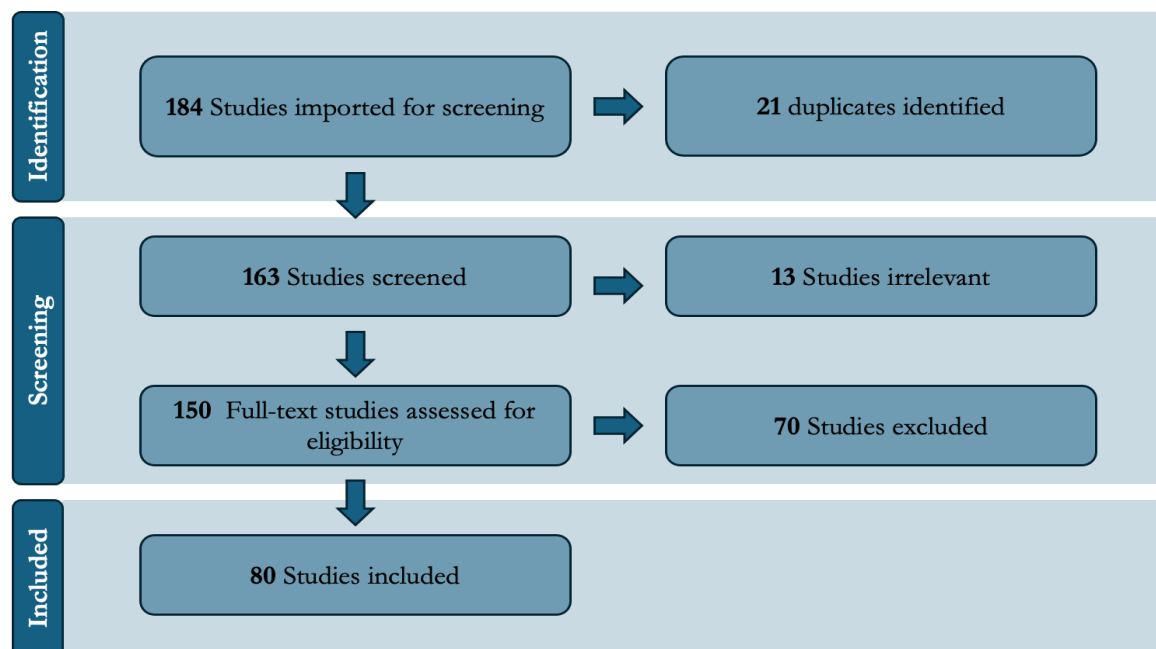


Figure 3: Flowchart illustrating the process of narrowing down the literature for the scoping study, based on the exclusion criteria (own figure, adapted from Covidence PRISMA).

Note: The chart begins with the study identification (184 studies), followed by the title and abstract screening (163 studies), then the final selection of 80 studies.

Consultation exercise: Expert interviews

To analyse the interviews, a thematic analysis was used. First, the interviews were transcribed using the Microsoft Teams transcription tool. Once transcribed, the data were systematically organised in the software MAXQDA by open coding. The codes were manually developed by the researchers, based on the participants' answers. The initial coding was divided between the two researchers, each independently coding a selected number of transcribed interviews. After this initial phase, the coded transcripts were exchanged and reviewed by the other researcher. In this second coding step, further relevant codes were added, ensuring a consistent coding process. Analogue to the scoping study's data analysis, the codes were grouped together into broader themes, letting a thematic map emerge (Braun & Clarke, 2006). The thematic map facilitated the interpretation and understanding of the relationship between different concepts. While the themes displayed similarities to the themes recognised in the scoping study, both naturally emerged from the coding and were treated separately.

4.4 Model Development

The development of the transitional process model is a crucial methodological contribution of the thesis. Drawing on the scoping study framework, the final transitional model was developed in an iterative three-stage process:

Firstly, the findings of the scoping study were translated into a simplified draft model, visualising the possible transitional process from the current state, to a condition of uninhabitability, and ultimately, full territorial loss in Tuvalu. This simplified draft model, as visualised in Figure 4, was deliberately kept simple to serve as an overview of possible thresholds and prompt discussion during the consultation exercise.

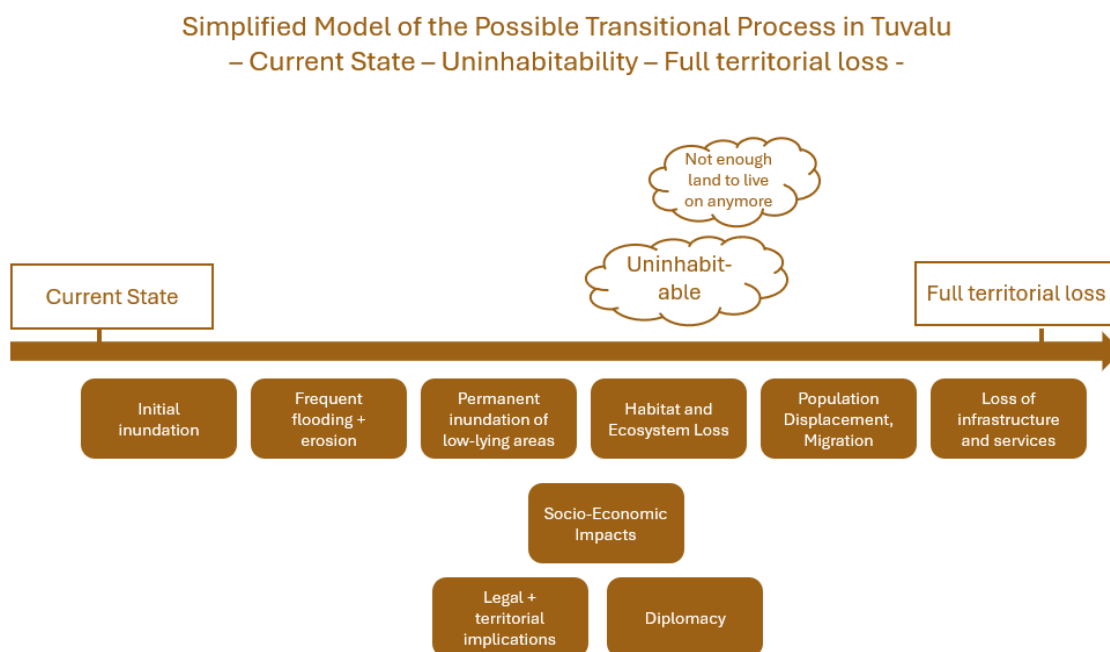


Figure 4: Simplified Draft Model (own figure).

Secondly, the simplified draft model was presented to all five experts in the consultation exercise. All experts were invited to give feedback on the model, to challenge the assumptions it made and to refine it. This ensured that the model was not developed solely from an external perspective, but that local experts and experts in the field meaningfully contest and enrich it. The interviewees had some validating insights, such as confirming the findings of the scoping study and their translation into the model. However, they also suggested some alterations, such as some missing factors, changes in terminology, and a more parallel representation of the stressors rather than the linear process presented in the draft.

Thirdly, based on the experts' feedback, the model was systematically refined. Beyond expanding, removing and resequencing the model's components, adjustments to the used terminology were made. Most importantly, the shift from 'full territorial loss' to 'full loss of habitable land' in order to avoid deterministic implications of an inevitable endpoint, especially in light of legal dimensions. By adopting this terminology, the model reflects the legal argumentation line for continuation of statehood and Tuvalu's self-determination, reframing the 'endpoint' to habitability and conditions to sustain human life rather than the presence of legal territory.

The final transitional process model is presented in Chapter 8. It consists of a potential worst-case scenario, including the possible social, environmental and legal factors, as well as the required preparedness measures.

4.5 Limitations

Many of the limitations originated from the selected methodology. While the scoping study provided foundational knowledge, it did not assess the quality and robustness of the findings from the included articles (Arksey & O'Malley, 2005). Consequently, some of the articles used to base our findings might be flawed. However, controversial research findings that potentially translate into the conceptualisation of the transitional process were addressed in the consultation exercise and discussed in Chapter 9.

For the consultation exercise, limitations were mostly found in the participant selection and the interpretation of the findings. The authors recognised that within purposive sampling, the researchers' judgement determines the participant selection, which could be influenced by biases (Tajik et al., 2025). Since researchers unconsciously bring along their own values, sympathies and preferences, voices of different insights might not be heard as loudly as those confirming one's own (Zahle, 2025). Furthermore, the expert's role or function might have politically tainted or disguised information (Von Soest, 2023). Both could have affected the information determining the model, potentially failing to depict a balanced picture of reality (Zahle, 2025; Johnson & Levin, 2009). This limitation was minimised by selecting experts from different positions and parties.

Limitations of the model mainly consisted of recognising uncertainty, as a reliable prediction of the future is impossible. This thesis thus recognises that other future scenarios are possible. Additionally,

the opportunity of refining the model in greater detail, especially when developed with local actors through a bottom-up approach, is recognised. Furthermore, the progression of the stressors was based on the author's interpretations of both experts and literature and was thus not based on calculated data.

Beyond methodological limitations, several practical ones arose. Firstly, given the time available, the number of expert interviews was limited. Secondly, this thesis did not take the international community's preparedness measures into consideration, although both authors acknowledged that effective preparedness must be in place across multiple levels. Thirdly, English literature was used exclusively. However, since most literature was written in English, the impact of this limitation was not considered significant.

4.6 Ethical Considerations

Researching sensitive topics such as habitability and potential loss of land required careful ethical reflection throughout the thesis. The overarching goal of the thesis was to explore the research field in a way that encourages and inspires future research rather than hindering it or negatively affecting Tuvaluans. Hence, the research and the conducted interviews did not expose participants to suffering or harm in any way (Wa-Mbaleka, 2019). Nevertheless, since the topic touched upon people's livelihoods, identities, and future prospects of an entire state, the framing of the findings and the design of the interview questions were approached with caution. That included avoiding deterministic questions and phrases while interviewing. Additionally, emphasis was put on respectful wording throughout the thesis, making efforts to incorporate local concepts (Muthanna & Alduais, 2023).

Beyond the considerations about deterministic and victimising framing of habitability mentioned within the conceptual framework, several methodological ethical risks were identified. Since the thesis was conducted in partnership, both parties held each other accountable to certain standards, reducing personal biases. The thesis acknowledges that the exploration of the topic requires ethical sensitivity that no research paper can ever fully capture or resolve. However, to minimise potential ethical issues, several measures were taken:

- (1) Firstly, the process of data collection and analysis was constantly monitored and adjusted for potential biases to ensure balanced perspectives and resolve them (Zahle, 2025).
- (2) Secondly, during the selection process of interview candidates, emphasis was placed on the diversity of the voluntary participants, including name recognition, background, expertise, geographical origin, and discipline (Zahle, 2025; Murphy & Aguinis, 2019; Wa-Mbaleka, 2019).
- (3) Thirdly, informed consent was a central component of the research design. A consent form was constructed to inform participants about the research's aims and objectives and to explain the intended use of the gathered information. All participants read and signed the

consent form before taking part, and the interview started with a clear statement of the terms of participation (Wa-Mbaleka, 2019).

- (4) Fourthly, the participants were offered anonymity or partial anonymity if they wanted, but this was waived by all. After the completion of the study, all audio recordings and personal information were deleted (Allmark et al., 2009).
- (5) Fifthly, transparency and data integrity were prioritised. This means that no data or results were changed, except in cases of grammatical errors within quoting (Muthanna & Alduais, 2023). For the use of quotations, consent was obtained. Additionally, interview participants were offered access to the completed thesis upon request.

The following chapters will present the results obtained using this methodology, starting off with a contextualising country profile to aid the interpretation of the displayed data.

5 Country Profile

The name *Tuvalu* translates to “eight standing together” (Stratford et al., 2013, p. 67), pointing to the eight historically inhabited islands that together form the archipelago and symbolise the strong social cohesion characterising the Tuvaluan life. Today, Tuvalu comprises nine low-lying islands, as visualised in Figure 4: three reef islands (Niutao, Nanumanga, Niulakita) and six atolls (Funafuti, Nanumea, Nui, Nukufetau, Nukulaelae, Vaitupu) (Islam et al., 2023). In addition to these nine main islands, Tuvalu has over 100 small islands, with 30 on Funafuti alone (McLean & Kench, 2015).

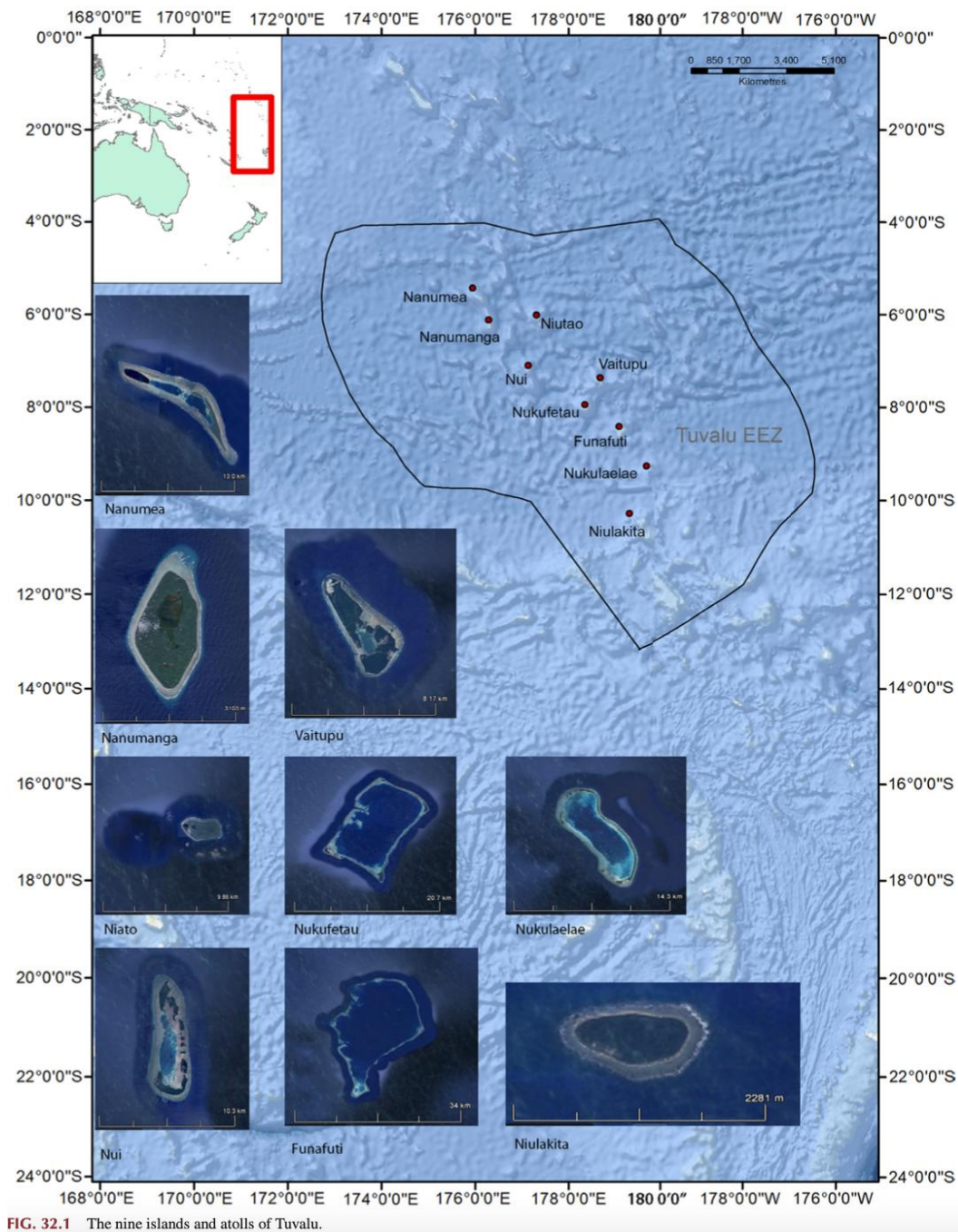


Figure 5: Geographic location of Tuvalu (from Ceccarelli, 2019, p. 700).

With a total land area of 24.4 square kilometres, Tuvalu is “one of the smallest independent nations in the world in its population size, land mass and national economy” (Connell, 2003, p. 92). Yet, Tuvalu’s maritime territory spans over 750 000 square kilometres of sea (Connell, 2003), grounding Tuvalu’s identity not as a small island nation but as a Large Oceanic State with rich maritime resources. The island’s average elevation is 1m above sea-level, and the highest point rises 4m (Islam et al., 2023). On the extremely narrow habitable land, just 100 metres wide (Stege, 2018), around 90% of the infrastructure and the majority of the population are concentrated in areas just a few metres from the coastline (Wandres et al., 2024; Duvat et al., 2021). Funafuti, the capital island, accommodates 63% of Tuvalu’s inhabitants (Letchford, 2025). In this light, Tuvalu is one of the world’s most densely populated nations (World Population Review [WPR], 2026).

This physical proximity is mirrored in Tuvalu’s strong sense of community (Stratford et al., 2013; Madaleno, 2011). The unity of the “eight standing together” is reflected in the local concept of *Fenua*. According to Stratford et al. (2013, p. 69), *Fenua* “indistinguishably bundles together community/people/places”, capturing the intimate relationship of communities, ancestors, culture, island and sea (Rothe et al., 2024). The emphasis on connectivity is further expressed in the concept of *Fale Pili* - “looking after one’s neighbour as if they were family” (Kitara et al., 2024, p. 233).

The proximity of people is further reflected in the high level of trust in the government, configuring a politically stable landscape (Barnett & Adger, 2003). On the international stage, Tuvalu is actively promoting climate action, which becomes evident, for example, in its engagement at the Conference of the Parties (COP) and the participation in proceedings at the International Court of Justice (ICJ) alongside its neighbour Vanuatu (Rothe et al., 2024; ICJ, 2024). Besides, Tuvalu proactively pursues a range of bilateral agreements to safeguard the future of its state and people. One example is the Falepili Mobility Pathway with Australia, enabling 280 Tuvaluans per year to permanently relocate to Australia (Gamboa & Goh, 2025).

Although Tuvalu’s geography, social structures, and political engagement were presented separately, it should be noted that these conditions form a complex, interconnected system. Changes in one dimension affect all others, making the understanding of these linkages crucial for analysing how SLR may shape Tuvalu’s long-term habitability and how the transition towards possible uninhabitability and territorial loss might unfold (McCubbin et al., 2015).

6 Findings Scoping Study

After the article selection through stages 1-3 of the scoping study, this section shows the main themes that arose from the full-text review according to the fourth and fifth stages. These themes are presented in a narrative, beginning with the impacts of climate change, separately highlighting sea-level rise, then tracing how these processes diminish habitability and concluding with the implications that might have for Tuvalu's future statehood. The following Figure 6 illustrates how these themes are connected within a bigger picture, formulating the foundation for the model later presented in Chapter 8.

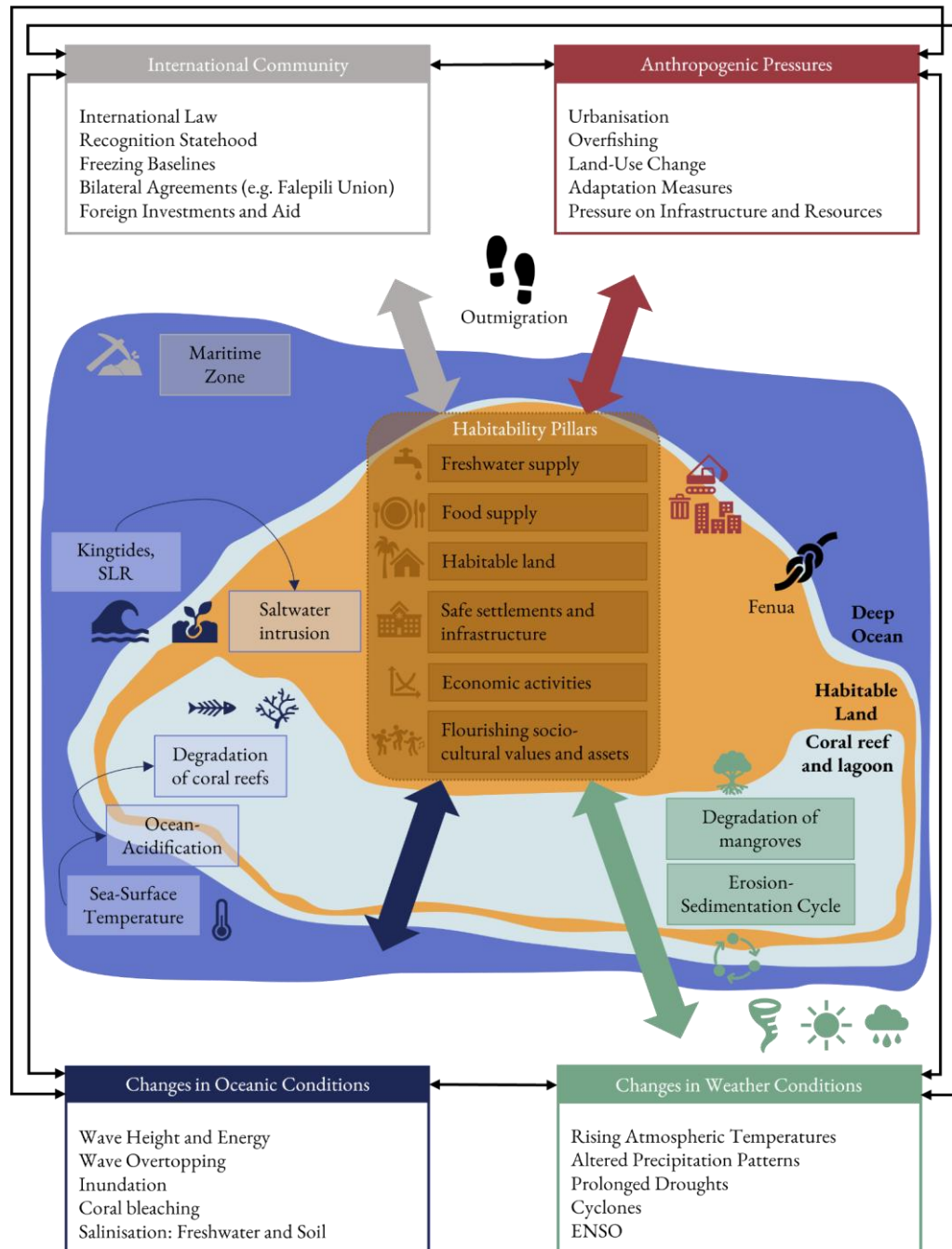


Figure 6: Overview of the scoping study's findings (own figure, based on Duvat et al., 2021; Magnan et al., 2026; Spencer et al., 2024).

