

**Exploring the integration of traditional knowledge in disaster risk management and
climate change adaptation policies and practices:
Guadalcanal of the Solomon Islands as a case study.**

**Jerry Wells Hagaria
Auckland University of Technology**

**A dissertation submitted to Auckland University of Technology (AUT) in partial fulfilment
of the requirements for the degree of Master of Disaster risk Management and
Development 2022.**

**School of Public Health and Health Sciences
Primary Supervisor: Dr Loic Le De**

TABLE OF CONTENT

CONTENTS

LIST OF FIGURES.....	3
LIST OF TABLES.....	3
ATTESTATION OF AUTHORSHIP	4
ACKNOWLEDGEMENTS.....	5
ABSTRACT.....	6
CHAPTER 1: INTRODUCTION AND OVERVIEW	7
Introduction	7
1.2 Critical concepts in DRM and CCA.....	9
1.3 Research context – Guadalcanal of the Solomon Islands	12
1.3.2 Socio-economic profile of Solomon Islands.....	13
1.3.3 Disasters and climate change risk in the Solomon Islands	13
1.3.4 Guadalcanal Province.....	14
1.4 Solomon Islands Institutional arrangement for disaster risk management and climate change	15
1.5 Research Rationale	16
1.6 Research Aim and Objectives.....	16
1.7 Dissertation structure	17
CHAPTER 2: LITERATURE REVIEW	19
Introduction	19
2.1 The meaning of traditional knowledge in disaster: an overview.....	19
2.2 Traditional knowledge strategy for DRM an CCA in the pacific region.....	23
2.3. Integration of traditional knowledge and scientific knowledge in DRM and CCA practice.....	29
2.4 Incorporation of traditional knowledge in DRM and CCA policies	30
2.6 Chapter Summary	32
CHAPTER 3. METHODOLOGY	34
Introduction	34
3.1. Research methodology and methods.....	34
3.2 Method of data collection	35
3.2.1 Data Collection.....	35

3.2.2. Study Participants	36
3.2.3. Recruitment procedures	37
3.3. Data analysis	38
3.4 Researcher Reflexivity.....	39
3.5. 21/304 Ethics Application and Amendment.....	40
3.6. Chapter Summary	41
CHAPTER 4: FINDINGS.....	42
Introduction	42
4.1 Traditional knowledge of Guadalcanal rural communities for disaster and climate risk management.....	42
4.2 Impacts of development and modernisation on traditional knowledge in Guadalcanal	48
4.3 Traditional knowledge in DRM and CCA policies and practices.....	50
4.4 Challenges and opportunities for integrating traditional knowledge in DRM and CCA policies	52
4.6 Summary of Key Findings.....	54
CHAPTER 5: DISCUSSION AND CONCLUSION.....	56
Introduction	56
5.1 The role of traditional knowledge in disaster risk management and climate change adaptation	56
5.2 The status of traditional knowledge in DRM and CCA policies and practices	60
5.3 Possibilities and difficulties for incorporating traditional knowledge in DRM and CCA policies and practice	63
5.4 Conclusion of the study	65
5.5 Limitations of the study	66
5.6 Recommendations of the study.....	67
Reference list	70
APPENDICES	76
APPENDIX A : ETHICS APPROVAL	76
APPENDIX C: CONSENT FORM FOR INTERVIEWS.....	80
APPENDIX D: SOLOMON ISLANDS RESEARCH PERMIT	82
APPENDIX E: NATIONAL DISASTER MANAGEMENT OFFICE SUPPORT LETTER	84

LIST OF FIGURES

Figure 1. Map of Solomon Islands comprising of provinces	12
Figure 2. Solomon Islands resilient development model.....	15
Figure 3. Climate change institutional arrangement	16
Figure 4. Guadalcanal feast of Kavo Mucher way of sharing food	25
Figure 5. Typical food garden in the Solomon Islands	26
Figure 6. Dried breadfruit known as Nambo in the Solomon Islands	27
Figure 7. Traditional bure houses of Fiji	27
Figure 8. Masi extracted from the pit fermentation of cassava, breadfruit and varios starchy food crops.....	28

LIST OF TABLES

Table 1. Forms of traditional knowledge in the Pacific Island Countries.....	22
Table 2. Categories and strategies for disaster risk management and climate change in the pacific Island nation.....	24
Table 3. Details of the participants that took part in this study	37
Table 4. Steps undertaken in an inductive analysis of this study.	39
Table 5. Summary of the various Guadalcanal community traditional knowledge in the face of climate changes and disaster.....	46

ATTESTATION OF AUTHORSHIP

"I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the qualification of any degree or diploma at a university or other institution of higher learning, except where due acknowledgement is made in the acknowledgements."

SIGNED: _____ DATE: 24/05/2022

Jerry Wells Hagaria

ACKNOWLEDGEMENTS

There are several people I want to personally thank that have encouraged me throughout the process of writing this dissertation.

My sincere gratitude goes out to Dr Loic Le De who is my dissertation supervisor. Loic has been supporting me throughout my studies especially during my postgraduate studies. His guidance and support have been very helpful. Loic always made sure I was progressing with my writing. I am very grateful to have had such a hardworking supervisor. I cannot thank him enough for the immense dedication he has put into helping me with my dissertation.

To the AUT Scholarship office team, thank you for the tremendous support you offered me during my studies. Sacha and your team, I cannot thank you enough for your encouragement and support.

To my wife Janet and our kids Jedidah and Jotham, thank you for being patient and supportive despite us being far apart. The last three years have been filled with a lot of craziness that has left me with little motivation at times. You were always there to encourage and motivate to reach the finishing line, and for that I thank you.

Lastly, to my mum Muriel who has always supported me through prayers and love. Not forgetting my Late Dad John who believed that formal education is important for the future. I hope I made you proud. To my siblings, thank you for constantly encouraging me to continue despite the many challenges we experienced your love and support for me never wavered.

Finally, to AUT for the opportunity to further my study and the tremendous support you offered.

ABSTRACT

Global and regional policy frameworks have increasingly emphasised the need for the integration of traditional knowledge in Disaster Risk Management (DRM) and Climate Change Adaptation (CCA). This is reflected in the Pacific Island Countries (PICs), where there have been increased efforts from both governments and Non-Government Organisations (NGOs) to incorporate traditional knowledge of local people in their policies and actions geared to DRM and CCA. However, the extent to which traditional knowledge is integrated into practice is not always very clear. Focusing on Guadalcanal in the Solomon Islands, this study aimed to explore the significance of traditional knowledge in the face of disaster and climate change, and if and how it is integrated into DRM and CCA. This study was conducted from November 2021 to January 2022. Six semi-structured interviews were conducted with DRM and CCA practitioners from government agencies and NGOs working in Guadalcanal and with local community representatives. All interviews were done remotely via Zoom except for one interview which was conducted via phone call. Thematic analysis was employed to analyse the data collected.

The findings demonstrate that local communities are aware of the existing risks within their locality and that they have developed different types of knowledge and mechanisms to overcome or adapt to those risks. Furthermore, the research recognises that while traditional knowledge is effective for DRM and CCA, it is also changing and deteriorating due to external influences brought by development and western civilisation. The dissertation identifies challenges for effectively incorporating traditional knowledge in policies and practice, including the absence of a clear definition for traditional knowledge, inadequate financial resources and limited information sharing between practitioners, policy makers and local communities. The findings also indicate that while traditional knowledge is mentioned in policy guidelines, the views of the communities who own this traditional knowledge are not always represented because policies tend to be designed using a top-down approach. There are many reasons for strengthening the integration of traditional knowledge in policy and programming initiated by government agencies and NGOs, including the need for research to document traditional knowledge in the face of disasters and climate change, and the need to learn from the previous policies.

This study concludes by highlighting the importance of the government and NGOs in engaging local people during the policy design phase for DRM and CCA. It also highlights the need to create a framework that is able to incorporate the communities' traditional knowledge with the knowledge of DRM and CCA practitioners in policy and practices.

CHAPTER 1: INTRODUCTION AND OVERVIEW

Introduction

In recent years, there has been an increase in disasters experienced across the globe affecting both developed and developing countries. Mizutori and Sapir (2020) reported that more than 7,000 disasters occurred between 2000 and 2019 compared to approximately 4,000 disasters between 1980 and 1999, affecting an estimated 4 million and 3 million people, respectively. Furthermore, a total of USD 2.79 trillion dollars was lost from 2000 to 2019 compared to 1.63 trillion between 1980 to 1999 (Mizutori and Sapir, 2020). The latest global climate prediction, which indicate an increase of four degrees Celsius by the end of the century, implies severe impacts for the Pacific Islands Countries (PICs). Such warming will increase the frequency and strength of natural storms, accelerate sea-level rise, cause the possible extinction of coral reefs, and have severe impacts on food crops and cash crops (The World Bank, 2013) which may lead to more disasters. Furthermore, low-income households and communities are more vulnerable to the impact of disasters because of their limited access to critical resources (Rosser & Richie, 2014). Over the last 50 years, both global and regional frameworks have been developed to deal with alarming disaster risks and climate change trends and projections. One of the key considerations in these frameworks is the recognition of traditional knowledge and the need for its integration in disaster risk management (DRM) and climate change adaptation (CCA) policies and practice.

The Solomon Islands has been characterised as having some of the highest disaster and climate risks in the Pacific. In an attempt to reduce these risks and potential impacts, the government, has developed policies that include traditional knowledge in the DRM and CCA national policies. As such, one of the key principles found within the National Disaster Management arrangement for the Solomon Islands is the recognition of local mechanisms and land rights (NDC, 2018). Furthermore, the Solomon Islands Climate Change Adaptation policies have also recognised the role of traditional knowledge in CCA. Therefore, they have provided additional policy directives that promote and support the documentation and integration of traditional knowledge and science which aim to enhance the resilience of communities. Despite such recognition, there are still weaknesses and gaps found in both the policies and in the implementation of the policies in communities (Wickham et al, 2012). The aim of this dissertation is to explore the integration of traditional knowledge in DRM and CCA policies and practices of the Solomon Islands, focusing on Guadalcanal as a case study. This study seeks to identify the different DRM and CCA practices in Guadalcanal and the level in which this knowledge was integrated in DRM and CCA national policies and applied in practice.

Integrating traditional knowledge in DRM and CCA policies and practices is crucial for supporting effective DRM and CCA interventions in local communities (Mercer et al, 2010). The DRM and CCA policies and practices are generally developed with the overall aim of reducing the risks and potential impacts of climate change through focused activities that address hazards, vulnerabilities, exposure, and the strengthening of local capacities (Leitner et al., 2020). Traditional knowledge has been documented and recognised as an effective tool to support local communities during disasters and climate change impacts throughout history. However, the effective use of traditional knowledge during disaster times has gained limited recognition from foreign experts (Dube & Munsaka, 2018). This could be attributed to the notion that traditional knowledge is applicable in one locality and does not apply worldwide, hence making it difficult to appraise and draw upon for DRM and CCA (Rai & Khawas, 2019).

The Pacific region is amongst the world's most vulnerable region to natural hazards. The geographic location of Pacific Island nations and the size and contexts of these islands have exposed their populations to adversities. Traditional knowledge has been the key to their ongoing survival. The communities' daily interactions with their environment to support their livelihoods and survival is guided by the knowledge acquired from generations before them. However, some studies argue that these traditional practices are weakening and have become less apparent in the fields of disaster reduction and climate change adaptation, causing some practices to fade away at an alarming rate (Campbell, 2006). Such observations provide the basis for this study.

This study focuses on Guadalcanal in the Solomon Islands as there is a limited understanding of the uptake of traditional knowledge into DRM and CCA policies and practices. Solomon Islands is one of the countries of the PICs most prone to disaster and climate change impacts. Integrating traditional knowledge in disaster risk and climate change interventions in a local community may enhance DRM and CCA. However, there is limited knowledge available regarding how the government and NGOs working in the DRM and CCA fields integrate local knowledge in their policies and practices. This dissertation aims to fill this knowledge gap as it seeks to identify the importance of traditional knowledge in DRM and CCA national policies and the extent to which it is applied in practice by relevant government and NGOs working in the Guadalcanal region.

This chapter introduces the research topic and explains its relevance in the context of DRM and CCA in the Solomon Islands. Hence, it starts with an overview of the different concepts related to DRM and CCA. It then provides a brief background to this study, followed by a description of the research aims and objectives. Finally, the chapter concludes by presenting the structure of this dissertation.

1.2 Critical concepts in DRM and CCA

There are numerous disasters experienced across the globe affecting thousands of people each year. A disaster is both a situation and a process involving a hazardous event with adverse consequences such as livelihood disruption or casualties that are too great for the impacted community or country to properly deal with on its own (UNDRM, 2021; Kelman & Gaillard, 2010). Hazards impacting a vulnerable population commonly trigger disasters. For instance, the Bam earthquake that shook Southeast Iran on 26 December 2003 claimed 35000 lives, injured over 23000 individuals, destroyed 20000 homes and essential services including water supply, power, telephone, health care, main roads, and the city's only airport (Manyena et al., 2011). The tropical cyclone Pam in 2015 had a terrible socio-economic and environmental impact in Vanuatu. Such events may require government, non-government, or external aid to support the impacted population in restoring 'normal' conditions as fast as possible.

Disasters do not impact members of society equally. Some places or communities are more exposed than others because of their geographic location proximity to potential hazards. The term exposure is commonly used in both disaster risk and climate change studies. Exposure is defined as the situation of people, infrastructure, housing, production capacities and other tangible human assets located in hazard- or disaster-prone areas (UNDRM, 2021). For example, uncontrolled urbanisation may result in the settlements of communities in hazard-prone areas, thereby increasing their exposure to floods and/or tsunamis. According to Gupta (2019), the primary causes that led to massive urban floodings in India during 2019, which devastated communities and negatively impacted numerous lives, include a combination of uncontrolled urbanisation, heavy rainfall over the cities and upstream catchment, overflow from upstream dumps and rivers and construction on flood plains or low lying areas in the cities. However, disasters and disaster risk cannot be explained only by the exposure and the impact from natural hazards. In addition to exposure, scholars have long emphasised that disasters also strongly relate to vulnerability.

The concept of vulnerability has been conceptualised in the literature for about four decades (O'Keiffe, et al, 1976) and continues to be used in disasters and climate change policies and practice (UNDRM, 2015). Vulnerability may be defined as an internal risk factor of the subject or system exposed to a hazard and relates to its underlying tendency to be affected or prone to damage (Cardona et al, 2012). According to Gaillard (2010), vulnerability is the susceptibility to suffer damage in a potentially dangerous event, regardless of the event being natural, social, economic, physical, or political. The concept stresses the conditions of a society which makes it possible for a hazard to become a disaster (Gaillard, 2010, Wisner et al, 2014). For instance, the increased population in some areas may result in development expanding towards hazard risk areas such as

riverbanks and coastal areas. Development in such areas may increase vulnerability by increasing exposure to river flooding and coastal inundation. Moreover, vulnerability is the human dimension of disasters and results from the range of economic, social, cultural, institutional, political, and psychological factors that shape people's lives and the environment they live in (UNDRM, 2021). Vulnerability thus relates to several factors, including physical factors such as poor design and construction, social factors such as poverty and inequality, economic factors like the uninsured informal sector, and environmental factors such as poor environmental management (UNDRM, 2021). Vulnerability is often the main reason why people are seriously affected during a catastrophic event. Vulnerability is defined by the World Health Organisation (2020) as the “degree to which a population, individual or organisation is unable to anticipate, cope with, resist and recover from the impacts of disasters”. Thus, depending on the society and situation, including social characteristics such as gender, marital status, sexuality, ethnicity, religion, and immigration status may contribute to the potential loss, injury, or death in the face of hazards or resources made to be hazardous (Wisner et al., 2011). According to the World Health Organisation (2020), children, women and the elderly are often the most vulnerable group in the event of a disaster.

While some people might be more vulnerable than others to disasters, they are generally not passive and have developed mechanisms to overcome such events. They have skills, resources, and knowledge, which have been termed as capacities. According to Gaillard (2010) capacity refers to people's resources and assets to resist, cope with, and recover from the disasters and shocks that they experience. It is the ability to either use and access necessary resources and thus goes beyond the sole availability of these resources. People's capacity to overcome disasters is often rooted in the resources available to them and the community, and they often rely on traditional knowledge, indigenous skills, and technologies, including solidarity and networks (Gaillard, 2010). For instance, a typical local community in small island countries may have men's groups, women's groups, youth groups, sports groups, and church groups. These groups may somehow connect to a broader community or a region. Hence, by acknowledging these groups and their connections, communities can use the networking capacity of these groups to overcome disasters.

Capacity also depends on social, economic, political, psychological, environmental, and physical assets (UNDRM, 2021). The primary focus of capacity is to reduce disaster risk. However, capacity requires inclusive participation, active engagement, and non-discriminatory partnerships in order for all society to become empowered (UNDRM, 2021). Capacity is critical for DRM and CCA as it enables a community, an organisation or an individual to cope with, resist, and recover from disasters (UNDRM, 2021).

Traditional knowledge is a very good example of a community's capacity as it has been with the local people for many generations. Traditional knowledge refers to knowledge resulting from intellectual activity in a traditional context and includes know-how, practices, skills, and innovations that can be passed from one generation to another (UNESCO, 2021). Traditional knowledge holds the element of ancient stories, myths, and folklores that, according to the modern scientific world view, do not have any rational explanation because scientific knowledge does not believe in subjective reality (Rai and Kwawasi, 2019). According to Gupta and Singh (2011), local or traditional knowledge is acquired through observations, experience, beliefs, or perceptions but does not necessitate scientific research. Traditional knowledge may sometimes be described as Indigenous knowledge, local knowledge, folk knowledge, and vernacular knowledge (Kelman et al., 2012). However, they all refer to knowledge acquired through generations of experience, observations, and practice within a specific area and geographic location. Traditional knowledge often plays an important role in terms of the livelihood and wellbeing of local people, and thus constitutes a critical capacity.

Policy makers, practitioners and scholars involved in DRM recognise the relevance of traditional, Indigenous, and local knowledge to complement scientific knowledge (UNDR, 2021). This is prospective, corrective, and compensatory community-based disaster risk management (UNDRM, 2021). This means that DRM comprises all the actions taken prior to disaster risk and aims to reduce exposure to natural hazards (Niebel et al., 2013) and vulnerabilities that are present in a system. DRM is a process where communities are empowered to identify risks and develop mechanisms that address and manage the risks which may become threats. It is also considered to be a similar approach to climate change adaptation.

Climate change adaptation is another robust approach focused on addressing the effects and impacts of climate change:

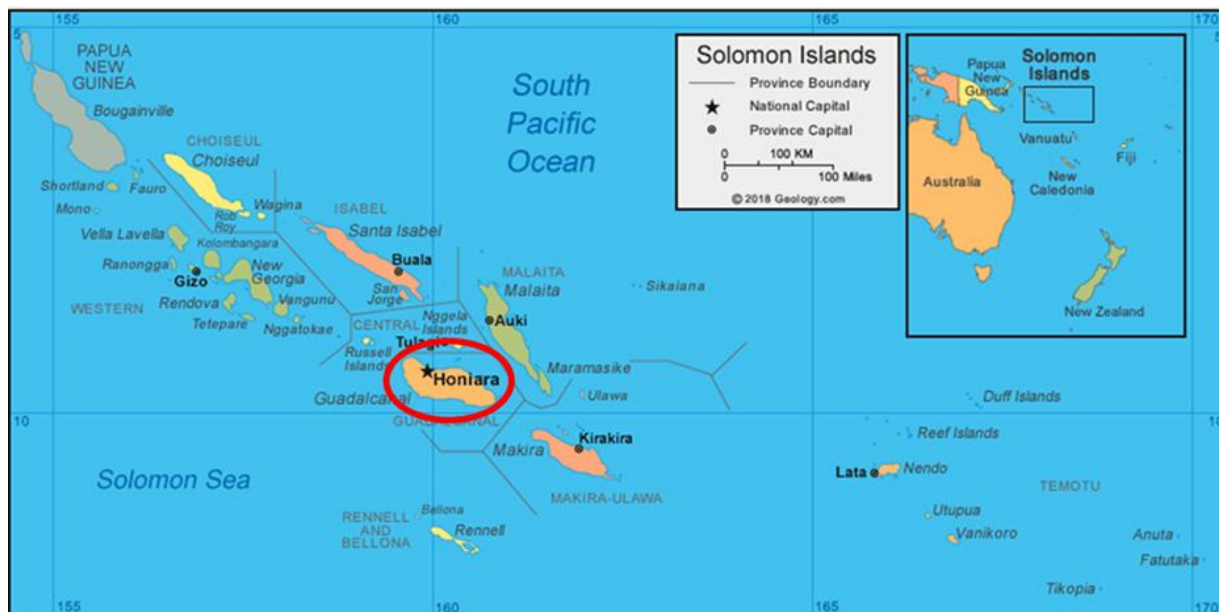
"The process of adjustment to actual or expected climate and its effects. Adaptation seeks to moderate or avoid harm or exploit beneficial opportunities in human systems to facilitate adjustment to expected climate and its effects" (IPCC, 2014).