Note: Overview of how climatic, oceanic and anthropogenic changes, as well as the influence of the international community, affect the habitability pillars in Tuvalu (thick arrows). All categories of stressors are interconnected - indicated by the thin arrows. Some oceanic processes are indicated, such as the link between accelerated sea-level rise (SLR) and saltwater intrusion. Factors that cannot be assigned to any category are out-migration and the Fenua, these are displayed in black. The illustration does not attempt to be exhaustive, but it summarises what will be described in the following chapters. Thereby, the figure intends to provide a better understanding of how the findings of the scoping study connect to a bigger picture.

6.1 Climate Change Impacts

This chapter addresses the main climate change related impacts affecting Tuvalu, beginning with processes related to atoll morphology and pointing to the uncertainty of the data available. Subsequently, changes in oceanic conditions are discussed, and the chapter closes with anthropogenic pressures influencing Tuvalu's natural atoll system.

Atoll islands like Tuvalu are described as “living geographies” (Yarina & Takemoto, 2017, as cited in Jarillo & Barnett, 2022, p. 850), capturing the dynamic nature and ability of atolls to respond to external changes. As a result, atolls continuously adjust their morphology (Jarillo & Barnett, 2022; McMichael et al., 2021). Three main natural processes are crucial to the morphology of atolls: erosion, sedimentation and accretion (McLean & Kench, 2015; Steibl et al., 2024; Woodroffe, 2008; Duvat, 2019). Erosion refers to the ablation and removal of land material on the shoreline due to wave and wind activity. Yet, the erosion of land material does not presuppose land loss per se. Rather, McLean and Kench (2015) argue that the eroded material is redistributed within the system to other parts of the atoll or the surrounding sea, thereby creating a cycle of erosion and sedimentation. Mobilised eroded material, sand and coral rubble are transported by wave and wind activity and subsequently deposited onto the sea-ground, island shore or the reef flat. This process is referred to as sedimentation (McLean & Kench, 2015). Within this process, the reef serves as both the sediment supplier and wave buffer while the vegetation on land traps sediments (Duvat, 2019). Accretion takes the process of sedimentation one step further as it refers to the accumulation of sediment material on the atolls' shoreline. It describes significant land growth either vertically or horizontally, driven by wave and wind activity (Woodroffe, 2008; Duvat, 2019).

The interplay of all three processes shows that erosion always goes hand in hand with sedimentation and accretion elsewhere: Erosion supplies the mechanism of sedimentation, which feeds the available pool for island accretion (McLean & Kench, 2015). Both Storlazzi et al. (2018) and Woodroffe (2008) anticipate that accretion may balance out the effects of erosion in the long term, indicating that atolls may possess a certain degree of resilience to permanent land loss. Hence, the processes of erosion and accretion must be considered over a long time to identify trends instead of concluding the overall picture based on a single cycle phase (Woodroffe, 2008).

Yet, this view is challenged by several scholars (McLean & Kench, 2015; Steibl et al., 2024; McCubbin et al., 2015; Wandres et al., 2024). It is argued, for example, that the understanding of the dynamics within atoll morphology is limited as there is a lack of baseline data and research to quantify

changes (McLean & Kench, 2015). Additionally, Steibl et al. (2024) emphasise that current research fails to take additional environmental and anthropogenic disruptions which influence the natural accretion process into account. According to them, the existence of atolls is not threatened by their characteristic low elevation but by the disruption of the erosion and accretion cycle (Steibl et al., 2024).

While the exact balance between erosion and accretion within atoll morphology is thus still heavily debated, many other important stressors due to climate change have been identified. Firstly, changes in weather conditions bring along an increase and alteration in precipitation patterns, as well as more frequent and intense cyclones (Duvat et al., 2021; Beyerl et al., 2018; Wandres et al., 2024; Fisher, 2008). Secondly, droughts occur more frequently and last longer (Terry et al., 2013; Schaeter-Santander, 2025). Thirdly, changing atmospheric temperatures lead to changing oceanic conditions, evident in a rise in ocean surface temperatures, which in turn causes ocean acidification (Farbotko & McMichael, 2019; Islam et al., 2023; McLean & Kench, 2015; Spencer et al., 2024). If both the thresholds for ocean acidification and the temperature for reef-building corals are exceeded, coral bleaching and the destruction of marine and terrestrial ecosystems may follow (Badillo-Interiano et al., 2025; Duvat et al., 2021; Stege, 2018; Farbotko & McMichael, 2019). Such degradation negatively affects fish abundance and biodiversity and leads to the death of the reefs (Stege, 2018; Connell, 2003; Nunn et al., 2025; McMichael et al., 2021; Farbotko & McMichael, 2019). Similarly, the living conditions of mangrove forests are no longer ideal, causing ecosystems and biodiversity to fall into a disbalance (Barnett et al., 2022; Barnett & Adger, 2003; Schaeter-Santander, 2025). Both the mangroves and coral reefs have a threefold function in atoll morphology as they serve as: 1) a natural barrier against wave energy, 2) a sediment trap, and 3) a sediment supplier (Duvat, 2019; Stege, 2018; Steibl et al., 2024). A degradation of these ecosystems thus leads to disruptions in the erosion and sedimentation cycle, influencing the atoll morphology and increasing the destabilisation of the island systems. Beyond that, the impacts of the atoll morphology become evident in the decreasing availability of natural resources, the functioning infrastructure and livelihoods (Stege, 2018; Connell, 2003).

As visualised in Figure 6, the physical processes and drivers of climate change are closely linked with socio-economic processes, creating a net of dependencies (Islam, 2023; Nurse et al., 2014; McCubbin et al., 2015). These various drivers and feedback loops of climate change act simultaneously, creating both slow-onset changes and acute events, which are partly manifested in “blue sky events”, such as cyclones (Spencer et al., 2024; Storlazzi et al., 2018). These changes generate short- and long-term effects, not only for Tuvalu’s environment, but also for its social fabric (Costa & Simões, 2025). Therefore, it is important to include anthropogenic drivers and consider how they might interact with both the morphological process and other climatic drivers.

An example of how climatic drivers can translate to human stressors is the internal mobility into cities, particularly to Funafuti (Duvat et al., 2021; Yamano et al., 2007). This urbanisation process

places additional pressure on the local waste management and infrastructure, which must meet the needs of the island's inhabitants (Duvat et al., 2021; Fisher, 2008; Beyerl et al., 2018; Monioudi et al., 2025). Furthermore, urbanisation directly impacts the atoll morphology as it requires human intervention in the ecosystems. Among these are the expansion of construction of houses and infrastructure into areas with greater exposure to hazards, the construction of roads between islands, land reclamation, the sealing of the airport's runway, sand mining, the construction of seawalls and deforestation (Connell, 2003; Steibl et al., 2024; Barnett et al., 2022; Noy, 2017; Ceccarelli, 2019; Monioudi et al., 2025). Local anthropogenic interventions and land-use change like these have altered the morphology of the atolls and, consequently, the environmental dynamics (Steibl et al., 2024; Connell, 2003).

Although communities managed to successfully cope with environmental and social stressors in the past, Barnett et al. (2022, p. 1) point out that the “rapid pace of climate change may bring conditions that exceed their adaptive capacities”. Among the climate change related impacts Tuvalu is facing, SLR constitutes the most far-reaching as it threatens the life of every Tuvaluan inhabitant (Fornalé et al., 2016; Monioudi et al., 2025; Becker et al., 2012).

6.2 Sea-level Rise

This chapter discusses the mechanisms and physical manifestations of SLR in the context of Tuvalu. It covers topics around inundation, the impact of weather phenomena on sea-levels, and critically reflects on media portrayals of Tuvalu.

With its low-lying geomorphology, Tuvalu is highly vulnerable towards SLR (McLean & Kench, 2015; Fornalé et al., 2016). Several researchers project Tuvalu's territory on land may permanently and completely submerge within this century (Fornalé et al., 2016; Monioudi et al., 2025; Yang et al., 2020; Duvat et al., 2021; Costa & Simões, 2025). McLean and Kench (2015, p. 453) complement these projections, explaining that Tuvalu “has experienced one of the fastest rates of SLR over the past few decades” in the Central and West Pacific Region, as depicted in the following Figure 7.

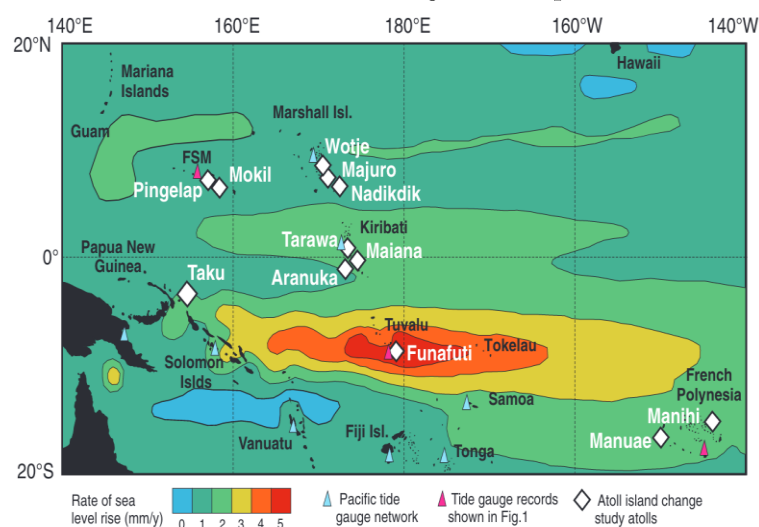


Figure 7: Sea-Level Rise in the Central and Western Pacific (from McLean & Kench, 2015, p. 450).

Rising atmospheric temperatures initiate three interconnected mechanisms that contribute to SLR: (i) melting of glaciers and ice caps; (ii) thermal expansion of ocean water; (iii) reduction in freshwater water resources, for example, in lakes (Costa & Simões, 2025; Silva, 2020). Aung et al. (2009) expanded these mechanisms by another five factors: iv) daily tides, v) meteorological effects like winds and rainfall, vi) seismic activity, vii) oceanographic effects like El Niño, and viii) vertical land movement.

Predominantly, SLR manifests physically through inundation and temporary flooding (Woodroffe, 2008). Inundation refers to the “diffusion of a high water level into or across an island”, while flooding describes the “accumulation or flow of water from adjacent areas” (Woodroffe, 2008, p. 90). As Steibl et al. (2024) note, inundation has two contradictory roles simultaneously: while it threatens to destroy human settlements, it supplies the natural erosion-sedimentation cycle and is thus considered an essential part of a balanced atoll morphology.

With climate change, the vertical range and energy of waves are expected to increase (Woodroffe, 2008; McLean & Kench, 2015; Terry et al., 2013; McCubbin et al., 2015; Farbotko & McMichael, 2019). In combination with the effects of SLR, the spatial extent of inundation will scale up accordingly (McLean & Kench, 2015; Terry et al., 2013; Duvat, 2019). A lack of healthy coral reefs and mangroves can exacerbate this situation as waves can more easily overtop, resulting in future floods being longer-lasting and affecting larger areas (Stege, 2018).

Alterations in the natural El Niño Southern Oscillation (ENSO), a seasonal weather phenomenon in the Pacific, further influence SLR (Wandres et al., 2024). ENSO refers to the oscillating condition between El Niño and La Niña phases, which describe the alternating order of cooling and warming of the Pacific. These temperature shifts affect the sea-levels due to thermal expansion (Ritman et al., 2022). As Barnett and Adger (2003) note, ENSO events may become more frequent and intense in the future, making the prediction of future sea-levels more difficult (Aung et al., 2009).

Closely connected to ENSO and SLR are high springtides, colloquially named “kingtides” in the Pacific (Lin et al., 2014) or *Tai Lele* in Tuvalu (Ritman et al., 2022). Unlike typical coastal flooding, atolls like Tuvalu can be inundated from below due to the porosity of the atoll soil, known as *Tai Lele* (Taupo et al., 2018). A *Tai Lele* lasts approximately 1-4 hours, bringing along saltwater intrusion and sewage contamination (Ritman et al., 2022). Over the last decades, the *Tai Lele* became higher (Burch, 2021), which is attributed to SLR and the ENSO.

Due to the range of these stressors and Tuvalu’s physical vulnerability to SLR, the media often portrays and sensationalises Tuvalu as the first nation to submerge (Farbotko, 2010a; Farbotko, 2010b; Mortreux & Barnett, 2009; Burch, 2021). However, not all scientists support the narrative of Tuvalu’s inevitable disappearance, referring back to the dynamic nature of atoll morphology and thus criticising such deterministic framings (Farbotko, 2010a; Duvat et al., 2021; Burch, 2021). Jarillo and Barnett (2022, p. 851) complement this perspective and caution against reasoning too

simplistically - the equating of “ASLR [accelerated SLR] + atoll islands = sinking” is disarming. McLean and Kench (2015, p. 458) criticise a similar narrative that equates “sea-level rise results in island inundation, erosion, and destruction and ultimately island abandonment and out-migration of people”, and call for a paradigm shift. While the media successfully draws global attention to Tuvalu’s challenges, narratives like these oversimplify reality and undermine both the physical capacity of atoll systems to adapt (Yamano et al., 2007) and Tuvalu’s preparation efforts (McLean & Kench, 2015). Despite the buffer capacity of atoll islands to SLR, human vulnerability must not be left out of the considerations. As Yamano et al. (2007) emphasise, atolls may be to some extent resilient towards SLR, but Tuvalu’s population remains vulnerable regardless.

6.3 Uninhabitability

The combined effects of SLR and the above-mentioned climatic and anthropogenic stressors significantly affect the physical, ecological, and social factors that determine the liveability of Tuvalu (Duvat et al., 2021; Schlosberg & Collins, 2014). While authors agree that atolls become uninhabitable - even by local definition - long before the permanent disappearance of land surface (Spencer et al., 2024; McAdam, 2010), the determination of an uninhabitability threshold has proven complex (Farbotko & Campbell, 2022).

An atoll’s habitability is determined by the interaction between climatic factors, such as the island’s size, shape, geomorphic components, sediment composition, positional stability, and elevation of shoreline (Duvat et al., 2021), and non-climatic factors such as culture and social cohesion (Badillo-Interiano et al., 2025; Farbotko & Campbell, 2022). While uninhabitability and its components are defined in theory, many discussions remain on the implementation in practice (Boas et al., 2025). Not only are scientists challenged by charting all feedback loops created by the complex interplay of these drivers (Badillo-Interiano et al., 2025), but also by the determination of the exact point of no return (Barnett & Adger, 2003; Farbotko & Campbell, 2022). The difficulty lies in the fact that the atoll’s social-ecological system has to be broken down into sectoral tipping points, so dangerous thresholds can be predicted and prevented through multidisciplinary impact assessments (Barnett & Adger, 2003). Moreover, these thresholds should also reflect that uninhabitability does not mean the same to all, either because of their different definition of habitability (Farbotko & Campbell, 2022), or because their socio-economic status does not allow them the same risk tolerance threshold (Magnum et al., 2026; Taupo et al., 2018).

Even though a universal assessment of habitability seems complicated, its determination is crucial to consider which adaptation measures apply to the current and future state (Badillo-Interiano et al., 2025; Spencer et al., 2024). Spencer et al. (2024) suggest adding adaptation limits to the thresholds to describe the scenario in which even adaptation measures cannot push the socio-ecological system back into the desired equilibrium.

The complexity and high requirements have translated into limited creation of habitability assessment frameworks (Spencer et al., 2024). The earliest attempt at an atoll habitability assessment was made as early as 1978, including rainfall, typhoon frequency, elevation, and island size as the main criteria (Stege, 2018). While other authors published various habitability metrics, such as a flood risk indicator (Stege, 2018), Duvat et al. (2021) became the first to publish a comprehensive habitability assessment framework (Figure 8).

In their design, habitability was assessed through five interrelated ‘habitability pillars’ that together formulate the atoll habitability system. The habitability pillars, inspired by the various aspects considered in their definition of habitability, consist of (Duvat et al., 2021, p. 5):

- Availability of sufficient and safe land
- Supply of safe freshwater
- Supply of nutritious food from local and/or imported resources
- Access to safe settlements and infrastructure that sustains freedoms and opportunities
- Access to sustainable economic activities

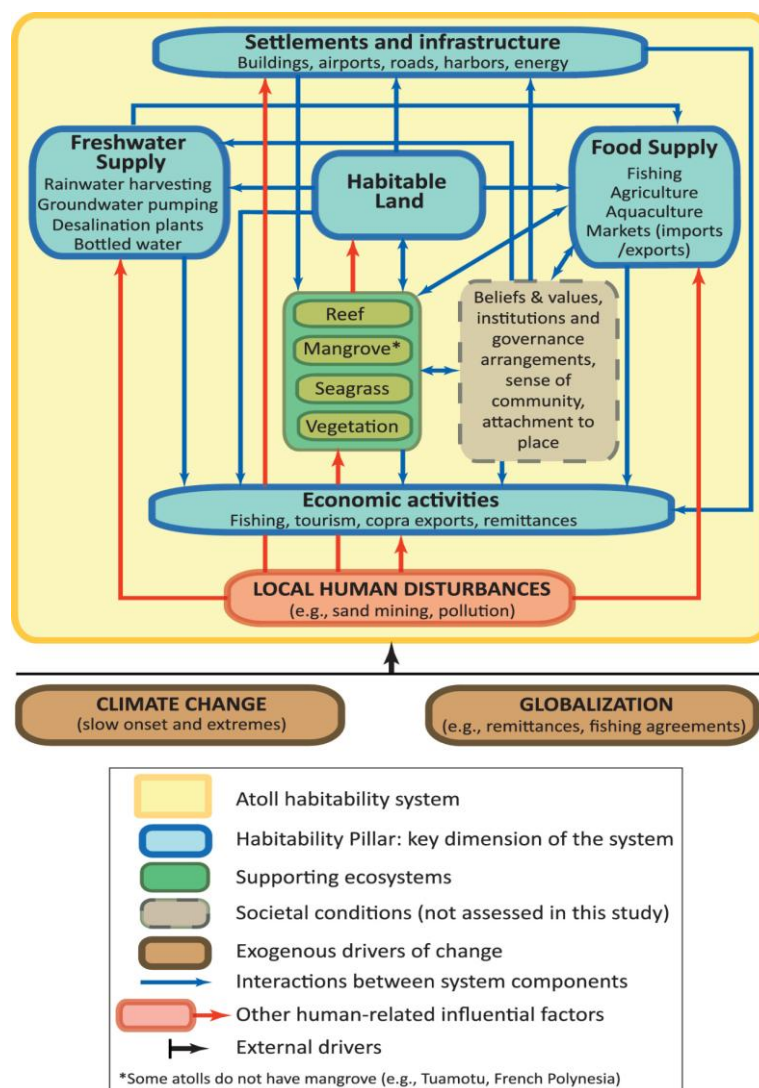


Figure 8: Conceptual Model of Atoll Island Habitability (From Duvat et al., 2021, p. 3).

6.3.1 Tuvalu's Habitability Pillars

In contrast to the low number of frameworks available, much has been speculated on the various habitability pillars and other potential thresholds. This section will provide an overview of the current status of the habitability pillars in Tuvalu, as suggested by Duvat et al. (2021). These include freshwater and food supply, habitable land, safe settlements and infrastructure, and economic activities, and will be complemented by Magnam et al. 's (2026) suggested addition of flourishing socio-cultural values and assets.