CCA has been adopted in many parts of the world, especially in disaster risk countries. It is about reducing risks and vulnerabilities by seeking opportunities, building the capacity of nations, regions, cities, the private sector, communities, individuals, and natural systems to cope with climate impacts, as well as mobilising the capacity by implementing decisions and actions (Nobel et al., 2014). There is an increased effort in countries engaging with their vulnerable populations to impact climate change by focusing more on adaptation.

1.3 Research context – Guadalcanal of the Solomon Islands

The Solomon Islands is in the southwest pacific and is approximately 2,000 km northeast of Australia. It is an archipelago comprised of six main islands and approximately 1000 small islands spread across a vast ocean. Its land area combined is just over 28000 square kilometres. The Islands extend over 1450 kilometres in a south-easterly direction (Australian government DFAT, 2021). As demonstrated in Figure 1, the Solomon Islands has nine provinces, which are Temotu, Makira, Renell and Bellona, Malaita, Choiseul, Isabel, Western, Central and Guadalcanal province. The capital city is known as Honiara and is situated in the Guadalcanal Province. Each province has its own provincial government that is representative of the national government and therefore has a mandate of administering each province led by the honourable Premier and provincial political leaders elected by the people of that province. In addition to having their own provincial pollical administration, the provinces are also divided into constituencies that are responsible for electing a pollical representative in the central government.

Figure 1. Map of Solomon Islands comprising of provinces



Note. It shows the map of the Solomon Islands with Guadalcanal Island in the red circle (Geology.com, 2021)

The current population is estimated to be just over 700000, with a growth rate of 2.3% annually and an urban population of 23.2% (Pacific Community, 2021). About 95% of the population is Melanesian, although there are also small Polynesian, Micronesian, Chinese and European communities present. There are 63 distinct languages in the country, with numerous local dialects. While English is the official language, Solomons' Pijin is the mostly commonly used language by most people (Australian government DFAT, 2021).

1.3.2 Socio-economic profile of Solomon Islands

The livelihood of The Solomon Islands' rural populations derives primarily from the environment (Filho et al., 2020). As such, Disasters and climate change risks continuously pressure the increasing Solomon Islands population and severely affect the marginalised rural populations. The Solomon Islands is recognised as amongst the poorest countries of the Pacific. However, 77 percent of the population live in remote Islands and communities of the Solomon Islands and depend heavily on subsistence farming for their livelihood. For instance, according to FAO (2020), the Solomon Islands population heavily depends on gardening, fishing, and livestock, and less than a quarter of the population receives a monetary salary. Agriculture and raw materials, including logging, accounts for 92 percent of exports, leaving the narrow-based economy vulnerable to shocks. In addition, it is estimated that 12.7 percent of the population of the Solomon Islands live under the poverty line, with Guadalcanal province having the highest percentage of poverty that is above 34 percent compared to other provinces (Solomon Islands government, 2017).

The Solomon Islands' critical infrastructures such as roads, wharves, airports, and communications are limited and restricted to urban locations, which presents a challenge for many of the rural populations. The primary medium of inter Islands movements are ferries and smaller boats with limited air transportation. Roads, wharves, and telecommunications appear to be available only in the urban centres, thereby making it difficult to reach remote and isolated communities. Furthermore, such a profile has increased the cost of effective economic activities in the Islands.

1.3.3 Disasters and climate change risk in the Solomon Islands

The Solomon Islands possible risks include tropical cyclones and windstorms, floods, earthquakes, landslides, volcanic eruptions, tsunamis and wave surges, droughts, pandemics, agriculture pests and disease, aviation and maritime disasters, fires, industrial accidents, marine pollution, and other artificial threats including the impact of civil conflicts (National Disaster Council, 2018). The Solomon Islands experienced various disasters in recent years. For example, the 2002 Tropical cyclone Zoe devastated 70 percent of households in the provinces of Tikopia and Anuta, in addition to various other environmental impacts (Yates & Berry, 2004). Another example is the Guadalcanal, Honiara, and Ysabel flooding in 2014 that displaced 52000 people and killed 22 persons (Relief Web, 2021). In addition, the 2007 Western province tsunami killed 52 individuals and affected just over 5000 people (McAdoo et al., 2008), and the San Christabel tsunami in 2016 killed one person and affected more than 9000 people (Relief Web, 2021). According to the Ministry of Agriculture and Livestock (2015), natural hazards such as cyclones, earthquakes, volcanic eruptions,

floods, droughts, and tsunamis have caused substantial damage to the agriculture sector and pose severe threats to the livelihood and wellbeing of communities. The Solomon Islands might incur USD20 million per year in loss due to earthquakes and tropical cyclones (GFDRM, N.A.).

It has been recognised that both disasters and impacts of climate change contribute to the increasing poverty rate in the Solomon Islands. Climate change increases hazards by intensifying the strength and occurrence of extreme events such as tropical cyclones, drought, heavy rainfall that leads to severe flooding (Dorevella, et al, 2021) and destruction to food gardens, critical infrastructure, and peoples' livelihoods (Filho et al., 2020). Furthermore, the rising sea level means coastal communities will have to relocate to higher ground. Thus, one key area of focus in the Solomon Islands National development strategy from 2011 to 2020 is creating an enabling environment to effectively respond to the impacts of climate change and manage the environment and risk of natural disasters (Ministry of development planning and aid coordination (MDPAC), 2011). This may be achieved by continuously supporting communities to reduce and manage the risks linked to disasters and climate change (MDPAC, 2011).

1.3.4 Guadalcanal Province

Guadalcanal province is one of the nine provinces of the Solomon Islands and has the largest land mass. The landmass is estimated at just over 5000 square kilometres with a northwest to southeast length of 150km and 45km at its broadest (Trustrum et al., 1989). The Island has a significant grassland and rich alluvium soils, and the socio-economic activity of this province is typical of those elsewhere in the country (Apreku et al, 2021). The Island is currently occupied by just over 155,000 people (SIG, 2021), excluding Honiara.

Guadalcanal province played an important role for the Solomon Islands development as it hosts the capital city Honiara, the largest palm oil company (Guadalcanal plains palm Oil Limited - GPOL), the Gold Ridge Mine the (only gold mine) in the country and accommodates several logging companies. These developments, companies, and infrastructures represent a significant part of the country's economic sector, however, they also pressure people to relocate to more exposed and high-risk areas. For instance, in the GPOL plains, most local villages are located in a flood-prone area and therefore, often experience disasters during the cyclone season. In addition, an increase in logging operations in the area has also increased the pressure on natural resources, causing more challenges to the livelihoods of the local population. Recently, Guadalcanal has been impacted with numerous disasters triggered by flooding, landslides, tropical cyclones, and climate change impacts.

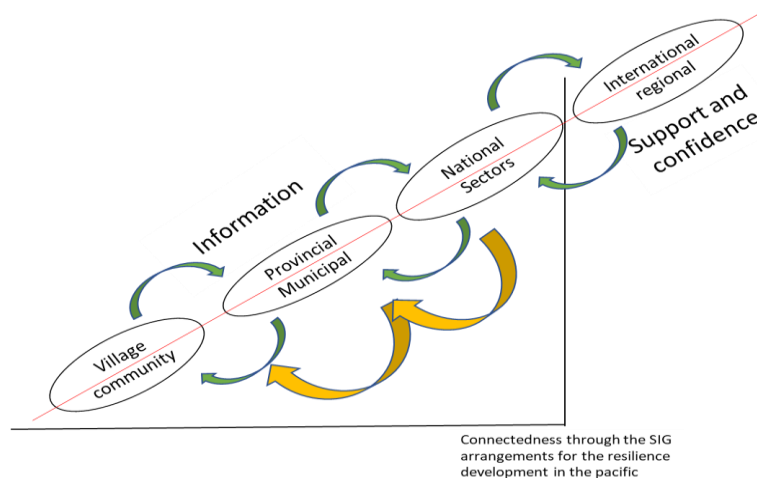
Guadalcanal has also experienced numerous disaster risk management and climate change adaptation interventions in recent years. These interventions target communities that are exposed

to hazards and are more vulnerable and likely to experience a serious disaster. CRISP, SWAK and disaster ready projects are some of the DRM and CCA projects undertaken in several communities of Guadalcanal (MECDM, 2021). Yet well before these interventions, the communities of Guadalcanal communities have been adapting and responding to disaster situations in their own ways by using their own traditional knowledge. However, it is not clear if or how these different organisations and the government have integrated such crucial traditional knowledge in their approaches. Thus, the basis of this study is to understand how traditional knowledge is integrated into policies and practices especially with regards to these projects and other interventions.

1.4 Solomon Islands Institutional arrangement for disaster risk management and climate change

The Solomon Islands institutional arrangement for addressing disasters and climate risks focuses on supporting communities to address their risks. This model adopts the Framework for resilience development in the Pacific (FRDP) goal 1 and includes the support for communities to understand and manage hazards to reduce and mitigate risks (NDC, 2018). In terms of Disaster Risk Management, the focus is on preparedness, response, and recovery, supporting capacity for self-help, and FRDP goal 3 is about supporting communities to manage disasters, setting arrangements to coordinate responses, assessing impacts, and receiving relief and recovery support at the community level (NDC, 2018). In this approach, everyone is involved, including all government sectors, NGOs, communities, private sectors, and individuals. As illustrated in Figure 2, for support to be given to communities from above, information must travel up from the communities. Figure 2 also demonstrates the interconnectedness between different levels of government agencies.

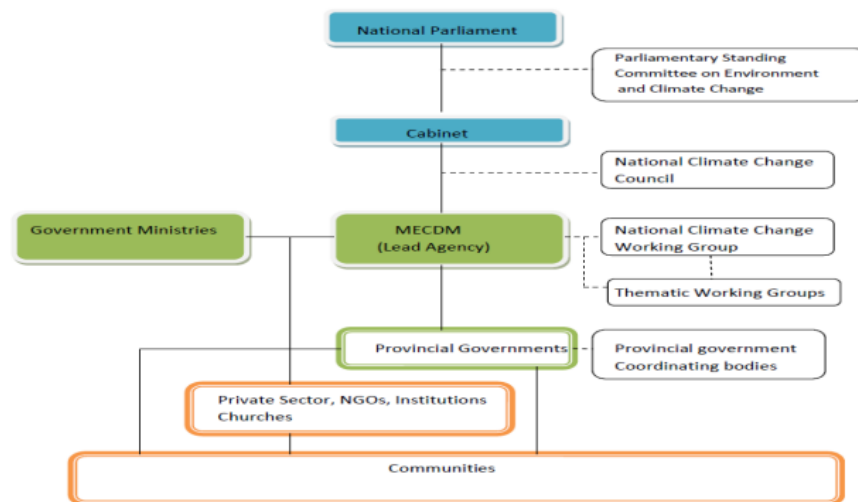
Figure 2. Solomon Islands resilient development model



(National Disaster Council, 2018)

In terms of climate change, Figure 3 represents the institutional framework for implementing climate change policies. It illustrates the various bodies and their specific functions and responsibilities that aim to support the Solomon Islands government and communities in dealing with climate change issues (Wickham, et al., 2012)

Figure 3. Climate change institutional arrangement



(Wickham et al., 2012)

1.5 Research Rationale

Government and NGO interventions that focus on DRM and CCA may undermine the traditional mechanisms of local communities (Campbell, 2006). Some of these existing traditional systems have been proven to be helpful in supporting communities recover and adapt to disasters yet they are slowly fading away (Gupta and Singh, 2011). According to Campbell (2006), a study on traditional disaster risk reduction in the Pacific region emphasised that these traditional DRM strategies seem to be disappearing because of the introduction and implementation of scientific DRM practices. However, traditional knowledge has proven vital in saving lives and properties during disaster situations (Dube & Munsaka, 2018). Therefore, it is critical to adopt local knowledge and strategies for climate change adaptation and disaster risk reduction.

1.6 Research Aim and Objectives

There has been an increase in the DRM and CCA interventions across the Solomon Islands communities in recent years. There are numerous government and non-government agencies implementing DRM and CCA projects in various communities across the Solomon Islands. Classic examples of such projects include the CRISP project, Solomon Islands Water Sector Adaptation

Project, Adapting to Climate Change through Sustainable Forest Management, and Strong Waka lo Community for Local Kaikai (MECDM, 2021). Despite the implementation of many DRM and CCA projects in local communities, it is not clear whether traditional knowledge has been considered or integrated into these initiatives. Hence, the primary aim of this dissertation is to explore the integration of traditional knowledge in DRM and CCA policies and practices in the Solomon Islands, focusing on Guadalcanal as a case study. In achieving this, the following objectives will be critically investigated:

- To find out the traditional DRM and CCA knowledge present in Guadalcanal province.
- To investigate if and how the coping mechanisms based on traditional knowledge are incorporated in DRM and CCA policies and applied in practice.
- To examine the challenges and opportunities in integrating traditional knowledge and related coping mechanisms within DRM and CCA policies and practices.

1.7 Dissertation structure

This dissertation comprises six chapters, organised in the following manner: introduction, literature review, methodology, results, discussion, and conclusions.

Chapter one has provided the introduction of the research by elaborating on the context, rationale, key concepts and emphasising the research gap, research question, aims and objectives of the study.

Chapter 2 comprises a literature review that investigates the existing academic literature on this topic across different regions around the world, including the Pacific. This chapter critically reviews previously published literature on traditional knowledge, DRM and CCA policies and practices and how traditional knowledge is taken up in DRM and CCA organisations and government policies and practices. It also addresses the different frameworks and policies addressing DRM and CCA globally, and more specifically, in the Pacific and the Solomon Islands.

The third chapter is the methodology which describes the different approaches undertaken in this study. It clarifies the rationale for selecting a qualitative descriptive approach and discusses the research paradigm, research design, research rigour, ethical considerations, and likely research output.

Chapter four includes the findings of this study. This chapter provides a detailed account of the study's findings. These results were attained by analysing the data collected during online interviews with research participants.

Chapter five is the discussion section. This chapter discusses the results presented in Chapter 4 by placing these findings within the existing relevant literature discussed in Chapter 2. This chapter discusses the implications of the study findings by linking the results to the current relevant literature and emphasising the implications for practice. The chapter concludes by pointing out the strengths and limitations of this study.

Finally, chapter six is the conclusion section which provides a closing summary of the study by highlighting the limitations and providing recommendations. It also presents areas for future research and a summary of key findings.

CHAPTER 2: LITERATURE REVIEW

Introduction

The integration of traditional knowledge in disaster risk management (DRM) and climate change adaptation (CCA) has been recently advocated by different stakeholders in the disaster and climate change field. DRM is "the application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses" (UNDRM, 2021; Hay, 2013). Countries that experience disasters adopted this DRM definition worldwide (Kelman, 2018). They all emphasize the need to reduce vulnerability and strengthen people's capacities while also mitigating the impacts of hazards.

Climate Change Adaptation (CCA) is a "process of adjusting to current or expected effects and impacts of climate change including adjustment in ecological, social or economic systems in response to actual or expected climatic impacts" (Burton et al. ,2006). It is an alternative way to respond to climate change and to reduce or avoid harm by focusing more on prevention. The actions relating to CCA may focus on maintaining the essence and integrity of a system or changing its fundamental attributes in response to climate change and its impact. Such actions can be described as incremental and transformative, respectively. Humans exploit opportunities to intervene in such situations and help adjustments in the face of environmental changes. For instance, building a sea wall to protect coastal erosion or communities planting more drought-resistant crops in low coastal communities and drought-prone areas are explicit actions derived from CCA.

Numerous DRM and CCA projects involve collaborating closely with local communities. However, the incorporation of local and traditional knowledge in these interventions is not always apparent. Yet, it has been increasingly recognized that traditional knowledge plays a key role in reducing disaster risk and adjustments in the face of climate change. Hence, this chapter reviews the literature on traditional knowledge for DRM and CCA, including how it is considered in policy and practice. It starts by defining knowledge and the different forms of traditional knowledge, discusses traditional knowledge strategy for DRM and CCA in the Pacific and elaborates on the integration of traditional knowledge and scientific knowledge in DRM and CCA. Finally, it discusses the incorporation of traditional knowledge in DRM and CCA policy and practice.

2.1 The meaning of traditional knowledge in disaster: an overview

Knowledge is the primary subject of epistemology, yet there is still a debate on this term. According to Arand and Singh (2011), knowledge ranges from practical to conceptual to

philosophical and from narrow to broad in scope. The history of knowledge has been studied in many ancient civilisations, including the Ancient Greeks. The concept of knowledge is complex and is thus hard to define. Alexander et al. (1991) tried to come-up with several categories of knowledge, including objective, natural, or scientific knowledge; subjective, literary, or aesthetic knowledge; moral (human or normative) knowledge, and religious or divine knowledge. Despite such attempts to categorize knowledge, there is no consensus on what the concept means and how it can be defined appropriately.

Numerous definitions of knowledge exist within the existing literature. One definition adopted by UNESCO (2015) defines knowledge as "the information, understanding, skills, values and attitudes acquired through learning". Another definition, according to the European Centre for Development of Vocational Training (DVT) (2008), states that knowledge is defined as "the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories, and practices related to a field of study or work" (ECDVT, 2008). It can also describe how society and individuals apply meaning to experience (UNESCO, 2015). Overall, knowledge is the outcome of understanding through learning and observation, the experience of an individual, community, or society. For example, during the 2004 Indian tsunami, 10-meters waves hit Simeulue Island in Indonesia's Aceh province less than 10 minutes after the earthquake. Due to their knowledge of the tsunami experienced in 1907, people escaped to higher grounds, and only seven people were killed compared to 163795 that died across the rest of Indonesia in this same earthquake (Rai & Khawas, 2019). The quick response of the Simeulue inhabitants is based on the lessons they learned through their oral history that is passed down from previous generations. On a similar note, traditionally built houses from Baliau, Papua New Guinea were designed to have steep sloping roofs to reduce the potential risk of the roof collapsing from the fire that may come from volcanic ash (Mercer et al, 2009; Kelman et al, 2012).

Traditional knowledge has played an essential part in communities and villages located in disaster-prone locations. Conner (2003) defined traditional knowledge as knowledge passed down from older generations to younger generations of a particular cultural community in the form of stories, songs, folklore, proverbs, cultural beliefs, rituals, community laws, local language, culinary recipes, and agricultural practices. Traditional knowledge may also be described as knowledge passed from one generation to another through sense, experiences, and circumstances in a particular locality (Gupta and Singh, 2011). This knowledge has been demonstrated to be effective during emergency and disaster situations. For example, a well-known Japanese story of the Ansei Nankai Tsunami, which happened in 1854, shows an account of a village chief who saved his village

by burning up his rice farm to attract villagers to his farm. He then advised them to seek shelter on higher grounds to be safe from the impacts of an incoming tsunami after noticing the slow rumbling of an earthquake (Carlson, 2017). Another example is seen in the traditional knowledge of Tsholotsho people in Zimbabwe, and their ability to observe cloud patterns, the behaviour of certain birds and the changes in certain plants to predict a severe rain that might cause flooding (Dube and Munsaka, 2018). This knowledge has been part of these communities over time and shared from one generation to the next.

Since the beginning of time, traditional knowledge has been part of Indigenous communities. Traditional knowledge is usually possessed by the elderly of a community and is passed down to younger generations. Younger generation may acquire such knowledge through observation, experience and directly participating with the elders. It is also important to note that different types of knowledge are passed down according to one's gender and depending on one's roles and responsibilities in the community and the family. For instance, young males may be taught how to make a dugout canoe, while young females may be taught how to weave mats. According to Kelman et al. (2012), traditional knowledge comprises numerous names or forms such as indigenous knowledge, indigenous technical knowledge, local knowledge, vernacular knowledge, folk knowledge, and traditional ecological knowledge. Table one illustrates common forms of traditional knowledge and their descriptions as defined by certain authors.

Indigenous knowledge is a form of traditional knowledge, and it refers to the knowledge of people that live in a specific region. Indigenous knowledge includes local people's cultural traditions, values, and world views acquired from direct experience with nature and the social world (Agrawal, 1995). Dei (2000) defines indigenous knowledge as the common-sense knowledge and ideas of local peoples that reflects their daily realities and how to live. Over the years, indigenous populations have interacted with their environment and thus have created essential knowledge of their surroundings such as knowing where the safe areas are in comparison to high-risk areas, and other forms of valuable knowledge that can save their lives during an emergency.

Vernacular knowledge is also a form of traditional knowledge. According to Wagner (2007), vernacular scientific knowledge is the scientific understanding amongst knowledgeable people as it is often found within scientifically interested sub-publics and armature scientists. Vernacular means colloquial or conversational language that a layperson can easily understand in a normal conversation. Such knowledge is different from the so-called scientific knowledge as it does not include detailed scientific analyses based on theory and/or lab experimentation (Wagner, 2007).

Traditional knowledge is acquired directly from experience and observation and sometimes passed down from the generation before them.

Table 1. Forms of traditional knowledge in the Pacific Island Countries

Traditional Knowledge form	description	Source
Indigenous knowledge	It is a form of traditional knowledge, and it refers to the knowledge of people that initially live in a particular place. Indigenous knowledge includes local people's cultural traditions, values, and world views acquired from direct experience of the working of nature and its relationship with the social world	(Agrawal, 1995)
Vernacular knowledge	It is a form of traditional knowledge based on the scientific understanding of knowledgeable lay publics, who can easily understand in a normal conversation situation.	Wagner (2007)
Folk knowledge	Knowledge embedded in the people culture and belief systems including the traditional elements of the way of life of a group of people and the creative expressions developed naturally as part of their way of life.	(Putnam, 1964)
Traditional ecological Knowledge	Generally defined as a body of knowledge comprising a system of classification, set of empirical observations about local environment and system of self-management governing the resources use built up by a group people through generations of living in close contact with nature.	(Dene Cultural institute & International development research centre, 1992)

Note. The table shows the different forms of traditional knowledge as alluded to by various authors.

Another form of traditional knowledge is folk knowledge. Such knowledge is embedded in people's cultural and belief systems. According to Putnam (1964), such knowledge includes the traditional elements of the way of life of a group of people and the creative expressions developing naturally as part of their way of life. In addition to folk songs, dances, tales, and handcrafts, folk knowledge includes generally held beliefs of community members and the practices that result from these beliefs (Putnam, 1964). In other words, it is the body of stories and legends attached to a place, group, or activity. Such knowledge is generally acquired from generations and is passed down either from old leaders to new leaders, parents to children, or grandparents to grandchildren. The use and application of folk knowledge have also been recognised to be helpful during disasters. For example, indigenous farmers in Nepal were found to make appropriate decisions on cropping patterns for cereal and vegetable crops based on their knowledge of climate conditions (Baul &

McDonald, 2015). Such knowledge was acquired from the previous generations and their collective experiences with the environment.

Traditional ecological knowledge is a form of traditional knowledge that has existed in local community throughout generations. According to John (1992) it is a body of knowledge built up by a group of people through generations of living in close contact with nature. Such knowledge is broad and includes a system of classification, a set of practical analyses about the local environment, and a method of self-management that regulates resource use (Berkes, 1993). The quantity and quality of traditional environmental knowledge varies among community members, depending upon gender, age, social status, intellectual capability, and profession (such as hunter, spiritual leader, and healer) (Brockman, 1997). Moreover, according to Berkes (1993) traditional environmental knowledge is both cumulative and dynamic, building upon the experiences of previous generations and their adaptations to new technological and socioeconomic changes.

Traditional or local knowledge comes in numerous forms, but they all have a role in the local community. One of the critical circumstances in which this knowledge is valuable for a community is its importance in DRM and CCA. Indigenous knowledge has gained increased acceptance in the disaster and climate change field and attempts are also being made to avoid isolating it from other types of knowledge (Shaw et al., 2008). Various examples demonstrate how traditional knowledge can save lives during disasters, thereby illustrating the effectiveness and importance of traditional knowledge in the face of disasters and environmental change. For this reason, the preservation and integration of traditional knowledge into DRM and CCA activities are greatly encouraged by researchers, policy makers and practitioners in places prone to disasters and climate change, including the Pacific Island Countries.

2.2 Traditional knowledge strategy for DRM an CCA in the pacific region

Practicing traditional knowledge for DRM and CCA has been effective in Small Island Developing States (SIDS) that are frequently hit by disasters, especially in the pacific region. According to Agrawal (1995), traditional knowledge systems are embedded in a community's social, cultural, and moral setting. Mercer et al. (2007) support the former statement by arguing that indigenous DRM strategies and practices can be grouped into several categories including, land use planning, building methods, food resilience, social resilience, and environmental resilience. Table 2 demonstrates how strategies for applying DRM measures are compatible with CCA and are shaped by the experiences of the local population over generations. As Balay-As et al, (2018) puts it, these

knowledge and practices are embedded in Indigenous peoples' cultures and traditions and are expressed in their everyday relationships with nature.

Many Pacific Island countries appear to share similarities in their traditional knowledge, especially regarding their knowledge on how to cope with natural disasters (Pelling, 2002). According to Fletcher et al. (2013), there are at least four thematic areas that different countries in the Pacific Islands have in common, including belief systems based on faith and religion, traditional governance and leadership, family and community involvement, and agriculture and food security. Campbell (2006) adds four traditional DRM activities, namely cooperation, food security, traditional knowledge systems, and settlement characteristics. The findings by Fletcher et al. (2013) and Campbell (2006) may show some similarities and differences, however, the descriptions of these features seem to fall into four categories. Table 2 shows the descriptions of these different strategies in the context of Pacific Island's states. These strategies were developed by Indigenous people over many generations and represent their experiences and observations of their natural surroundings.

Table 2. Categories and strategies for disaster risk management and climate change in the Pacific Island nation

Strategy	Brief Description	Source
Social resilience (Inter and intra village cooperation, family, and community involvement)	These include mechanisms such as. <ul style="list-style-type: none"> • Inter Islands network, • Cooperation, • Ceremony, • Hardship, • Kindship, • reciprocity. 	Campbell, 2006 Mercer et al, 2007 Fletcher et al, 2007
Food Security (Food resilience)	Pacific Islands countries have well-established food security mechanisms sustainable for during hard time. This includes <ul style="list-style-type: none"> • food preservation, • diversity, • storage, • consumption control, • fermentation, • crop resilience, • land fragmentation. 	Campbell, 2006 Mercer et al, 2007 Fletcher et al, 2018
Traditional Knowledge system (Environmental resilience)	Help communities understand signs of impending troubles. Includes: <ul style="list-style-type: none"> • Environmental knowledge • Calendar 	Campbell, 2006 Mercer et al, 2007

Settlement characteristics (Land use planning & Building methods)	These Includes. <ul style="list-style-type: none"> • Housing structure built based on location and extent of exposure to wind, • Settlement forms, • Safe places. People turn to know the safe settlement areas and appropriate gardening/farming locations 	Campbell, 2006 Mercer et al, 2007
New changes response	Include relief, <ul style="list-style-type: none"> • coping decline, • dependency, • remittances. 	Campbell, 2006 Mercer et al, 2007
Believe system	Believe system based in faith and religion	Fletcher et al, 2018

Note. Shows the different strategies and categories of traditional knowledge for DRM and CCA in the pacific region (Campbell, 2006; Mercer et al, 2007).

Inter and Intra cooperation amongst villages and community' residents appear to be one of the vital DRM systems in many PICs. According to Campbell (2006), cooperation involves establishing a mutual relationship between villagers and neighbouring communities. This is achieved through ceremonial feasting and inter-Island networks. Ceremonial feasting involves mass food production and distribution of food through ceremonial festivities. For example, Figure 4 illustrates the cultural ways of sharing food during a feast of Kavo Mucha in Guadalcanal of the Solomon Islands. The purpose of this feast is to acknowledge the relatives and families gathered to witness the placing of stone mark (kusu gilugilu) on a leader of a tribe who has died (Manakako, 2020). Such activities are Practiced in the pacific island countries and are usually initiated by the person with the highest status in the community. One critical aspect of such an initiative is strengthening relationships and ties amongst individuals, villages, and communities. In DRM, these relationships represent the networking capacity of local villagers to seek support from other communities during disasters.

Figure 4. Guadalcanal feast of Kavo Mucher way of sharing food



Note: Traditional way of sharing food in Guadalcanal communities during such feasting (Manakako, 2020)

Food security is also another vital aspect for disaster risk management and climate change in Pacific island countries. According to Campbell (2006), PICs are strong subsistence agriculturalists and therefore have diverse crop productions. Researchers have documented that in PICs local people use famine food, control of food consumption, and the maintenance of agricultural resilience through the diversity of cultivars and the use of resilient crops to maintain their sustainable food production (Campbell, 2006). The Pacific Islanders' diverse food and crop production are essential in DRM and CCA. For instance, famine food is consumed during hunger periods and consumption control can manage limited resources. As an example, during the aftermath of tropical cyclone Zoe, which severely destroyed the province of Tikopia in the Solomon Islands, people depended on local preserved food and whatever was left from their gardens for more than two weeks while waiting for relief support to arrive. This demonstrates the importance of having traditionally diverse crop productions and maintaining these agricultural traditions for DRM and CCA purposes.

Figure 5. Typical food garden in the Solomon Islands



Note: Typical food garden with diverse crop in the Solomon Islands (Devissche T., 2007).

It has been widely acknowledged that traditional knowledge systems are vital for DRM and CCA in PICs. These traditional knowledge systems include traditional food security, cooperation, and settlement factors. Food preservations mechanisms, interisland networks, housing techniques and environment knowledge are a few examples of traditional knowledge (Campbell, 2006). The local populations rely largely on their traditional knowledge to survive during both peaceful and disruptive times. For example, dried bread fruit presented in Figure 4 and pit fermenting presented in Figure 6 represent local ways to preserve food during times when there is no electricity available. This system of preserving food has been practiced in isolated and remote communities for generations and have proven to be very helpful to communities experiencing disasters.

Figure 6. Dried breadfruit known as Nambo in the Solomon Islands



Note: dried breadfruit prepared for preservation in Santacruz of the Solomon Islands (Tutua, 2021).

Settlement characteristics of communities and villages in Pacific Island countries are also fundamental for DRM and CCA. According to Campbell (2006), most traditional houses were built to withstand the hazards present in the location. Campbell (2006) also stated that many Fijian bure and vale houses are built on a meter-high mound to reduce the effects of flooding and storms surges. This feature of traditional knowledge is critical in DRM and climate CCA in SIDS. For example, Figure 7 shows a traditional bure house in a traditional village in Fiji. The house was built with traditional materials that were known to withstand potential hazards present in the area.

Figure 7. Traditional bure houses of Fiji



Note: The traditional thatched bures huts of Navala village of Fiji (Bibiko W, n.d)

Furthermore, Solomon Islands, just like other Melanesian Island states, has its disaster risk reduction mechanism for dealing with disasters and climate change. According to Hagen (2015), gardening is the key to survival in the Solomon Islands, and land is mostly clan and tribally owned. Most people rely on subsistence activities, such as cultivating gardens, fishing, and using a wide

range of forest resources for building materials (Fazey et al., 2010). In terms of food security, people may have several food gardens in different locations with diverse crops planted. This means that if one food garden is destroyed, that person can still survive on other gardens. For instance, during the 2007 Western province tsunami, most of the gardens along the coast in the western province were destroyed. Families therefore had to survive from the food that was farmed in their uphill gardens (Hagen, 2015). Others heavily depended on marine foods such as fish and reef shells, specifically communities residing in low-lying atolls. Meanwhile, traditional food preservation practices, such as pit fermenting, enabled the drying of starchy food. This practice is still used today is therefore critical for DRM and CCA.

Figure 8. Masi extracted from the pit fermentation of cassava, breadfruit and varios starchy food crops



Note. This is a picture of Pit fermenting in the Solomon Islands where starch is stored in a pit, then later when needed, collected it, and pounded to make a pudding (Brown & Mayer, 1993).

Traditional knowledge is also critical in the preparation for natural hazards. Before tropical cyclone Zoe hit the province of Tikopia in 2002, people used the time they had to secure the roofs of their houses by weighing them down with banana, palm trunks, and vegetation (National disaster council, 2003). Furthermore, the social cohesion, cooperation and remittances embedded in the customs and Christian principles and values are crucial for disaster recovery in remote villages (Berry & Yates, 2004). According to Hagen and Kimberly (2015), the use of traditional skills and knowledge that are associated with the local environment enabled the survival of many Pacific Island communities during natural disasters. For these reasons, researchers, policy makers and practitioners have advocated for the integration of traditional knowledge within DRM and CCA.

2.3. Integration of traditional knowledge and scientific knowledge in DRM and CCA practice

Integrating traditional knowledge with scientific knowledge in DRM has evolved over a century of research. It started with a hazard paradigm that focused on natural hazard intensity, scale, and frequency as a cause of harm and loss (Le De, 2017). Until the 1990s, the focus of the hazard paradigm has dramatically influenced by global disaster risk reduction policies that emphasise the transfer of knowledge from first world countries to third world countries. However, in the mid-1990s, the vulnerability paradigm started to influence policies and became the focus of discussion especially regarding disasters and emergencies (Ellemer, 2005). The vulnerability paradigm recognises that disasters are either political, historical, or socioeconomic in origin, and unequal access to resources among society members may create the conditions for a hazard to become a disaster (Le De, 2017; Kelman & Gaillard, 2010)., Nowadays, disaster risk experts argue that disaster risks are part of everyday life. They recognise a need to involve people in all disaster risk reduction interventions at the community level, emphasising the integration of traditional knowledge and local knowledge to complement scientific knowledge (Le De, 2017).

Furthermore, despite traditional knowledge and scientific knowledge coming from different perceptions and world views, they have been used compatibly in local communities. One critical area where these two types of knowledge are applied is during the early warning phase of an imminent disaster. Community members may listen to weather updates on the radio while observing their environment to complement the information received. For instance, Balay-As et al. (2018) observed how the Kankanaey indigenous people of the Philippines use warnings from scientific systems to confirm their observations, and at times use traditional knowledge to confirm the scientific weather warnings they received from the weather bureau or local government authorities, such as the Municipal Disaster Risk Reduction and Management Office (MDRMMO). These methods of checking and confirming between traditional and scientific knowledge systems can be interpreted as a successful integration of both forms of knowledge, where both serve to complement each other in seeking validity. Similarly, according to Agrawal, (1995) traditional knowledge is also important in development planning in communities. Local people have more knowledge about their environment hence, their input in development planning may contribute to more effective disaster risk reduction planning

Another vital area where traditional knowledge and scientific knowledge can be integrated is within community risk assessment. Local people know their surroundings, and their participation in risk assessment along with the use of scientific tools can add value to the results of the proposed assessment. According to Dube and Munsaka (2018), traditional knowledge of local communities can

help identify elements of risk. Hence, the authors argue that applying traditional knowledge with scientific knowledge may yield the best results for planning and action. The findings reveal the importance of traditional knowledge for the survival of local communities. Furthermore, the coupling of local knowledge with scientific knowledge demonstrates the importance of integration and through its effective compatibility.

Practitioners believe that combining Indigenous knowledge with scientific knowledge may help practitioners effectively manage a disaster situation through proper planning and execution (Dube & Munsaka, 2018). Local people have in-depth knowledge of their environment and the social status of their community, and therefore, including them in disaster response planning may help enlighten disaster responders and resolve doubts they might have previously questioned. For example, Dube & Munsaka (2018) indicated that practitioners could effectively manage disaster situations by combining traditional knowledge and scientific knowledge. This can be achieved through indigenous participation in disaster response planning and through consultations with the community. Hence, traditional community knowledge is a vital tool that can empower communities by creating effective plans for disaster response and management.

2.4 Incorporation of traditional knowledge in DRM and CCA policies

The current Sendai framework for disaster risk reduction 2015 -2030 recognises the importance of local traditional knowledge. This framework has four key priorities for member countries to implement and include: understanding disaster risks, strengthening disaster risk governance to manage disaster risks, investing in disaster risk reduction for resilience, and enhancing disaster preparedness for effective responses that "build back better" in recovery, rehabilitation, and reconstruction (UNISDR, 2017). Under each key priority, it also stipulates various actions required to undertake at local, national, regional, and global levels to help achieve each priority. For example, one of the important actions stipulated under the priority is the use of traditional, indigenous, and local knowledge and practices to complement the scientific knowledge in DRM. The framework also recommends that development of policies, strategies, plans and programmes of specific sectors should use a cross-sectoral approach which is tailored to the local context (Wahlistrom, 2015). Since this framework is essentially responsible for shaping the country's national development strategies, policies, and plans relating to disaster risk (Pearson and Pelling, 2015) its acknowledgement of traditional knowledge is encouraging for the continued integration of traditional knowledge in future DRM and CCA plans.

However, scholars have also argued that these actions were top down and predominately based on scientific knowledge, thereby ignoring the communities' traditional and local knowledge. According to Pearson and Pelling (2015), despite efforts to blend scientific information with local knowledge, the actions in the framework are overwhelmingly top down and includes limited emphasis on the governance mechanisms to place communities in decision-making positions. Moreover, the Sendai framework for disaster risk reduction 2015-2030 was also criticized for taking a technocratic approach to disaster risk, as seen in the priority which recommends practitioners to first rely on science and technology as the main source of information, and only use traditional, indigenous, and local knowledge as a complementary source (Penrose, 2020). This is obvious throughout the call for actions under the priority where most of the paragraphs are dominated by scientific knowledge as the means for understanding disaster risks. The dominant emphasis on technology and science-based knowledge may affect the disaster risk practice and policies at national level since they are mostly guided by this framework.

On a similar note, the United Nations framework conventions on climate change (UNFCCC) recognises the need to stabilise a global temperature at an increase of no more than 2 degrees Celsius (Gao et al., 2017). The parties to this framework recognised CCA as one of the critical strategies for dealing with climate change impact in any one country (United Nations Climate change, 2021) and emphasised the use of traditional knowledge. Parties to the UNFCCC acknowledge that adaptation action should follow a country-driven, gender-responsive, participatory, and fully transparent approach, considering vulnerable groups, communities and ecosystems, and should be based on and guided by the best available science and, as appropriate, traditional knowledge, knowledge of indigenous peoples and local knowledge systems, to integrate adaptation into relevant socioeconomic and environmental policies and actions (United Nations climate change, 2021). This inclusion of traditional knowledge and local knowledge systems in this framework indicates the value this knowledge may add to the desired intervention. For instance, climate change sustainable forest management projects focus on supporting local communities to reduce vulnerabilities using multiple-purpose land-use models that can integrate forest management and conservation in the Solomon Islands (MECDM, 2021). Such a project may allow the inclusion of traditional knowledge of the local beneficiary community in the implementation of the project.