Freshwater Supply

One of the most frequently mentioned threats to the habitability of Tuvalu is the lack of freshwater resources (Barnett & Adger, 2003; Fisher, 2008; McCubbin et al., 2015; Terry et al., 2013; Becker et al., 2012). Freshwater is crucial as it must sustain the local communities, agricultural practices and economic activities (Duvat et al., 2021). Atoll islands in origin are scarce in freshwater resources as lenses are shallow and non-saline groundwater is absent (Mortreux & Barnett, 2009; Terry et al., 2013). Therefore, the islands are heavily dependent on rainwater harvesting and desalination (McCubbin et al., 2015; Nunn et al., 2025). However, those methods are threatened by the expected future climatic changes. Prolonged droughts and increased cyclone activity could significantly interrupt rainharvesting and deplete shallow freshwater lenses (Duvat et al., 2021; Marino & Lazrus, 2015; Mortreux & Barnett, 2009; McCubbin et al., 2015), which could take over a year to recover (Terry et al., 2013). Furthermore, more intense storm surges and island overtopping will increase freshwater salinisation (Barnett & Adger, 2003; Duvat et al., 2021). Ultimately, together with human stressors such as urbanisation, pollution and government mismanagement, water shortages are expected to increase (Duvat et al., 2021; McCubbin et al., 2015).

Food Supply

Closely connected to these freshwater implications is food security, especially through agricultural output. Extended dry spells, strong winds, salinisation, and loss of topsoil through flash floods decrease soil quality and destroy gardens, making growing traditional crops practically unfeasible (Barnett & Adger, 2003; Fisher, 2008; McCubbin et al., 2015; Singh et al., 2022). Furthermore, fish supplies from the sea, the primary source of protein in the Tuvaluan diet, are also expected to fall (Fisher, 2008). Ocean warming, acidification, and coral bleaching severely impact coral reef health and fish habitats (Duvat et al., 2021; McCubbin et al., 2015). Additionally, the increase in extreme weather events will decrease safe fishing opportunities (McMichael et al., 2021). Combined with the current over-fishing practices and rapid urbanisation process, the per capita fish consumption is expected to decrease, potentially endangering the locals' health (Duvat et al., 2021; Fisher, 2008).

Habitable Land

At the centre of all pillars is the need for habitable land surface, as all other pillars are impossible without it (Spencer et al., 2024). Risk to land mainly consists of coastal erosion, SLR, and increased flood events (Duvat et al., 2021). The latter seems to be one of the major threats to habitability (Badillo-Interiano et al., 2025), as the frequency and intensity are expected to significantly increase (Barnett & Adger, 2003; Duvat et al., 2021). Several thresholds have been suggested, ranging from very pessimistic to relatively optimistic. For example, Yang et al. (2020) put their uninhabitability threshold at 38 cm of SLR, amounting to 60% of Tuvalu's land lost, as the island would not be able to withstand the frequent tides. They estimated this threshold could already be met during the period between 2038 and 2047. Contrarily, Duvat (2019) found no widespread trend in land area change of atoll islands in the past decades, and concluded that islands larger than 10 ha should be stable enough for human occupancy. Regardless of future predictions, currently, the high tides already regularly submerge around 40% of the capital Funafuti (Costa & Simões, 2025).

Safe Settlements and Infrastructure

Strongly related to habitable land surface is the need for safe settlements and infrastructure. Without proper protection of infrastructure, maintaining human habitation might be challenging in light of expected climatic changes (Noy, 2017). The lack of investment and worsened conditions of infrastructure development might change migration patterns, even before environmental circumstances render the place uninhabitable (Gilmore et al., 2024; Marino & Lazrus, 2015). Previous studies did not provide any local information on the current state of this particular pillar.

Economic Activities

Economic activities are required to maintain society on the island. Tuvalu is already listed as one of the least developed countries “due to its limited potential for economic development” (Ceccarelli, 2019, p. 704). The economy is highly dependent on foreign aid and the fishing industry, with approximately 90% of national revenue derived from tuna-fishing fees (Duvat et al., 2021; Ceccarelli, 2019). Yet, these economic foundations may be endangered by anticipated food-security issues (Schaeter-Santander, 2025; Duvat et al., 2021). Additionally, Monioudi et al. (2025, p.8) concluded that “atoll nations, such as Tuvalu and Kiribati, will experience the most significant economic losses relative to GDP [Gross Domestic Product]” due to SLR. Consequently, the erosion of financial opportunities might result in the island becoming economically uninhabitable (Schaeter-Santander, 2025).

While the design of Duvat et al. (2021) was, and still is, an often-referenced model within atoll habitability literature, it also sparked a big debate on the role of the missing social and cultural factors (Horton et al., 2021; Farbotko & Campbell, 2022; Spencer et al., 2024; Boas et al., 2025). Horton et al. (2021) argue that social, economic, and political factors may render environments uninhabitable far before physical hazard-based thresholds are crossed. This claim was echoed by Farbotko and

Campbell (2022), criticising that this materialistic and technical framing undermines the social and cultural construction of habitability. Moreover, their critique raised the question of who should be in charge of defining habitability. So far, the top-down technical model seems to prioritise external experts over the traditional knowledge of the local population. This imbalance can become problematic if the expert-determined habitability threshold falls below local perceptions of habitability, effectively diminishing human agency and forcing residents to relocate (Horton et al., 2021; Farbotko & Campbell, 2022).

Nevertheless, scholars agreed that the habitability framework could still provide useful scientific insights into possible diminishing habitability aspects - as long as it is combined with traditional knowledge and a local bottom-up approach (Horton et al., 2021; Farbotko & Campbell, 2022; Spencer et al., 2024). Recently, an updated version of the model was published, including an extra 'flourishing socio-cultural values and assets' habitability pillar to account for the mentioned criticism (Magnam et al., 2026). This updated list of pillars can also be recognised at the core of Figure 6.

Flourishing Socio-Cultural Values and Assets

Connected to all other pillars are the social and cultural dimensions. Due to the close relationship between land and identity, a threat to one is experienced as a threat to the other (Farbotko & Campbell, 2022). It is also this identity and tight-knit community that distinguishes the Tuvaluan population as very resilient in times of disaster (Kelman, 2015; Kitara et al., 2024; Weber, 2022). Generations of experience with weather extremes paired with indigenous knowledge result in a high-level of individual preparedness (Kelman, 2015). Moreover, the social and community capital are also extremely valuable during recovery (Kitara et al., 2024; Weber, 2022). Strong concepts such as *Fale Pili* dictate a collective rebuilding process. Resource distribution within families, religious groups, communities and friends in difficult periods helps to balance vulnerability and exposure to shortages in the other habitability pillars (Kitara et al., 2024; Taupo et al., 2018).

6.3.2 Thresholds

Besides the current and future conditions of the habitability pillars, several scholars have speculated about other possible thresholds crucial to determine Tuvalu's habitability. These include out-migration as well as external funding and investment.

Out-Migration

Firstly, there was a concern that increased out-migration over time would cause critical community services and ultimately society to collapse (Barnett & Adger, 2003; Piguet, 2019). As the circumstances on the island become worse and new migration pathways are opened, more people might make the decision to move. This could create a negative feedback loop as it weakens the labour market and decreases tax revenues, while costs for disaster risk reduction and management continue to rise (Bazela & Robinson, 2025). An example of such a process can be found on Holland Island, which encountered a severe decrease in population after 1900, ultimately leading to abandonment in

1920 when critical services could no longer be maintained and the community lost hope (Piguet, 2019). Horton et al. (2021) identify a similar social tipping point, illustrating that advancing risk perception and disinvestment could contribute to accelerated and more sudden out-migration than suggested by habitability assessment frameworks.

External Funding and Investment

As portrayed by the last statement, the lack of investment represents another important turning point, particularly for a country like Tuvalu that is heavily dependent on foreign aid (Ceccarelli, 2019). Foreign investors must remain confident that Tuvalu can be maintained through in-situ adaptation measures and development, rather than investing in relocation options (Barnett & Adger, 2003; Mortreux & Barnett, 2009). As adaptation measures are often more costly, it is essential that donors believe their investments will not literally disappear under water in the near future (Farbotko & Campbell, 2022). Therefore, Tuvaluan politicians have the difficult task of creating a sense of urgency to receive the support they require, without painting it as a lost cause (Bazela & Robinson, 2025).

The thresholds outlined above, together with the physical processes discussed in the previous subchapters, show that Tuvalu's possible transition towards uninhabitability is shaped not only by physical factors but equally by social, economic and political dimensions, as visualised in Figure 6. As habitability diminishes, the consequences start to translate into the erosion of the traditional foundation of statehood - including territory on land and a permanent population. The following chapter discusses what repercussions this decline in habitability might entail for Tuvalu's future statehood and sovereignty.

6.4 Implications for Future Statehood and Sovereignty

Key issues addressed in this chapter include the criteria for statehood under the Montevideo Convention on the Rights and Duties of States, the importance of statehood for Tuvalu in practical terms and emerging legal and ontological frameworks for conceptualising statehood in novel ways.

6.4.1 Statehood in the Understanding of the Montevideo Convention

Traditionally, the Montevideo Convention on the Rights and Duties of States (MCRDS) defines the criteria for the recognition of statehood under international law (Ardito, 2024; Atapattu, 2014; Yamamoto & Esteban, 2017; Vidas, 2014; Green, 2024; Simon & Alexander, 2014). "According to Article 1 of the 1933 Montevideo Convention on the Rights and Duties of States, a legitimate state should possess the following characteristics: (1) A permanent population; (2) A defined territory; (3) A government and (4) A capacity to enter into relations with other states" (Skillington, 2016, p. 2). When applied to the context of Tuvalu, all four criteria are increasingly called into question due to climate change related impacts (Jain, 2014; Blanchard, 2016; Piguet, 2019; Lapaš, 2022; Lee & Bautista, 2021; Schaeter-Santander, 2025).

Defined Territory

Out of the four criteria, the loss of defined territory depicts the most visible threat to statehood. Due to the SLR, Tuvalu could lose its entire territory on land (Yang et al., 2020; Costa & Simões, 2025). In this case, the MCRDS's second criterion of 'defined territory' would no longer be met, and with it the formal requirement for statehood under conventional international law (Costa & Simões, 2025; Jain, 2014; Allen & Prost, 2022; Lapaš, 2022; Green & Wewerinke-Singh, 2025). This situation represents an unprecedented challenge to international law, prompting scholars to refer to such cases as "disappearing states" (Rayfuse, 2013; Kittel, 2015; McAdam, 2010; Piguet, 2019; Oliver, 2009).

Territory fulfils several essential functions for statehood: territory enables the effective exercise of jurisdiction and therefore governance (MCRDS criterion 3), depicts the physical space for exercising sovereignty, serves and generates economic resources, captures historical and cultural resources, and ensures stability and security (Jain, 2014; Blanchard, 2016). Beyond that, territory forms the basis for political and social organisation. According to Blanchard (2016), a state is "the result of the intersection of these two approaches: a politically organized community on a defined territory" (Blanchard, 2016, p. 73). Additionally, territory is necessary to maintain nationality as only a state with territory is able to meaningfully grant rights and responsibilities to individuals (Simon & Alexander, 2017). However, existing frameworks are currently "under-developed" (Lapaš, 2022, p. 26) to address these issues adequately.

Yet, the criteria and the relationship between statehood and territory are more complex as it seems at first glance. As Allen and Prost (2022) point out, the MCRDS places no requirements on the geographical features of territory. Territory "may be small, fragmented, disputed, surrounded by huge expanses of water or enclaved" (Allen & Prost, 2022, p. 173) or entirely wet (Calzolari & Phantanaboon, 2025), while still falling into the MCRDS' requirements. Moreover, as Ardito (2024) argues, these criteria were designed for the initial acquisition of statehood and do not entail the maintenance or conditions when statehood is lost. Just like the territory intends to provide stability and security for the people, international law is oriented towards stability too (Blanchard, 2016). With this nature, international law favours the continuation of statehood once established. Hence, the loss of one criterion for statehood along the way does not inevitably lead to the deprivation of statehood per se (Blanchard, 2016) - or, as Jain (2014, p. 31) puts it, "involuntary extinction of statehood is almost impossible" in the understanding of international law.

Permanent Population

Changes in land availability influence the people's decision whether to stay or leave Tuvalu and thus the state's efforts regarding mobility (Burson et al., 2023). Against this backdrop, growing displacement and out-migration may undermine the MCRDS's first criterion for statehood: a permanent population (Lapaš, 2022; McAdam, 2010; McAdam et al., 2025; Lee & Bautista, 2021; Schaeter-Santander, 2025; Piguet, 2019). In this regard, even if parts of Tuvalu's population remain

on the atoll, this “‘caretaker population’ (...) or ‘land-keeping population’” (Lapaš, 2022, p. 14) would not fulfil the criterion satisfactorily. Therefore, connected to the permanent population must be the functioning of social infrastructure and a flourishing community life (Lapaš, 2022).

Effective Government

Closely related to the requirement of a permanent population is the MCRDS’s third criterion of an effective government. In that sense, territory and population are a prerequisite for effective governance (Jain, 2014; Lee & Bautista, 2021), as they enable the conduct of legislative and administrative functions in a state (Lee & Bautista, 2021). Even in the scenario of complete territorial loss and population displacement, the state would formally be maintained, but the state’s capacity to govern would be compromised (Lee & Bautista, 2021).

Capacity to Enter into Relations with Other States

The erosion of territory, population and effective governance ultimately threatens the MCRDS’s fourth criterion: the capacity to enter into relations with other states. As Schaeter-Santander (2025) points out, the loss of territory, community and culture goes hand in hand with the loss of political voice. For a meaningful participation on the international stage, the ability to advocate for the state’s interests and people is important (Schaeter-Santander, 2025).

Crucially, the concerns about effective government, permanent population and the capacity to enter relations with other states will materialise long before the physical territory is gone (Lee & Bautista, 2021). However, the question remains why statehood matters for Tuvalu.

6.4.2 The Importance of Statehood for Tuvalu

The retention of statehood is not merely a legal issue but brings along practical challenges for Tuvalu (Blanchard, 2016; Jain, 2014; Green & Wewerinke-Singh, 2025). As Jain (2014, p. 6) emphasises, the loss of statehood depicts “a significant degradation of international legal personality”. This “downgrading of status” (Jain, 2014, p. 9) unfolds in many ways: Firstly, it blocks the door for a United Nations (UN) membership - a platform for international contacts and diplomatic opportunities (Blanchard, 2016). Secondly, the symbolic framework that embodies Tuvalu’s culture and identity, capturing the heart of being a Tuvaluan, would be eroded (Blanchard, 2016). Thirdly, would Tuvaluans lose the right to get jurisdiction from the ICJ, as a state must represent the individual (Jain, 2014). Fourthly, treaties and customary law can only be adopted by states (Jain, 2014). Fifthly, access to fundamental support mechanisms is restricted to states, for example, the Global Environment Facility fund (Green & Wewerinke-Singh, 2025). Finally, the deprivation of statehood leads to the loss of maritime entitlements and resource rights, and thus to the erosion of the state’s economic foundations (Blanchard, 2016; Jain, 2014; Green & Wewerinke-Singh, 2025; Roberts, 2024).

Maritime Zones

Under the current framework of the 1982 UN Convention on the Law of the Sea (UNCLOS), the maritime zones of a state are defined based on the lands' baseline, and thus determined by the lands' position and size (Roberts, 2024; McAdam et al., 2025; Rayfuse, 2009; Schofield & Freestone, 2009; Vidas, 2014; Green & Wewerinke-Singh, 2025; Jain, 2014; Green, 2024). For reef islands like Tuvalu, the baseline follows the seaward low-water line along the reef (Roberts, 2024), marking the starting point for marine entitlements such as the state's exclusive economic zone (EEZ) (Thao, 2020; Roberts, 2024). With the possible reduction of Tuvalu's baseline due to SLR, Tuvalu might lose its EEZ and the connected rights to it (Jain, 2014; Green & Wewerinke-Singh, 2025). This could open doors for other states to take economic advantage of Tuvalu's situation (Roberts, 2024). Losing access to maritime resources would further undermine the identified habitability factors, as the Tuvaluan economy and identity are strongly connected to maritime resources (Roberts, 2024; Bazela & Robinson, 2025; Blanchard, 2016; Jain, 2014; Green & Wewerinke-Singh, 2025).

To resolve the baseline issue fairly, international scholars propose to freeze the baseline coordinates in their present location, ensuring the continuation of Tuvalu's EEZ (Rayfuse, 2009; Thao, 2020; Silva, 2020; Ödalen, 2014; McAdam et al., 2025; Green, 2024). Tuvalu proactively established its baselines in their Constitution, self-determining that these coordinates are to persist, regardless of possible future land loss scenarios (Vaha, 2025; The Constitution of Tuvalu Act, 2023). Considering what is at stake for Tuvalu and the discord within legal frameworks to resolve Tuvalu's challenges has prompted scholars to rethink the foundations of statehood - and whether it must be necessarily linked to land at all.

6.4.3 Rethinking Statehood

In order to rethink new ways to maintain statehood in light of the challenges posed by climate change, scholars start questioning the underlying assumptions of the statehood concept. In particular, scholars propose the principle of self-determination as the legal basis for state continuity, the rise of a wet ontology to challenge land-centred perspectives, and entirely new legal approaches to upholding statehood.

Self-determination as Legal Foundation

The underlying factor of considerations around the continuation of statehood is the human right to self-determination - to "freely determining their cultural, economic, political and social futures" (International Covenant on Civil and Political Rights, 1966, as cited in Green & Wewerinke-Singh, 2025, p. 558). Self-determination can be the key to establishing the legal foundation for the continuation of statehood, as the obligations arising out of self-determination have peremptory character. This means that the states' responsibilities are independent from political or territorial changes and that all relevant legal norms need to be interpreted under the standard of self-determination (Green & Wewerinke-Singh, 2025). The international community's recognition of

the right to self-determination and with it the continuity of a disappearing state - independent of land territory - depicts therefore a moral duty (Skillington, 2016; Blanchard, 2016). In this sense, self-determination forms the legal basis for the preservation of statehood, “notwithstanding total submergence, uninhabitability or exodus” (Green & Wewerinke-Singh, 2025, p. 556).

Tuvalu made use of the self-determination principle in the Constitution: “The State of Tuvalu within its historical, cultural, and legal framework shall remain in perpetuity in the future, notwithstanding the impacts of climate change or other causes resulting in loss to the physical territory of Tuvalu” (The Constitution of Tuvalu Act, 2023, section 2 (1)). Thus, the state of Tuvalu translated their right to self-determination into a legal commitment to state continuity, contributing to the preservation of both Tuvalu’s statehood and identity (Farran, 2021; Green & Wewerinke-Singh, 2025; Kitara et al., 2024).

Yet, the right to self-determination was traditionally associated with the existence of habitable territory (Calzolari & Phantanaboon, 2025). If habitability diminishes, the exercising of governance is no longer effectively possible as it assumes a liveable space. As Capisani (2020, p. 199) declares, “one cannot effectively claim certain civil rights or political rights (such as the right to self-determination) if one is under water or stranded in a desert”. As a response to this claim, Vaha (2025) advocates for challenging the underlying assumptions associated with the traditional understanding of statehood.

In contrast to the concrete and quantifiable attributes the MCRDS puts on statehood, Tuvalu’s own constitution reflects a more differentiated view that extends beyond territory on land (Farran, 2021; The Constitution of Tuvalu Act, 2023). The constitution defines the states’ area across “land and sea, inland waters, rocks and reefs” (Farran, 2021, p. 7) and even includes geographical coordinates (The Constitution of Tuvalu Act, 2023). This understanding underlines the significance of the sea and can be legally justified as the MCRDS does not specify the territory to be dry land (Calzolari & Phantanaboon, 2025). In addition, the constitution’s preamble foregrounds the Tuvaluan identity as being more than living on land. The core of being a Tuvaluan comprises the shared culture, values, traditions and community life, anchoring the identity not on physical land but on everything around it (Farran, 2021; The Constitution of Tuvalu Act, 2023).

Vaha (2025) resonates with this understanding and challenges the current land-centred assumptions as well as the international laws’ ‘belittling’ Western perspective on the sea. Vaha (2025, p. 201) argues that atoll states like Tuvalu “are not small, but large”, rich in their sea territories, marine resources and their relationship with the sea. From this perspective, the sea is not a meaningless “empty space” (Vaha, 2025, p. 201), but a lived territory worth being appreciated and valued. This perspective directly challenges today’s prevailing territorial ontology, in which statehood and sovereignty are linked to land. As Vaha (2025, p. 202) argues, the Pacific Islands have historically exercised statehood “with and at sea”. This perspective is conceptualised as wet ontology, requiring legal scholars to “look beyond the land/sea divide and to expand our understanding of the terrestrial

world in which we are living” (Vaha, 2025, p. 207). In light of climate change, the approach offers the opportunity for disappearing states to maintain statehood in a legally, politically and ethically sound manner (Vaha, 2025).

New Pathways for Tuvalu’s Future Statehood

The novel approaches to conceptualise statehood open up doors for designing new pathways to prevent state-death and remain sovereign. These pathways range from the physical preservation of territory to new legal models of governance, as presented in Table 3.

Table 3: Alternative governance models (own table).