However, critiques feel that the climate change framework seem to align with a hazard paradigm based on intensity, scale, and frequency of a natural hazard as cause of harm and losses (Heiman's, 2009). Disaster risk management has over the years shifted its focus away from hazard as the cause of harm, towards a vulnerability paradigm. Vulnerability paradigm emphasises that

disasters are either political, historical, or socio-economic in their origin and that unequal access to resources among society member may create the conditions for a hazard to become a disaster (Hewitt, 1983; Watts and Bohle, 1993). The path in which climate change is taking is focused on the transfer of technical knowledge as a better approach for addressing climate change issues, which may have less consideration for traditional knowledge. The different policies and plans addressing climate change are guided by this national framework and will therefore affect the initiatives conducted in the communities. Consequently, limited appreciation for traditional knowledge in the local community may adversely affect the way in which knowledge is practiced.

Another essential framework critical for DRM and CCA in the Pacific region is Framework for resilience development in the Pacific (FRDP) 2017 – 2030. This framework succeeded the previous two frameworks, namely, the framework of the Pacific Island for action on climate change 2006 – 2015 and the Pacific disaster risk reduction and disaster management framework for action 2005 – 2015 (The Pacific Community, 2016). This framework integrates approaches for addressing climate change and disaster risk in the Pacific. International NGOs, bilateral partners and local NGOs depend on this framework for guidance and directions. Interestingly, one fundamental guiding principle of FRDP 2017-2030 framework includes to "build on and help reinforce cultural, traditional resilience and knowledge of communities who should be engaged as key actors in the designing plans, activities and solutions that are of reference to them" (The Pacific Community, 2016. p.6). In addition, most of the countries in the region national strategies and policies related to disaster and climate risks were linked to this framework. For instance, the Solomon Islands National disaster management plan of 2018 is aligned with FRDP 2017 – 2030 (NDC, 2018). Acknowledging the traditional knowledge in these frameworks has strengthened the emphasis of the higher frameworks. As such, practitioners and national policymakers have no excuse for not including traditional knowledge in their local actions and national policies. However, because this policy framework is for the Pacific, there seem to be a challenge in terms of enforcing the uptake of traditional knowledge by practitioners. Sometimes practitioners seem to focus on upholding the principles of their organizations and donors, thinking that traditional knowledge is applied only in the communities.

2.6 Chapter Summary

This chapter briefly brought into perspective the epistemology of knowledge and discussed both scientific and traditional knowledge. It further elaborated on the different forms of traditional knowledge and categories of traditional knowledge critical for DRM and CCA in the Pacific and Solomon Islands respectively. Indeed, traditional knowledge in the Pacific is critical for DRM and CCA

and has been with the local population for many generations. However, it is obvious that this knowledge is rapidly fading. Nevertheless, the inclusion of this knowledge in the DRM and CCA policies and practices may be a potential way of ensuring that it lives on. It is evident that international and regional framework such as Sendai framework for disaster risk reduction 2015-2030, and United nations framework for climate change, and the framework for resilience development of the pacific 2017-2030 put emphasis on consideration and uptake of traditional knowledge in policy and practice. Finally, there is still a doubt on the way practitioners have integrated traditional knowledge in their community projects and interventions. The next chapter provides the methodology of this study.

CHAPTER 3. METHODOLOGY

Introduction

Disaster risk management (DRM) and climate change adaptation (CCA) are the cross-cutting fields that affect all dimensions of society. Traditional knowledge has played a critical role in communities that are at risk to both natural and manmade hazards, especially in remote and isolated villages. This research aims to explore the integration of traditional knowledge in DRM and CCA policies and practice, with Guadalcanal of the Solomon Islands as a case study. This study focuses on understanding how DRM and CCA policies integrate the traditional knowledge of local communities who are prone to disasters and climate change. In achieving this, a research question was developed focusing on how traditional knowledge is incorporated into the current DRM and CCA policies and practice. Furthermore, the objective of this study is to examine various traditional mechanisms practiced in Guadalcanal, their inclusion in the DRM and CCA policies and practice, and challenges and opportunities for the integration of these traditional knowledges in current policies and practice. This chapter presents the research methods employed in this study in the following sections: section 3.2 describes the methodological approach undertaken in this study; section 3.3 explains the method of data collection by briefly describing how the data was collected, the study participants and how they were recruited; section 3.4 briefly discusses the method in which data were analysed and then evaluate and justifies the appropriateness of this methodological approach; section 3.5 briefly provides the research reflexivity and finally, section 3.6 presents the ethical and cultural considerations of this dissertation.

3.1. Research methodology and methods

This research employed a qualitative methodology, using a qualitative case study approach. Researchers have used the case study research method for many years across fields of studies such as disasters, climate change adaptation and development at large (Dooley, 2002). The qualitative case study is a research methodology that helps explore a phenomenon in a particular context through a variety of lenses to reveal multiple facets of the phenomenon (Rashid et al., 2019). A comparative case study approach often uses several techniques for gathering information, ranging from interviews to surveys to content analysis (Dooley, 2002; Kaarbo & Beasley, 1999). The case study research is applicable for both qualitative and quantitative study and is applicable in even a single case.

A qualitative case study is an appropriate methodology to explore the integration of traditional knowledge in DRM and CCA policies in the Solomon Islands for several reasons. Traditional knowledge is gained through experience, observations, and regular interactions between

the communities and their surroundings. Moreover, the influence of colonisation and the impacts of globalisation on the communities' people and culture appears to have affected their traditional way of life, their ways of learning, their knowledge, and their interactions with the environment (Campbell, 2006). In addition, the introduction of new technologies along with various project interventions have influenced traditional knowledge holders, and as a result, traditional knowledge appears to be fading in many Indigenous communities. Hence, to understand how practice implements policies from the government at the community level, and if traditional knowledge is taken into consideration in such interventions, a qualitative case study proved to be the best approach.

Guadalcanal Island of the Solomon Islands was chosen for this study as it is one of the Islands that has experienced many disasters in the past and continues to face the increasing threats and risks of climate change. For instance, the 1977 earthquakes that hit the western coast of Guadalcanal (Webber, 1978), tropical cyclone Namu of 1986, which devastated the livelihoods of numerous communities across Guadalcanal (UN Department of Home affairs, 1986), and the 2014 flash flood that rendered thousands of people homeless for several months (UNOCHA, 2013). In between these major disasters, people living in Guadalcanal continued to experience small scale and unreported disasters affecting the livelihoods and wellbeing of many communities (Solomon Islands Government, 2014). In addition, Guadalcanal also experiences the interventions and projects numerous government and non-government organisations, especially in the DRM and CCA programmes

3.2 Method of data collection

3.2.1 Data Collection

This study employs one-on-one interviews with different DRM and CCA practitioners involved in these sectors at the village and community level in Guadalcanal. Interviews were chosen for this study as they provide a flexible tool to capture people's voices and the way people interpret their experiences. According to Jamshade (2014), interviews are the most common data collection method for qualitative research. There are three common types of interviews: structured, semi-structured, and unstructured interviews (Easwaramoorthy & Zarinpoush, 2006). This study employs the unstructured interview. Unstructured interview was critical for this study as it enabled the participants to share their opinion with less barriers compared to a more systemic and structured approach. Only those who were engaged in DRM and CCA projects and programmes in Guadalcanal were recruited. In addition, due to the COVID-19 restrictions and limited funding support, the

researcher conducted unstructured interviews online or on the phone where phone coverage was available.

Unstructured interviews were conducted with five DRM and CCA practitioners and one village disaster committee chairman from the community. These practitioners work for the government and the non-government organisations in the Solomon Islands that are engaged in disaster risk programs and activities in the Guadalcanal province. In the Solomon Islands, these Non-government organisations play an important role in the DRM and CCA projects. Most of these NGOs are also members of the National Disaster Operation committee (NDOC) formed in accordance with the NDRM framework of the Solomon Islands (NDRM) 2010 and National Disaster Management arrangement 2018. These agencies are very important partners of the government in the field of DRM and CCA in Solomon Islands.

Unstructured interviews are appropriate for this study as they provided the opportunity for the DRM and CCA interviewees to offer as much information as they could and share their opinions on traditional knowledge integration in DRM and CCA policies and practices. Non-government organisations implement numerous projects that aim to reduce disaster and climate change risks in the Solomon Islands. While these programmes may be externally funded, they are generally in line with government's policies. These organisations have a huge amount of experience working with communities especially on livelihood, disaster risk management and climate change adaptation projects. Therefore, engaging them in this study was crucial to include their input especially regarding the way they perceive and integrate a communities' traditional knowledge with current DRM and CCA practices and policies.

Hence, to effectively capture their knowledge and thoughts, a zoom interview was conducted online. The interviews were recorded via zoom after the researcher received the consent from the participants. Zoom played a critical role in the data collection since the researcher was not able to travel to the Solomon Islands due to COVID-19 border restrictions and limited finance. Thus, conducting interviews via Zoom enabled the researcher to communicate with participants despite not being able to travel. All interviews were mainly conducted in Pijin English, the Solomon Islands common language and then transcribed and translated into English for analysis.

3.2.2. Study Participants

The participants involved in the study were from diverse sectors, including government officers, NGO employees, and one village disaster risk committee chairperson. Dedicated attempts were made to recruit DRM and CCA practitioners, including village disaster committee leaders, government officers and non-government organisations involved in DRM and CCA activities in the

Solomon Islands, specifically in Guadalcanal. In the Solomon Islands, NGOs are key government partners regarding the work involved in developing and implementing disaster risk management and climate change adaptation programmes. Most of the NGOs in the Solomon Islands are members of the National Disaster Operations Committee (NDOC) through their sector. These organisations support government disaster responses and implement CCA programmes with communities. Hence, the people that participated in this study have a wealth of experience working in the fields of DRM and CCA. All the participants had more than seven years of experience in the field of DRM and CCA as demonstrated in Table 3.

The research targeted a wide range of key stakeholders, including National Disaster Management Office personnel, Oxfam Australia, World Vision Solomon Islands, Safe the children Australia, and other NGOs and government officers working with agencies that are members of the NDOC disaster management framework. Only six participants eventually participated in the study. Table 3 below shows the details of the participants interviewed for this study.

Table 3. Details of the participants that took part in this study

Participant Code	Field of work	Years of professional work	Types of interviews	Months
Pax01	Disaster risk Management project coordinator (NGO)	12	Zoom	Dec 2021
Pax02	DRM/CCA community facilitator (NGO)	8	Zoom	Dec 2021
Pax03	Senior Provincial Disaster officer (Guadalcanal province)	10	Zoom	Dec 2021
Pax04	CBDRM officer (MECDM)	7	Zoom	Dec 2021
Pax05	Village Disaster Risk Committee chair (Community)	10	Phone call	Jan 2022
Pax06	Climate Change Adaptation project manager (NGO)	10	Zoom	Jan 2022

Note: Authors own designed table showing the area of expertise and professional work experience and medium of interview and dates engaged with the research participants.

3.2.3. Recruitment procedures

The recruitment and interviewing of research participants for this dissertation occurred between November 2021 and January 2022. The participants' contact information was collected from the respective agencies' websites. The researcher conducted an online investigation to search for agencies that have been established in the Solomon Islands for at least more than 5 years. Once identified, phone contacts were collected, and the researcher made a direct call to the respective agency's reception asking to speak to the officer responsible for DRM or CCA. Once connected with

the officer, the researcher then introduced himself and briefly talked about his dissertation topic and then verbally invited him to participate as this is culturally appropriate in the Solomon Islands. Once the officer agreed, an email was sent to the researcher including a formal invitation, a Participant information sheet, and a consent form. The officer was given time to reply to the researcher and provide their consent form as well as confirming a suitable date and time to conduct the interview if they wished to participate. Once the date and time for the interview was confirmed, the researcher sent a zoom link to the research respective participants.

Out of the 15 participants that were contacted, 12 were willing to participate in the study. However, only six total participants ultimately participated in the study. The reasons for the low level of participation remains unknown to the researcher as the participants did not provide any explanations for their sudden withdrawal. The researcher found it challenging to recruit participants remotely while being out of the country. The researcher also faced challenges with recruiting and conducting interviews given that many Solomon Islanders prepare for festivities during the months of November, December and January. Furthermore, there was civil unrest triggered by a peaceful protest on the 25th of November 2021, which lasted about a week and forced the government to invite the defence force from Australia, New Zealand, and Papua New Guinea to support the local police. The government also initiated a curfew during this period forcing the working population to remain at home. Consequently, the researcher had many difficulties contacting potential participants during this time.

Finally, on the 9th of January, there was a reported outbreak of COVID-19 in Honiara, which led the country through a series of lockdowns. This situation triggered fear amongst the local population and most of the government and nongovernment organisations offices were closed for several days. Moreover, since most of the agencies that are responsible for DRM and CCA in the Solomon Islands are also part of the N-DOC disaster management arrangement, their focus shifted from their normal routine activities to support the N-DOC health sector as they responded to the COVID-19 outbreak. This also may have affected the potential involvement of participants in this study. Despite the challenges encountered with the recruitment of participant, the interviews provided meaningful information that addressed the objectives of this study.

3.3. Data analysis

Transcripts were analysed using the inductive approach and a thematic analysis. The Inductive approach is appropriate for this study as it is a systemic procedure for analysing qualitative data where the analysis is guided by specific objectives of a study (Thomas, 2003). Thematic analysis was also employed as the dataset is wide ranging and thus requires a critical analytic approach to

identify patterns, similarities, and differences within the vast amount of information. The first step of the analysis process was the transcription of the interviews, which was done in Pijin as it is the interviewee's spoken language. All transcriptions were then translated from Pijin to English. The researcher then thematically analysed all the translated transcripts. Following the data analysis procedure proposed by Braun and Clarke (2006) the researcher conducted all six interconnected steps of data analysis demonstrated in Table 4. The researcher printed out the transcripts to thoroughly read and re-read them to gain in-depth understanding of the data. The researcher assigned codes to relevant and important sections of the transcripts. Once this process was complete, the coded data then grouped into categories, and each category were appropriately named. The names of each category were critically reviewed and then assigned to themes. After successfully completing the data analysis process, the researcher began to write the findings.

Table 4. Steps undertaken in an inductive analysis of this study.

Steps	Description
1	Preparation of primary data: primary data was transcribed and translated to English.
2	Critically review the script: The scripts were read and reread to gain in-depth understanding of the data.
3	Open Coding: relevant data was then coded appropriately.
4	Creation of categories: the codes were then assigned to categories using a tabular format.
5	Naming the categories: The categories were then named accordingly.
6	Assign categories to themes: The names of the categories thoroughly analysed and assigned to themes. Once analysis was complete, the researcher proceeded to write the results.

Note: Authors own table on the different steps undertaken in the inductive analysis of qualitative data

3.4 Researcher Reflexivity

Reflexivity is a critical aspect of qualitative research. It is an interpretive process which requires the researcher to reflect on their experiences and worldviews. Reflexivity is defined as the critical analysis of the researchers' position throughout the research process and how they participate in producing knowledge (Rankl et al., 2021). It allows the researcher to reflect upon their experiences, assumptions, belief systems, and perception of knowledge. The researcher's interest in this topic is based on more than six years of experience working for the government in the Solomon Islands in the DRM sector. During these years, the researcher was part of the National Emergency

Response team and was deployed in several provinces of the Solomon Islands to support coordination on the ground humanitarian responses. In addition to supporting humanitarian activities, the researcher supported N-DOC sector committees with preparedness activities and community disaster risk management initiatives during non-disaster times.

During these deployments, the researcher found its very interesting how communities were able to endure and overcome disasters by using their knowledge and the limited resources available to them. The Solomon Islands is made up of scattered islands that are separated by the Pacific Ocean and thus, it takes several days for disaster response teams to arrive at the affected communities and provide relief support. Furthermore, mobile phone coverage and access to the internet network is available only within the capital city and provincial headquarters. As a consequence, disseminating information from the responsible authorities to communities, and from communities to authorities, is sometimes hindered by the limited access to communication systems. Despite such challenges, communities were generally able to cope and recover from disasters by themselves.

Thus, the research is mainly based upon a great admiration and appreciation of the local and traditional knowledge that exists in communities. Such admiration may play an influential role in during the research process. However, being aware of this experience was critical for the researcher to engage with the research participants and collect the necessary data. Hence, every attempt was made to ensure the interviews were not biased and truly reflected the views of participants. Sometimes the researcher asked additional questions to clarify the points made by the participant. In addition, during data analysis, the researcher thoroughly read through the scripts and sometimes went back to the audio recordings to ensure that he properly understood what was meant in the script. Such approach was critical for the researcher to ensure that his biasness and emotions were not influencing the data which otherwise may affect the results of the study.

3.5. 21/304 Ethics Application and Amendment

Ethics is very important for this study as it involves primary data collection through one-on-one interviews via zoom. In this study ethics approval was granted by the Auckland University of Technology Ethics Committee (AUTEC). Ethics is vital for the success of this study as it provides details on the research topic and the way the research was conducted. This includes details and processes the researcher undertook from identifying the research participant, recruiting participants, interviewing participants, and the management and disposal of data.

Moreover, as the study was conducted in the Solomon Islands, the researcher needed to obtain a research permit from the Solomon Islands government through the Ministry of Education and Human Resources Development (MEHRD) before proceeding with the study. This is an important ethical consideration, as the Solomon Island government requires that all research conducted in the country must abide by the country's law. To acquire this permit, a support letter from the National Disaster Management Office (NDMO) and the ethics approval from the AUTECH were required. The NDMO is responsible for policy and advisory related to disaster risk management in the Solomon Islands. The researcher requested a support letter from the NDMO of the Solomon Islands, whom soon after provided the letter without any difficulties. With this support letter the researcher was able to apply and acquire a research permit from the MEHRD. Once all these requirements were met, approval was given, and the researcher proceeded to conduct this study.

3.6. Chapter Summary

This chapter discusses the research methodology and methods used in this study. This study used a qualitative methodology based on a case study approach. This chapter also provides a detailed description of the requirements for the study participants and recruitment procedures. This chapter also describes how data analysis was conducted. It also includes the researcher's reflexivity that may affect the study and provides information regarding the ethical considerations. Understanding these different facets of the methodology is critical especially regarding the way in which data was collected and analysed. Furthermore, being aware of the researcher's world views and his position in the study through his experiences and acknowledging them here helps to reduce the researcher's bias and assumptions throughout the study. Finally, ethical considerations were discussed as they are an important part of this study and guided the way this study was conducted. Overall, the different aspect of this study's methodology and research methos are fundamental for the overall outcome of this dissertation. The next chapter presents the findings of the study.

CHAPTER 4: FINDINGS

Introduction

The research questions this study aimed to answer was if and how traditional knowledge of people living in Guadalcanal is integrated into the disaster risk management (DRM) and Climate change adaptation (CCA) policies and practices supported by government agencies and non-government organisations. This study explored various forms of traditional knowledge local people employ in the face of disasters and climate risks. It also investigated how DRM and CCA policies and practices of government and non-government organisations that operate at the local community level embrace traditional knowledge. While examining the importance of traditional knowledge in DRM and CCA, this dissertation also tried to appraise the opportunities and challenges for integration into policies and practices.