GOVERNANCE MODEL	EXPLANATION	REFERENCE
1. Physical Preservation of Territory:	Maintaining or recreating a state's physical territory.	(Blanchard, 2016; Oliver, 2009; Allen & Prost, 2022).
• Land Acquisition	Buying or getting land donated.	(Blanchard, 2016; Lee & Bautista, 2021; Oliver, 2009).
• Constructing Artificial Structures	Compensating for land loss by constructing artificial islands.	(Allen & Prost, 2022; Piguet, 2019; Lapaš, 2022).
• Merge With Another State	Integration of a disappearing state into an existing state.	(Blanchard, 2016).
2. Landless or Deterritorialised State:	Exercising sovereignty over a geographical area, regardless of whether it is habitable land or completely submerged.	(Ödalen, 2014; Allen & Prost, 2022; Schaechter-Santander, 2024; Lapaš, 2022; Blitz, 2011).
• Ex-Situ State	Continuation of sovereignty outside of the original territory, recognised by the international community.	(Burkett, 2011; Atapattu, 2014; Schaechter-Santander, 2024; Skillington, 2016; Stratford et al., 2013; Sancken, 2020).
• Digital State	Continuation of statehood in virtual space.	(Rothe et al., 2024; Evans, 2025; Costa & Simões, 2025; Schaechter-Santander, 2024; Calzolari & Phantanaboon, 2025; Ardito, 2024).
3. Sui Generis Legal Entity	Exception in statehood, currently applied to the Sovereign Order of Malta and the Holy See.	(Allen & Prost, 2022; Lapaš, 2022).
4. Political Trusteeship System	Administration of the state through other states or international organisations.	(Lee & Bautista, 2021; Burkett, 2011; Atapattu, 2014; Lapaš, 2022).
5. New Category of States	Recognition of a new statehood category for disappearing states.	(Lapaš, 2022; Allen & Prost, 2022).

As Allen and Prost (2022) emphasise, each pathway has both advantages and limitations, thus requiring a flexible interpretation of the existing frameworks in international law. Beyond that, it is important to keep in mind that the development of new pathways to recognise statehood without territory on land could open the door to potential misapplication (Allen & Prost, 2022). Tuvalu currently pursues the *Te Ataeao Nei* (Future Now) programme, which intends to digitalise the state entirely (Costa & Simões, 2025; Rothe et al., 2024).

7 Findings Consultation Exercise

The observations of the consultation exercise contributed to the development of the transitional process by providing insights about the current state, as well as reviewing and clarifying findings from the scoping study. Appendix D provides an overview of the five interviewed participants and their expertise. All participants were shown an initial simplified draft of the model so the interviewees could provide feedback, and identify additional thresholds, stressors and influences. Its findings are displayed in the thematic map (Figure 9), as well as described in the text below, and are presented separately from the results in Chapter 6. Both findings will later be combined and equally considered to formulate the final model described in Chapter 8. The themes will follow the various stages of the transitional model.

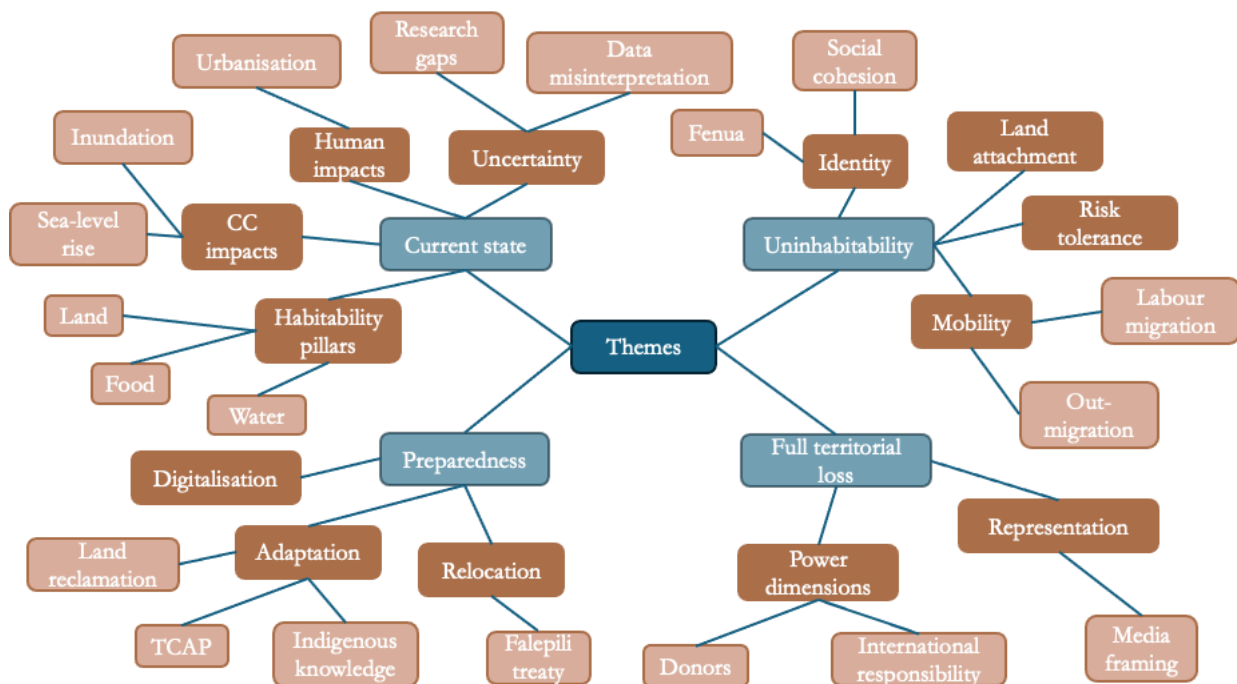


Figure 9: Thematic Map (own figure).

7.1 Current State

To illustrate a more accurate picture of the current state of habitability in Tuvalu - filling the gaps of previous literature - experts were consulted to discuss the most pressing environmental and anthropogenic stressors. This current state was used to determine the starting point of the transitional model.

Climate Change and Anthropogenic Impacts

The scoping study revealed that Tuvalu is globally presented as the experiment that has to show the urgency of the climate crisis (Farbotko, 2010a), the so-called ‘canary in the coalmine’ (Farbotko, 2010b; McAdam, 2010; Taupo et al., 2018). While this image is criticised by many as highly problematic due to the passive attitude it portrays, the gravity of the climatic issues rang true. As

Taukiei Kitara, Tuvaluan national and development scholar, put it, “We’re living the reality of climate change in Tuvalu. And I see, I know this because I grew up in Tuvalu and growing up in Tuvalu, you see the changes in our landscape.”

When asked about the most pressing climate impacts, all participants agreed that SLR formed the most urgent challenge. As Arthur Webb, an expert in island shoreline processes and coastal management, described it:

Sea-level rise is the most well-monitored, most well-understood phenomenon related to coastal climate change impacts. It’s the one that scares me the absolute most. I think that in these tropical locations, we can even potentially live with quite a lot of reef disruption, for example, through bleaching and acidification - but I don’t think we can live through sea-level rise. (...) I’m not optimistic about what sea-level rise means in these environments and I think that, without a doubt, it is the most pressing problem.

One of the biggest consequences of SLR is more frequent and intense inundation, which has already led the entire island to be inundated on several occasions. During these events, people squeeze together in the large church buildings - one of the highest points on the island - and wait for the water to recede. Although Tuvaluans are used to these flooding events and do not seem to display much concern, the impacts it has on their livelihoods remain significant. As Kitara portrayed very vividly:

During kingtides and cyclones, the sea would just come and inundate the whole island - and I mean the *whole* island. The sea would just meet from the ocean. They’ll come into the middle from the lagoon, and that’s it. All our food crops destroyed, our animals, pigs, chickens and all that. They all get affected.

Besides the impacts of SLR, many other climatic changes affect the Tuvaluan lifestyle. Alan Resture, local inhabitant and marine environment specialist, agreed with the identified impacts of the scoping study, and emphasised storms, prolonged droughts, coastal erosion, inundation and flooding. These “friends of climate change” (Resture) place additional pressure on the already existing food and water security issues. Nevertheless, it is not only the climate change impacts deteriorating the situation in Tuvalu, but also human factors: “there is the honest truth that we humans are also the culprits” (Resture). The process of urbanisation and thus increasing population density, enlarges the consumption patterns and pressure on the city’s water and food resources. This anthropogenic dimension creates a negative feedback loop as the needs of a growing population must be met - often at the cost of the ecosystem.

Habitability Pillars

Besides the questions on the biggest challenges, participants were asked about the current status of the identified habitability pillars, including which one they feel is most endangered. Webb, one of

the contributing authors to the Duvat et al. (2021) framework, pointed out an important prioritisation:

There's one thing to understand about those habitability pillars. (...) if you don't have the safe land platform, then you're not going to have vegetation or water. (...) so there is a sort of hierarchical ranking among those pillars, and I think land does come first.

Beyond the importance of land, Webb highlighted that the natural state of atoll islands already makes some of these habitability pillars more challenging for Tuvalu than other societies, such as the lack of freshwater resources. After all, Tuvalu's freshwater supply depends heavily on rainwater harvesting practices and desalination plants, regardless of climate change. As this challenge is inherent to the atolls, locals turn to traditional sources such as coconuts to satisfy their drinking-water needs. However, the participants recognised the correlation between freshwater scarcity and food security, as the soil is notably more saline and thus less fertile. Moreover, Resture reported a rapid decline in fish abundance, which could prove to be problematic as fish are their main protein source.

Uncertainty

One of the main obstacles to determining the current state and the exact position on the transitional process was the lack of data and high uncertainty. As shown in previous literature, scholars disagree on both the exact land height of Tuvalu and the impact SLR has had and will have. According to Webb, this disagreement can be attributed to a lack of data:

About up until 2020, nobody, *nobody*, could have given you a clear understanding of land height above sea-level in Tuvalu. And we still can't tell you what that number is in the Maldives, Kiribati or Marshall Islands and many of the other atoll communities. So, the problem has not been characterised in a way that really shows its urgency.

However, lack of data is not the only problem causing uncertainty regarding the availability of habitable land, it is also the misunderstanding of data. Particularly, the process of vertical accretion, as discussed in the scoping study, has led several authors to claim that the islands are rising rather than sinking (Storlazzi et al., 2018; Woodroffe, 2008). Nevertheless, seeing this as a way for land to remain habitable for longer was considered by Webb as a big misinterpretation. According to Webb, no verified data proved that vertical accretion can raise islands significantly in large-scale. Even if there was evidence, such an undertaking would severely disrupt the organic soils and the atoll ecosystem. All of this uncertainty together can become one of the main obstacles in Tuvalu's preparation process, as Webb highlighted: "You cannot manage what you do not measure".

7.2 Uninhabitability

Building on the findings of the current state, interviewees were consulted to reflect upon critical factors that might diminish habitability in Tuvalu. These insights helped the understanding of the possible thresholds on the habitability continuum along the transitional process.

Identity

Themes around the strong sense of identity were a red thread throughout all interviews. Both Kitara and Resture brought up the unique concept of *Fenua*: “But for us Tuvaluans, the land and the ocean are one. You can’t separate them. And you can never separate them” (Kitara). Every Tuvaluan carries this deep-rooted sense of identity with the Tuvaluan sea, land, language and culture – regardless of where they are physically located. As Kitara captured it: “You can take the Tuvaluan out of Tuvalu, (...) but you cannot, you can *never*, take the Tuvaluan out of the person”.

This understanding of belonging and connectivity becomes not only apparent at the individual level but is also reflected in the significance of family and flourishing community life. Cultural practises such as singing, dancing and eating together were foregrounded as the heart of being a Tuvaluan, distancing them from purely materialistic convictions:

Not everything is about money in Tuvalu. It’s people. And if you don’t have people, there’s no point in having money. You need people to sing songs, you need people to dance, and you need people to make traditional food, feasting and stuff like that. You know, you need people. (Kitara)

The strong sense of social cohesion and land attachment becomes evident in the tireless commitment and dedication to continuously rebuild houses that have been destroyed by climate extremes. After all, climate extremes are perceived to be part of everyday life in Tuvalu: “We are (...) resilient people, and we always rebuild. We know our houses get damaged, we rebuild them” (Kitara).

At the same time, Kitara acknowledged that “climate change has made it worse than what it used to be”, putting the previously mentioned resilience to the test. Regardless of the intensifying impacts related to climate change, the commitment and responsibility to preserve the state for future generations is expressed with hope and a sense of urgency: “While we are here, we’ll do and spend all the energy we can to contribute to saving Tuvalu, ensuring that future generations can see their country” (Resture).

Land Attachment

Hand in hand with the location-independent sense of identity is place-bound attachment to Tuvalu. This “attachment of a person to a place, for us, that’s the most important thing” (Kitara). The land is not merely understood as a physical place, but as a historical site, filled with the spirit of the

ancestors, “who make that place home for us” (Kitara). This lifelong connectivity of a Tuvaluan to the land and sea is further expressed by the cultural family practice from the moment of birth:

In some Tuvaluan families, they'll bury one part of the umbilical cord on the land and plant a significant tree on it. In my case, when I was born, my umbilical cord was cut in two. So one was planted on land, and the other half of my umbilical cord was thrown into the ocean (...), which means that you will be travelling the world. (...) The significance of umbilical cords planted on the land is because that's your connection to your land, to your country. (Kitara)

Risk Tolerance

All of the interviewees expressed that habitability is subjective, while four interviewees added that habitability depends on the individuals' risk tolerance. This risk tolerance is shaped by social circumstances and individual means and capacities to adapt, which may lead to different opinions on whether a place is habitable or not. As Jane McAdam, expert in international law, described, “it may be that within a particular village or community group, there will be some people who decide ‘I don't feel it's safe for me to live here anymore’, whereas others will think that it is”. Additionally, Kitara highlighted that habitability is connected to the individual's agency and willpower to create a habitable space:

Even if we (...) only have rocks on the island, we can still live on that place. (...)
Because you make it habitable. It's not the environment that is habitable or uninhabited. It's the person who's living in the place that makes it habitable. (...)
If we have to float on top of it, we will float on top of it.

All interviewees shared that the assessment of habitability cannot be reduced to one point in time, accepted and applicable to everyone. Additionally, all challenged the practice of top-down habitability assessments, as they often reflect power asymmetries. Ingrid Boas, professor of climate mobilities studying political and power dimensions, emphasised that habitability assessments must be conducted in a community-owned process, enabling Tuvaluans to self-determine when adaptation is no longer viable and when to explore other options.

Mobility

Mobility was mentioned by all interviewees as both the current lived reality and the future prospect. However, different forms of mobility such as displacement, migration and labour-migration were reported, calling for a nuanced examination. As Resture described, labour-migration is an increasingly lived practise, bringing along challenges like manpower drain. Yet, leaving does not equate to disconnection with Tuvalu. The Tuvaluans who leave will remain strongly connected to the land and financially support family members staying at home. Generally, Tuvaluans want to

remain in their country as the attachment to land, language and ancestors are vital factors that no other place can satisfy:

‘You want to come to Australia?’ - I said: ‘Are you willing to take my parents to Australia?’ - ‘Where are your parents?’ - I said: ‘They’re dead. They’re right next to my house. They’re buried here. Do you have room for that?’ (...) It’s not that easy to go. We have ties to our land, you know, to our culture, to our language especially, and we can’t just pick up overnight and then leave Tuvalu. (Resture)

Finally, the interviewees discussed the duality of the possible migration threshold. Out-migration both accelerates and slows down the process of uninhabitability simultaneously. McAdam pointed out that with a declining population, the pressure on infrastructure may be relieved, which would allow the remaining population a better quality of services. Yet, a certain tax revenue is required to maintain the infrastructure. This revenue would no longer be given once the population falls below a critical threshold.

7.3 Full Territorial Loss

The final component of the transitional process is the permanent inundation of the total habitable land area, in literature referred to as full territorial loss. This component raised questions about power dimensions, the responsibility of the international community, media representation, and the role migration plays.

Power Dimensions

An overarching theme of the consultation exercise was the influence of power, manifesting in several aspects. Firstly, the power to determine when ‘the habitability threshold’ is or will be crossed:

Who gets to measure what habitability is? I mean, scientists will say one thing, but that’s bringing a very particular perspective, tools and knowledge base to an issue. Whereas communities might say, ‘Well, wait a second, we think it’s habitable. We think we can stay here.’ (McAdam)

Secondly, Boas argued that these power dimensions already come into play way earlier along the line, as donors have a determining influence on the success of adaptation plans. Underdeveloped countries like Tuvalu depend on foreign investment to prepare for the impacts of climate change. However, these investment decisions are often not made from moral or climate justice obligations, and thus do not consider the best interests of the local population, but instead focus on the donor:

You see, it is especially donors that see a particular country as very risky to invest in, (...) and then it becomes a cost efficiency story of whether it is still feasible to adapt a particular place to climate change, or whether it is in the end more cost efficient if people move somewhere else. (Boas)

When the participants were asked what they considered the role of the international community to be in preparing for the worst-case scenario, many echoed the need for financial support in adaptation measures. However, Kitara argued that in the midst of this talk of adaptation, mitigation should not be forgotten. The pace and intensity with which the consequences of climate change will hit Tuvalu are partly dependent on the ability of the international community to contain the crisis and minimise global warming. Kitara highlighted that the main responsibility of developed countries should thus be to meet their climate targets, as he stated: "If you act locally, the impact will be global (...) that's what I want the international community to do. If you do your bit at home, it will help us in Tuvalu as well."

Representation

Besides determining the allocation of financial aid, the unequal power relations also seem to impact the global image and representation of Tuvalu. Kitara noted that one of the most common misconceptions in the current media is the role of climate change in recent mobility decisions. As Tuvalu arranged the Falepili Union treaty with Australia, the portrait of Tuvaluans as climate refugees started rising:

I think a lot of the media, when this treaty was signed, and this pathway started to be implemented, they still call this pathway a 'climate change migration pathway', but that is totally wrong. It's not a climate change [pathway]. There is no mention of climate change in the treaty. (Kitara)

According to Kitara, the portrayal of passive victims is completely wrong. Not only because it indicates that the local population has given up on Tuvalu and would rather move, but also because it gives the impression that Tuvalu is the only place suffering from the impacts of climate change:

People say: 'oh, but Australia is a bigger country, you can escape climate change', but that's the thing, you can't. You're going from one climate change impact in Tuvalu to a different climate change impact in Australia, which includes Bush fires, which includes flooding. It's still climate change. You're not actually escaping anything in relation to climate change.

Contrary to this media misconception, the scoping study revealed a dominant willingness to stay in Tuvalu, regardless of future climatic changes (McNamara & Gibson, 2009). However, the latest media coverage on the Falepili Union treaty gave the illusion that this attitude has changed once a convenient pathway has opened up, emphasising that 80% of the local population signed up for consideration (France 24, 2025). Kitara highlighted that, again, framing was the culprit, as this pathway was available to anyone with Tuvaluan nationality, not just those remaining in their homeland: "That's true, like 80%, if you look at the population of Tuvalu (...), but the only false

thing that came out of that data is that maybe 50% (...) or close to 70% of those applicants are people living in New Zealand”.

7.4 Preparedness

Building on the transitional process sketched by the previous themes, the interviewees were consulted about Tuvalu’s current measures to prepare for the worst-case scenario. The interviews revealed that Tuvalu is adopting a wide range of preparedness measures to accommodate different future scenarios. Boas summarised the preparedness measures into a threefold plan, along which this section is structured: Plan A entails the adaptation through the physical preservation of land, Plan B involves the facilitation of relocation, and Plan C focuses on the establishment of a digital state to maintain legal statehood if the territory on land is lost.

Plan A - Adaptation

Tuvalu’s plan A pursues land reclamation, projects to ensure food and water security, and the strengthening of individuals’ capacities to cope with climate extremes. Within adaptation, Webb perceived a fundamental prerequisite as often unfulfilled: Characterising the problem first and assessing the resources already at hand before designing and implementing preparedness measures. Otherwise, resources - especially financial resources - might be misallocated, resulting in ineffective adaptation.

Land reclamation was considered by Webb as the most fundamental adaptation measure, as it constitutes the physical platform on which all the other adaptation projects rely. Without dry and stable land, other adaptation projects are at risk of being destroyed by climate extremes:

If you’ve got nowhere to put your new \$20 million desalination plant that’s safe and dry and well out of the way of storm waves, then it may be a very poor investment. Cause it’s gonna get wrecked in the next big storm or the flood.
(Webb)

Hence, land is the prerequisite for other adaptation measures to function effectively. Tuvalu’s primary measure to preserve and reclaim land is the Tuvalu Coastal Adaptation Project (TCAP). Rooted in a community-owned approach, the TCAP incorporated local knowledge and experiences from the start, ensuring the acceptance of the measures taken. With that, TCAP has proven to be effective. Resture, the national project manager of TCAP, reported that in 2024, exceptionally high kingtides inundated the entire island. Yet, there was only one part left dry on the island - the TCAPs’ reclaimed land. This observation is further supported by a model developed as part of the TCAP, showing that “by 2050 it’s about 80% of Fongafale that would be inundated and then by 2100 it will be like 99%. The only dry place is, of course, the TCAP’s reclaimed land” (Resture). Considering TCAP’s success and projected gains, Resture showed confidence in continuing with the project in the future.

Besides the TCAP, Resture reported on other small-scale adaptation projects implemented by the local population, including the cultivation of crops with a higher resilience to soil salinity, and the raising of gardens. Crosscutting these adaptation measures is the strengthening of the individual's adaptive capacity. Kitara pointed out that this individual capacity is already ingrained in the Tuvaluan identity and has been refined over generations: "There are indigenous practices that have been passed down from generation to generation with regards to food preservation, how people can store food for longer periods of time, especially during cyclonic events. And people will prepare".

Plan B - Relocation

With regards to Plan B - the facilitated relocation - all interviewees consistently emphasised the predominant wish of the Tuvaluan population to stay. In this context, Resture pointed towards the *Fenua*, explaining that this is making it difficult for Tuvaluans to leave the country for good: "We have ties to our land, to our culture, to our language especially, and we can't just pick up overnight and then leave Tuvalu. Other people may have that, but they will one day return to Tuvalu". At the governmental level, McAdam reported a shift in mindset over the past decades, highlighting that the decision-making around migration is not an easy topic in Tuvalu. Nevertheless, there was consensus among the interviewees that Tuvaluans must be given the freedom to choose whether to stay or leave, including the option to return.

Plan C - Digitalisation

Plan C entails the states' digitalisation in the event of full territorial loss. The Tuvaluan interviewees described this preparedness measure as an innovative, pragmatic and meaningful response to preserve Tuvalu's cultural heritage. Kitara describes, "when Tuvalu comes to the worst-case scenario, full territorial loss, then at least there are points of reference on the digital platform to say 'this is where Tuvalu was or, this is where my island was'". Beyond that, the digital Tuvalu is envisioned as a platform where people remain connected to each other and to the Tuvaluan culture, despite being scattered around the globe: "I think it comes down to the mental part of it, you know, where people can still connect with each other and with culture through the technology that exists today" (Kitara).

8 Model of the Transitional Process

To answer RQ2, the results of the scoping study and the consultation exercise were combined to develop the thesis's heart: The model of the transitional process, tracing the possible transition from Tuvalu's current state to the condition of uninhabitability to the full loss of habitable land. To date, no such model exists in the literature, which is the gap identified in the introduction that the model seeks to fill. The model synthesises the findings from climate science, international law, habitability, social, and economic studies into a coherent whole, visualising how all these disciplines are interlinked. The final transitional process model is presented in Figure 10 on the page below.

8.1 The Worst-Case Scenario

The scenario storyline intends to display the narrative of a potential worst-case scenario. While not based on a timeline, it outlines a potential chronological order in which the worst-case scenario could unfold. The narrative contains three clearly defined moments: the current state, insufficient land area, and the full loss of habitable land - earlier referred to as 'full territorial loss'. Other elements, such as the uninhabitability determination and its thresholds, are more flexible and might shift, based on the development of the 'stressors' and the impact of the 'influences'. Along this transitional process, 'uninhabitability' is illustrated as a cloud to reflect its broad range, depending both on the individual's definition of the concept and socio-economic circumstances that affect its placement. Within this cloud, the various thresholds impacting uninhabitability are displayed in an order derived from the results. From the current state to full loss of habitable land, the narrative reads as follows:

In the short term, the most pressing habitability challenge will be freshwater scarcity, followed quickly by the soon expected coral bleaching threshold. Correlated to these two is the food security threat. As inundation is more frequent, weather conditions are compounding, human pressure is at an all-time high, the quality of infrastructure is deteriorating, and settlements are being lost. All these elements constitute additional push-factors to labour-migration, leading to brain-drain on the islands. All these thresholds cause external donors to lose confidence in the success of adaptation measures, resulting in the withdrawal of foreign investment. With the decline of the workforce and loss of foreign investment, the local economy collapses, worsening socio-economic circumstances on the island and leading to another peak in out-migration. This out-migration will eventually cause social institutions to collapse as there will no longer be enough people to keep critical services running. The collapse will trigger a final voluntary abandonment of the island, leaving behind only those who would rather die on the island than relocate. They will soon face the harsh threshold where there is not enough land area left to sustain human life or settlements. Finally, the highest points on the island will also disappear beneath the waves, marking the point of full loss of habitable land in Tuvalu.

Transitional Process

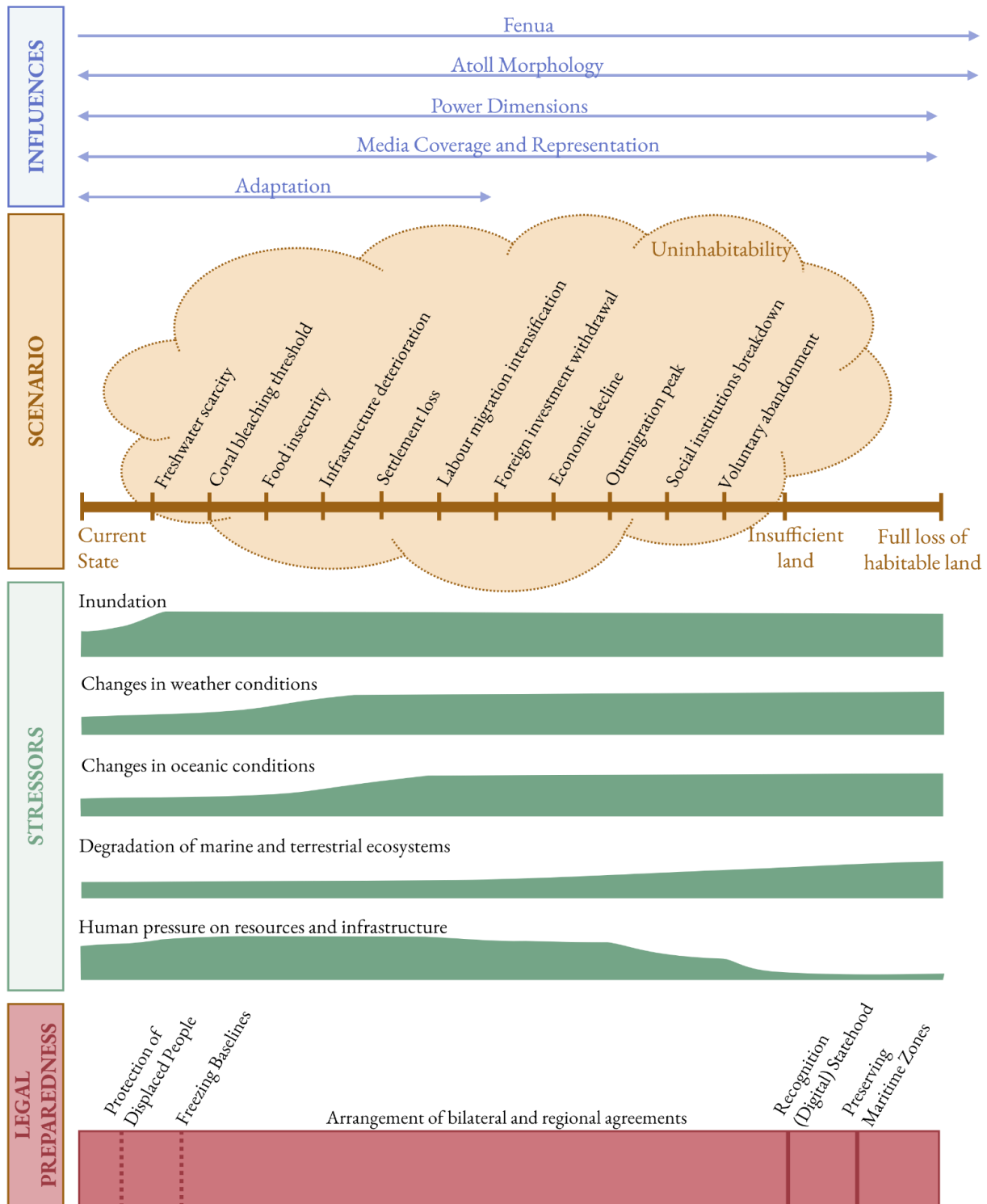


Figure 10: Model of the transitional process from the current state, to a condition of uninhabitability, and full loss of habitable land in Tuvalu (own figure).

8.2 Stressors

The stressors are the environmental and anthropogenic factors that have an impact on several uninhabitability factors. They have been portrayed in a parallel fashion to avoid the impression of a linear process, and to highlight their interdependence instead. The five selected stressors are overarching forces, composed of the impacts identified in earlier sections, as displayed in Table 4.

Table 4: Overview of the stressors identified in the transitional process model (own table).

STRESSORS CATEGORY	INCLUDING IMPACTS
Inundation	• Salinisation: freshwater and soil • Coastal erosion • Flooding • Kingtides • Wave overtopping • Wave height and energy
Changes in Water Conditions	• Precipitation patterns • Droughts • Rising atmospheric temperatures • ENSO • SLR • Wind intensity and frequency • cyclones
Changes in Oceanic Conditions	• Ocean surface temperature • Acidification • Coral bleaching
Degradation of Marine and Terrestrial Ecosystems	• Biodiversity • Fish abundance • Mangroves • Coral reef degradation
Human Pressure on Resources and Infrastructure	• Urbanisation • Waste management • Overfishing • Land-use change

All stressors have been identified as already impacting the current state, meaning most start from a medium level of impact. Currently, the most pressing stressors are inundation, as participants already described several examples of entire islands being temporarily inundated, and human stressors, as urbanisation was reported by many as one of the most urgent issues. All stressors are expected to increase over time, except for human pressures, which will decline once people start relocating and disappear completely once the land is voluntarily abandoned. The degradation of terrestrial and

marine ecosystems is expected to progress at the slowest rate, as experts indicated that the current impacts are small and that the ecosystems are resilient to a certain degree.

8.3 Influences

The positioning of the uninhabitability cloud and the rate at which the scenarios' thresholds are reached are influenced by external factors. These factors, referred to as 'influences', do not trigger the thresholds, but shift the conditions under which the transition takes place. In a way, the influences are like the wind determining the direction and pace of the uninhabitability cloud: all influences have the potential to accelerate or slow down the progression of the transition - with the exception of the *Fenua*. This portrayal once again highlights that the future is not inevitable but dependent on the actions taken.

Firstly, the influence of adaptation, which has an effect from the current state until the moment at which financial support is withdrawn. Even though adaptation is meant to delay the thresholds or even prevent them indefinitely, the arrow is drawn double-headed to account for the possibility of maladaptation. Secondly, the media coverage and representation, which were shown both by literature and the interviews, have a significant influence on the risk perception among both external donors and the local population, and could thus have a significant impact on the habitability status. Although the influence was often described as negative, media attention has been demonstrated to help express the urgency of the situation and open up new pathways. Thirdly, the power dimensions refer to the people in charge of determining the local habitability status, the responsibilities of the international community, and the local influence on development and adaptation investments. Again, the findings indicate that these power dimensions mostly had a negative effect, but possess the potential to influence the transition for the better. Fourthly, atoll morphology, which is presented as a two-sided influencing factor, primarily because scientists have not yet been able to agree whether the natural process of accretion can keep pace with future SLR. Finally, *Fenua* has been added to represent the high level of social cohesion and strong cultural ties on the island. By incorporating this influence, the model acknowledges that many of these habitability challenges are better addressed when people continue to work together to tackle them.

8.4 Legal preparedness

Finally, to represent the legal discussions on this potential transitional process, a layer for legal preparedness was added. The preparedness bar is portrayed at full height throughout, to emphasise its consistent importance during the process. Moreover, the most important legal discussions have been included; dotted lines for challenges that should be addressed as soon as possible, and solid lines for the issues with a hard deadline. The protection of displaced populations has been placed first, not only as new treaties are currently being drafted, but also because human safety debates are prioritised over others. It is quickly followed by the matter of freezing baselines of the maritime economic zones. Subsequently, legal preparedness will mainly consist of arranging bilateral and regional agreements

to ensure resource availability and assistance in times of disasters. Finally, once the threshold of insufficient land is crossed, it is important that Tuvalu's digital state is recognised, and shortly after, the original maritime zone is preserved and recognised internationally.

While the model exhibited a visual representation of the combined result sections, it did not critically assess the synergies and contrasts of the findings in Chapters 6 and 7. These discrepancies and how they impacted the model will be discussed in Chapter 9.

9 Discussion

Synthesising the findings from both the scoping study and the consultation exercise reveals a dual picture: While some of the information from the literature was confirmed, other information was challenged, revealing tensions and misinterpretations that influence how Tuvalu's situation is understood and responded to. This chapter will analyse how the synergies and contrasts of the result chapters 6 and 7 impacted the design of the model. Moreover, it will reflect on how preparedness has been operationalised in the Tuvaluan context.

Layers of Uncertainty

Both the scoping study and the consultation exercise confirm SLR as the central driver of Tuvalu's challenges. SLR manifests in several interconnected processes such as wave overtopping, saltwater intrusion and ecosystem degradation (Stege, 2018; Badillo-Interiano et al., 2025; Schaeter-Santander, 2025). Each of these processes involves ecological implications and economic, social and legal conditions that provide the foundation of Tuvalu. Together, these factors erode the conditions for Tuvalu's habitability (Duvat et al., 2021; Schlosberg & Collins, 2014). Yet, a certain degree of uncertainty runs through the research field, having practical implications for subsequent preparedness.

One big tension concerns atoll morphology. Atolls are, by nature, dynamic systems that continually adapt in response to external influences (Jarillo & Barnett, 2022). The big debate in the literature is whether this natural balancing process can keep pace with future SLR. The consultation exercise and recent articles show a tendency towards the view that it cannot, given the current stressors and adaptation measures (Steibl et al., 2024; Wandres et al., 2024; Webb). However, as long as this question remains vague, a false sense of security can be created (Webb), potentially influencing assumptions in future research, adaptation measures, and the allocation of resources. Furthermore, some of these discussions are so focused on the morphological elements that they disregard the habitability dimension. As Yamano et al. (2007) highlight, the resilience of the land area does not equate to continued access to habitable land area and thus resilience of the population. In short, even when the physical land as a platform is preserved, proper conditions for habitability are not guaranteed.

These layers of uncertainty are deepened by research gaps. Little research has been done on how atolls have changed in the past, leaving questions unanswered about how atolls respond to changes in SLR (McLean & Kench, 2015). Beyond that, each atoll is unique in its cultural practices, morphology and exposure to SLR (McLean & Kench, 2015; Lazrus, 2016). These characteristics complicate the development of suitable models to describe the relationship between SLR and atoll response appropriately (McLean & Kench, 2015). This uncertainty is further reflected in the inconsistency of figures across the literature. Different sources claim varying numbers for land height and rates of local SLR, without specifying the assumptions or baseline value on which these figures are based.

Subsequently, projections for the worst-case scenario span a wide time horizon, ranging from 2038 to 2100 (Yang et al., 2020; Balesh, 2015; Duvat et al., 2021; Ritman et al., 2022). The lack of this baseline agreement and adequate scientific data hinders the design and implementation of effective preparedness measures in Tuvalu (McLean & Kench, 2015). The consultation exercise echoed this concern, advocating for adequate problem characterisation and meaningful data collection (Webb).

Knee-deep in High Waters

The findings about Tuvalu's current state are drawn primarily from the consultation exercise. Tuvalu's current state is characterised by changes in weather and oceanic conditions, such as increasing soil salinity and higher *Tai Lele*, as well as by anthropogenic factors (Kitara; Resture). The trend of urbanisation, particularly in Funafuti, is driven by the advantages of the island's education, healthcare infrastructure, and career opportunities (Resture; Kitara). This is supported by literature, as McCubbin et al. (2015) state that in 2015, around 83% of Funafuti's inhabitants were not indigenous. Already in 2003, Connell (2003) reported overcrowding in Funafuti, which led to the infrastructures' overload, challenges in waste management and an increased instability in water and food supply. All these factors not only change the social fabric but disrupt the natural ecological balance of Funafuti – after all, houses and infrastructure must be built to meet the demands of population growth (Steibl et al., 2024; Kitara; Resture).

These current conditions are crucial for the conceptualisation of the model: The starting point of the model does not assume a healthy, stable system facing future stressors, but an already stressed system moving along the possible transition. The model's first 'threshold' of freshwater scarcity is not a far-away future condition but a lived reality, underlining the urgency of preparedness (Singh et al., 2022; Resture). This exemplifies how closely connected the current state is to the preparedness measures taken - after all, one needs to know what the present looks like to adequately prepare for the future (Webb). Beginning from the TCAP's land reclamation, to water and food security projects, to strengthening the individual's capacity to respond to both present and anticipated future conditions (Kitara; Resture).

Another aspect of the current state is the legal landscape. Current consensus in international law - also reflected in the consultation exercise - is that Tuvalu will retain its statehood. The international law's character of favouring state continuity, combined with Tuvalu's self-determination strategy, provides a certain degree of legal protection of Tuvalu's future statehood in the worst-case scenario. Additionally, this protection is reinforced by regional declarations on preparedness and support for SLR impacts drafted by the Pacific Islands Forum. These include the Declaration on Preserving Maritime Zones in the Face of Climate Change-related Sea-Level Rise in 2021 (Pacific Islands Forum, 2021), and the Declaration on the Continuity of Statehood and the Protection of Persons in the Face of Climate Change-Related Sea-Level Rise in 2023 (Pacific Islands Forum, 2023).

However, maintaining statehood practically and having adequate legal frameworks to confirm this are two separate things. Existing international law assumes territorially stable states, thus failing to consider the dynamic prospect of diminishing habitability and with it the cascading effects it may have on territory, population, and governance capacity (Lapaš, 2022; Ödalen, 2014). Therefore, a shift of the international law's view towards opening ways to accommodate the dynamic character of states is still needed (McAdam et al., 2025; Skillington, 2016; Lee & Bautista, 2021; Blanchard, 2016).

The Continuum of Habitability

Along the transitional process from the current state to full loss of habitable land is the continuum of habitability. The consultation exercise reflected a similar definition as Sterly et al. (2025, p. 3), who consider “the quality of the relation between people and a place” as a determining factor for the community’s capacities to sustain a meaningful life. The connection to land is sacred to the Tuvaluan population, through their ancestral bonds and birth rituals, but also to practice their culture and traditions. Life, as they know it, can only take place in Tuvalu (McMichael et al., 2021; Talia, 2025), not dictated through money and a nine-to-five job, but through community and self-sustaining practices (Kitara). Therefore, Tuvaluans are willing to fight to keep that life a reality for as long as possible, using traditional knowledge and community capital to survive in conditions that others perhaps already defined as uninhabitable. As Kitara concluded, it is the inherent resiliency of the Tuvaluan identity that enables them to rebuild and recover every time they are confronted with various climate change challenges. It is also this identity that will keep many Tuvaluans on their islands until the last rocks have disappeared beneath the waves.

This centralisation of identity highlights the importance of contextualisation within habitability assessments, as everyone’s definition of habitability will be different (McMichael et al., 2021; Boas et al., 2025). Partly through the earlier described urgency to stay connected to a particular territory, but also partly defined by one’s socioeconomic status and thus risk tolerance thresholds. Even within a small country like Tuvalu, risk exposure and vulnerability can significantly differ within one community (Taupo et al., 2018). Factors such as income, age, and living situation can alter the means and capacities - and perhaps even willingness - to adapt (Magnam et al., 2026). When connecting that risk tolerance threshold to the transitional process, it becomes clear why uninhabitability is better understood as a continuum rather than a binary state. For someone with more technical and financial resources, initial thresholds such as freshwater and food scarcity are easier to overcome through, for instance, imported goods (Spencer et al., 2024; Taupo et al., 2018). Similarly, the age factor can mean that certain thresholds - such as infrastructural deterioration and settlement loss, affecting services like education, healthcare, and economic activities - will push younger families to look for opportunities elsewhere (Barnett et al, 2024).

While all of those factors are difficult to capture through expert-driven habitability assessments, previous literature and the current results agree that these assessments remain valuable (Horton et al.,

2021; Farbotko & Campbell, 2022; Spencer et al., 2024). Although the frameworks are unable to reduce habitability to one point in time, they provide useful scientific insights into the exogenous drivers of change impacting the atoll habitability system (Duvat et al., 2021). Therefore, they can be used to map the changes in environmental and anthropogenic stressors, which in turn could help identify required adaptation interventions. Furthermore, by tracking changes in weather and oceanic conditions, the status of marine and terrestrial ecosystems, inundation frequency, local SLR, land height, and human pressures, the effectiveness of adaptation measures can be considered to formulate adaptation thresholds (Spencer et al., 2024). These adaptation thresholds should be a combination of scientific and traditional local knowledge (Kelman, 2010; Fletcher et al., 2013; Stege, 2018), and ultimately self-determined by local communities before other measures are considered (Boas). This will ensure the right to stay for inhabitants and minimise the influence of external power dimensions or even a scenario of forced relocation (Horton et al., 2021; Farbotko & Campbell, 2022; Sterly et al., 2025).

Staying Afloat

As shown by the scoping study, the consultation exercise, and the transitional model, the potential permanent inundation of Tuvalu requires various forms of preparedness. In its current policy, Tuvalu has broken down preparedness measures into three distinct stages. Plan A, focused on mitigation and adaptation measures to slow down or even prevent full permanent inundation from happening, takes priority (Piguet, 2019; Boas). Adaptation measures occur on different levels and scales, ranging from large-scale governmental programs to smaller-scale household measures. For example, to deal with the increased soil salinisation, agricultural products have been replaced by saltwater resilient taro crops, or raised gardens (Taupo et al., 2018; Resture). However, the consultation emphasised that it is not only the recent changes in the environment that have driven the individual preparedness in Tuvalu. The population has been plagued by weather extremes for centuries and is thus used to preparing for cyclone seasons. As Kitara stated, practices like food preservation skills that have been used for generations are often underrepresented in the assessment of habitability and preparedness of Tuvalu. Nevertheless, this example proves that effective adaptation is not always a matter of investment and infrastructure. Rather, adaptation is embedded in the gathered knowledge, longstanding experience and cultural practices of communities, which have to be considered in the bigger picture of the adaptation strategy. Besides these individual adaptation and preparedness practices, Tuvalu started a local land reclamation project in 2017 - the TCAP. After its successful completion in 2025, two new TCAPs have been started (Resture).