A total of six interviews were conducted throughout the months of December 2021 and January 2022 via zoom and phone calls. The data analysis for this study is based on an inductive approach which allows the data to inform the themes. Open-ended interviews were conducted to limit the influence that the researcher may have over the participant's responses, thereby allowing the interviewees to share their experiences and understandings regarding traditional knowledge and policies in their work and other related activities. The findings of this study are presented according to the themes outlined throughout this chapter. Section 4.2 focuses on traditional knowledge for disaster and climate risk management of Guadalcanal rural communities. Section 4.3 examines the impact of development and modernisation on traditional knowledge in Guadalcanal. Section 4.4 explores traditional knowledge in DRM and CCA policies and practice in Guadalcanal and Solomon Islands. Finally, section 4.5 presents the challenges and opportunities for integrating traditional knowledge in DRM and CCA policies and practice.

4.1 Traditional knowledge of Guadalcanal rural communities for disaster and climate risk management

One of the key themes that stood out from the interviews is the importance of traditional knowledge of Guadalcanal rural communities for disaster and climate risk management. The participants of this study noted that local people were aware of the risks present in their communities due to their experiences facing disasters. Thus, they have developed knowledge and understanding of indicators that may warn them of these hazards and risks. The communities further developed disaster reduction and climate change adaptation practices to address these issues.

The participants of this study noted that local communities of Guadalcanal experience numerous disasters and impacts of climate change. They acknowledged that natural hazards including flooding, tropical cyclones, and landslides had impacted local communities. These hazards continue to pose great risks on the local populations. The following quotes support the former statements:

Responding to disaster before and during a disaster is not new in Guadalcanal (Pax01 22/11/21)

Here in the Guadalcanal plains is one of the most prone areas to flooding (Pax05, 26/01/22).

so, at Guadalcanal, they are prone to landside and most of the time, their gardens are in the landslide areas (Pax06, 01/02/22)

The above quotes from key participants demonstrate that disaster experiences relating to the impacts of natural hazards including flooding and landslides are common in Guadalcanal communities.

Furthermore, the study also noted that local Guadalcanal communities tend to develop natural indicators and warning signs to inform them of potential hazards and climate change risks. These indicators and warning signs were acquired from their elders and their daily experiences with their local environment. Depending on the type of hazard, these warning signs include thick clouds and wind direction for bad weather such as rain and strong winds, flooding, and birds flying in a certain direction:

Early warning signs such as thick cloud followed by heavy rain and strong wind were observed (Pax01,22/11/21).

birds flying, tree leaves starting to fall, especially the rara tree, I forgot its botanical name yah... (Pax04, 17/12/21)

The behaviour of birds is one of these early warning indicators. One key example surrounding this indicator is the frigate bird. It can show changes in the wind directions and is relevant until today. It can be used in the seasons called Ara and Koburu. In terms of timeframe, from November to December, usually this bird used to fly from west to east direction, this is normal. But sometimes if this bird turns and flew from East to West direction, then that indicate a cyclone will occur (Pax02, 04/12/21).

The movement of clouds from the coast of a particular location towards another point and the wind direction from west to east indicates bad weather. The use of dark and thick clouds as indicators for bad weather was used every day across Guadalcanal. Other common indicators include birds flying in a certain direction and tree leaves falling. Guadalcanal communities seem to develop the

understanding that if they observe these indicators during a certain timeframe, especially during November or December, they are expecting bad weather or in a worst situation they might be hit by a tropical cyclone or heavy rain. Their everyday decisions are based on their observations of the environment, including the animals. Furthermore, local communities of Guadalcanal seem to develop disaster risk reduction and climate change adaptation practices in response to these risks and experiences. These practices include local knowledge of seasonal weather patterns, livelihood activities such as gardening knowledge, food crops and fruit trees, building designs, and social networks. The following quotes illustrate the former points:

... in general, we have cyclone season which starts from November to April. So, during times where we say, not a cyclone season, that's when communities put more effort in planting more crops so that more food stock during cyclone season (Pax03, 15/12/21).

Understanding these weather patterns enables local communities to make informed decisions regarding what time of the year to plant and which crops to plant according to the seasons. In addition to using traditional knowledge for disaster and climate risks, many of the communities' activities that support their livelihoods, such as gardening and planting, also depend on traditional knowledge. Gardening practices appear to be dependent on weather and seasonal patterns as they guide communities to plant crops and fruit trees according to the different seasons throughout the year:

...important crop that is commonly used as a preparedness food is yam (Uveghai), swamp taro, taro, and Pana. People also grew yellow leaves cabbage (kaivagu) that can grow rapidly and spread widely if planted just anywhere... These crops and vegetables are important for disaster preparedness (Pax01, 22/11/21).

As demonstrated in the previous quote, it appears that communities also have knowledge on climate resistant crops which can help them cope and adapt to climate change impacts. The participants indicated that crops such as swamp taro, yam, pana, bananas, and local vegetables may withstand adverse weather conditions, such as a tropical storm and/or cyclone. In addition, local communities also strategically plant their gardens in safe areas and some households may even have several gardens spread out across different locations:

In terms of preparedness, regarding food gardens, I observed that people used to make gardens one on top of the hills and one near the riverbanks (Pax01, 22/11/21).

Yes, so at Guadalcanal, they are prone to landslides, and most of the time, their gardens are in the landslide areas, so ... tend to move away from such places like that to make their

gardens. So, in terms of understanding their traditional knowledge we explore their settlements and gardening histories (Pax06, 01/02/22).

Having multiple gardens spread out across different locations that are away from landslides and flood-prone areas can help reduce the risk of a community losing their livelihood and food security. Another disaster risk reduction practice that was observed in local communities of Guadalcanal is linked to their local knowledge of settlement sites and building designs. Potential village sites tend to be chosen based on their safety from potential hazards such as floods and strong winds:

Also, in identifying a site to build a home and village in Guadalcanal, people ensure that it is some distance away from the river and less exposed to the wind. They identify such sites because they know very well their surroundings and location (Pax01, 22/11/21).

Dwelling houses are built in a way that may withstand natural hazards. The materials used for building houses are chosen carefully according to their hardness and strengths as explained in the following quote:

... before a house is built, it is designed to withstand the wind. Houses that were built on top of a hill, the sago palm leaves were stacked very close to each other on the roofs. Strong sticks were used as posts, bearer, starch, and rafts. Bracings were used to hold down the leaves firmly to the rafts to prevent it from flying away during strong winds. They also have different designs to strengthen the house. The way they sew the sago palm leaves and tie them at the exterior walls were designed to withstand the strong wind. Inside the house, they also have different design on how the leaves were tied so that it is strong (Pax01, 22/11/21).

Choosing a safe location and a strong design to build dwelling houses that can withstand natural disasters and climate risks are important skills that help reduce disaster risks in Guadalcanal communities.

Finally, intra-community, and inter-community support is also an essential practice of Guadalcanal Islanders. The participants noted that local communities and individuals may support each other during disaster situations:

So, when the river started to rise, I observed that leaders and mature individuals were actively involved. The younger people assisted to move properties like pigs, and some helped old women to move to the safe ground. That time a church building was the safe area that we all moved to. The cyclone and flood came in the night, so early in the evening, we all moved to the church building with few items such as kitchen utensils. So, before the river

burst its bank and the strong wind hit the village, everyone is already at the church (Pax01, 22/11/21).

Community cooperation during emergency helps inhabitants evacuate and secure important property assets to safe locations before the disasters hits and impacts a community. Moreover, most of the interviewees also explained about inter-community support being strong in Guadalcanal Islands. Communities can support each other in numerous ways, including sharing food:

... But sometimes, people share their food with others, and other times they exchange food with one another (Pax01, 22/11/21).

... We supplied them with bananas. Some of them were too busy with marketing their produces in town that they didn't get to plant bananas or had already sold their produces at the market, so when the disaster hit us, we had to help them too (Pax05, 26/01/22).

Such support is critical for communities that are prone to hazards and disasters. Table 5 summarises the various local knowledge and practices of the Guadalcanal communities.

Table 5. Summary of the various Guadalcanal community traditional knowledge in the face of climate changes and disaster.

Traditional knowledge & Practices of Guadalcanal communities	Disaster risk management phases			Early warning	CCA knowledge and practice
	Disaster preparedness	Disaster response	Disaster recovery		
Thick clouds				X	
Animal Behaviours (e.g., Frigate bird flying in groups of two or more at low altitudes and crying out loud, it's a sign for strong wind).				X	
Weather observation (e.g., Colourful sun set, fine weather next day).				X	
Natural element observations (e.g., Rising, and dirty river implies risk of flood).				X	
Plants (e.g. If a Rara tree grows thorns it's a sign of Koburu).				X	X

Food for disasters (e.g., Yam pana, taro & banana).	X			X	
Building designs and building materials selected cautiously for strong winds and other hazards.	X	X	X		X
Families may have two gardens (one on the hills, and another near river flat area).	X	X	X		X
Ato or Atogui (use to strengthen the bananas to withstand strong winds during cyclones).	X				X
Shifting gardens from landslide prone areas to save location.	X				X
Herbal medicines.	X	X	X		X
Safe sites to build dwelling houses.	X		X		X
Low dwelling houses built on the ground level.	X		X		X
Raised floor houses.	X				X
Ecosystem-based risk mitigation measures (e.g. Buffers -planting trees to prevent erosion and washed logs from hitting the village).	X		X		X
Inter & Intra community support (e.g. community A provides community B with food during disaster or a household in a community also provides food to another family in need).	X	X	X		X

Table 5 illustrates various forms of local knowledge used by communities in Guadalcanal which is critical for disaster preparedness, response, and recovery. The table also includes knowledge related to early warnings, practices related to disaster risk and climate change adaption

within Guadalcanal communities. The findings of this study reveal that Guadalcanal communities are aware of the various existing disaster and climate risks. Given their acute awareness, they have developed indicators and practices that help them prepare and make critical decisions relating to these risks.

4.2 Impacts of development and modernisation on traditional knowledge in Guadalcanal

The second theme that emerged was the impact of development and modernisation on traditional knowledge. There was a consensus that traditional knowledge-based practices are fading due to several factors. These include the changing nature of traditional knowledge and practices, western science and civilisation, western education, and exposure to new information due to development. One important impact of development and modernisation on traditional knowledge is the role it plays on changing the nature of traditional knowledge. Improvements such as advancements in technology and faster communication systems in communities may affect local knowledge and practices. Several participants acknowledged that traditional practices have changed as communities were exposed to new knowledge brought about by development and modernisation:

Traditional knowledge is changing as we progress towards things, it changes because of technology, it changes because of the communication began to improve, change because of the changes in the communities, so traditional knowledge is also changing (Pax06, 01/02/22).

Practices do not remain the same. What I saw, when we develop, we have better knowledge and better understanding of things, and therefore we do things differently. So, these changes were not caused by DRM practitioners, but when we develop and access information, people become aware of this information. I think that's the reasons for these changes (Pax01, 22/11/21).

For example, Pax05 highlighted the use of mobile phones as a tool to send information on incoming risks to communities when warnings are heard over the radio:

Nowadays, since almost everyone has access to a mobile phone, we can also pass information through it as well. So, in bad times like this, and even if the rain could destroy our gardens, at least we were made aware about it before it took place (Pax05, 26/01/22).

People increasingly tend to rely on mobile phones and other Western science-based technical information for decision making on issues that might affect them. Thus, traditional knowledge found in local communities has changed due to development and adoption of western practices.

Another factor that has contributed to the loss of traditional knowledge in local communities of Guadalcanal is western science and civilisation. Western science tends to focus on research and experimentation and is perceived to be a civilised method of attaining knowledge which has attracted many members of the community. Hence, when local people adopt modern civilisation, they abandon certain traditional knowledge-based practices as captured in this quote:

Another thing is science. When science came, we tend to overlook traditional knowledge and we base everything on science. Some traditional knowledge no longer works for us. So, when civilisation came, it came with six different things; including competition, it comes with commercialising, it comes with different influences. So, when it got here, we tend to believe in it and forget the traditional knowledge that we originally practice (Pax03, 15/12/21).

80 to 90 % of the people live in the communities and depend on the environment for their survival. Where civilisation and modernisation are expanding, it began to undermine the traditional knowledge of the local people that they depend on (Pax01, 22/11/21).

The participants unanimously acknowledged that people tend to leave traditional knowledge and practices as they thought these are more primitive and out of date compared to modern western knowledge which is perceived to be more robust.

Lastly, findings indicate that western education also influenced local knowledge. Individuals that are exposed to western education learn new knowledge, develop new skills, and adopt new ideas. This new knowledge may be valued more than traditional knowledge leading to limited preservation of traditional knowledge in the communities:

Us we can see; civilisation tend to take over. For example, people's education and Western science tend to take away traditional knowledge from the people (Pax03, 15/12/21).

...Because this knowledge gap must have been missed somewhere. I mean when people shift out to other thinking that idea of preserving this kind of knowledge is gone (Pax04, 17/12/21).

Today, in our contemporary society, formal education is directly influencing, changing, and contributing to the loss of traditional knowledge and practices of communities. Western education

seems to be relevant and globally accepted hence, local people tend to value it more than their own traditional knowledge and practices.

4.3 Traditional knowledge in DRM and CCA policies and practices

The third key theme that stood out in this study was the traditional knowledge in DRM and CCA policies and practices developed by government agencies and non-governmental organisations. Traditional knowledge plays a critical role in the livelihoods and decision making skills of Guadalcanal community members, especially regarding decisions that are related to disasters and climate risks. However, participants of this study appear to think that traditional knowledge is not specified or appropriately included in DRM and CCA policies. Traditional knowledge is only considered during project designs, yet it could also be used to create more effective tools that contribute to DRM and CCA activities of the government and non-government organisation.

Interviewees seemed to think that DRM and CCA policies only marginally mention traditional knowledge but do not clearly articulate how it can be integrated for effective DRM and CCA:

I think this is a tricky question, especially in the DRM and CCA sectors. We only have some policies that make mention of the traditional knowledge, but there is no clear articulation. I think it's also the same at the provincial level. What they have is on environment. For a province like Guadalcanal, they have a small office that put together disaster and environment and then a little bit about traditional knowledge. They seemed to value traditional knowledge but its inclusion in their policies and plans is still a gap. I think in my experience, I am not aware of an existing policy that captured it. I think it's a thing that I need to find out (Pax02, 04/12/21).

Most interviewees tend to think there should be a clear policy that provides guidance to the DRM and CCA programmes on how traditional knowledge can be supported in local communities.

Secondly, the comparisons made by participants between the provincial ordinances and the national policies, demonstrate that there is no clear status on how traditional knowledge is observed. Several participants thought that DRM and CCA had no clear policy addressing the communities' traditional knowledge and tend to think that national and provincial authorities need to put in place such policies, as captured in the following quotes:

To my knowledge, integration of traditional knowledge in policies and practices really doesn't exist. Yeah, to my knowledge it's not there, but how I see it, I think it needs to be integrated not only with DRM and CCA but other sectors as well (Pax03, 15/12/21).

I think DRM does not have it...I think we must have it. If the province can develop its own ordinance and putting emphasis on traditional knowledge. Also, reemphasis traditional knowledge somewhere inside those ordinances (Pax04, 17/12/21).

There appears to be strong suggestions for the consideration of local knowledge in DRM and CCA policies in the national and provincial level government structure.

Thirdly, participants thought that policies need to consider and address the different issues that are affecting traditional knowledge in local communities. Several key informants highlighted those policies should be more open to capture the different facet of traditional knowledge. The interviewees indicated that current policies insufficiently deal with local traditional knowledge:

So that we define or formulate policies that are more responsive, otherwise our policies are very high level and are poorly defined and so therefore, we do not quite address the need for traditional knowledge as we wanted to do (Pax06, 01/02/22).

This is an essential point as policies often represent the government's priorities for addressing the needs and issues affecting people in the communities, yet policies must accurately capture the needs of people in local communities. Hence, if policies are too general and not specific enough, they will not be able to address the issues affecting communities, including the issues that are affecting traditional knowledge. Key informants further highlighted another way that external agencies can build upon traditional knowledge, which is by conducting risk assessments and damage and/or loss assessments in the communities. Pax03 stated that DRM and CCA have tools that can be employed during interventions in the communities. Such tools, once employed in the communities, can capture various traditional knowledge and practices in a community:

I think, like I already said, DRM and CCA, they already have tools. These approaches that we already use. For example, participatory tool that we use which they called PR tool, I am kind of forgot the name a little bit, but they called it Participatory tool. Inside those tools, we come up with committees of their own, we come up with certain practices at the community level (Pax03, 15/12/21).

Using participatory tools to capture risks, damages and loss relating to disaster and climate change impacts may provide critical insights of traditional knowledge and its application in the village setting. Participants also stated that conducting a vulnerability assessment can also help develop a disaster plan at the community level. During this process, communities' vulnerabilities and capacities are explored which can also capture the traditional knowledge of local communities:

So, in practices at the community level like I mentioned earlier, everything become clearer in dealing with these sectors, the how part in planning for disaster, how people will response during a disaster. Such planning also includes climate change as well. So once the community went through a vulnerability assessment; vulnerability that born from disaster, it born from climate change, or born from natural you know somethings experiences which the communities have. And then we come up with a plan which they will have to sort of support their preparedness capacity or coping mechanism that give more details on how they perceive risk. So, risks born from disasters, risk born from climate change, risk born from evolving disasters, like for now, we experience COVID-19 (Pax02, 04/12/21).

A similar sentiment was also shared by other interviewees who explained that a community-based disaster management manual was used to organise the communities. Through the process of organising the communities, local knowledge of climate resilient crops can be captured. In addition, this study indicated that communities can also share their knowledge of different indicators for various hazards during project designs such as hazards signs:

Okay, in the CBDM manual, when organising the community. When we conduct those trainings, one of the sections inside mentioned the resilience crops (Pax04, 17/12/21).

It allowed people to share their knowledge of those hazard signs (Pax01, 22/11/21).

Capturing such knowledge is essential for emphasising the value of local knowledge and for broadening the understanding of resilient crops and relevant practices related to DRM and CCA.

4.4 Challenges and opportunities for integrating traditional knowledge in DRM and CCA policies

Challenges and opportunities for integrating traditional knowledge in DRM and CCA policies and practice is another theme that emerged from this study. One important challenge is the limited understanding on what constitutes traditional knowledge as stated in the following quote:

... because we have a very poor understanding of the context of what we really define as a traditional ecological knowledge which really needed for our strategic papers or plans that we come up with, so I think there is a real need to understand it and specify it well. We tend to jump over things at present (Pax06, 01/02/22)

There is no clear definition of traditional knowledge for DRM and CCA. The meaning of traditional knowledge is vague, especially because local knowledge is not the same in every community. The lack of a clear definition or understanding on what constitutes traditional knowledge could explain

why it is excluded from policies. Therefore, it is fundamental to establish an in-depth understanding of traditional knowledge and its application in local communities.

In addition, the participants felt that resourcing is one of the challenges that hinder the incorporation of traditional knowledge in practice. Communities' interventions may sometimes identify priority areas to be addressed, however, their plans are often constrained due to limited available resources, especially financially resources:

I think one of the challenges is around resourcing. So, when I said resourcing it's a lot to do with financing. It relates to finance; it relates to whatever capacity they may have in terms of resources. Yah, so resources capacities, so meaningful resourcing is very important especially if they put in place their plans (Pax02, 04/12/21)

Information sharing is another key challenge for effectively integrating traditional knowledge in practice. Organisations often acquire information on the different kinds of traditional knowledge present in local communities but instead of sharing this information with other agencies involved in DRM and CCA, they keep it to themselves:

That is a challenge, we tend to put those information's within our organisations rather than sharing them (Pax03, 15/12/21),

Capturing and sharing such knowledge with stakeholders involved in DRM and CCA activities is important so that they can include the information they learn into their policies and practices. Despite these challenges, several participants also identified opportunities. Many participants claimed that research is one of the most important opportunities. There seem to be limited information about traditional knowledge within existing policies and other strategic documents. According to participants, one of the ways to capture this is through research:

Yah, one of the opportunities I think is like I said is Research. Research is one of the things that we needed most, and I think it's an opportunity. Because now the challenge is there is lack of ah say climate change policy, climate change bill. Even in the NDS, there is no reflection of the traditional knowledge. I think that will form bases of how we include policy documents or legislation. Yes, so once we got that right then when it comes back to the policy, then it will come back for implementation (Pax03, 15/12/21)

Research is a critical tool that can inform policy makers on the status of local knowledge in local communities. Research may help policy makers and practitioners understand the context of traditional knowledge so that it can be captured and applied within the existing policies.