In terms of mitigation measures, Tuvalu itself started to create an image of the renewable energy change in the Pacific (Farbotko, 2010a), but mainly began using international platforms to urge big emitters to do the same (Farbotko & McGregor, 2010; Smith & McNamara, 2015). Since the atoll countries are only responsible for 0.03% of global emissions, countries like Tuvalu are dependent on the reductions of other countries, while facing some of the most severe consequences (Burch, 2021;

Calzolari & Phantanaboon, 2025; McAdam et al., 2025). Due to this disproportionality, many scholars claim that the developed countries have a climate justice and moral obligation to financially support adaptation measures (Atapattu & Simonelli, 2021; McAdam et al., 2025). An example of such financial support is the TCAP, which was initially financed through the Green Climate Fund, and later continued through financial aid from Australia and New Zealand (Resture). As the land reclamation project surpasses Tuvalu's budget, the continuation of such adaptation projects is dependent on external financial support and technical expertise (Barnett et al., 2024). However, as Kitara pointed out, this does not remove the responsibility of these countries to simultaneously invest in mitigation measures.

Nevertheless, Tuvalu's plan A has two harsh deadlines: the lack of financial support for adaptation measures as donors lose confidence in Tuvalu's survival (Bazela & Robinson, 2025; Mortreaux & Barnett, 2009), or the lack of land area available to support the placement of these measures such as desalination plants (Webb). Once the adaptation threshold has been passed, and plan A will no longer be sufficient, plan B will come into action: relocation. Even though Tuvalu has one of the smallest populations in the world, preparedness for a mass relocation scenario requires immediate action (Sjöstedt & Povitkina, 2017; Noy, 2017). To ensure the eventual plan would be accepted by the local population, an intense participatory planning trajectory has to be started (Farbotko & McMichael, 2019; Magnam et al., 2026; Stege, 2018). Additionally, the high expenses and multi-stakeholder coordination needed for a successful execution require clear regional and international agreements (Stege, 2018). While money for adaptation is frequently discussed, financial support for migration as a form of long-term adaptation has so far received little attention from the international community (Sancken, 2020; Yamamoto & Esteban, 2017).

However, plan B has only recently been added to Tuvalu's preparedness portfolio through the Future Now Project (Kofe, 2021). However, even with the start of this project, Tuvalu's foreign policy still clearly states they oppose relocation as a solution to the climate crisis, referring to the right of its population to live on its own land and continue as a sovereign state (Barnett et al., 2024; Kofe, 2021). While migration is still supported as an important constituent of the local economy and as a matter of self-determination (Barnett et al., 2024), recent endeavours, such as the arrangement of the Falepili Union treaty, should not yet be seen as a climate change migration pathway (Kitara).

For decades, Tuvaluans have been portrayed by the media as the world's first 'climate refugees' (Burch, 2021; Farbotko, 2010b; McNamara & Gibson, 2009). Even though the term was used to gain support, it was locally ill-received as it painted the inhabitants as passive victims that have already given up, highly underestimating their resilience, resourcefulness, and desire to stay (Burch, 2021; McNamara & Gibson, 2009). In fact, several scholars observed a high willingness to stay in Tuvalu, regardless of the increased climate change challenges (Barnett et al., 2024; Burch, 2021; Farbotko & McMichael, 2019; Mortreaux & Barnett, 2009). Therefore, the signing of the Falepili Union treaty caused some local backlash, as they believed it sent a signal that Tuvalu had given up on plan A, while

the local population was still fighting (Barnett et al., 2024; Magnam et al., 2026; McAdam). However, Noy (2017) warns that a sense of loyalty - both from the government to the population and from the population to the land - might postpone the preparation for this scenario too long, forcing unintended negative consequences to the remaining population. The local government is trying to prevent this through the Future Now Project with the tagline “preparing today to secure tomorrow” (Kofe, 2021).

To ensure that the identity and culture of Tuvalu does not get lost under water, Tuvalu initiated Plan C: digitalising the state. This metaverse is a way for Tuvalu to solidify future statehood as a deterritorialised state, while connecting Tuvaluans to their origins (Rothe et al., 2024; Costa & Simões, 2025; Kitara). Through legal avenues, Tuvalu intends to use this digital state to secure its claim to sovereignty and its maritime zone (Kofe, 2021). Examples of such avenues are clauses in the arrangements made by Tuvalu binding the signing party to recognise the digital state, as for example, the Falepili Union treaty (Barnett et al., 2024). In 2025, Tuvalu’s virtual sovereignty has already been recognised by 26 States (Costa & Simões, 2025).

Local Visualisations

Besides an assessment of the preparedness actions taken by Tuvalu, this thesis examined the extent to which the worst-case scenario had been locally portrayed. While the model visualised one possible future pathway imaginable based on current literature and Tuvaluan experiences, the question arose on whether and how Tuvalu had interpreted and projected the worst-case scenario. The consultation exercise gave insights into the modelling Tuvalu carried out as part of the TCAP. According to their projection, the worst-case scenario may occur in 2100, by which time 99% of Funafuti may be inundated. Yet, this model carried hope: The TCAP’s reclaimed land will remain above water (Resture). This community-owned project thus exemplifies how technical assessments can be used in a meaningful way to serve the local people and assess the effectiveness of adaptation measures. However, it also underlined that the possibility of losing a significant amount of land is not an abstract thought but a real concern for which Tuvalu is actively preparing and raising its voice (Boas; Resture; Rothe et al., 2024; Farran, 2021). However, like many other predictions presented in the literature, this locally created model simply portrayed a potential future endpoint, illustrating the novelty of the transitional approach conceptualised in this thesis.

10 Conclusion

To answer the three research questions, no one knows for certain what Tuvalu's future holds. As a response to RQ1, both the literature and experts confirm SLR as the main driver of Tuvalu's challenges already being experienced today. Hereby, the effects of SLR are operating through interconnected processes that erode habitability-relevant pillars in Tuvalu - the very foundation on which daily life depends. At the same time, SLR reveals deep uncertainties in the underlying data and research on which Tuvalu's future predictions are based, exacerbating implementation and effectiveness challenges for preparedness planning, whether for land reclamation projects or relocation planning.

The transitional model developed in response to RQ2 presents the first-ever transitional model from the current state, to a condition of uninhabitability, and ultimate loss of full habitable land area in Tuvalu, under a potential worst-case scenario. The model presents a comprehensive summary of how SLR impacts legal, social, economic, and environmental factors that could diminish Tuvalu's habitability and future statehood. It demonstrates that the possible process is neither linear nor inevitable. Instead, it is a process shaped by the people who live in Tuvalu, but also by the international community, which has the power to support Tuvalu through investments, adaptation measures, legal reforms and recognition of statehood. In the end, whether the worst-case scenario of the model becomes reality is thus a question of political will. While the transitional model could apply to other SIDS, this model has been created to reflect the unique characteristics of Tuvalu. Therefore, future models would have to account for changes and contextualisation.

The examination of Tuvalu's current state, answering RQ2.1, provides the starting point of the transitional model to know where Tuvalu's future path could lead to. The consultation exercise was used to provide a clear picture of the current challenges and preparedness measures, and to fill the gap in the yet insufficiently explored connection between preparedness and uninhabitability in existing literature. The analysis of the current state shows that Tuvalu is already acting, planning and taking its future into its own hands.

This thought is also reflected in the determination of the habitability threshold. While a combination of scientific and traditional knowledge proved useful to establish current and predict future habitability stressors and influences, individual contextualisation is required to define a personalised threshold. It cannot be presented as a binary state, but rather as a continuum, allowing individual agency and self-determination. Moreover, this determination goes beyond the basic needs of food, water, and land - it encompasses the safety of settlements and infrastructure, economic opportunities, availability of critical societal functions, ties to the community and land, and individual adaptive capabilities. It requires an open mind to the living conditions people are willing to accept and adapt to, as long as they can stay connected to their land and waters. After all, "It is for the people to determine the destiny of the territory and not the territory the destiny of the people" (Western Sahara Case (Advisory Opinion), 1975, as cited in McAdam, 2010, p. 1).

In all this, we must keep in mind that we are not talking about an abstract or empty landmass. We talk about people's homes. Yet, Tuvalu is often reduced by the media and the international community as a symbol - the 'canary in the coal-mine' (Farbotko, 2010b) of the climate debate, a laboratory and paramount example for climate change (Farbotko, 2010b; Mortreux & Barnett, 2009). Images, such as a government representative standing knee-deep in water giving a speech, travel around the world (Saddington, 2025; Costa & Simões, 2025) - and people watch it with fascination, curiosity and pity as Tuvalu drowns under its fate (Farbotko, 2010b; Mortreux & Barnett, 2009). This 'sensationalisation' with which the media represents Tuvalu (Mortreux & Barnett, 2009) reveals a profound injustice, illustrating that we apply different standards (Farbotko et al., 2023): the Netherlands, as a wealthy European country, is likewise threatened by rising sea levels - yet, here we talk about solutions and the art of engineering. When it comes to Tuvalu, we speak about loss and a tragic, but inevitable fate (Farbotko, 2010b; Rothe et al., 2024). What is overlooked in this framing is the people's and nation's tireless fighting spirit - on political, diplomatic, legal and technological fronts (Saddington, 2025; Rothe et al., 2024; Farran, 2021). Its people are determined, resilient and eager to develop innovative concepts (Rothe et al., 2024; Saddington, 2025; Costa & Simões, 2025). Tuvaluans do everything in their power to preserve their country for future generations and to literally keep their heads above water - and they do it with dignity, foresight and hope (Rothe et al., 2024). Tuvalu may be small in size and population, but it is visible and loud at international conferences, and thus not passively awaiting its end (Saddington, 2025; Rothe et al., 2024). Tuvalu is a home to people - and it deserves to be treated as such.

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Appendix

A Data Charting Form

B Inclusion and Exclusion Criteria

C Interview Guide

D Participant Matrix

E Expanded Data Charting Form

A: Data Charting Form

Table A: Stage 2 & 3 Scoping study: Abstract and Title screening (own table).

Note: This table contains only the search prompts used by the researchers. It does not give a comprehensive collection of all search prompts used as the search prompts were revised over time.

Num ber	Database	Search prompts	Search results	Included
1	Scopus	("Tuvalu") AND ("sea-level rise") AND ("climate change")	1277	8
	WoS		79	15
	EBSCO		35	6
	Scopus AI	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("sea-level rise") AND ("climate change")	13	3
2	Scopus	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("climate justice")	39	6
	WoS		118	1
	EBSCO		17	1
	Scopus AI		12	0
3	Scopus	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("territorial loss" OR "land loss")	8	3
	WoS	("Tuvalu" OR "PSIDS") AND ("territorial loss" OR "land loss")	33	1
	EBSCO	("Tuvalu") AND ("territorial loss" OR "land loss")	4	2
	Scopus AI	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("territorial loss" OR "land loss")	14	3
4	Scopus	("Tuvalu") AND ("disaster preparedness")	106	11
	WoS	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("disaster preparedness")	31	2
	EBSCO		1	0
	Scopus AI		11	5

5	Scopus	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("uninhabitability" OR "liveability")	3	1
	WoS	("Tuvalu" OR "PSIDS") AND ("uninhabitability" OR "liveability")	24	0
	EBSCO		301	0
	Scopus AI	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("uninhabitability" OR "liveability")	8	1
6	Scopus	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("statelessness")	4	0
	WoS	("Tuvalu" OR "PSIDS") AND ("external sovereignty") AND ("statelessness")	309	0
	EBSCO	("Tuvalu") AND ("external sovereignty") AND ("statelessness")	329	0
	Scopus AI	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("external sovereignty") AND ("statelessness")	9	4
7	Scopus	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("disappearing states" OR "deterritorialised states" OR "deterritorialized states")	1	0
	WoS	("Tuvalu") AND ("disappearing states" OR "deterritorialised states" OR "deterritorialized states") AND ("external sovereignty")	32	3
	EBSCO	("Tuvalu") AND ("disappearing states" OR "deterritorialised states") AND ("external sovereignty")	0	0
	Scopus AI	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("disappearing states" OR "deterritorialised states" OR "deterritorialized states") AND ("external sovereignty")	14	4
8	Scopus	("disappearing states" OR "deterritorialised states" OR "deterritorialized states") AND ("uninhabitability" OR "liveability")	0	0
	WoS	("deterritorialised states" OR "deterritorialized states") AND ("uninhabitability")	32	0
	EBSCO	("deterritorialised states" OR "deterritorialized states") AND ("uninhabitability")	94	0
	Scopus AI	("disappearing states" OR "deterritorialised states" OR "deterritorialized states") AND ("uninhabitability" OR "liveability")	8	3
9	Scopus	("disappearing states" OR "deterritorialised states") AND ("uninhabitability" OR "liveability")	0	0
	WoS		0	0
	EBSCO		0	0
	Scopus AI	("disappearing states" OR "deterritorialised states") AND ("uninhabitability" OR "liveability") AND ("risk")	22	9
10	Scopus		0	0

	WoS	("disappearing states" OR "deterritorialised states") AND ("uninhabitability" OR "liveability") AND ("preparedness")	0	0
	EBSCO		0	0
	Scopus AI		14	2
11	Scopus	("disappearing states" OR "deterritorialised states") AND ("Tuvalu" OR "Pacific island" OR "SIDS") AND ("risk")	16	3
	WoS	("Tuvalu" OR "Pacific island") AND ("risk")	880	0
	EBSCO	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("risk")	28	7
12	Scopus	("disappearing states" OR "deterritorialised states" OR "deterritorialized states") AND ("uninhabitability" OR "liveability") AND ("sea-level rise")	0	0
	WoS		32	0
	EBSCO		0	0
	Scopus AI		15	5
13	Scopus	("external sovereignty" OR "external souvereignty" OR "statelessness") AND ("sea-level rise") AND ("risk")	205	7
	WoS		1	0
	EBSCO		2	1
	Scopus AI		13	3
14	Scopus	("Tuvalu") AND ("sea-level rise") AND ("risk")	999	0
	WoS	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("sea-level rise") AND ("risk")	96	17
	EBSCO		1	0
	Scopus AI		13	2
15	Scopus	("Tuvalu" OR "PSIDS") AND ("disaster preparedness") AND ("sea-level rise")	143	6
	WoS	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("disaster preparedness") AND ("sea-level rise")	1	0
	EBSCO	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("preparedness") AND ("sea-level rise")	0	0
	Scopus AI	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("disaster preparedness") AND ("sea-level rise")	17	1
16	Scopus	("disappearing states" OR "deterritorialised states" OR "deterritorialized states") AND ("territorial loss" OR "habitat loss" OR "land loss") AND ("sea-level rise") AND ("risk")	0	0
	WoS		0	0
	EBSCO		0	0

	Scopus AI		15	1
17	Scopus	("disappearing states" OR "deterritorialised states" OR "deterritorialized states") AND ("uninhabitability" OR "liveability") AND ("climate justice")	0	0
	WoS		0	0
	EBSCO		32	0
	Scopus AI		9	2
18	Scopus	("uninhabitability" OR "liveability") AND ("climate justice")	0	0
	WoS		0	0
	EBSCO		4	0
	Scopus AI		15	5
19	Scopus AI	RQ1: How will Tuvalu be impacted by sea-level rise?	22	2
20	Scopus AI	RQ2: What is the transitional process from uninhabitability to full territorial loss due to sea level rise for a state?	0	0
		What are the stages of land loss due to sea level rise for coastal states?	17	1
21	Scopus AI	RQ3: How can insights into the preparation for the transitional process help to plan for Tuvalu's future statehood?	0	0
		What are the key factors influencing Tuvalu's transition to statehood preparation?	12	3
22	Scopus	("uninhabitability" OR "liveability") AND ("tipping point" OR "threshold")	83	4
	WoS		29	2
	EBSCO		8	0
	Scopus AI		15	0

B: Inclusion and Exclusion Criteria

Exclusion criteria:

- When there was more recent data available (e.g. the rate of SLR in relation to today's size and shape of the atolls)
- SIDS in the Caribbean Sea
- Whole books
- Article not in English
- No access through Lund University
- News articles
- When we had a lot of search results, we excluded those in which Tuvalu was not mentioned or was only mentioned in a list.
- When the article was focused on a different study area and the findings were not generalisable
- Wrong interpretation of the concepts; e.g. liveability was connected to urban planning
- Low citation rate
- Subject areas in the database:
 - Adaptation
 - Arts and Humanity
 - Business, Management and Accounting
 - Chemistry, Biochemistry
 - Computer Science
 - Disability
 - Energy
 - Gender studies
 - Imaginaries
 - Invasive species
 - Loss and damage
 - Medicine
 - Mental health
 - Neuroscience
 - Nursing
 - Physics
 - Resilience indicators
 - Tourism
 - Urban planning
 - Veterinary

Inclusion Criteria:

- Atoll
- Autonomy
- Climate Change impacts
- Climate justice
- Deterritorialised state, Deterritorialized state
- Disappearing state
- Disaster preparedness
- External sovereignty, External sovereignty
- Habitability, Inhabitability, Uninhabitability
- International community
- International law
- Inundation
- Land erosion
- Migration
- Pacific Island, Pacific
- Sea level rise, Sea-level rise
- SIDS, PSIDS
- Statehood
- Territorial loss
- Thresholds
- Tipping points
- Transitional process
- Tuvalu

C: Interview Guide

The interview guide is designed for the semi-structured expert interviews. Due to the diversity of the interview participants, the interview guide contains two types of questions. The first type of questions are core questions that every participant has been asked. Among them are questions about the current state of Tuvalu, as well as the question for thoughts and comments on the simplified model of the transitional process. The second type of questions are specific questions tailored to the background and profession of the interviewee. Additionally, the interview guide for each participant was structured along thematic pillars relevant to the research purpose and the interviewees' knowledge horizon.

Core Questions

- What is your affiliation with the Tuvaluan context?
- Many habitability scholars are arguing for the active involvement of local actors in that determination. Have there been local habitability assessments performed by local actors, or how are the local people included in that habitability debate?
- **Show simplified model**
- Do you have any thoughts and comments on the simplified model?
- Questions about the current state. The specific question depends on the background of the interviewee.

Specific Questions

Participant 1:

- What is your affiliation with the Tuvaluan context?

Challenges

- From your perspective, what are currently the most urgent climate-related challenges Tuvalu is facing? OR
- How is sea-level rise affecting life in Tuvalu in the current state? OR
- Which changes became most evident in the last 5 years in Tuvalu?
- How have local communities been adapting to maintain and lengthen habitability on the island?
- [if time:] *What challenges are local communities most worried about in the future?*

Habitability

- Food and water security are often mentioned as crucial pillars of habitability. Are locals already experiencing difficulties on those fronts in the current state?

- If there is one thing habitability scholars agree on, it is that habitability is very hard to determine. Are there specific thresholds and tipping points that are mentioned by local actors in Tuvalu?
 - How would you notice when Tuvalu has reached an irreversible tipping point for habitability?
- In your article, you describe the strong sense of community, the *fale pili*. How do you think this social cohesion will affect the capability and will to migrate or remain on the island?
- Many habitability scholars are arguing for the active involvement of local actors in that determination. Have there been local habitability assessments performed by local actors or how are the local people included in that habitability debate?

**Show model:* Do you have any thoughts and comments on the simplified model we created?

Preparedness

- Studies have shown that there is an expected increase in the frequency of cyclone activity, the wave height, coastal erosion, precipitation, and sea level rise. All these factors combined impact the risk of flooding. How is Tuvalu currently preparing for the expected increase in flood risk?
- How is Tuvalu currently preparing for the worst-case scenario of full permanent inundation?
- What are the focus areas of Tuvalu's current preparations for possible habitability challenges?
- How do you balance the obligation to prepare for the worst-case scenario without leaving the impression on the international stage that you have given up?
- [if time:] *The connectedness of the population to the culture and land has often been described as the most important factor for local actors. When is the "fenua" lost, and can it be captured in an authentic digital fenua that is accepted by Tuvaluans?*
- [if time:] *Which decisions are crucial in the next 10 years?*

Migration

- While many scholars have written about the will to remain, the first sign-ups for the new migration program with Australia showed applications of about 80% of the population. What are your thoughts on the mindshift of Tuvaluans clearly stating they do not want to leave and would never leave, to a lot of people applying for a Visa?
 - Out-migration has been mentioned by several scholars as another critical threshold for the habitability of the island. Do you believe that out-migration will form a threat to habitability and the continuation of Tuvalu's statehood?

- You have worked as a contact person for people who have struggled with their migration from Tuvalu to the mainland of Australia. If the need for permanent migration arises, what aspects are important to be sufficiently prepared by Australia and Tuvalu?
- [if time:] *There has been a lot of speculation about the possible future migration of the Tuvaluan population. Some are arguing for an individual case basis, whereas others are talking about a mass migration event. What do you think is the most likely scenario?*
 - *What would be best for Tuvalu?*

Participant 2:

- What is your affiliation with the Tuvaluan context?

Atoll Morphology:

- As some of your work took place in Tuvalu, could you tell us something about the most pressing climate change-related challenges in recent years?
- Accretion and erosion are part of the natural process of atoll morphology. How can the effects of this natural process and the negative consequences of sea level rise be separated?
- In your research, you have mentioned examples of atoll islands rising rather than sinking. With the expected rise in sea level, can island morphology keep up with local sea-level rise in Tuvalu?
- [if time:] *What are the main uncertainties in projecting possible future scenarios of Tuvalu?*
 - *Which physical processes are left out in most discussions about possible future scenarios?*
- [if time:] *Research covers the direct impacts of sea-level rise or coastal erosion. Which indirect effects of sea-level rise are often overlooked when talking about habitability?*

Habitability:

- You were a co-author in some of the most frequently cited articles on habitability assessments, especially in the context of atoll islands. In the model, you describe five and later six pillars of habitability. Which of these pillars do you believe to be most endangered by current climate changes in the Tuvaluan context?
- Food and water security are often mentioned as crucial pillars of habitability. Are locals already experiencing difficulties on those fronts in the current state?
- Many habitability scholars are arguing for the active involvement of local actors in that determination. Have there been any developments on a local level to determine habitability factors and their thresholds?

Thresholds:

- In a recent article on the promise of the habitability lens, you describe the various steps of needing to know the current state of habitability pillars and the need for risk tolerance thresholds, which will ultimately lead to suitable adaptation solutions. Could you take us through the thought process of this model?
- You are involved in one of the biggest adaptation projects in Tuvalu. Did this project make any reference to specific habitability thresholds they wanted to safeguard?
- What do you think this local and indigenous involvement could look like for habitability assessment and risk tolerance thresholds, if their definition of habitability might be very different?

- [if time:] *Which indicators should be monitored to identify warning signs?*

**Show model:* Do you have any thoughts and comments on the simplified model we created?

Preparedness

- Studies have shown that there is an expected increase in the frequency of cyclone activity, the wave height, coastal erosion, precipitation, and sea level rise. All these factors combined impact the risk of flooding. How is Tuvalu currently preparing for the expected increase in flood risk?
- How is Tuvalu currently preparing for the worst-case scenario of full permanent inundation?
- What are the focus areas of Tuvalu's current preparations for possible habitability challenges?
- How do you balance the obligation to prepare for the worst-case scenario without leaving the impression on the international stage that you have given up?

Participant 3:

- What is your affiliation with the Tuvaluan context?

Habitability:

- The determination of habitability is currently a hot topic within climate science, with some scholars arguing that there should not be a rigid definition for habitability as it is very context-dependent. Do you believe that there is a need for a clear definition for legal purposes?
 - Who should be the one to define and assess/declare that?

**Show model:* Do you have any thoughts and comments on the simplified model we created?

- On what part of the continuum do legal issues become important? And why?
 - Are there identifiable legal thresholds where a situation fundamentally changes?
- *[if time:]* Climate justice is also often reported as an important issue within this context. Tuvalu is responsible for only 0.03% of gas emissions, but it now faces severe consequences from climate change. More and more SIDS are trying to legally hold big emitters responsible, with the Vanuatu case as a recent example. Do you believe these cases will translate into help from big emitters in practice?
 - How can big emitters be held accountable and forced to help mitigate and fight the severe consequences of climate change?

Migration and the international stage

- Some scholars describe the likelihood of amendments to the refugee convention as unlikely and potentially dangerous, partly because they believe powerful countries would not ratify a new convention. What do you believe can be done from an international law perspective to provide protection for the Tuvaluan population?
 - *[if time:]* In your opinion: What are the most important steps for Tuvalu to take in terms of preparedness for sea level rise?
 - *[if time:]* Since there hasn't been any case where the entire state lost its territory - Tuvalu might be the first case, a precedent, so to speak. What legal amendments might be necessary if full territorial loss occurs?
- Many articles refer to declarations made about the maintenance of statehood, or even the maintenance of maritime zones. How much power do these declarations hold, especially those that are not signed by many states, in the eyes of international law?
- On several occasions, the Tuvaluan government has suggested the draft of legally binding instruments to help people displaced by the consequences of climate change. Do you believe any such agreement would ever be passed on an international stage?

- The ILC and the ILA have published several reports on their progress on these big legal questions in the topic of sea level rise. However, within these reports, there is little to no reference to climate justice. Why is that the case?

Future statehood

- There are many researchers that wrote about possible future scenarios for deterritorialised states. For example, State Death, Zombie State (Trusteeship), Landless State or Government-in-exile (ex-situ state). What do you consider the most likely option?
- The government of Tuvalu has been working hard on digitalising the state. Would they, as a digital state, have the same benefits as any other state in the eyes of international law?
- [if time:] *Do you believe that the digital state has the potential to be a long-term and sustainable solution?*

[if time] Future economic zones

- Do you consider it likely that maritime law will be adapted due to sea-level rise?
- Do you think that Tuvalu would be able to maintain its maritime zone when they switch to a fully digital state?

Participant 4:

- What is your affiliation with the Tuvaluan context?

Challenges

- From your perspective, what are currently the most urgent climate-related challenges Tuvalu is facing? OR
- How is sea-level rise affecting life in Tuvalu in the current state? OR
- Which changes became most evident in the last 5 years in Tuvalu?
- How have local communities been adapting to maintain and lengthen habitability on the island?

Habitability

- Food and water security are often mentioned as crucial pillars of habitability. Are locals already experiencing difficulties on those fronts in the current state?
 - What about fisheries? Since fisheries are mentioned a lot to be the main income source of Tuvaluans, has there been a change in terms of the availability and reliability of fish?
- If there is one thing habitability scholars agree on, it is that habitability is very hard to determine. Are there specific thresholds and tipping points that are mentioned by local actors in Tuvalu?
 - How would you pinpoint/notice when Tuvalu has reached/exceeded an irreversible tipping point for habitability?

Coastal Adaptation Project

- You are involved in one of the biggest adaptation projects in Tuvalu, the Tuvalu Coastal Adaptation Project. Did this project make any reference to specific habitability thresholds they wanted to safeguard?
 - You are in the leadership position of the Tuvalu Coastal Adaptation Project. Could you briefly describe what the project is about, how it has been started and what the main goals are?
 - How would you explain to people why the project is so significant?
- What were the risks of maladaptation or even unintended environmental damage (e.g. stress on corals) identified at the start and noticed during the project? How were these risks managed?
 - Do you think that the project has met its intended outcomes?
 - How is local knowledge in the project integrated?

- How would you say the Tuvaluan people value the efforts of the Adaptation Project and how are they integrated in those considerations?
 - How does the project change the relationship between people and the sea? (aiming for the fenua)
- *[if time]* What was the most memorable/inspiring story or experience you had in connection with the project?
- *[if time]* How has the morphology of the islands changed over time? Is there anything outstanding?
 - Is there baseline data for the atoll morphology, or how are changes measured and determined (basically changes in relation to what)?
- *[if time]* Which technologies could transform the project in the next 10-15 years?

**Show model:* Do you have any thoughts and comments on the simplified model we created?

Preparedness

- Besides the Coastal Adaptation Project, how is Tuvalu currently preparing for the worst-case scenario of full permanent inundation?
- What are the focus areas of Tuvalu's current preparations for possible habitability challenges?
- From your perspective, how can the international community help to facilitate this process?
- How do you balance the obligation to prepare for the worst-case scenario without leaving the impression on the international stage that you have given up?

Participant 5:

- What is your affiliation with the Tuvaluan context?

Habitability

- In a recent paper you mention that climate change and other factors can have a serious impact on habitability. However, you also warn for possible misuse and even power dimensions of the term. Could elaborate a little bit on that?
- Are there situations in which the label of uninhabitability could be important?
- What do you consider the most important factors in a habitability assessment?
 - In some of the papers you collaborated on you mention the need for bottom-up approaches in habitability assessments. Could you describe what such a project could practically look like in the Tuvaluan context?
 - Who do you believe should be in charge of assessing habitability?
- What do you believe to be important indicators and tipping points to determine whether Tuvalu is inhabitable or not?
- The uninhabitability status could be the main claim that people who do leave the island will use to defend their need for citizenship elsewhere. However, you have pointed out that the status of uninhabitability is also misused to remove people from the land, people who do not want to leave. How can you balance that?
 - *[in time]* What kind of measures and protection should Tuvalu still provide for people that stay in an area that has been labelled uninhabitable?

Migration

- The determination of habitability is currently a hot topic within climate science, some scholars arguing that there should not be a rigid definition for habitability as it is very context dependent. Do you believe that there is a need for a clear definition for legal purposes?
 - Who should be the one to define and assess/declare that?
- There has been some discussion about the appropriate terminology for the migration from Tuvalu. A lot of scholars have expressed issues with the terminology of 'climate refugees'. What would you believe is a better suited term, that would still allow the population to gain proper protection?
- If the need for permanent migration arises, what aspects are important to be sufficiently prepared by Australia and Tuvalu?
- Leaders have been vocal about the serious situation in Tuvalu, and have even insinuated that Tuvalu might be the first country to disappear. You have mentioned the dangers of self-fulfilling prophecy, so how can you find the right balance between wanting to express the urgency of the situation to call others into action, and not describing the future of Tuvalu as inevitable?

**Show model:* Do you have any thoughts and comments on the simplified model we created?

Preparedness / international community

- What is the responsibility of the international community in preparing for this scenario?
- What do you believe can be done from the international community to provide protection for the Tuvaluan population?
 - *[if time]* In your opinion: What are the most important steps for Tuvalu to take in terms of preparedness for sea level rise?
- *[if time]* The most well-documented current preparation for the full disappearance of Tuvalu is digitalizing the state. Do you believe this will be a successful project for the future of Tuvalu?
- *[if time]* Why is it important to portray the disappearance of a country as a process rather than an event?

D: Participant Matrix

Table D: Participant Matrix (own table).

PARTICIPANT	DESCRIPTION
Alan Resture	Alan Resture is a local inhabitant of Tuvalu and a marine environment specialist. He is the national project manager of the Tuvalu Coastal Adaptation Project (TCAP), works with local communities and has been a consultant for the Tuvaluan government and organisations worldwide (TCAP, n.d.).
Arthur Webb	Arthur Webb is an expert in island shoreline processes and coastal management. He has long-term experience working with Pacific Islands and is a co-author of the Duvat et al. (2021) article, conducting one of the first habitability assessments. Additionally, Webb was a “Lead Author in the Small Islands Chapter of the 2014 IPCC Assessment”, covering topics such as SLR (World Climate Research Programme [WCRP] Sea Level Conference, n.d.).
Ingrid Boas	Ingrid Boas is a professor of climate mobilities at Wageningen University, focusing on political and power dimensions. She is familiar with the context of Tuvalu, having written several articles on Tuvalu (Wageningen University & Research, n.d.).
Jane McAdam	Jane McAdam is an international lawyer, specialised in refugee law and forced migration, particularly in light of climate change and disasters. She is a Professor at the University of New South Wales and a former member of the International Law Association committee for SLR (University of New South Wales [UNSW], n.d.).
Taukiei Kitara	Taukiei Kitara is an indigenous knowledge holder and climate activist. As an independent researcher, he writes about climate justice and mobility connected to the Tuvaluan context (Farbotko & Kitara, 2022).

E: Expanded Data Charting Form

Table E: Extended Data Charting Form – Stage 4 of the Scoping Study: Full-text Review and Coding (own table).

Search Number	Search prompts	Retrieval date	Reference (APA 7)	Study location	Aim of study	Important results	Codes	Reader (S/J)
1	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("sea-level rise") AND ("climate change")	02/02/2026	(Green & Wewerinke-Singh, 2025)	SIDS and generally	interconnection statehood and self-determination	chapter 2.2: how risks imposed on SIDS negatively affect the states' self-determination. Losing statehood would also mean losing access to key support structures. Raises question if statehood is lost if people remain their right for reparations. Definition of "statehood".	statehood, total submergence, self-determination, state continuity	S
			(Wandres et al., 2024)	Tuvalu	modelling possible SLR scenarios in Tuvalu	data, graphs, simulations for entire Tuvalu islands in 5y rhythm. Climate injustice because poor people live in lower-lying areas. Interface to explore the different scenarios available	sea-level rise projections, habitability, STAPLEE, injustice	S
		23/03/2026	(Lazrus, 2016)	Tuvalu	How Tuvaluans understand climate-induced migration and how this understanding is reflected in their agency	Migration as adaptation (but it doesn't address root causes of vulnerability), why the future is not inevitable, critique on "climate refugee" terminology, vulnerability is multilayered and socially constructed	disappearing state, migration, international law, sea-level rise, climate change impacts, land attachment	S

		(Aung et al., 2009)	Tuvalu	impacts of sea-level rise in Tuvalu	speed and severity of sea-level rise in Tuvalu. Factors of sea-level rise. Predictability of sea-level rise	climate change impacts, sea-level rise, prediction of sea-levels	S
		(Bazela & Robinson, 2025)	Tuvalu	impacts of climate change in Tuvalu: ecological, economic, political, legal, social dimension	short-term and long-term risks of climate change in Tuvalu, definition of "climate migrant" and phases of migration, natural resources and the loss of such, loss of infrastructure, dilemma of the government: people migrate --> less taxes but expenses to manage climate change impacts increase	climate change impacts, sea-level rise, climate justice, migration, natural resources, habitat loss, policies and projects of Tuvalu to mitigate climate change impacts, fale pili treaty	S
		(Becker et al., 2012)	Pacific islands	Sea-level rise in Pacific islands and simulations of future sea-levels	technical data about sea-level rise, Tuvalu as a case study: SLR amplifies already existing fresh water scarcity	climate change impacts, SLR, water scarcity	S
		(Evans, 2025)	Tuvalu	digital twinning of Tuvalu	culture of Tuvalu, Future Now Project, climate change threatens the upholding of Tuvalu's culture and identity. Digital Tuvalu as the "new" nation Tuvalu	Disappearing states, digital Tuvalu, sovereignty	S

			(Farran, 2021)	Pacific islands	Significance of Sea-level Rise for the Continuation of States and the Identity of their People	The Tuvaluan convention mentions that the state of Tuvalu goes beyond physical land but includes its culture	Disappearing state, international law, citizenship, Montevideo Convention, Tuvaluan Convention, climate refugee, self-determination, ex-situ statehood, maritime zones, recognition of the international community	S
			(Jarillo & Barnett, 2022)	Pacific islands	connections between island peoples and their terrestrial environments and the work that they are doing in response to the impacts of climate change	atoll morphology and geology as climate change impact amplifier, criticism on the simplified equation “ASLR + atoll islands = sinking”, islands are not sinking but dynamically changing	atoll, sea level rise, adaptation, ex-situ state, islands are not sinking, land reclamation, fale pili, responsibility, fenua	S
		25/03/2026	(McCubbin et al., 2015)	Tuvalu	Identify where climate impacts already affect livelihoods, adopting a vulnerability framework	key concern areas are economy, food, water, overcrowding rather than climate change. Human implications of CC. Cultural obligations mentioned to be a burden and can negatively impact mental well-being	climate impacts, adaptation, vulnerability, SLR, current state, country profile, adaptive capacity	S
			(Noy, 2017)	Tuvalu, consider also other islands	Inquiring the link between CC and migration, using Tuvalu as case to find out why uneasy living conditions	climate change impacts, inequalities: poor people live in hazard prone areas in Tuvalu, drivers of migration, voicing (use voice to protest against CC and	climate impacts, interconnection climate change + hazards + humans, inequalities,	S

					not necessarily lead into mass migration	raise attention towards climate action)	migration, voicing, loyalty to the land	
		26/03/2026	(Monioudi et al., 2025)	atoll nations, including Tuvalu	Coastal Flood Risk Modelling Framework to evaluate permanent inundation from SLR and episodic flooding from extreme events across Asia and the Pacific	sea-level rise in combination with rapid urbanisation and population growth. Not all information in generalisable and transferable to Tuvalu. Vulnerability of low-lying infrastructure (e.g airport of Tuvalu)	impacts climate change, sea-level rise at densely populated areas, economic loss, vulnerability, adaptation, system understanding	S
			(Vaha, 2025)	Pacific Island States, Tuvalu, Maldives	Statehood at sea, critique on Western ontology of the requirement of territory for statehood	Tuvalu's constitution, Tuvalu will maintain its statehood, criticism on Western perspective that a state needs land while Oceanic states always co-existed with the sea (critique on the terrestrial world we are living)	disappearing state, postcolonial justice, oceanic state, identity, anthropogenic climate change, sovereignty	S
2	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("climate justice")	03/02/2026	(Fisher, 2008)	Tuvalu	Explore climate justice and global responsibility and vulnerability to CC	Five reasons to focus on Tuvalu, Four levels of climate injustice (1: suffer disproportionately 2: already vulnerable 3: limited capacity to adapt 4: muted voice on global stage), urbanisation and influx of Tuvaluans to the main island Funafuti	global climate change, climate justice, global asymmetry, SLS, urbanisation (internal migration), waste, well-being	S
3	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("territorial loss")	03/02/2026	(Kench et al., 2018)	Tuvalu	climate induced changes of Tuvalu over time and	nice visualisations of the erosion simulations, argue that the islands may persist, suggest new adaptation pathways mainly in	habitability, land erosion, adaptation, land-use, persistence of islands	S

	OR "habitat loss" OR "land loss")				pathways to adapt to those changes	land-use planning to rethink island change		
		27/02/2026	(Rothe et al., 2024)	Tuvalu	maintain and protect state sovereignty, language, knowledge and culture —both materially and virtually- in the face of existential climate-related loss.	Digital state preservation Future Now Project, digital Tuvalu, digital fenua, ownership over the future, representation, "Tuvaluan territory would become differently located (in cyberspace) and fixed (as a permanent EEZ) at the same time." (p. 1508)	international recognition, digital Tuvalu, state preservation	S
		19/03/2026	(Ardito, 2024)	Tuvalu	Continuity of statehood in Tuvalu and the Falepili-Union Treaty	Montevideo convention and its criteria is for entering statehood but not for maintaining statehood -> statehood in Tuvalu will be continued, the only question is how. Article talks about digital Tuvalu, the treaty with Australia, but also about the state's duty to adapt and let people remain living there	Falepili treaty, digital Tuvalu, citizenship, international law, coastal adaptation project, climate justice, duties of states	S
		23/03/2026	(Simon & Alexander, 2017)	SIDS; Maldives, Tuvalu and Kiribati	Territory as prerequisite to maintain nationality and perform the duties of a state	A state need to have territory in order to maintain nationality.	disappearing state, international law, citizenship, territory, nationality	S
4	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("disaster preparedness")	02/02/2026	(Farbotko, 2010-b.)	Tuvalu	"Wishful-sinking". Criticize the illustration of Tuvalu as climate canary	Misinformation, colonial past, lack of economic modernity, and the wish of Tuvalu as sinking experiment	Ethics; Uninhabitability; Climate Justice; STAPLEE	J

			(Burch, 2021)	Tuvalu/Fiji	Impact of social media in accurate representation	local perspectives on the changes + critical stance on Western media	Ethics; local perspective	J
		05/03/2026	(McMichael et al., 2021)	Tuvalu but also Fiji	overlapping drivers of immobility and translocation in sites of coastal risks. why do people remain in and move to low-lying coastal sites, even as coastal risks are anticipated and emerge?	nice map of Tuvalu, talk about habitability and that it is very contextual, mobility and being trapped, interview of locals. No one wants to relocate, urban to rural migration. Talks about Climate pressures but also optimistic view that advocates for changing land and not sinking land	migration, mobility, SLR, STAPLEE, current state, coastal erosion, peace, community efforts, individual preparedness measures, risk awareness, urban to rural migration, right to stay	S
		24/03/2026	(Kelman, 2010)	SIDS	Details some climate change topics emerging from local voices from SIDS	Calls for the combination of local knowledge with the technology and education from developed countries, and their responsibility to provide resources in the name of justice	Climate Justice; Local Knowledge; Ethics	J
			(Farbotko, 2010-a)	Tuvalu	"The global warming clock is ticking so see these places while you can': Voyeuristic tourism and model environmental citizens on Tuvalu's disappearing islands". Assess how media attention can shape the narrative	Tuvalu is used as an example of people living in harmony with nature, sustainable, with renewable energy, or is shown as a place that you should see as it will soon be gone, drawing the attention of dark tourism	Ethics; Identity; Climate justice; Media	J

5	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("uninhabitatbility" OR "liveability")	03/02/2026	(Beyerl et al., 2018)	PSIDS including Tuvalu	how residents perceive their situation regarding climate-related challenges, what adaptation strategies they have devised and implemented, and what they expect of governmental and nongovernmental organisations in these efforts	International dialogue has often failed to include the diversity of local perspectives,	Readiness for change, CC awareness/perception, adaptation strategies, STAPLEE	S
6	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("external sovereignty") AND ("statelessness")	17/02/2026	(Mortreux & Barnett, 2009)	Tuvalu	Exploring the framing of the media regarding climate change and how it is perceived in Tuvalu. Analysis if Tuvaluans want to migrate, if yes, who and why.	Study who wants to migrate to another country and why. Role of the media and the framing of climate change with regards to migration. Result: Climate Change is a secondary reason for Tuvaluans to migrate, the majority wants to stay in Tuvalu.	STAPLEE, donors, economy, framing + sensationalising Tuvalu, migration, risk perception, risk management	S
8	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("disapperaring states" OR "detrterritorialised states") AND ("external sovereignty")	20/02/2026	(Calzolari & Phantanaboon, 2025)	Tuvalu	Exploring and interviewing local people from Tuvalu about their perceptions of climate change, international debates around Tuvalu and its possible loss of statehood	disappearing state, statehood, Kofe suggested a twinstage in digital form, Tuvalu tries to gain sympathy on international stage to facilitate climate refugee status, economic zones and their definition for tuvalu, global climate responsibility and accountability, coral bleaching and ocean temperatures, a country is more than land but it includes culture, faith and the role of perception of	disappearing state, statehood, digital state, economic zones, climate justice, coral bleaching, culture, faith, climate refugee, solastalgia	S

						SLR, "ecologically displaced people" instead of climate refugees, solastalgia: disorientation due to loss/alteration/replacement of familiar places		
		27/02/2026	(Allen & Prost, 2022)	disappearing island states in general,	investigating the "fate" of a disappearing state under international law. it looks at Malta and the Holy Sea as possible precedent cases and explores pathways and its consequences for possible future disappearing states	don't mention Tuvalu, though, still super interesting. fate question (live or die), statehood, scenarios of deterritorialised states under international law: state death, zombie state and landless state. Focus on Malta and Holy Sea as precedent (that I did not read in detail), continues with consequences of the transition from state to non-state (e.g. treaties, ..., maritime zones)- Malta and The Holy Sea as precedent cases for deterritorialised states in international law	disappearing state, deterritorialised state, statehood, territory, state death, zombie state, landless state, maritime zones	S

			(Blanchard, 2016)	Disappearing states generally, focus on SIDS	new way/model of understanding statehood in light of sea-level rise and territory. Facing the physical disappearance of states' territories, is the territorial state still an appropriate basis for the international legal system?	list Tuvalu only. Definition of statehood and territory and why both need the other, presents ways to preserve disappearing states: artificial structures, land acquisition, government/state in exile, trusteeship system.	disappearing state, deterritorialised state, statehood, territory, international law, maritime law, self-determination, human rights, climate justice, artificial structures, land acquisition, government in exile, states in exile, trusteeship, globalisation, social belonging, global governance	S
		28/02/2026	(Connell, 2003)	Tuvalu	Observed impacts on Tuvalu, provides both climate change explanations and other explanations for them	Talks about greenhouse effects, impacts on Tuvalu, and sea-level rise. It criticises that media frames Tuvalu negatively, posing doomsday scenarios on it. The paper presents different explanations why Tuvalu might seem to disappear, other than SLR and climate change consequences. It argues that Tuvalu uses Greenhouse Effect and Climate change as "garbage can" to put all other observed environmental changes in there, not considering if those are really due to climate change or rather to man-made changes (such as building roads, degrading reefs, ...)	impacts, groundwater, media, doomsday, biodiversity, overcrowding, STAPLEE, urbanisation, internal migration, education, SLR, no SLR, climate justice, inaction,	S

						Increased competition for scarce land + reduced availability of resources such as wood		
		19/03/2026	(Jain, 2014)	general concepts	Exploring relationship of territory and statehood	territory as a prerequisite for statehood but not a deal-breaker for statehood since nowadays, effective government is possible without territory	disappearing state, SIDS, sea-level rise, deterritorialised state, international law, territory, ex situ	S
9	("disapperaring states" OR "deterritorialised states") AND ("uninhabitatbility" OR "liveability")	28/02/2026	(Capisani, 2020)	states with territorial instability	By assuming territorial instability and employing a practice-based method of justification we can identify a fundamental, basic right protected under the state system—the right to a liveable locality—which grounds a moral obligation to protect against climate change–induced displacement.	addresses moral questions, responsibility, international law, two components of livability. super interesting the part about inhabitability and liveability: alone the likely prospect of inhabitable land in the future violets the right to liveable locality --> enable to move	disappearing state, territorial instability, right to liveable locality, displacement, international law, citizenship, livability, refugee convention	S
		05/03/2026	(Lapaš, 2022)	disappearing states generally	try to identify a feasible and durable solution for these nations within the framework of the existing system of international law and its concept of legal personality.	legal consequences of a state (produce legal consequences, treaty-making capacity, right of legation). Identified 3 scenarios: (1) state death without recognition, (2) legal fiction of state even though the state is not habited, (3) state death but continuity as a new legal personality. Even if some of the	disappearing state, international law, legal personality, relocation, people who will stay, existing frameworks, new category for disappearing states, underwater heritage	S

						people stay, they don't form a state in the sense of the law, Relocation only as a temporary solution, existing frameworks are not sufficient, proposes a new category for disappearing island states, underwater heritage and the right to it		
10	("disappearing states" OR "deterritorialised states") AND ("uninhabitability" OR "liveability") AND ("risk")	02/02/2026	(Barnett & Adger, 2003)	Atoll countries	Identify CC impacts on atolls, and thresholds for habitability	Various vulnerabilities for atoll countries to CC, threshold of migration, and faith of aid countries	Uninhabitability; Impacts; Threshold	J
			(Farbotko & Campbell, 2022)	Atoll countries	criticize habitability definition and assessment, and recommend future research improvements	New mixed ontology between traditional and indigenous knowledge, critical assessment of past habitability assessments	Uninhabitability; Ethics; Climate justice; definition	J
		03/02/2026	(Horton et al., 2021)	Global focus	propose a bottom-up habitability assessment	show how top-down habitability assessments overlook the social qualitative factors, and tend to ignore local context. Mix between "engineering" top-down and "social" bottom-up approach is needed	Uninhabitability; Ethics; Bottom-up approach; Migration	J

			(Stege, 2018)	Atoll countries	present the case for one habitability metric in particular: a flood risk indicator by which atoll communities may be able to determine and communicate their own atoll's habitability and 'when it is time to move.'	proposed mixed methods between indigenous and scientific knowledge to determine the threshold to SLR for Atoll countries + emphasised the importance of proper preparation in case migration becomes unavoidable	Uninhabitability; Habitability threshold theory	J
		03/03/2026	(Marino & Lazrus, 2015)	Sishmaref (Alaska)/ Nanumea (Tuvalu)	examine how climate change hazards can increase migration before a catastrophic disaster	habitability threatened by old infrastructure and lack of investments + lack of water resources	Migration; Investments; water shortage; labour migration	J
		24/03/2026	(Fornalé et al., 2016)	SIDS	Discusses the legal frameworks and policies that could be developed to mitigate the threat of statelessness	There are several gaps in current international law; Regional agreement show promise, but currently only exist for labour migration; Humanitarian law in New Zealand provides a loophole	Disappearing states; Statelessness; Labour migration	J
			(Oliver, 2009)	Disappearing states generally	Question what will happen to citizens of states that are expected to disappear	Assesses three migration scenarios through human rights law, environmental law, and refugee law, to determine the duty of the current and receiving state	Disappearing States; Duty of the state; Climate Justice; Migration	J
11	("disappearing states" OR "deterritorialised states") AND ("uninhabitability"	06/02/2026	(Skillington, 2016)	Global focus	explores whether disappearing states' collective right to self-determination can be	Will be challenging to find new territory for disappearing states in a time of global resource scarcity. Climate justice should be	Disappearing state; Climate justice; Corrective justice	J

	OR "liveability") AND ("preparedness")				protected into the future if the territorial component of their existence is lost	recognized, but current powerful big emitters are not committing to		
		24/03/2026	(McAdam, 2010)	Kiribati & Tuvalu	Determine how and when states cease to exist, and how the displaced population is legally protected	Focus on disappearing territory is misplaced, as it will be uninhabitable first, and lack of population thus threatens future statehood	Disappearing state; Sovereignty; Canary	J
12	("disappearing states" OR "deterritorialized states") AND ("Tuvalu" OR "Pacific island" OR "SIDS") AND ("risk")	06/02/2026	(Marshall, 2020)	Sinking islands/Tuvalu, Kiribati, Maldives	Show how new deterritorialized conceptualization can open new tools for law and policy makers in managing climate migration	International law needs to revisit the singular conceptualization of citizenship and statehood	Migration; Agency; Sovereignty; Deterritorialized state	J
			(Piguet, 2019)	Global focus	Describing statelessness and its legal status, and provide solutions to current obstacles	Defined different sort of displaced groups, threshold outmigration, warned for populist resistance	Disappearing state; Migration; Threshold; International cooperation; Sovereignty	J
		06/03/2026	(McLean & Kench, 2015)	Atoll islands	assess the impact of sea level rise on erosion and island morphology	Erosion is not as bad as currently portrayed by dominant narrative + they do not believe many atolls will go under water by 2100	Atolls; SLR; Impacts	J
		24/03/2026	(Rayfuse, 2013)	Global focus	Assess the law of the sea for potential problems	Adoption of a positive rule, freezing the baseline, ensuring EEZ is maintained, even if the territory	Maritime zones; Disappearing state; EEZ	J

					after disappearance of states for their EEZ	disappears, as long as the state is still recognized		
			(McNamara & Gibson, 2009)	Pacific	Assess how the discourse of 'climate refugees' started and how it is impacting locals	Claim that they are not passive victims, but want to fight for their country. It is no longer about mitigation but adaptation which is sad and not the right form of climate justice	Migration; Climate Refugees; Ethics	J
13	("disapperaring states" OR "deterritorialised states") AND ("uninhabitatbility" OR "liveability") AND ("sea-level rise")	28/02/2026	(Ödalen, 2014)	SIDS generally and disappearing states	deterritorialised state proposal: continue sovereignty over land that is under water	proposes pathways how SIDS could continue their sovereignty over submerged land and defends it against self-determination claims, freeze maritime zones as they are now to solve the economic zone problem.	disappearing state, deterritorialised state proposal, sovereignty, self-determination, government in exile, trustee, economic zones, autonomy, independence	S
			(Silva, 2020)	States threatened by baseline shift due to SLR	impacts of SLR on baseline shift and consequences of such to maritime zones	this article dives deep into baseline shift and maritime law. Talks about SLR and its triggers (thermal expansion, glacier melt, loss of Greenland ice).	maritime zones, SLR, baseline shift,	S
		05/03/2026	(Lee & Bautista, 2021)	disappearing states generally	disappearing states due to SLR and what that means for statehood, mainly state death	argues that a state is never static. even if land submerges, it won't lose its abstract legal personality. Loss of territory is not the problem but the effectiveness of exercising governance and sovereignty are the real problem.	disappearing state, state death, territory, effective government, trusteeship, artificial islands	S

14	("external sovereignty" OR "external sovereignty" OR "statelessness") AND ("sea-level rise") AND ("risk")	26/02/2026	(Burson et al., 2023)	Global focus	highlight important developments in international law on statehood and the protection of persons affected by SLR	Highlights most important parts of ILC report; quantitative and qualitative assessment to SLR impacts; questions who the duty bearers are.	Disappearing states; Climate justice; Transitional process;	J
		27/02/2026	(McAdam et al., 2025)	Global focus	To summarize the findings of the ILA committee on international law and SLR	Adjustment of sea law + different interpretation of statehood; overview of different statements and initiatives; discusses duty of the state.	Disappearing state; state duty; scenario approach; DRM	J
		28/03/2026	(Duvat, 2019)	Atoll islands	Literature review of atoll planform change	Suggest land threshold for human occupancy; concludes atoll size has not responded drastically to sea level rise in past decades; Highlights influence of anthropogenic change	Atolls; Anthropogenic change; Threshold	J
			(Thao, 2020)	Western Pacific Region	Summarize the consequences of SLR for Western Pacific States and outline their legal positions	Baselines should be fixed regardless of the impacts of SLR, and the "land dominates sea principle" should be more flexible	Maritime zones; EEZ; UNCLOS	J
			(Yamamoto & Esteban, 2017)	Atoll island states	Assess possible solutions for climate change displacements of Atoll Island States	the use of regional or bilateral instruments and soft law appears to be the most viable alternative, providing a direct line of negotiation for Atoll Island States	Migration; External funding; Rights;	J

						with possible countries of reception		
15	("Tuvalu" OR "Pacific island" OR "SIDS") AND ("sea-level rise") AND ("risk")	28/01/2026	(Duvat et al., 2021)	Tuvalu	Identify pillars of inhabitability + assess risk on Tuvalu	5 pillars of habitability, conceptual framework of interconnectedness, criteria for different pillars	Uninhabitability; indicators; SLR	J
			(Islam et al, 2023)	Tuvalu	Understand impacts of CC and SLR on Tuvalu	Conceptual framework of interconnected CC slow and fast-onset events + describe various impacts on Tuvalu	Impacts; SLR; CC	J
		17/02/2026	(Woodroffe, 2008)	Atoll islands	reviews the structure and evolution of the rim of atolls and their response to past sea-level change.	Shoreline erosion too often seen as a sign of CC when it is natural; inundation and salt water intrusion biggest problem; Storms help with natural sedimentation but cause significant economic damage to islands	Atolls; Impacts; SLR;	J
			(Costa & Simoes, 2025)	Tuvalu	Analyse the impact of CC on the security of the South Pacific and Tuvalu specifically	CC impacts on various security elements (food, humans etc.) and the current measures taken by the Tuvalu government	Impacts; Disappearing state; Climate justice	J
			(Kitara et al., 2024)	Tuvalu	The concept of fale pili in international mobility policy	Shows that they care for others even when across international boundaries, hinting towards keeping the state even without territory	Migration; Disappearing states; Ethics; mobility	J

		06/03/2026	(Singh et al., 2022)	SIDS	frame vulnerability of SIDS from a socio-metabolic risk perspective and identify tipping points	Potential tipping points for water, waste management, and port availability	Tipping points; Freshwater resources; Dependency	J
		24/03/2026	(Schaeter-Santander, 2025)	PSIDS	Reflect how sovereignty is threatened and describe scenarios in which it can persist	This note argues that territory should be decentralized as an essential factor for sovereignty, instead focusing on treatment of citizens and their identity in order to promote equality in the face of climate change.	Disappearing states; Sovereignty; Digitalization; Climate Justice	J
		28/03/2026	(Gilmore et al., 2024)	Global	Assesses how uninhabitability is connected to agency in mobility decisions.	Focus on the international community should be on how suffering can be identified and prevented, and open up safe mobility pathways. Lower habitability = higher migration	Migration; International community; Uninhabitability	J
			(Yamano et al., 2007)	Tuvalu	reconstruct changes in topography, land use/cover, population, and the distribution of buildings at Fongafale Islet.	Examine different factors of vulnerability to SLR; acknowledge that while atolls might be resilient, that does not mean the people are too	Atoll; Tipping point; Resilience; Geomorphology	J
		29/03/2026	(Ritman et al., 2022)	Pacific small-island nations	assessment of historical and projected changes in coastal flooding in 11 Pacific small-island	Shows the flooding impact threshold for Fongafale as a case study; Reflects on historic and	Flooding; Threshold; Flood impacts	J

					nations, using tide gauge data	future flood risk; Overview of inundation in last two decades		
			(Taupo et al., 2018)	Tuvalu	Investigates household vulnerability to climatic disasters in low-lying atoll nation of Tuvalu	not only are the poor more likely to reside in areas prone to disasters in both the rural islands and the capital, they also tend to migrate internally and externally less compared to non-poor households.	Disaster preparedness; Migration; Adaptation; Canary	J
16	("Tuvalu" OR "PSIDS") AND ("disaster preparedness") AND ("sea-level rise")	17/02/2026	(Smith & McNamara, 2015)	Tuvalu/Kiribati	Analyse how the position of governmental officials on migration as adaptation have impacted policy	Government officials already consider worst case scenario, but internationally not seen as a problem for now	Migration; Preparedness; worst-case scenario; Tipping point	J
		04/03/2026	(Terry et al., 2013)	Pacific atoll islands	assess freshwater vulnerability of atoll islands	Freshwater lenses very vulnerable, take long to recover + influence food security	Atoll; Freshwater pillar; inundation; food security	J
		05/03/2026	(Farbotko & McMichael, 2019)	Pacific	Explore the concept of voluntary immobility and its ethical dilemmas	Many people do not want to leave even if they die staying + ethical questions on the duty of government	Migration; ethics; voluntary immobility	J
17	("disappearing states" OR "deterritorialized states" OR "deterritorialized states") AND ("territorial loss" OR "habitat loss" OR	16/02/2026	(Roberts, 2024)	Global focus	explores how the retention of maritime territory has become an ongoing legal issue and analyzes several potential solutions	Main problems with current LOSC convention, and 3 proposed solutions, but all politically hard to realize	Maritime zones; Disappearing state; SLR	J

	"land loss") AND ("sea-level rise") AND ("risk")							
18	("disapperaring states" OR "deterritorialised states") AND ("uninhabitatbility" OR "liveability") AND ("climate justice")	04/03/2026	(Arapattu & Simonelli, 2021)	Maldives and SIDS	climate justice. What does development mean in the context of climate change? What does the social pillar of sustainable development mean for the people of small island states? What is the role of government? What is the responsibility of the international community, especially the major emitters and rich, oil-producing countries to provide climate finance, if not compensation for the damage caused?	only mentions Tuvalu in one sentence. So I skimmed the article only as we have enough articles about climate justice specifically on Tuvalu. There is one interesting sentence, however, that Tuvalu bought land from Fiji to accommodate Tuvaluans there and to plant crops there (as the soil in Tuvalu is too salty)	climate justice, sustainable development, climate finance, "just sustainability", global fund for displacement	S
19	("uninhabitatbility" OR "liveability") AND ("climate justice")	04/03/2026	(Schlosberg & Collins, 2014)	no specific region	climate justice at grassroots	doesn't talk about Tuvalu, introduces different lenses on climate justice, also in combination with development and sustainability. Continues with the need of adaptive capacity and capacity development for more just adaptation --> tackle root causes for injustice (e.g. poverty). Participatory justice	climate justice, environmental justice, just sustainability, sustainable development, capacity development, participatory justice	S

20	How will Tuvalu be impacted by sea-level rise?	16/02/2026	(Lin et al., 2014)	Tuvalu	clarify and interpret King Tide, and analyzed the factors of King Tide in Tuvalu	King Tide happen more during La Nina years, and are increased in height because of warmer waters.	Flooding; King Tide; STAPLEE	J
22	What are the key factors influencing Tuvalu's transition to statehood preparation?	16/02/2026	(Ceccarelli, 2019)	Tuvalu	Provide background information on Tuvalu and its environment	Show anthropogenic climate change, socio-economic concerns, and problems of overfishing and threat to biodiversity	STAPLEE; Impacts; Anthropogenic impacts; socio-economic challenges	J
			(Yang et al., 2020)	Tuvalu	Use mathematics and computer modelling to determine habitability and future population at risk	States that Tuvalu will be uninhabitable if 60% of land has disappeared, which they expect to happen between 2038-2047, with a population between 14500-15500	Disappearing state; Uninhabitability; Threshold	J
23	("uninhabitability" OR "liveability") AND ("tipping point" OR "threshold")	03/02/2026	(Badillo-Interiano et al., 2025)	Atoll countries, including Tuvalu (Fongafale)	Develop a BN model based on Duvat et al. (2021) to assess the climate risk to the habitability of four atoll islands in the Pacific and Indian Oceans	The results reflect which risk criteria are associated with high risk to Fongafale habitability. These include flooding, loss of critical infrastructure, reduced reef fisheries production and decrease in rainwater harvesting.	Uninhabitability; Thresholds; Risk assessment; Impacts	J
			(Spencer et al., 2024)	Low-lying coastal socio-ecological systems	an exploration into how irreversibility, thresholds, and cascading effects could materialize and how the question of uninhabitability sits within the wider context of adaptation visions,	Portrays the interconnectedness of habitability pillars and highlights several thresholds, while also acknowledging statements about the importance of social and cultural factors raised by Farbotko and colleagues	Uninhabitability; Thresholds; Framework	J

					options, and limits on the ground			
		05/02/2026	(Magnan et al., 2026)	Atoll countries	argue that a focus on habitability (Box 1) offers a way to operationalise this shift because it makes locally acceptable outcomes a starting point for action.	Optimistic focus on adaptation and habitability better than a focus on loss. + habitability model, and the importance of identifying the current state of habitability pillars	Uninhabitability; Framework; Readiness; Preparation	J
			(Steibl et al., 2024)	Atoll islands	Explain and visualise atoll formation and natural adaptation, and explain how that is impacted	Many anthropogenic factors should be considered alongside CC impacts + Accretion and erosion is natural for atoll islands	Atoll; CC; Impacts; Anthropogenic	J
			(Sterly et al., 2025)	Global focus	highlight key dimensions that are essential for conceptualising habitability and its changes in a connected, unequal, and changing world.	Suggest uninhabitability should be studied within a social-ecological system, as that can embody the interconnected complex connection between various factors + calls for ethical considerations	Uninhabitability; Ethics; definition	J
			(Nunn et al., 2025)	Western Pacific Island countries	Evaluates the equitability of the distribution of external funding for attaining water security.	Shows Tuvalu has not yet experienced big lack of freshwater, and that other pacific countries have higher relative SLR; might exclude	External funding; SLR; Freshwater resources	J