The people of Guadalcanal have various forms of traditional knowledge. Therefore, in terms of practice, policy makers and practitioners must gain an in-depth understanding of the numerous forms of traditional knowledge to be able to integrate it in practice. According to a participant, there is an opportunity to learn and relearn indigenous knowledge relating to the DRM and CCA, as demonstrated in the following quote:

So, there are opportunities for us to learn or relearn things. And opportunities for people to learn new skills, people make new networks, people understand problems in a different way. So, there is a lot of scope for learning for people including the leaders, in the community, the young people, women, I see a lot of women groups, that form saving clubs. Or they form women's networks. And learn a lot of new skills, because they need to kind of develop new livelihood activities, as a result of impacts they face that constrains their livelihood activities, so they tend to find new opportunities that has come up as a result of increase in the impact of climate change or those things like that, that happened (Pax06, 01/02/22).

There are many ways one can learn about traditional knowledge. For example, since different communities face different issues, one can learn about the different types of traditional knowledge by observing how communities apply numerous forms of traditional knowledge to address different types of needs or challenges across diverse contexts. Finally, participants unanimously emphasised the critical need for policies to explore different types of learning opportunities by looking at previous issues and investigation how to improve them:

I think in my own thinking, policies are like forms of experiments. It should be treated as forms of experiments and by that, I mean it should be flexible to look out for learning, look at new opportunity to learn something and to adjust the policy so that it reflects things that are happening on the ground (Pax06, 01/02/22).

It is very clear that there is always room for improvement in DRM and CCA. To properly address the issues affecting traditional knowledge in local communities, policy development must also provide an opportunity to learn by conducting research, which can result in the overall progression and advancement of DRM and CCA policies and practices.

4.6 Summary of Key Findings

The findings in this study reveal that local people have an in-depth awareness and understanding of the risks posed in their communities. Over many generations, local people have developed mechanisms and strategies based on local and traditional knowledge, including early warning indicators, such as animal behaviours, and local risk management practices, such as

gardening and weather-resistant designs for building. The use of traditional knowledge and practices has permitted local communities to effectively deal with disaster risk and environmental changes for a long period of time.

At the same time, results indicate that traditional knowledge in Guadalcanal province is decreasing. The loss of traditional knowledge can be attributed to the influence of modernisation, formal education, and an increased dependence on western science and technology. As society evolves, the lived experiences of communities also change which leads to modifications of traditional knowledge.

The participants in this study all agreed that the incorporation of traditional knowledge in policies and practices is critical to develop effective DRM and CCA programmes. Yet, they consider that local communities' traditional knowledge is both limited and not clearly included in DRM and CCA policies. Furthermore, these government policies have not clearly articulated how traditional knowledge can be effectively integrated in DRM and CCA. However, in terms of practice, there are DRM and CCA tools that have been developed for the purpose of planning and organising the communities. While these tools include useful traditional knowledge, it is not clear how this knowledge is preserved and maintained.

Finally, there are challenges and opportunities that are associated with integrating traditional knowledge in DRM and CCA policies and practices. One of the challenges identified in this study is that there is limited understanding of what constitutes traditional knowledge and what traditional knowledge actually means for people outside the local communities. The study also observed that due to limited resources and effective planning, it is difficult to include traditional knowledge in practice. However, the study revealed that research could present an opportunity to inform policies relating to DRM and CCA. There is also an opportunity to learn and relearn issues affecting communities. Finally, the findings indicate that policy should be more flexible and provide space for these learning opportunities to facilitate the integration of traditional knowledge in DRM and CCA policies and practices.

CHAPTER 5: DISCUSSION AND CONCLUSION

Introduction

This chapter discusses the findings of this study, which aim to explore the integration of traditional knowledge in Disaster Risk Management (DRM) and Climate Change Adaptation (CCA) policies and practices, using Guadalcanal of the Solomon Islands as a case study. It examines the various types of traditional knowledge used by local people in the face of disasters and climate risks. It also discusses how DRM and CCA policies and practices of government and non-government organisations that operate at the local community can embrace these forms of traditional knowledge. Lastly, this dissertation evaluates the opportunities and challenges for integrating traditional knowledge into policies and practices.

This chapter comprises of the following sections. Section 5.1 discusses the role of traditional knowledge in DRM and CCA at the community level. Section 5.2 discusses the status of traditional knowledge in DRM and CCA policies and practices. Section 5.3 evaluates the difficulties and possibilities for integrating traditional knowledge in policy and practice. Section 5.4 draws conclusion to this study and section 5.5 discusses the limitation that affect the study. Lastly section 5.5 provides recommendations for future study.

5.1 The role of traditional knowledge in disaster risk management and climate change adaptation

The findings of this study indicate that local communities are very much aware of the hazards and risks present in their local communities. Such awareness is acquired through their daily interactions with the environment, via dealing with recurrent hazards and disasters, and orally, by passing stories from the older generation to the younger generation. These finding are aligned with the relevant literature that emphasises the importance of traditional knowledge in the face of climate and disaster risk. Rai and Khawas (2019) comments on how the people of Simeule Island in Indonesia's Aceh province were able to use local knowledge that they acquired from experiences dating back to an earthquake in 1907 to save them from a 10-meter tsunami in 2004. Similarly, indigenous farmers from Nepal used their knowledge of climate conditions acquired from the previous generations and their daily environmental experiences to make appropriate decisions on cropping patterns for cereal and vegetable crops (Baul & McDonald, 2015). In the context of this research's case study, the people of the Guadalcanal communities have strong experiences related to the impacts of natural hazards such as flooding, landslides, and the effects of climate change including pest and disease, changes on weather pattern, and saltwater intrusion in wells and streams. Such experiences have contributed, and continue to contribute, to the development of

coping mechanisms that enable communities to adapt to the hazards and risks associated with climate change, such as flooding, landslide, pests, diseases, and severe weather.

The study's results demonstrate that communities have often developed important indicators and warning signs to inform them of potential hazards and/or climate change impacts that may adversely affect them. These natural indicators and warning signs are numerous and include animal behaviours, plant behaviours and cloud patterns. For instance, a frigate bird flying in a specific direction may mean a bad weather is soon to occur, when certain trees grow flowers and thorns this is indicative of a wet season, and thick clouds and wind moving towards the mountains are signs that heavy rain is coming. . These findings align with the scholarly work done by Dube and Munsaka (2018) on the Zimbabwe Tsholotsho people who used the behaviour of birds, knowledge of cloud patterns and changes in certain plants to predict incoming heavy rain that may trigger flooding. The findings also relate to research conducted by Carlson (2017) in his account of a Japanese farmer who saved the lives of local villagers by burning his rice farm to attract the community in order to warn them of an incoming tsunami and advise them to seek safety on higher grounds. Guadalcanal villages developed such knowledge of indicators and warning signs and often applied them regularly in their day-to-day decision-making. These indicators are part of the local communities' mechanisms for reducing disaster risk and adapting to climate change. The role of such early warning systems is critical for decision making, especially regarding their livelihood activities and practices.

Chapter 4 highlights that local communities have developed various DRM and CCA practices in response to their experiences dealing with hazards and risks. These practices include local knowledge of weather patterns, gardening practices, knowledge of crops and fruit trees, building designs and social networks. These practices are embedded in the communities' everyday activities, such as daily planning and activities relating to livelihood and traditional knowledge systems. Several researchers have emphasised the important role of traditional knowledge for DRM and CCA. Mercer et al. (2007), focusing on Papua New Guinea, stated that indigenous DRM strategies and practices might be grouped into several categories, including land use planning, building methods, food resilience, social resilience, and environmental resilience. Baley-As et al. (2018) argues that traditional knowledge and practices are embedded in indigenous people's culture and traditions and are expressed in their everyday relationship with nature. Such knowledge is important to the Solomon Islands as the communities are made up of subsistence farmers living in isolated and remote villages with limited access to critical services. Since access to resources and advanced forms of technological communication in these remote villages is limited, many rural communities depend on traditional knowledge and practices to save lives.

Gardening practices of the Guadalcanal people tend to be influenced by the environment, the weather, seasonal patterns, and the hazards and risks that are present in the surroundings. The study shows that local communities use their traditional knowledge to specifically select low exposure areas to plant their food gardens to avoid risks of flooding and landslides. In addition to carefully selecting the location site for their gardens, subsistence-based farmers may also have multiple gardens spread out across different locations, such as flat plains and ridges, to reduce the risks of flooding and landslides. Results also revealed that gardens are composed of mixed crops and vegetables that are suitable and relevant to the environment and local climatic conditions. These findings align with Bell's (2016) comment which states that Pacific Island countries are strong subsistence agriculturalists and engage heavily on various crop production. To some extent, these practices are like livelihood diversification strategies as they aim to increase a community's resilience to disasters and severe weather conditions (Scoones, 2011; Ellis, 2000). The results of this study are also aligned with the work conducted by authors like Campbell (2006), Mercer et al. (2007) and Fletcher et al. (2018) which discusses the use of famine food, control of food consumption, maintenance of agricultural resilience through diverse crop cultivation, and the use of resilient crops to maintain sustainable food production. From this position, the researcher concludes that the gardening practices observed in this study play a critical role in DRM and CCA.

The findings of this study indicate the great diversity of traditional knowledge-based mechanisms for DRM and CCA. Guadalcanal communities have acquired strong local knowledge about planning around settlement sites and building designs. Sites for constructing a village may be chosen based on their safety from potential hazards such as floods, strong winds and landslides. Furthermore, buildings are designed to withstand extreme weather events and use materials that can endure the pressure of tropical storms. Similarly traditional houses in Baliau village of Papua New Guinea are built with steep sloping roofs to reduce the threat of the roof collapsing or taking fire due to volcanic ashes. These houses are also built with local materials that are known to withstand strong winds (Kelman, 2012). These building designs are also observed in Fijian bure and vale houses that are built to reduce the effect of floods and storms (Campbell, 2006). These practices were purposely maintained and improved over time to reduce natural disasters and climate risks.

Finally, this study showed that intra- and inter-community support is also an essential practice for Guadalcanal people during challenging times. Participants mentioned that local community members might support each other before, during and after a disaster. Such intra- and inter-community arrangements may take different forms. For example, both communities and individuals with a community may assist vulnerable people to evacuate a high hazard risk location

and save property assets from damage and loss. Moreover, sharing food between families and individuals is a common practice in the evacuation centres. In addition, local villagers may donate food and essential resources to neighbouring communities during a disaster situation. These findings support previous research conducted by Campbell (2006), Mercer et al. (2007), and Fletcher et al. (2018), where they observed that cooperation amongst villages and communities' residents may be established through previous mutual relationships. Such relationships may be built through ceremonial feasting, intermarriages, amongst other ways. These relationships seem to be strong in Guadalcanal communities, and villagers still uphold them nowadays. However, while highly effective in the face of disasters and climate change, there is a risk for traditional knowledge-based practices to disappear and change due to the increased influence of western development and modern practices within the traditional society. Such external influences appear to have changed the traditional knowledge of Guadalcanal communities.

Access to information and adoption of modernised improvements such as advancement of technologies and communication systems all contribute to the erosion of traditional mechanisms and practices. Several participants acknowledged that traditional practices changed as communities become increasingly exposed to new forms of knowledge brought by western development and modernisation. Acceptance and use of the modernise practices empowers western knowledge and discredits local traditional knowledge (Briggs, 2005). In addition, digital technology and innovative products have been designed to prioritise foreign knowledge holders and change the way knowledge is transmitted (MA, 2019). Furthermore, access to internet and communication networks causes people to rely more on mobile phones and other Westernised technical systems for decision making on weather related issues that may affect them.

The study also showed that when local people adopt modern civilisation, they abandon certain traditional knowledge-based practices. Western science, which focuses on research and experimentation, is perceived to be a more 'civilised system of knowledge', which attracts numerous people in Guadalcanal. According to Briggs (2005), western science appears to be an instrument of power and is unlikely to be ceded easily by experts for another knowledge system, including traditional knowledge through which they have no power. People from traditional societies tend to slowly abandon traditional knowledge and practices as they perceive them to be more primitive and 'out-of-date' when compared to modern and contemporary western knowledge and practices.

Finally, it was found that western education also contributes to changes in local knowledge. Through western education, individuals learn new knowledge, develop new skills, and adopt external ideas. This new knowledge may be valued more than traditional knowledge, leading to

limited preservation of traditional knowledge in communities. According to Marrie & AM (2019) formal education has replaced the role of parents and grandparents teaching their children local knowledge and practices relating to DRM and CCA. The current formal education system, which focuses on Western knowledge systems, plays a significant role in changing and influencing a community's traditional knowledge and practices (Agrawal, 1995; Mercer, 2008). Since western knowledge is globally accepted as the leading form of knowledge, local people tend to value it more than their own traditional knowledge and practices.

5.2 The status of traditional knowledge in DRM and CCA policies and practices

Integrating traditional knowledge in DRM and CCA policies and practices is important for the preservation of traditional knowledge of local communities of Guadalcanal and the Solomon Islands. This study recognises that traditional knowledge is vital for the villager's livelihood and decisions relating to disasters and climate risks. Most of these practices may be categorised under community-based disaster risk reduction (CBDRM) as they focus on addressing vulnerabilities and strengthening capacities using traditional knowledge. This is in line with Gaillard and Willison's (2011) goals of CBDRM which focuses on the risk reduction measures that are managed by community members themselves. For instance, villagers of Guadalcanal use their traditional knowledge to predict weather, reduce damages and losses relating to floods, landslides, and climate change impacts. This knowledge is considered to be disaster risk reduction knowledge that communities depend on to save their lives and properties. Despite the usefulness of such traditional knowledge and practices, its usage in the communities is decreasing. Therefore, incorporating traditional knowledge in policies and practices is extremely necessary for reviving and promoting traditional coping strategies and technologies in climate change adaptation (MECDM, 2012) and disaster risk management in local communities.

This study demonstrated that at present, there is no clear articulation of traditional knowledge in the DRM and CCA policies. The participants appear to think that Solomon Islands DRM and CCA policies may mention traditional knowledge but do not detail how agencies should integrate it into practice. However, the CCA policy of the Solomon Islands has acknowledged that traditional knowledge has played an important role in the resilience and coping capacity of communities (Ministry of Environment Climate Change Disaster management and Meteorology, 2012). Indeed, the climate change policy has recognised the importance of traditional knowledge in the local community but its inclusion in the policy is not clear and does not demonstrate effectiveness. It seems that the focus is more on strategies for dealing with climate change impacts and there is limited indication on how traditional knowledge can be considered. These findings agree

with Pelling and Pearson (2015), who comment that the actions in the CCA framework are overwhelmingly top down with very little emphasis on governance mechanisms to place communities in the decision-making seat. The overall goal of these policies is to ensure communities are able to deal with climate change issues that continually pose a threat to them. However, these strategies appear to be top-down and rely predominately on technology rather than traditional knowledge. In the Solomon Islands, where more than 70 percent of the population lives in rural communities and depend on traditional knowledge for decision making regarding livelihood activities, such technocratic strategies may be ineffective. It is important that policies clearly stipulate the strategies for capturing traditional knowledge and how it can be applied in a meaningful way to address climate risks in rural communities.

This study also revealed that the Guadalcanal province does not have a policy that incorporates traditional knowledge into DRM and CCA. The study participants thought DRM and CCA policies had not addressed the communities' traditional knowledge. It is unclear how local knowledge of the communities is considered in the provincial government policies. For instance, in terms of DRM, most of the provinces including Guadalcanal use the national disaster management plan of 2018 (NDC, 2018) and attempt to contextualising it to provincial context. Such plans, despite acknowledging traditional knowledge and its role in the communities, recommend top-down strategies and put strong emphasis on technology with limited guidance for addressing traditional knowledge. Perpetuating the use of policies that ignore the traditional knowledge of communities may increase the vulnerabilities of the communities as villagers tend to heavily depend on their traditional knowledge for their livelihood and survival. Furthermore, provinces including Guadalcanal need policies that incorporate their traditional knowledge in DRM and CCA because most of this knowledge may be acquired freely. Hence, to ensure that traditional and local knowledge is well established and properly recorded, managed, and adopted, provincial policies must be able to recognise it and integrate it in their strategies.

Policies need to actively address the issues affecting traditional knowledge at the local community level. The informants of this study stated that traditional knowledge is eroding and is at risk of becoming weak. According to the Ministry of Environment Climate Change Disaster Management (2012) the reason for this erosion is due to increasing reliance on modern technology and practices – as supported by the results of this study. Hence, DRM and CCA policies and practices should be more open to providing effective strategies that can maintain local knowledge of the communities. Nakashima et al. (2012) further argue that policies and practice should be designed to address these issues as local knowledge and practices contribute to a community's livelihood. According to the UNDRR (2019), traditional knowledge can reduce the risks of disasters and climate

change impacts. This is an essential point as policies often represent the government's priorities for addressing the needs and issues affecting people in the communities. While it is not an easy task, policies must incorporate strategies that specifically aim to maintain the use of traditional knowledge in communities and prevent it from fading away.

The key informants in this study unanimously pointed out that external agencies can build upon traditional knowledge by conducting risk assessments and damage and loss assessments with local communities. Participants further stated that these risk assessment tools can be employed during an intervention in the communities to identify, assess and collect traditional knowledge and practices including hazards, vulnerabilities, and capacities of the communities. These tools, if applied appropriately, may support the amalgamation of traditional knowledge and scientific knowledge in policy and practice (Mercer, 2013). For example, according to Rai and Khawas (2019), combining the local expertise in a scientific hazard mapping exercise and survey would precisely verify the information needed for a clear and detail hazard map. Therefore, incorporating a balanced mix of modern technology and traditional technology in DRM and CCA policy and practice is critical for maintaining and sustaining the traditional knowledge of a community. One approach for achieving this is to use frameworks that integrate scientific knowledge and traditional knowledge and aim to enable indigenous people research ways to approach their vulnerability to hazards whilst increasing collaboration among community members and stakeholders to collaboratively organise and plan disaster risk reduction programmes (Mercer et al, 2010). Such frameworks may enable outside agencies to build upon the available traditional knowledge of people and reduce the risks present to them while also preserving their traditional knowledge.

Finally, participants also stated that a community's traditional knowledge can be identified and incorporated into practice through vulnerability and capacity assessments that are usually conducted during DRM and CCA planning in the communities. Vulnerabilities such as poor design and construction, poverty and inequality, uninsured informal sectors, and environmental factors such as poor environmental management may be identified (UNDRR, 2021). Moreover, people's ability to access resources and assets that could enable them to cope with and recover from disasters may be identified and strengthened. By understanding these vulnerabilities and capacities, context specific and socio-culturally appropriate DRM and CCA strategies may be developed. However, it is noted that there is no 'one way solution' to address the different vulnerabilities present in the communities, and most of the time, the combination of traditional knowledge and scientific knowledge may be required to address such issues. According to Mercer et al. (2010), there needs to be an interdisciplinary and integrated approach to disaster risk reduction where both Western science and indigenous knowledge are utilised in an effective and culturally compatible

manner. For this reason, an in-depth understanding of a community's vulnerabilities and what causes these vulnerabilities is critical to developing capacity building efforts that aim to address such vulnerabilities. Employing both traditional knowledge and western science knowledge to address a community's vulnerabilities may also enhance a community's capacity to adapt and cope with natural disasters.

5.3 Possibilities and difficulties for incorporating traditional knowledge in DRM and CCA policies and practice

Both maintaining traditional knowledge and integrating it in DRM and CCA policy is critical. However, this study also identified that there are challenges and opportunities for integrating traditional knowledge in DRM and CCA policies and practices in the Solomon Islands. This section discusses these challenges and opportunities in a broader context, respectively

One of the key difficulties for integrating traditional knowledge is that there is no clear understanding of what constitutes traditional knowledge. This study indicated that traditional knowledge is continuously changing, and as such, the current traditional knowledge may be different from the traditional knowledge that existed more than 50 years ago. In addition, traditional knowledge for a community may be different from another community which makes its application difficult. Shaw et al. (2008) argue that indigenous knowledge could be challenging to define and identify since, in many cases, it emerges as a way of life rather than a specific set of initiatives, protocols, or defined tools. Similarly, traditional knowledge is embedded in a particular community's culture, traditions, ideology, language, and religion and may not be applied in other contexts (Rai & Khawas, 2019). Hence, while in-depth understanding of traditional knowledge and its contextual application in a respective community is fundamental, it also presents great challenges.

Secondly, participants of this study felt that limited financial resources is one of the challenges that hinders the integration of traditional knowledge into practice. While a community's intervention may identify priorities for disaster and climate risk areas, limited access to financial resources may delay or prevent advancements of the community plans. According to the South Pacific Regional Environment Programme (N.A), small islands will face many challenges, including insufficient resources, equity considerations, prioritisation of adaptation measures and uncertainties over climate change projections and adaptation strategies. This is evident in the Solomon Islands as challenges relating to limited funding seem to affect the efforts of some NGOs and the communities in addressing disaster and climate risks in the villages. For instance, the Solomon Islands are vulnerable to the adverse impacts of climate change and dependent heavily on external aid support for most development plans (Leal et al, 2020). This study indicated that some of the communities'

DRM and CCA priorities were not addressed due to limited funding. Acquiring financial support is critical for executing the community DRM and CCA initiatives as most of the economic activities are based in the city and commercial farming is very limited in the rural villages.

Information sharing is another critical challenge for effectively integrating traditional knowledge into practice. The findings of this study show that organisations often acquire information on the different types of traditional knowledge present in communities but have a tendency to keep this information to themselves rather than sharing it with other agencies involved in DRM and CCA and the public. According to Shaw et al. (2008), formal and informal education systems help share and distribute such knowledge. To bridge the challenge of data sharing, there is a need for establishing a traditional knowledge framework that specifically deals with traditional knowledge and DRM and CCA policies and practices. Capturing and sharing such knowledge is vital for stakeholders to enhance their learning opportunities, especially for those involved in DRM and CCA activities with communities. Effective sharing of information can result in the inclusion of traditional knowledge in practice.

Despite these challenges, several participants also identified opportunities. This study revealed that research of traditional knowledge is essential. There is a particular need to document the local knowledge in the communities and present it appropriately where institutions, policymakers and practitioners may have access to it and use it effectively. Hence, research seems to be one of the means to collect and document local wisdom and skills. According to Shaw et al. (2008), there is a need to catalogue and document Indigenous Knowledge in Disaster Risk Reduction and develop contextual guidelines based on Indigenous knowledge for disaster-prone areas. In addition, research on the effectiveness of CCA efforts is critical if researchers and policy makers are to prioritise best policies aim to accomplish adaptation (Dorevela et al, 2021). In addition, Meyers, and Watson (2008) stated that it is important to document the traditional knowledge in a systemic way such as collecting basic information, verification of strengths and weaknesses, examination of applicability in different context and classification of technology based on certain criteria. Recording such different areas of traditional knowledge is important for the preservation of knowledge as it will help policy makers and planners refer to it in their policy design and planning.

Lastly, there is an opportunity to explore learning from the previous policies that addressed disasters and climate change risks. Traditional knowledge of the local population of Guadalcanal is numerous and requires skills and understanding to be able to relate it to practice. Likewise, several policies have been developed in the past to address these issues. Hence, there is an opportunity to reflect and evaluate the lessons learned from these policies, practices and indigenous knowledge

relating to the DRM and CCA activities. According to Shaw et al. (2006), there is a need to create an environment where policymakers and practitioners of DRM and CCA can reflect on previous approaches, evaluate them, discuss the way forward, and prioritise awareness and education on the issues they identified.

In addition, to adequately address the issues affecting the local community's traditional knowledge, policy development space must also provide an opportunity for advancements through learning. Gaillard and Mercer (2013) propose a road map for integrating knowledge action and stakeholders for disaster risk reduction to provide an opportunity for policy makers, practitioners, and local people to participate in a dialogue. Gaillard and Mercer (2013) argue that DRM should be inclusive and recognise the value in different forms of knowledge in addressing disaster risk. The must also consider that actions at different scales from top down and bottom up are necessary to reduce the risk of disaster in a sustainable manner, and that such approaches require a large array of stakeholders operating and collaborating across different scales. This seem to be absent in the Solomon Islands especially in the design of policies which seem to engage with practitioners, scientists and decision makers operating at the higher level, but do not include local people. Eventually, there is an opportunity to engage local people, including remote communities and villages, to improve the content of DRM and CCA policies.

5.4 Conclusion of the study

The key findings of this study suggest a need to address traditional knowledge of local communities in policies and practice. This study recognises that local communities are aware of disasters and climate change issues affecting them and have developed risk reduction knowledge, skills and practices that may support them for mitigation, adaptation, and the reduction of disaster and climate impacts. Such knowledge includes observation of key indicators in the environment for early warning such as clouds, birds, and plants, building designs and agricultural practices and knowledge of climate resilient crops. Despite the importance of traditional knowledge in local communities, the presented study found that while traditional knowledge is still practiced it is also quickly eroding. Recent modern developments, western science and western education seem to be the key reasons for the fading of traditional knowledge. The disappearance of traditional knowledge is further impacted as more local people accept and adopt western ideologies and perceived them to be superior, or 'civilised', than their own traditional knowledge.

This study also noted that DRM and CCA policies have been developed to address issues affecting local communities of Guadalcanal and the Solomon Islands at large. Despite traditional knowledge being acknowledged in principle and mentioned in the strategies of these policy

documents, there is no clear description of its implementation in practice. The study participants seem to think that these policies are 'high level', focus on accessing external funding, and do not effectively address local needs and traditional knowledge and practices. Local and traditional knowledge must be clearly stated in the policy document strategies to allow government and nongovernment organisations to include them in their planning for community engagement, particularly for DRM and CCA programmes.

Furthermore, this study also indicated that bringing all stakeholders together in a dialogue is important for effective integration of local and traditional knowledge in DRM and CCA. It is obvious that local people may not be included in the policy design and consultations despite their traditional knowledge being mentioned in the policy documents. Often, practitioners seem to think that they may be representing their local communities during policy designs and consultations, but rarely understand the local context they claim to represent given that local and traditional knowledge has evolved significantly while they have been away living in urban centres. Therefore, to ensure that traditional knowledge is well integrated into policy and practice there needs to be a framework that may bring together all the different types of knowledge and practices into policy. Solomon Islands will really need to adopt such framework in the DRM and CCA activities to ensure the knowledge of the local communities is taken into consideration in policy and practice.

Finally, the finding of this study demonstrates that there are difficulties but also opportunities for integrating indigenous knowledge into policies and practices. The difficulties include clear articulation of traditional knowledge in the policy documents, limited funding support and limited information sharing in the traditional knowledge data collected in the communities amongst the DRM and CCA stakeholders. Meanwhile, there are still possibilities to support the integration of local knowledge in DRM and CCA policies. These include an opportunity to research and document the local knowledge in local villages: such research may lead to proper documentation of this local and traditional knowledge for the communities. Furthermore, there is also an opportunity to learn and relearn the knowledge in the communities. Traditional knowledge is usually transferred from the older generation to younger generations. Hence providing a learning environment that can support learning is critical for indigenous knowledge transfer. Finally, this study indicated that some traditional knowledge is still practiced in Guadalcanal, and the different DRM and CCA stakeholders seem to recognise it in practice, but less in policy design.

5.5 Limitations of the study

This study has identified gaps in integrating traditional knowledge in DRM and CCA policies and practices of the Solomon Islands. However, there are several limitations that may affect the

results of this study. Although this study involved six participants, the results could have been strengthened with a larger sample size. A small sample size may mean that there is limited representation of the research topic and the themes associated with the integration of traditional knowledge and DRM and CCA policies and practice. All participants were recruited from government and non-government organisations and individuals working on the projects and programmes in Guadalcanal province including a village disaster committee chairman. Such limited representation may mean that the results may not be generalised across the Solomon Islands at large but limited to Guadalcanal communities. It is nonetheless important to acknowledge that this study was conducted during the COVID-19 pandemic: a COVID-19 outbreak was declared at the beginning of January 2022 in the Solomon Island, causing a lot of potential candidates for this study to remain at home and thus unable to be contacted.

Additional challenges included the festive season when government and non-government officers were preparing for holidays as well as civil unrest in Honiara resulting from a peaceful protest which also affected the recruitment of participants. However, despite these challenges, the researcher followed AUT's recommended academic processes in addressing these limitations, as demonstrated by a rigorous and comprehensive ethical review which explored and considered these weaknesses.

Secondly, this study focused mainly on key informants who are practitioners. Interviewing people from the local communities of Guadalcanal may have strengthened the result of this study. As previously stated, all participants were recruited based on their work with the communities of Guadalcanal, including one village disaster risk committee chairman. Several organisations, including government and non-government organisations operated in the Guadalcanal communities on DRM and CCA projects and programmes. Interviewing only one community member means that local people's perspectives on traditional knowledge is limited. Engaging several local people, including village representatives, in this study may broaden the perspectives of the communities regarding the integration of traditional knowledge in policy and practice. The study was done during the COVID-19 pandemic, and the researcher could not travel to the Solomon Islands to collect data due to travel restriction and limited funding. Further studies would greatly benefit from engaging with all the DRM and CCA practitioners, including community participants who own the traditional knowledge.

5.6 Recommendations of the study

It should be noted that there is currently a unique opportunity for the organisations invested in integrating traditional knowledge in DRM and CCA in Guadalcanal. This opportunity exists as many Guadalcanal communities' inhabitants still have the local knowledge for DRM and CCA in their

communities. This includes an opportunity to assess and revise disaster risk reduction strategies on both a micro and macro level as follow. Firstly, this research was the first to explore the integration of local knowledge into the DRM and CCA policies and practices of the Solomon Islands. However, it is now known that the level of government and non-government organisations' uptake of traditional knowledge in policies and practices remains weak as traditional wisdom of local communities is less prioritised in these policies and practices.

There is a need to ensure that local and traditional knowledge is appropriately included in the relevant policy documents that guide practitioners' actions. The study participants suggested that bringing the owners of this local knowledge to discussion during policy design is essential. It is important that traditional knowledge is clearly incorporated in the strategies of the policy documents so that they can be effectively implemented in practice. Participants overwhelmingly noted that traditional knowledge is essential for daily decision making in local communities of Guadalcanal, especially decisions relating to livelihood activities. This also includes the knowledge of hazards, indicators for these hazards, and practices to mitigate, reduce and adapt to these hazards and risks. Community individuals who own this traditional knowledge and use it daily must be consulted in a systemic manner on how well knowledge can be supported during policy and projects designs.

Secondly, there is a need for further research to be conducted concerning the need for traditional knowledge to be incorporated into policies and practices, especially given the fact that the Guadalcanal province is just one of the many islands of the Solomon Islands. Other islands and communities may have a different view of their local knowledge. This is also a consideration that needs to be made as Guadalcanal is the largest island of the Solomon Islands, and thus other smaller islands' ways of living may be different, and hazards and resources available to their communities may also be different. Demography, remoteness of the communities and features of their locality may shape the villagers' way of living. Hence, further research is needed in the Solomon Islands to provide a platform for the effective integration of local knowledge in policies and practices.

The third recommendation is that knowledge relating to hazards, disasters risk, and climate change needs to be made available to the public. Findings of this study and others have shown how traditional knowledge is not clearly stated in DRM and CCA policies. In addition, traditional knowledge is fading at an alarming rate, yet there is an opportunity to preserve and strengthen it. Traditional knowledge must be integrated into policies and practices, including in the school curriculum so that more students and teachers may share and learn it. For this to be more successful, an integration framework is needed to ensure that local and scientific knowledge can be

integrated in a compatible manner to develop effective DRM and CCA programmes. This study also noted that tools could be used to capture local knowledge. In conclusion, there is a need to ensure that traditional knowledge is captured and shared across society.

Reference list

- Alexander, P. A. (1991). Coming to terms: How researchers in learning and literacy talk about knowledge. *Review of educational research*, 61(3), 30.
- Agrawal, A. (1995). Dismantling the divide between indigenous and scientific knowledge. *Development and change*, 26(3), 413-439.
- Barley-As, M., Marlowe, J., & Gaillard, J. C. (2018). Deconstructing the binary between indigenous and scientific knowledge in disaster risk reduction: Approaches to high impact weather hazards. *International Journal of Disaster Risk Reduction*, 30, 18-24.
<https://doi.org/10.1016/j.ijDRM.2018.03.013>
- Baul, T. K., & McDonald, M. (2015). Integration of indigenous knowledge in addressing climate change.
- Berkes, F. (1993). Traditional ecological knowledge in perspective. *Traditional ecological knowledge: Concepts and cases*, 1.
- Brown S., Mayer E. (1993). *Saving it for a hard time: indigenous food preservation*. Ileia Newsletters. New York
- Brash, C. (2021). *Breadfruit for local food security in the Solomon Islands*. Pacific farmer organisation.
- Burton, I., Diringer, E., & Smith, J. (2006). *Adaptation to climate change: international policy options*. Arlington: Pew Centre on Global Climate Change.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), 77-101.
- Cardona, O. D., Van Aalst, M. K., Birkmann, J., Fordham, M., Mc Gregor, G., Rosa, P., & Thomalla, F. (2012). Determinants of risk: exposure and vulnerability. In *Managing the risks of extreme events and disasters to advance climate change adaptation: special report of the intergovernmental panel on climate change* (pp. 65-108). Cambridge University Press.
- Campbell, J. R. (2006). Traditional disaster reduction in Pacific Island communities, GNS Science Report 2006.38 46 p.
- Carlson, C. M. (2017). *The revival and integration of traditional knowledge and practices for cyclones into government of the Cook Islands Policies and planning*. Auckland University of Technology.
- Le De, L. (2017). *Connecting knowledge and policy for disaster risk reduction including climate change adaptation*. Fullbook.indb, pg, 275
- Dei, G. J. S. (2000). Rethinking the role of indigenous knowledges in the academy. *International Journal of Inclusive Education*, 4(2), 111-132.
- Devissche, T. (2007). *Enhancing resilience of communities in Solomon Islands to adverse effect of*

climate change in agriculture and food security. Weadapt.

Dooley, L. M. (2002). Case study research and theory building. *Advances in developing human resources*, 4(3), 20.

Dorevella, N., Sakiti, H. W., & Tabe, T. (2021). Climate change adaptation programmes on water security in the Pacific: A focus on the Solomon Islands. *Journal of interdisciplinary research*, 5(1). <http://dx.doi.org/10.26021/10637>

Dube, E. & Munsaka, E. (2018). 'The contribution of indigenous knowledge to disaster risk reduction activities in Zimbabwe: A big call to practitioners', Jàmbá: Journal of Disaster Risk Studies 10(1), a493. <https://doi.org/10.4102/jamba.v10i1.49>

Easwaramoorthy, M., & Zarinpoush, F. (2006). Interviewing for research. *Canada volunteerism initiative*, 6, 1-2.

European Centre for the Development of Vocational Training, (2008). *Terminology of European education and training policy: A selection of 100 key terms*. European Centre for the Development of Vocational Training. <https://www.cedefop.europa.eu>

Fazey, I., Kesby, M., Evelyn, A., Latham, I., Wagatora, D., Hagasua, J. E., ... & Christie, M. (2010). A three-tiered approach to participatory vulnerability assessment in the Solomon Islands. *Global Environmental Change*, 20(4), 713-728.

Fletcher, S. M., Thiessen, J., Gero, A., Rumsey, M., Kuruppu, N., & Willetts, J. (2013). Traditional coping strategies and disaster response: Examples from the South Pacific region. *Journal of environmental and public health*, 2013.

Food and Agriculture Organisation (2020). *Solomon Islands national agriculture livelihood survey*. Food and Agriculture organisation of the United Nations.

Gao, Y., Gao, X., & Zhang, X. (2017). The 2 °C Global Temperature Target and the Evolution of the Long-Term Goal of Addressing Climate Change—From the United Nations Framework Convention on Climate Change to the Paris Agreement. *Engineering*, 3(2), 272-278. <https://doi.org/10.1016/j.Eng.2017.01.022>

Gaillard, J. C. (2010). Vulnerability, capacity, and resilience: Perspectives for climate and development policy. *Journal of International Development: The Journal of the Development Studies Association*, 22(2), 218-232

Gaillard, J. C., & Mercer, J. (2013). From knowledge to action: Bridging gaps in disaster risk reduction. *Progress in human geography*, 37(1), 93-114.

Geoscience news and information (2021). *Solomon Islands map and satellite image*. Geology.com

Gupta, A. K., & Singh, A. (2011). Traditional intellect in disaster risk mitigation: Indian outlook-Rajasthanan Bundelkhand Icons. *Indian Journal of traditional Knowledge*, 10 (1), 156-166.

- Hagen, K. (2015). *Analysing resilience: disaster response and recovery in the Solomon Islands*. Open University (United Kingdom).
- Hay, J. E. (2013). *Role of pacific regional organisations in disaster risk management: Questions and answers*.
- Heijmans, A. (2009, February). The social life of community-based disaster risk reduction: origins, politics, and framing. In *World Conference of Humanitarian Studies, Groningen* (pp. 3-8).
- Hewitt, K. (1983). *Interpretations of calamity*. Allen & Unwin Inc.
- Jamshed, S. (2014). Qualitative research method-interviewing and observation. *Journal of basic and clinical pharmacy*, 5(4), 87.
- Johnson, M. (1992). Research on traditional environmental knowledge: its development and its role. In *Lore: capturing traditional environmental knowledge*. IDRC, Ottawa, ON, CA.
- Kaarbo, J., & Beasley, R. K. (1999). A practical guide to the comparative case study method in political psychology. *Political psychology*, 20(2), 369-391.
- Kelman, I. (2018). Lost for words amongst disaster risk science vocabulary? *International Journal of Disaster Risk Science*, 9(3), 281-291.
- Kelman, I., & Gaillard, J. C. (2010). Chapter 2 Embedding climate change adaptation within disaster risk reduction. In *Climate Change Adaptation and Disaster Risk Reduction: Issues and Challenges* (pp. 23-46). [https://doi.org/10.1108/s2040-7262\(2010\)0000004008](https://doi.org/10.1108/s2040-7262(2010)0000004008)
- Kelman, I., Mercer, J., & Gaillard, J. C. (2012) Indigenous knowledge and disaster risk reduction, *Geography*, 97:1, 12-21, DOI: 10.1080/00167487.2012.12094332
- Lavell, A., & Maskrey, A. (2014). The future of disaster risk management, *Environment Hazards*, 13 (4), 267-280, <https://doi.org/10.1080/17477891.2014.935282>
- Leal Filho, W., Ha'apio, M. O., Lütz, J. M., & Li, C. (2020). Climate change adaptation as a development challenge to small Island states: A case study from the Solomon Islands. *Environmental Science & Policy*, 107, 179-187.
- Leitrner, M., Bushman, D., Lowrence, T. C., Coninx, I., & Schmidt, A. (2020). *Bonding CCA and DRM: Recommendation for strengthening institutional collaboration and capacities*, PLACARD project, FCID
- Manakako, P. (2020). *Kavo mucha ritual feasting*. Facebook.com.
- Manyena, B., O'Brien, G., O'Keefe, P., & Rose, J. (2011). Disaster resilience: a bounce back or bounce forward ability. *Local Environment: The International Journal of Justice and Sustainability*, 16(5), 417-424.
- McAdoo, B. G., Fritz, H., Jackson, K. L., Kalligeris, N., Kruger, J., Bonte-Graptin, M., & Tiano, B. (2008). Solomon Islands tsunami, one year later. *Eos, Transactions American Geophysical*

- Union*, 89(18), 169-170.
- Mercer, J., Kelman, I., Suchet-Pearson, S., & Lloyd, K. (2009). Integrating indigenous and scientific knowledge bases for disaster risk reduction in Papua New Guinea. *Geografiska Annaler: Series B, Human Geography*, 91(2), 157-183.
- Mercer, J., Kelman, I., Taranis, L., & Suchet-Pearson, S. (2010). Framework for integrating indigenous and scientific knowledge for disaster risk reduction. *Disasters*, 34(1), 214-239.
- Mercer, N. (2013). The social brain, language, and goal-directed collective thinking: A social conception of cognition and its implications for understanding how we think, teach, and learn. *Educational Psychologist*, 48(3), 148-168.
- Ministry of environment climate change, disaster management and meteorology (2021). Solomon Islands 2021 national determined contribution. Ministry of environment climate change and disaster management and meteorology.
- Mizutori, M., & Sapir, D. G. (2020). *The Human cost of disaster: An overview of the last 20 years 2000 – 2019*, UNDRM and CRED.
- National Disaster Council (2018). *National Disaster Management plan 2018*. National Disaster Management office, Honiara
- Niebel, D., Kopp, G., & Beerfeltz, H. J. (2013). *Disaster risk management for all: The inclusion of children, elderly people, and persons with disabilities*. BMZ
- Noble, I.R., S. Huq, Y.A. Anokhin, J. Carmin, D. Goudou, F.P. Lansigan, B. Osman-Elasha, & A. Villamizar (2014). *Adaptation needs and options. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 833-868.
- O'Keefe, P., Westgate, K., & Wisner, B. (1976). *Taking the naturalness out of natural disasters*. *Nature*, 260, 566-567.
- Otumawu-Apreku, K., Higashida, K., Yamazaki, S., & Kiyama, S. (2021). *Artisanal fisheries in the Solomon Islands: The Wantok paradigm in West Guadalcanal*.
- Pelling, M. (2012). *The vulnerability of cities: natural disasters and social resilience*. Routledge.
- Pearson, L., & Pelling, M. (2015) The UN Sendai Framework for Disaster Risk Reduction 2015–2030: Negotiation Process and Prospects for Science and Practice. *J Extreme Events*, 2(1). <http://www.doi.org.10.1142/S2345737615710013>.
- Penrose, J. (2020). Authenticity, authentication, and experiential authenticity: telling stories in museums. *Social & Cultural Geography*, 21(9), 1245-1267.

- Putnam, J. F. (1964). Folklore: A key to cultural Understanding. *Education Leadership*.
- Rai, P., & Khawas, V. (2019). Traditional knowledge system in disaster risk reduction: Exploration, acknowledgement, and proposition. *Jamba*, 11(1), 484. <https://doi.org/10.4102/jamba.v11i1.484>
- Rankl, F., Johnson, G. A., & Vindrola, C. (2021, Jun). Examining What We Know in Relation to How We Know it: A Team-Based Reflexivity Model for Rapid Qualitative Health Research. *Qual Health Res*, 31(7), 1358-1370. <https://doi.org/10.1177/1049732321998062>
- Rashid, Y., Rashid, A., Warraich, M. A., Sabir, S. S., & Waseem, A. (2019). Case Study Method: A Step-by-Step Guide for Business Researchers. *International Journal of Qualitative Methods*, 18. <https://doi.org/10.1177/1609406919862424>
- Rosser, M., & Richie, H. (2014). *Natural disasters, our world in data*. <http://ourworldindata.org/natural-disasters>
- Shaw, J. V. R. (2008). *Indigenous knowledge for disaster risk reduction: Good Practices and Lessons Learned from experiences in the Asia Pacific region*. United nations international strategy for disaster risk reduction.
- Solomon Islands Government (2014). *Honiara and Guadalcanal flash flood humanitarian action plan*. Ministry of environment climate change disaster risk management and meteorological services. Honiara
- South Pacific Community (2016). *Framework for resilience development in the pacific: An integrated approach to address climate change and disaster risk management*. The pacific community geoscience division, Suva.
- Thomas, D. R. (2003). A general inductive approach for qualitative data analysis.
- The World Bank (2013). *Acting on climate change and disaster risk in the pacific*, The world Bank.
- Trustrum, N. A., Whitehouse, I. E., and Blaschke, P. M. (1989). Flood and landslide hazard, northern Guadalcanal, Solomon Islands. *Division of Land and Soil Sciences, Department of Scientific and Industrial Research, Palmerston North, New Zealand*.
- Tutua, S. (2021). *Breadfruit for local food security in the Solomon Islands*. Pacific farmer organisation.
- UNDRMR (2021) *Glossary of terms*, United Nations Disaster Risk Reduction. <https://www.unDRM.org/terminology/disaster-risk-management>
- UNDRM (2021). Understanding disaster risk: Capacities. Prevention web. <https://www.preventionweb.net>
- UNDRMR (2021) *Glossary of terms*, United Nations Disaster Risk Reduction. <https://www.unDRM.org/terminology/disaster-risk-management>
- UNISDR (2017). United Nations plan of action on disaster risk reduction for resilience: Towards

- informed and integrated approach to sustainable development. UNISDR, Geneva.
- UNESCO Institute of Statistics (2021) Glossary, UNESCO, <http://uis.unesco.org/en/glossary-term/traditional-knowledge>
- UNESCO (2015). *Rethinking education: Towards global common good?* United Nations Educational, Scientific and Cultural Organization. <https://unesdoc.unesco.org>
- United nations climate change (2021). *What is climate change adaptation?* UN Climate change. <https://unfccc.int/>
- United Nations office for the coordination of humanitarian Affairs (2013). *The pacific experience in developing policy and legislation on disaster risk reduction and climate change adaptation.* UN office for disaster risk reduction.
- Wagner, W. (2007). Vernacular science knowledge: Its role in everyday life communication. *Public Understanding of Science*, 16(1), 7-22.
- Wahlistrom, M. (2015). Sendai framework for disaster risk reduction 2015-2030. United nations general assembly, United nations.
- Watts, M. J., and Bohle, H. G. (1993). The space of vulnerability: the causal structure of hunger and famine. *Progress in human geography*, 17(1), 43-67.
- Webber, R. H. (1978). Guadalcanal earthquake. *Tropical doctor*, 8(3), 160-162.
- Wisner, B., Gaillard, J. C., & Kelman, I. (2011). Theories and stories seeking to understand hazards, vulnerability, and risk.
- Wisner B., Blaikies, P., Cannon, T., & Davis, I. (2014). *At risk: Natural hazards, people's vulnerability, and disasters.* Routledge
- Yates, L & Anderson-Berry, L. A. (2004). The Societal and Environmental Impacts of Cyclone Zoë and the Effectiveness of the Tropical Cyclone Warning Systems in Tikopia and Anuta Solomon Islands December 26–29, 2002. *The Australian Journal of Emergency Management*, 19(1).

APPENDICES

This section comprise the different documents used to ensure that this research was conducted according and include Appendix A, B, C, and D.

APPENDIX A : ETHICS APPROVAL

9 September 2021

Loic Le De

Faculty of Health and Environmental Sciences

Dear Loic

Re Ethics Application: **21/304 Exploring the integration of traditional knowledge into Disaster risk management and climate change adaptation policies and practice in Guadalcanal of Solomon Islands as a case study**

Thank you for providing evidence as requested, which satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTEC).

Your ethics application has been approved for three years until 9 September 2024.

Non-Standard Conditions of Approval

1. Include in the Information Sheet under the Privacy Section the following statement. Limited confidentiality only can be offered given that there is a possibility that participants will be identified due to a small number involved.
2. Include the exclusion criteria 'if you have a close personal relationship with me, you will not be eligible to participate.

Non-standard conditions must be completed before commencing your study. Non-standard conditions do not need to be submitted to or reviewed by AUTEC before commencing your study.

Standard Conditions of Approval

1. The research is to be undertaken in accordance with the Auckland University of Technology Code of Conduct for Research and as approved by AUTEC in this application.
2. A progress report is due annually on the anniversary of the approval date, using the EA2 form.
3. A final report is due at the expiration of the approval period, or, upon completion of project, using the EA3 form.
4. Any amendments to the project must be approved by AUTEC prior to being implemented. Amendments can be requested using the EA2 form.
5. Any serious or unexpected adverse events must be reported to AUTEC Secretariat as a matter of priority.

6. Any unforeseen events that might affect continued ethical acceptability of the project should also be reported to the AUTEK Secretariat as a matter of priority.
7. It is your responsibility to ensure that the spelling and grammar of documents being provided to participants or external organisations is of a high standard and that all the dates on the documents are updated.
8. AUTEK grants ethical approval only. You are responsible for obtaining management approval for access for your research from any institution or organisation at which your research is being conducted and you need to meet all ethical, legal, public health, and locality obligations or requirements for the jurisdictions in which the research is being undertaken.

Please quote the application number and title on all future correspondence related to this project.

For any enquiries please contact ethics@aut.ac.nz. The forms mentioned above are available online through <http://www.aut.ac.nz/research/researchethics>

(This is a computer-generated letter for which no signature is required)

The AUTEK Secretariat

Auckland University of Technology Ethics Committee

Cc: vdw7832@autuni.ac.nz

APENDIX B: PARTICIPANTS INFORMATION SHEET

Date Information Sheet Produced:

2nd August 2021

Project Title

Exploring the integration of traditional knowledge in disaster risk management (DRM) and climate change adaptation (CCA) into policies and practices: Guadalcanal of the Solomon Islands as a case study.

An Invitation

Hello,

I am Jerry Wells Hagaria. I previously worked for the National Disaster Management Office as a Senior Operations Officer but currently studying at the Auckland University of Technology in New Zealand. I am now inviting you to participate in my research dissertation as part of the Masters of disaster risk management and development degree. This will be an interesting study as we will reflect on integration of traditional knowledge into DRM and CCA practices and policy in the Solomon Islands. There is no risk involved in participating in this study; however, your participation is voluntary.

What is the purpose of this research?

This study aims to uncover how traditional DRM and CCA knowledge were integrated into DRM and CCA practices and policies in the Solomon Islands, especially Guadalcanal. Over the years, Guadalcanal has experienced numerous disaster interventions from the government and non-government organisations in the Solomon Islands, thus understanding how such traditional knowledge uptake in policies and practices in such intervention may help the DRM policies and practitioners to address the falling local knowledge in their dealings with the local communities. This study is part of the Masters of Disaster risk Management and development degree that I am currently undertaking; therefore, the findings of this research may be used for academic publications and presentations.

How was I identified, and why am I being invited to participate in this research?

You were invited to participate because you have experience working with agencies dealing with DRM and CCA activities and programmes in the Solomon Islands. In addition, you may be previously or currently involved in projects of such nature in Guadalcanal province. Your experience in managing DRM or CCA project in the Solomon Islands makes you a potential candidate for this study. Hence, it is anticipated that you have an excellent experience in DRM and CCA in the Solomon Islands. Thus, sharing your experiences and knowledge through this study may help us understand how traditional knowledge is considered in our DRM and CCA policies and practices. Lastly, if you have a close personal relationship with me, you will not be eligible to participate.

How do I agree to participate in this research?

Your participation in this research is voluntary (it is your choice), and whether you choose to participate will neither advantage nor disadvantage you. You can withdraw from the study at any time. If you decide to withdraw from the study, you will be offered the choice between having any identifiable data belonging to you removed or allowing it to continue to be used. However, once the findings have been produced, removal of your data may not be possible.

Moreover, for you to participate in this study, it is important that you fill out and sign the consent form I sent you. Once completed signing it, you can either scan or take a picture of it and send it to me via the email jhagaria2011@gmail.com. I will then be in touch later to set up the interview time.

What will happen in this research?

This project will involve an interview with a researcher about the topic stated above. So that means you will engage in an unstructured interview with the researcher for at least 1 hour. I will ask you few questions, and you will need to respond to them as per what you experienced on the field and your knowledge of the communities you work with. Depending on your choices, it will be done through either a phone call or the use of the internet, such as skypes, messenger, or zoom. This is because of the covid-19 pandemic travel restrictions that do not allow me to be present on the site to conduct this small study.

What are the discomforts and risks?

There is no discomfort in answering the questions; however, discomfort may occur when you provide information that might undermine the identity of the organisation you work. However, the questions do not seek to undermine the identity of an organisation or any person but focus on understanding the traditional knowledge that is present and how they are uptake into our practices and policies.

What are the benefits?

This study will enable me to acquire a masters in disaster risk management and development at the Auckland University of Technology. However, as a participant, it will also allow you to evaluate your engagement with the communities of Guadalcanal and how you take up traditional knowledge in your practices. Understand traditional knowledge uptake in policies and practices is vital for disaster resilience in the communities. Overall, this study seeks to uncover new knowledge in the disaster risk management space and climate change adaptation and how policies and practices integrated traditional knowledge.

How will my privacy be protected?

Limited confidentiality only can be offered given that there is a possibility that participants will be identified due to a small number involved. However, personal information such as your name, position and organisation will not be disclosed or indicated in the findings and reports of this study. Data collected will be kept safely under the guidelines and regulations of AUT and will be destroyed after 6 years. During this 6 years period, the research supervisors and the researcher may access the data for the purpose of further understanding the topic, and neither your organisation, you nor your identity will be disclosed to any third party.

What are the costs of participating in this research?

Your participation in this programme is voluntary and, therefore, no costs are associated with it; however, the interview is expected to take up at least one hour of your time.

What opportunity do I have to consider this invitation?

You are given a period of one month to consider participating in this study.

Will I receive feedback on the results of this research?

You will be able to access a summary of the finding of this study. Once the researcher has completed the data collection and analysed the data, a summary of the results will be sent to each participant through their email addresses.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Dr Loic Le De, on email; loic.le.de@aut.ac.nz, and on the phone; +64 09921999 ext. 7499

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTECH, ethics@aut.ac.nz, (+649) 921 9999 ext. 6038.

Whom do I contact for further information about this research?

Please keep this Information Sheet and a copy of the Consent Form for your future reference. You are also able to contact the research team as follows:

Researcher Contact Details:

The researcher contacts are:

Email; jhagaria2011@gmail.com or vdw7823@autuni.au.ac

Project Supervisor Contact Details:

The researcher supervisor contacts are:

Email; loic.le.de@aut.ac.nz, phone; +64 09921999 ext. 7499

Approved by the Auckland University of Technology Ethics Committee on *type the date final ethics approval was granted*, AUTEK Reference number *type the reference number*.

APPENDIX C: CONSENT FORM FOR INTERVIEWS

Project title: Exploring the integration of traditional knowledge in disaster risk management (DRM) and climate change adaptation (CCA) policies and practices: Guadalcanal of the Solomon Islands as a case study.

Project Supervisor: Loic Le De

Researcher: Jerry Wells Hagaria

I have read and understood the information provided about this research project in the Information Sheet dated 02/08/2021

I have had an opportunity to ask questions and to have them answered.

I understand that notes will be taken during the interviews and that they will also be audio-taped and transcribed, or video recorded, for the purpose of transcription only and will be deleted once the transcription is completed.

I understand that taking part in this study is voluntary (my choice) and that I may withdraw from the study at any time without being disadvantaged in any way.

I understand that if I withdraw from the study then I will be offered the choice between having any data that is identifiable as belonging to me removed or allowing it to continue to be used. However, once the findings have been produced, removal of my data may not be possible.

I understand that the data collected will be kept in a secure location at AUT for a period of 6 years before it can be destroyed. During this storage period, the researcher or the research supervisors may access the data for the purpose of further understanding the topic only. No details such as my name, job, or my organisation will be disclosed to a third party.

I agree to take part in this research.

I wish to receive a summary of the research findings (please tick one): Yes ☐ No ☐

Participants signature:

Participants Name:

Participants Contact Details (if appropriates):

.....

.....

.....

.....

Date:

Approved by the Auckland University of Technology Ethics Committee on type the date on which the final approval was granted AUTECH Reference number type the AUTECH reference number

Note: The Participant should retain a copy of this form.

APPENDIX D: SOLOMON ISLANDS RESEARCH PERMIT



Solomon Islands Government
Ministry of Education and Human Resources Development
 P O Box G 28
 Honiara, Solomon Islands

Ph: (677) 24664
 Fax: (677) 22042

Our Ref: 21 /21

Date: 14th October 2021

In Accordance to the Research Act 1982 (No. 9 of 1982) RESEARCH PERMIT:

Permission is hereby given to:

1. Name (s) : Jerry Wells Hagaria
2. Country (ies): Solomon Islands
3. Research subject areas: The research is focused on exploring the integration of traditional knowledge in disaster risk management (DRM) and climate change adaptation (CCA) policies and practices in the Solomon Islands, Guadalcanal as a case study. This research seeks to uncover the various traditional mechanisms necessary for DRM and CCA in the S.I and if these knowledges are considered in DRM and CCA policies and practices. The finding of this study is critical for government and non-government organisations working in the field of DRM and CCA in the Solomon Islands.
4. Ward (s): Guadalcanal
5. Province: Guadalcanal
6. Conditions:
 - a. To undertake research only in subject areas specified in 3 above.
 - b. To undertake research only in the ward (s) and Province (s) specified in 4 and 5 above.
 - c. To observe with respect at all times local customs and the way of life of people in the area in which the research is carried out.
 - d. Not to take part at any time in any political or missionary activities or local disputes.
 - e. To leave four (4) copies of your final research report in English with the Solomon islands Government Ministry responsible for research at your own expense.
 - f. A research fee of **SBD 500.00** must be paid in full or the Research Permit will be cancelled. (See sec. 3 subject 7 of the Research Act).
 - g. This permit is valid until 31st January 2022 provided all conditions are adhered to.
 - h. No live species of plants and animals to be taken out of the country without approval from relevant authorities.
 - i. A failure to observe the above conditions will result in automatic cancellation of this permit and the forfeit of your deposit.

Signed:

Minister of Education and Human Resources Development



Date: 21/10/21

APPENDIX E: NATIONAL DISASTER MANAGEMENT OFFICE SUPPORT LETTER



To: The Chairman
Research Committee
Ministry of EDUCATION AND Human resources
Solomon Islands

From: Director National Disaster Management Office
Ministry of Environment, Climate Change, Disaster Management and Meteorology
Date 16/09/21

Subject: Jerry Hagaria's Research Permit

I am writing in support for the application of research permit for Mr. Jerry Hagaria.

Jerry is one of the senior staffs at the National Disaster Management Office which he currently on study at the Auckland University of Technology in New Zealand.

He is now reaching a point that he needs to conduct his research here in the Solomon Islands as part of his Masters studies in **Disaster Risk Management and Development**. His research will be focused on **Exploring the integration of traditional knowledge into Disaster risk management and climate change adaptation policies and practice in Guadalcanal of Solomon Islands as a case study.**

This area of study is critically important to gauge how best traditional knowledge practices has been integrated into Climate change adaptation and Disaster Management policies. The DRR and CCA sectors significantly need somebody with technical knowledge in this area in order to have a very good balance of traditional knowledge and scientific information to be aligned in the respective policies.

On this note I would like to sincerely ask for your assistance in supporting him through your academic processes to achieve his goals.

Thank you for your kind consideration and assistance



Director, National Disaster Management Office
P.O. Box 21, Honiara, Solomon Islands
Phone: