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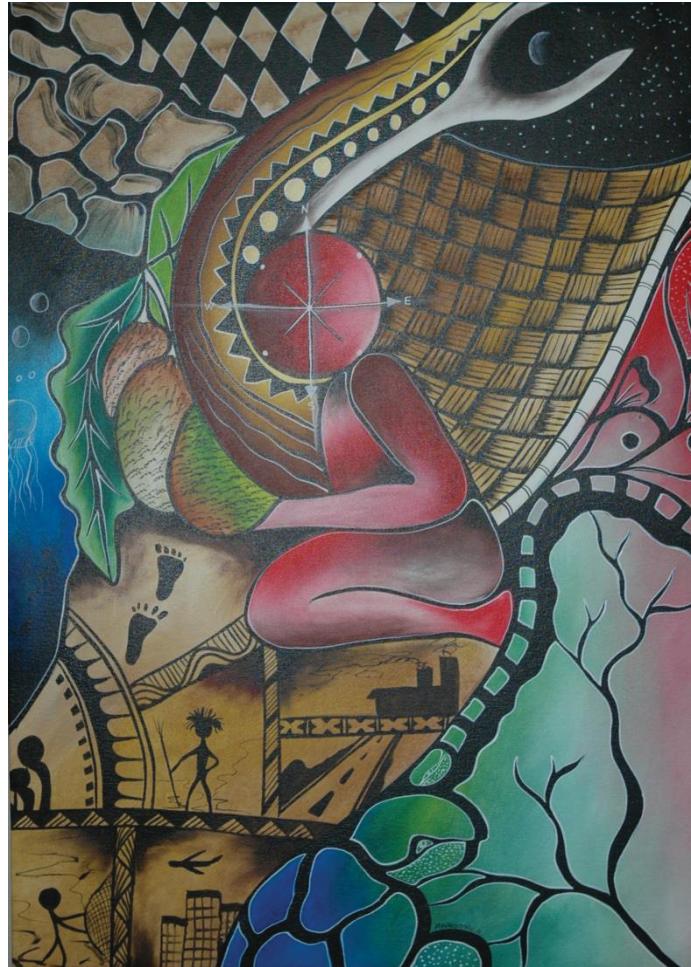
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NASINU VILLAGE

OVALAU

**NA BU: AN EXPLANATORY STUDY OF INDIGENIOUS  
KNOWLEDGE OF CLIMATE CHANGE EDUCATION IN  
OVALAU, FIJI**

Rosiana Kushila Lagi



A thesis submitted in fulfilment of the requirements for the degree of  
Doctor of Philosophy

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School of Education  
Faculty of Arts, Law and Education  
The University of the South Pacific

August, 2015

**Declaration by the Candidate**

I hereby declare that this thesis is my own work and effort and that it has not been submitted anywhere for any award. Where other sources of information have been used, they have been acknowledged.

Name: Rosiana Kushila Lagi

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

**Declaration by the Supervisor**

In my capacity as supervisor of the candidate's thesis, I certify that the above statements are true to the best of my knowledge.

Name: Professor Konai HeluThaman

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## Abstract

In mainstream Western Sciences, Climate Change (CC) is defined as the long-term alteration of global weather patterns, such as temperature increase/decrease, changes in winds are a subcategory of alteration of global weather patterns. Indigenous Fijians' understanding of CC, however, is linked to their perception of climate or weather. Consequently, they view CC as an increase in temperature and rainfall that alter planting, harvesting, and fruiting seasons. They believe it contributes to the migration of fish, consequently affecting fisheries, on which the villages depend on as a food source and for financial income.

Indigenous Fijians have gained their knowledge about CC mainly from their observations and experiences of their environment over thousands of years. This Traditional Ecological Knowledge (TEK) has enabled Indigenous Fijians to forecast adverse weather. Nowadays TEK is a marginalized knowledge system and Indigenous Fijians are losing this knowledge due to a number of factors including education, modernisation and globalization.

The aim of this research was to collect and document indigenous Fijian's knowledge and perceptions of CC, particularly TEK, and the knowledge transfer processes between generations. This study assumes that the indigenous Fijian knowledge of CC is useful for and relevant to modern day living in Fiji. As such, TEK needs to be considered when teaching about CC in formal educational institutions.

Using a mixed-method approach, drawn from Qualitative, Interpretive, Phenomenological and Indigenist Research Methodologies, this study explores the perceptions, knowledge and wisdom of indigenous Fijian elders, parents and children focusing on three villages on the island of Ovalau, Fiji. A mixture of *Bula Vakavanua* (Ethnography), *Talanoa* (narrative) and (*Vakadidigo*) (Observations) were used to gather data which was eventually *Talimagimagi* (woven together) with the knowledge and wisdom of the *Vanua* (the land, the sea, the sky, the people, all living things, the spirits, in a specific place and how they are related to each and responsible for each other. It also includes the knowledge, skills, culture, tradition and practices of the people) into the findings of this study.

Initially, a desktop research was undertaken to gather information about the type of CC knowledge taught in Fiji schools. In addition, an analysis of CC policies which had been implemented in the country was undertaken.

The first finding of this thesis is that the environment indigenous Fijians live in is the main source for their knowledge about TEK and CC. This is due to their close relationship with land, sea and sky. The elders were and continue to be aware of changes in the agricultural sector which strongly impact the daily lives of many indigenous Fijians. An example of this is the decreasing harvest of Pandanus plants, which are used by many women to weave mats and other items which are used during traditional events or sold for an additional income. Furthermore, changes in sea temperatures have negatively affected the number of fish and shell fish as a food source as well as for sale.

The second finding of this research is that while elders were knowledgeable about changes in the climate, younger members of the communities surveyed did not possess the same amount of TEK. Furthermore, it became apparent that such traditional knowledge nowadays is not being transmitted to the younger generations as effectively as in the past. Since the Pacific Region is seen as highly vulnerable to CC it is vital to be aware of and prepared to the consequences of it.

Therefore the study recommends that further research must be encouraged in other parts of Fiji and the Pacific Region in order to provide a data bank for curriculum personnel and educational policy officials to draw from. Students can then benefit from the knowledge of their ancestors and elders in relation to environmental knowledge in general and climate change in particular.

## Acknowledgements

In a way this study is my attempt to recall, restore and reclaim my own traditional knowledge of my *Vanua*, much of which I had considered irrelevant for modern educational pursuits. I am therefore indebted to my paternal grandparents and parents for planting my *vicovico* (umbilical cord) under a coconut tree thus ensuring my connectedness to the *Vanua*, my source of knowledge, wisdom and means of survival. Throughout my educational journey I have always been troubled by the apparent tension between traditional Fijian knowledge and knowledge from our education system which is under a strong western influence. Growing up in my grandfather's *Koro ni Vasu* (where my grandfather's mother is from) enabled me to learn about my tribes indigenous knowledge, but I used to wonder about its usefulness, especially because it was never mentioned in any of the schools I attended.

A special thanks goes to my paternal grandparents Semi Qio and Nanise Ucudra for their gift of story-telling and their frequent reminders about the importance of traditional knowledge. I also wish to acknowledge my maternal grandparents, Ananaiasa Solevu and Akanisi Dau, for the knowledge they passed on to my mother and later to me. I humbly acknowledge receiving such knowledge from her, the knowledge that helped my mother to adapt to living in a different *Vanua* as well as encouraged her to pass it on to her children. A large part of this knowledge and wisdom has shaped the person that I am today.

My mother, Roko Susana Mokoiwaqa, deserves a special thank you: Despite completing only two years of school she became a *yalewavuku* (mid-wife) and a wise woman with many gifts which have helped and benefitted many people, including her children. Similarly, I wish to thank my late father Semi Lagi, a humble man who taught me the importance of silence as a state behaviour as well as a tool for obtaining important information. *Malo a vakadrakai!* (Thank you for all your support!)

I also would like to acknowledge the guidance of my supervisor, Professor Konai Helu Thaman, whose own traditional knowledge as well as western-derived knowledge and experience of teaching and learning provided me with motivation and inspiration to begin this journey and to complete it. *Malo 'aupito!* (Thank you very much!)

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This study would not have been made possible without the participants in Ovalau.

*Na vakavinavina na ceceka vua na Turaga na TuiWailevu kei na vanua o Lovoni, vua na Turaga na Roko Matairua keina na vanua o Rukuruku, vua na Turaga na Roko Takala kei na vanua o Nasinu. Ke sega na nomudou veiciqomi, veisusugi keina veivakayalomatuataki ke sega ni mai rawa vakavinaka na vuli oqo. Vinaka saka vakalevu na loloma!*

To the *Vanua Lovoni*, *Rukuruku* and *Nasinu*, I convey my gratitude and sincere appreciation for accepting my request and in nurturing and sharing their wisdom and knowledge with me so that I can share it with *na kawa kei Viti* (the descendants of Fiji) for the survival of all Fijians.

I offer a special acknowledgement to my colleague and friend, mentor and co-supervisor, Dr. Cresantia Frances Koya-Vakauta, whose experience, knowledge, support, words of wisdom and an eye for detail have inspired me throughout this study. I thank her for the endless support. Whether it was work, study or family – she was always there.

Also a special thank you to my older sister Neomai Bale Keresoni and her husband Wilisoni Langi Buadromo for all their support during my educational journey. Since my childhood they have shared with me what little they had, often playing the role of parents in protecting and nurturing me. *Mo drau kalougata tiko ena nomudrau qaravi tavi!* May your family be blessed!

A hearty *Vinaka Vakalevu* to my baby sister Marily Audrey Daphney Lagi, for holding the fort at home providing Nana, Ratu and Zechariah support during all my years of absence from home for studies and/or work. To my daughter Lusiana Adi Tamana Bukadrou Muamua, your *absence* from our home is a motivating factor in my studies and the struggle to achieve and be a better mother. And to my son Zecharaiah Lagi, whose constant outbursts of the new *Matuavosa Vaka Viti* (archaic Standard Indigenous Fijian words) which he has picked up from his cousins, uncles and elders constantly reminded me of the importance of maintaining our vernacular languages and ensuring that our young people learn it. I am also reminded of the important link between language and traditional knowledge and have been encouraged to work harder towards speaking and thinking in my vernacular language as well as teaching it to the younger generations.

A special thank you also is due to my friend Gade Maitokana her continuous support throughout my studies, and for always being there, whether it was a last minute call after missing baggage at the airport during a conference trip, or some quick editing of a paper – she always there for me. *Vina'ava'alevu!* (Thank you very much!)

Finally, to all my teachers, family members and other friends whose names I have not mentioned but who in their own different ways have inspired me throughout my educational journey – many thanks for your teachings and support. To you all I say *Vinaka vakalevu* (thank you) and may all the honour and glory be given to God for all of our lives, the successful completion of my studies and particularly the continuing survival of the *kawa iTaukei* (indigenous Fijian descendants)!

## Personal Statement

*To everything there is a season, and a time to every purpose under the heavens*

Ecclesiastes 3:1 KJV

I was born to Roko Susana Mokoiwaqa from the *Yavusa Nasau*, *Mataqali Nakoroicake*, *Tokatoka Sereu*; and Semi Lagi also from the *Yavusa Nasau*, *Mataqali Navucunimasi* and *Tokatoka Naocavonu* from Naro, Moala, Lau. I descend from a strong lineage of generations of *Tui Nasau* whose traditional role as *Sau Turaga* (Chief Executive) is to be the keeper and bestower of the *Sau ni vanua o Moala* (blessings and power of the vanua Moala) to the Tui Moala and be the Chief Executive of the Tui Moala. The role entails advising and enforcing decisions made by the Tui Moala and providing support and protection to the Tui Moala and the *Vanua Moala*.

Descending from a long strong lineage of *Tui Nasau* holding such a high and prestigious position is not a coincidence. I believe that I have been born and placed in this position for a reason, which is to support and protect the *vanua o Viti* with the *sau* (blessings of knowledge and wisdom) bestowed upon me by my parents, my ancestors and the chiefs of Ovalau.

Both my paternal and maternal grandparents have strong links to Lovoni the *Korosau* (capital village) of Ovalau. The title of *Tui Nasau* which my grandfather holds stems from the title *Tui Nasaumatua* Chief of Nasaumatua the chiefly village in Lovoni. My being raised in Nasinu, one of the villages of the descendants of the people of Lovoni again is not a coincidence. As stated earlier I am of the view that I was destined to be raised there in order to acquire the *sau* (power of the wisdom and knowledge) of the *vanua o Ovalau* and to pass it on to the future generations of Fiji.

My ancestors, grandparents, parents and family have not failed in their task of handing down *Vanua* wisdom, knowledge and *sau* (power and blessings) to me so that I may use them effectively and also pass them on to the younger and future generations of Fiji. I hold my inheritance of this knowledge, wisdom and *sau* dearly and share it freely in this study hoping that readers might have the same feeling I had when acquiring it and may share as well as implement it effectively for a sustainable future of my country..

My personal interest in CC stems from my participation at a climate change conference organized by the University of the South Pacific's (USP) Faculty of Arts, Law and Education (FALE) in Suva in 2010. After the event, I then began to consider the relationship between TEK and CC from an Indigenous Fijian perspective. At that event, I was asked to contribute to the Keynote Speaker's concluding remark and that made me think more seriously about the state of Indigenous Fijian TEK especially about how it might be revived and incorporated into the school curriculum.

The fieldwork for this study was conducted on Ovalau in a fishing village called Nasinu. It consists of two *itokatoka* (extended families), and most males are fishermen. When a local, especially a younger family member, visits their family in the village, it is a tradition for the older family members to *takitaki* (take food and visit) the visiting family member. For instance, when I visited my family in Nasinu, as the daughter of the eldest of the male cousins in Nasinu, the younger family members have their traditional responsibility to *takitaki* (serve food) to show their respect and that I am their *gone ni toko* (favorite child).

All my male cousins would bring me fish in exchange for monetary gifts. Although I am not obliged to do this, I do it to acknowledge their *veidokai* (respect), *veivakaliuci* (putting others first) and *veikauwaitaki* (caring). As a traditional *kaivanua* (inhabitant of the land), fish is my traditional food. In addition, *kaivanua* (inhabitants of the land) are the real owners of the land hence they know a lot about it including their *iqoliqoli* (fishing areas). Different fish are caught at different times of the year so no matter what time I visit; my cousins would bring me fish that they had caught.

During one of my visits in 2010 (after the climate change conference mentioned earlier), one of my male cousins came to visit me and brought a bundle of fish. When handing over the fish he was apologizing that it was not enough and further explaining the reason for the small number of fish: '*sa batabata na waitui*' (the sea temperature was cooling); and, '*ra sa vuku na ika, sa ra digitaka na baca era kania*' (the fish were smart and they choose which bait to eat). I asked him why this was happening and he told me '*baleta ga na veiveisau ni draki*' (because of the changing climatic conditions). I asked him what he was doing to ensure he caught enough fish.

He replied, ‘au dau vakaraica na matanicagi me’u rawa ni kila na vanua e kana vakalevu kina na ika’ (I just watch the direction of the wind to know where I can catch the most fish) (Mr U Cika, 2010: pers. comm). I was fascinated by his explanation and wondered if the younger males in our village were aware of this. This encounter further encouraged me to explore indigenous people’s perceptions and knowledge of climate change and the adaptive measures they are implementing to ensure their communities’ survival and sustainability.

There were several reasons why I selected this topic for my study: First, as an Indigenous Fijian I am interested to know how TEK might contribute to the sustainability debate, especially sustainable livelihoods and development; second, there is an apparent decrease of Indigenous Fijian TEK and I would like to contribute to its revival. This could be achieved through collecting and documenting available local knowledge and use it as an input for the formal curriculum of schools. Finally, I believe that researching Indigenous Fijians’ Knowledge is an important venture in itself.

## **Dedication**

To the memory of my late father

Semi Lagi

*For Lusiana and Zechariah:*

*Always remember the Vanua where your vicovico, umbilical cord is buried; for it is there that your roles and responsibilities lie. To receive the sau blessings and wisdom of your ancestors for your survival and for the sautu peace, balance and prosperity of your Vanua, you are to always make things right and fulfil your obligations to your Vanua where you are rooted.*

&

*For the children of Ovalau:*

*This is your wisdom, knowledge, roles and responsibilities.*

# Table of Contents

Abstract .....	i
Acknowledgements .....	iii
Personal Statement .....	vi
Dedication .....	ix
List of Tables .....	xii
List of Figures .....	xiii
List of Acronyms.....	xv
Chapter One Introduction .....	1
Purpose of Study.....	2
Research Questions .....	2
Assumptions .....	3
Rationale .....	3
Study Limitations .....	4
Significance of the Title: <i>Bu</i> .....	5
Summary of Findings.....	6
Chapter Two Study Context .....	9
Oral History of Ovalau .....	11
Socio-Cultural Structure at the Research Sites... ..	14
Lovoni .....	14
Nasinu.....	18
Rukuruku.....	24
Summary .....	30
Chapter Three Literature Review.....	32
Indigenous Perceptions of Climate Change.....	32
Traditional Knowledge... ..	37
Traditional Ecological Knowledge .....	39
Weaving TKe with Science in CCA.....	43
Transmission of Traditional Ecological Knowledge of Climate Change...	52
Indigenous Knowledge Reserach .....	54
Summary .....	59
Chapter Four Methodology .....	60
Conceptual Framework .....	60
Qualitative Research.....	61
Selection and Description of Sites and Participants .....	74
Methods of Data Collection .....	77
The Criteria for the Admissibility of the Data.....	78
Procedures for Collecting Data.....	79
Data Analysis... ..	85
Presentation of Results .....	86
Limitations .....	86

Summary .....	87
Chapter Five Findings.....	88
What is the Indigenous Fijians' Perception of CC? .....	89
What is the Indigenous Fijians TEK of CC?.....	91
How is the TEK of climate change manifested, interpreted and transmitted to the younger generation? .....	113
How is the Indigenous Fijian TEK similar to and/or different from the type of Knowledge about CC that is taught in schools in Fiji? .....	121
How can we use indigenous Fijians' TEK to further enhance people's (especially young people's) understanding of CCA in Fiji .....	123
Summary .....	127
Chapter Six Discussion .....	128
Indigenous Perception of CC .....	128
Indigenous Fijians' TEK of CC and CCA .....	130
Transmission of Indigenous Fijians' TEK of CC.....	133
Indigenous Fijians' TEK in Fiji Schools .....	135
Indigenous Fijians' TEK and CCA Education .....	136
Summary .....	139
Chapter Seven Conclusion and Implications .....	141
Conclusion.....	141
Implications of the Study .....	144
Implications for Future Research .....	146
Summary .....	148
Bibliography .....	150
Glossary .....	159
Appendices .....	166

## **List of Tables**

Table 1 Traditional Roles – Lovoni.....	16
Table 2 Traditional Roles – Nasinu.....	23
Table 3 Traditional Roles – Rukuruku.....	28
Table 4 Indigenous Fijians’ Common Cyclone Indicators.....	94
Table 5 Indigenous Fijians’ Tsunami Indicators.....	97
Table 6 Indigenous Fijians’ Bogi-walu Indicators .....	98
Table 7 Indigenous Fijians’ Rain Indicators .....	100
Table 8 Indigenous Fijians’ Fine Day Indicators.....	102
Table 9 Indigenous Fijians’ Transmission of TEK.....	113
Table 10 Strategies to Enhance People’s Understanding of the TEK of CC and CCA.....	123

## List of Figures

Figure 1.0 Structure of Thesis.....	8
Figure 2.0 Map of Ovalau.....	10
Figure 2.1 Migration route to Ovalau.....	11
Figure 2.2 Naigani Island as viewed from Rukuruku Bay.....	12
Figure 2.3 3D Map of Ovalau.....	14
Figure 2.4 A view of Nasinu village from the sea.....	18
Figure 2.5 Nasinu Governance System .....	21
Figure 2.6 A view of Rukuruku village from the Northern end of the village	24
Figure 3.0 Literature Review Outline.....	32
Figure 3.1 TEK in Summary.....	43
Figure 4.0 Chapter 4 Summary.....	60
Figure 4.1 Methodologies in Summary.....	64
Figure 4.2 <i>Bu ni</i> Ovalau Research Framework.....	65
Figure 4.3 Illustration of an Indigenous Fijian House.....	68
Figure 4.4 Concept of <i>Vanua</i> in Summary.....	71
Figure 4.5 Salusalu Metaphor.....	72
Figure 4.6 Indigenous Fijians' Traditional Roles .....	73
Figure 5.0 Chapter 5 Summaries .....	88
Figure 5.1 Breadfruit fruiting in four is an indicator of an approaching cyclone	92
Figure 5.2 Bota i ra na vanua (Red skies in the evening) an indicator for fine weather the next day.....	101
Figure 5.3 Summary of Indigenous Fijians' Climate Indicators .....	103
Figure 5.4 Vanua Sauvi in Rukuruku (Terrestrial & Marine) .....	107
Figure 5.5 Vanua Sauvi in Rukuruku (Mangrove Forest).....	108

Figure 5.6 Spill over effects: bech de mer & rock cod high yields.....	108
Figure 5.7 Davuke – fermentation pit.....	109
Figure 5.8 Lololo – storage for root crops.....	110
Figure 5.9 iYavoi (intercropping).....	111
Figure 5.10 Moka (Stone weir) in Rukuruku.....	112
Figure 5.11 Young Indigenous Fijian boys traditionally dressed to perform a traditional Indigenous Fijian dance.....	118
Figure 5.12 How TEK of CC is disseminated.....	119
Figure 6.0 Chapter 6 Outline.....	128
Figure 7.0 Summary of the Study.....	142
Figure 7.1 Niu Metaphor.....	149

## **LIST OF ACRONYMS**

- CC – Climate Change
- CCA – Climate Change Adaptation
- CCE – Climate Change Education
- CDU – Curriculum Development Unit
- ERC – Education Resource Centre
- ESD – Education for Sustainable Development
- FALE – Faculty of Arts Law and Education
- FIK – Fijian Indigenous Knowledge
- FNCF – Fiji National Curriculum Framework
- IEK – Indigenous Environment Knowledge
- IFTEK – Indigenous Fijian Traditional Ecological Knowledge
- IFTEK – Indigenous Fijians Traditional Ecological Knowledge
- IKS – Indigenous Knowledge System
- KTC – Kiribati Teachers College
- LEK - Local Ecological Knowledge
- MOE – Ministry of Education
- PACE SD – Pacific Centre for Environment- Sustainable Development
- PEDF – Pacific Education Development Framework
- SK – Scientific Knowledge
- TEK – Traditional Ecological Knowledge
- TEKS – Traditional Ecological Knowledge System
- TK – Traditional Knowledge
- TKS – Traditional Knowledge System
- UNDESD – United Nations Decade for Sustainable Development
- UNESCO – United Nations Educational, Scientific and Cultural Organizations
- UNFCCC – United Nations Framework Convention on Climate Change
- USP – University of the South Pacific
- WS - Western Science
- WSK – Western Scientific Knowledg

# **Chapter One | Introduction**

*'Land is life, without land there is no life'* (Kwa, 2008)

## **1.0 Introduction**

There continues to be global interest in CC given the approaching end of the UN Decade of Education for Sustainable Development in 2014. It is significant to note that the global discourse on CC is driven and dominated by western scientific knowledge about world weather patterns and major climate shifts. This study is an attempt to engage in the CC dialogue from the perspective of Small Island States of the Pacific through a study of a particular indigenous knowledge system.

CC has affected all nations including Fiji. For this reason, world governments and scientists continue to search for ways of mediating the impacts of CC. For centuries most Indigenous peoples of the Pacific Ocean have survived the changing climate through the use of their accumulated knowledge of their environments including their knowledge of changing weather patterns and how to adapt to these. The Indigenous people of the Pacific used their Traditional Ecological Knowledge system for ways of helping them adapt to CC. Dyer (1945:6) remarked that, "Fijians' traditional weather knowledge were acquired through close observation of meteorological phenomena...helping people adapt to their islands' vulnerability to disasters". This statement suggests that Pacific Islanders have survived using traditional disaster reduction measures that were mostly concerning food security, settlement security and inter- and intra-community cooperation. Today, a large part of this knowledge has been lost.

The purpose of this study is to document and analyze Indigenous Fijian traditional knowledge of climate change adaptation, and to explore how this knowledge impacts people's preparedness for climate change and, readiness for leading a sustainable live and the implications of such knowledge for the formal education sector, especially the school curriculum. In this study Fijian people's Indigenous Knowledge (IK), is defined as inter-related bodies of indigenous knowledge, skills and practices accumulated, maintained and developed over thousands of years of interaction with their environment (UNESCO), 2002). Traditional Knowledge (TK) includes

indigenous ways of knowing, seeing and thinking and passed down orally from generation to generation (Interinstitutional Consortium for Indigenous Knowledge, 2012). TK also includes Traditional Ecological Knowledge (TEK) defined by Berkes (1999) as a body of knowledge, practices and belief systems including about Climate Change (CC). The definition of CC used in this study is based on the United Nations Framework Convention on Climate Change's (UNFCCC) definition which sees it as change in climate over a long period due to human and natural variability. In this study, the term Indigenous Knowledge (IK) will be used interchangeably with Traditional Knowledge (TK) as well as Traditional Ecological Knowledge (TEK) although sometimes TK may include the knowledge of people who are not indigenous to a place.

## **1.1 Purpose of the Study**

This study investigates and collects Indigenous Fijians' traditional knowledge of CC. It focuses on the ways those changes are being predicted and the way adjustments are being made by the locals. The fieldwork has been conducted in three villages on the island of Ovalau: Lovoni, Rukuruku and Nasinu. The main interest of this study is to investigate and document Indigenous Fijian Traditional Ecological Knowledge of Climate Change and Climate Change Adaptation (CCA) and how this knowledge can be used to educate future generations on a formal level.

## **1.2 Research Questions**

The four main research questions of this study are:

- a. What is the Indigenous Fijians' perception of Climate Change?
- b. What constitutes Indigenous Fijians' perceptions of Traditional Ecological Knowledge (TEK) of climate change?
- c. How this TEK of climate change is manifested, and how it is interpreted and handed down to the next generation?
- d. How is this TEK similar to and/or different from the type of knowledge about Climate Change that is currently taught in local schools?

- e. How can this knowledge be used in order to enhance people's understanding of predicting changes in climate and adapting to them? (This question particularly applies to younger generations)

## 1.3 Assumptions

This study is based on three main assumptions:

- Assumption 1:** CC is not a new phenomenon and Indigenous Fijians have lived through changes of climate for millennia using TEK.
- Assumption 2:** Indigenous peoples' TEK of CC should be researched and documented . For centuries Indigenous Fijians have used it and it has proved to be a cheap, feasible and effective form of dealing with and surviving changing climatic conditions.
- Assumption 3:** The Indigenous peoples' TEK of CC should be integrated into the educational curriculum and government policies and CC adaptation projects in order to enhance their relevance and practicality.

## 1.4 Rationale

As mentioned earlier there were several reasons why I undertook this study. Firstly I am an indigenous Fijian who grew up with the values and beliefs of my community. As an Indigenous woman, mother and educator, I am interested in maintaining the Indigenous Knowledge System (IKS) and in particular TEK through formal and non-formal education for the sake of continuity and survival of my people and our shared *Vanua* (the land, the sea, the sky, the people, all living things, the spirits, in a specific place and how they are related to each and responsible for each other. It also includes the knowledge, skills, culture, tradition and practices of the people).

In addition, apart from the importance of Indigenous Fijian TEK for the continuity and survival of Indigenous communities, the international community is also keen to document and conserve indigenous (or traditional) knowledge for a number of reasons, the most important one being the

link between IK and the UN Decade of Education for Sustainable Development (DESD) – 2005-2014. The UNESCO LINKS (Local and Indigenous Knowledge Systems) Project for example is aimed at recording and safeguarding indigenous knowledge and worldviews. UNESCO acknowledges the importance of local knowledge and languages as repositories of cultural diversity and as key resources in understanding the environment (UNESCO, 2006).

The study is also directly related to two themes emphasized in the Pacific Education Development Framework (PEDF) 2009-2015, namely ‘Language and Culture’ and ‘Education for Sustainable Development’ (ESD). Complementing the two themes are the ‘Regional Culture Strategy’ and the ‘Regional Strategy for Culture and Education’. The link between TK and ESD is exemplified in a research conducted in Tonga. (Johansson-Fua, 2006 & Fua et al, 2007) This research would encourage researchers and teachers to document and disseminate indigenous knowledge and value systems to ensure that future generation of Pacific Islanders have the opportunity to learn about their own cultural knowledge and worldviews (Thaman, 2011).

In summary, this study can be seen as an opportunity for learning about various things including the importance of gathering and documenting the knowledge of the indigenous Fijian elders before they pass on. It provides an opportunity for Fijian curriculum personnel to possibly reorient the Fiji Curriculum towards Education for Sustainable Development (ESD). This research may provide opportunities for indigenous Fijians to reconnect with their *Vanua* and to hence recognize and interpret IK and TEK. The study results may assist scientists to integrate TEK with the scientific knowledge of CC in the development of a CCA initiative in Fiji. Finally, the study may be seen as a contribution to the educational discourse on CC at school.

## 1.5 Study Limitations

Some of the limitations of this study include:

- i. **Time.** When conducting research in a Fijian village it is important to allocate a certain amount of time talking to locals, especially the elders. An ideal amount of time spent would have been around twelve months. However for me it was not possible to live in the villages continuously. Instead I visited the villages four times and for every visit, I spent two weeks at the sites.

- ii. **Funding.** Conducting research in traditional village settings can be a costly affair. Villagers expect gifts in exchange for hospitality and as a sign of respect. As every research should be conducted in a culturally sensible way it would be advisable for future researchers to reduce these costs by visiting for an extended period of time instead of numerous short visits.
- iii. **Logistics and Communication.** When conducting research in traditional village settings it is important to optimize the communication processes between the researcher and locals. Daily activities in a village are governed by a schedule that is agreed upon by the village chief and the villagers. Researchers should be mindful of these activities before they establish a fixed time to conduct their research so that their visit does not clash with the village scheduled activities.
- iv. **Literature.** Although there is some international literature on TK and or TEK there is a dearth of literature on TEK and CC forecasting and their adaptation in the Pacific Islands generally and Fiji especially. Important contributions to the field of how TEK has been used to forecast the climate and to adapt to CC have been made. Pa'i (2012) and Lefale (2010) highlight the use of TEK for climate forecasting and CC adaptations in Samoa. (PACE-SD, 2013) together with McNamara and Prasad (2013) have done the same for Fiji and Vanuatu. Alexander et al (2011) emphasised the use of TEK in forecasting CC and CCA in the Northern Hemisphere, Bynoe (2012) for the Caribbean, Boillat and Berkes (2013) for Bolivia and Davydov and Milkailova, (2011) for the Arctic while (Codjoe, Owusu and Burkett, 2013) discussed Ghana.

## 1.6 Significance of the title : *Na Bu*

*Na Bu* has two meanings. First, *Na Bu* can refer to a young fruit of a coconut tree. The term's second meaning can denote a gift that children present to story tellers. In ancient times as well as in some rural settings today, elders usually tell stories to young children in the evenings. After the storytelling, the children would always present a *Na Bu* (gift) to the story teller to reciprocate his/her work. Every evening after the gift had been presented a new child would be selected to prepare the gift for the following evening.

In the context of this study *Na Bu* refers to the second meaning, the young coconut, which is read as a metaphor for the children who are yet to grow into a new generation of knowledge holders. They are seen as the output of a school curriculum that has successfully integrated aspects of TK of CC and CCA. Fijian children would then be able to live sustainably using knowledge and ways of understanding the world derived from both Western and Indigenous sources.

Furthermore, *Na Bu* is a gift to my own forefathers, elders and participants of this study, who have contributed to my research with their numerous stories. Without them this study would not have been possible.

Finally, *Na Bu ni Ovalau* is a coconut that is endemic to Ovalau. It will grow only in Nasinu and has to be replanted and nurtured in a special way in order for it to grow. This coconut is well known for its sweetness which entices people to return for more. The *Na Bu ni Ovalau* concept is used as a Research Framework for this study and is explained in details in the Methodology chapter.

## 1.7 Summary of Findings

### 1.7.1 Indigenous Fijian Notions of Climate Change

The study found that the Indigenous Fijians perception of climate change varies according to their gender, their traditional roles and their experiences. Contrasting views could be found between children and adults. While the younger generation perceives CC as a change in weather that can be predicted through the use of basic TEK, older generations' view it as a change in weather that can be forecasted and to which they can adapt to. In addition, parents and elders repeatedly highlighted that CC impacts their agricultural as well as their fishery productivity even though they could be reduced through the use of traditional adaptation methods.

## **1.7.2 TEK of CC and CCA**

The TEK of CC is embedded in the local setting. The participants of this study use their senses to read their surroundings that indicate to them the changing weather conditions. When locals see these weather indicators, they take proactive steps in order to prepare for the approaching weather.

## **1.7.3 Interpretation and Transmission of TEK**

This study discovered that the indigenous Fijians' TEK of CC adaptation manifests itself in their traditional roles and their *vanua*. It is interpreted by locals through indicators shown by the *vanua*. This TEK of CC is then passed on to the younger generation orally (through songs, poems and stories), and through practice (rituals and daily activities) and observation. Some of the TEK has been lost since the elders' role as teachers is decreasing and schools do not incorporate TEK in their curriculums. Local elders possess a treasure of knowledge, one that should not be lost. Therefore it seems logical that the older generation should assist during the process of transmitting the TEK of CC and CCA into school curricula.

## **1.7.4 Climate Change Education**

Currently, several Non-Government Organizations (NGOs) such as the Secretariat of the Pacific Community (SPC) and Live and Learn in Fiji are assisting in educating teachers and communities about CC. Only the scientific knowledge, not TEK, is included already in the current Fiji curriculum (2007). However, the Fiji National Curriculum Framework (2013) is aiming to incorporate TEK into a new curriculum.

## **1.7.5 Indigenous Fijian TEK of CC and CCA Education**

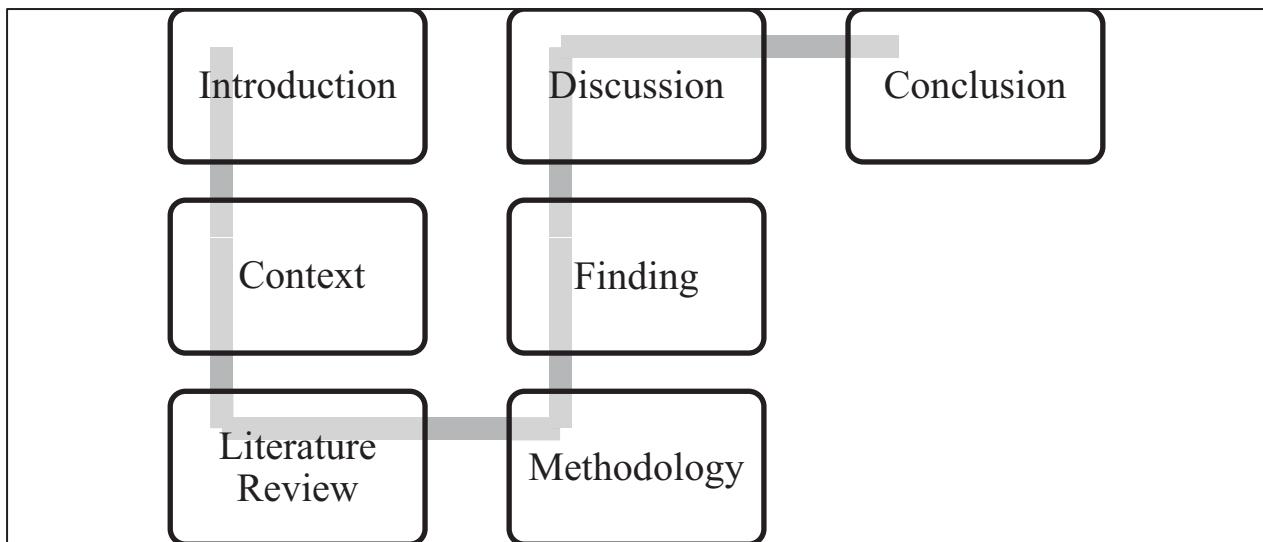
This study found that people's understanding of the TEK of CC and CCA can be enhanced if different learning and teaching strategies are implemented. Some strategies were suggested by the participants for a better understanding of the TEK of CC and CCA. They include teaching TEK of CC and CCA in schools, discussing them in village and religious meetings, promoting them in media, social networks, books and videos.

## 1.8 Thesis Structure

After an introduction, Chapter Two outlines the context of the study; Chapter Three reviews the relevant literature for this study; Chapter Four outlines the methodologies used; Chapter Five describes the findings of the fieldwork; Chapter Six discusses these findings and Chapter seven summarizes the study and its implications as well as outlines recommendations for future research.

The diagram below visualizes the following chapters of the thesis.

*Figure 1.0 Structure of Thesis*



## **Chapter Two | Study Context**

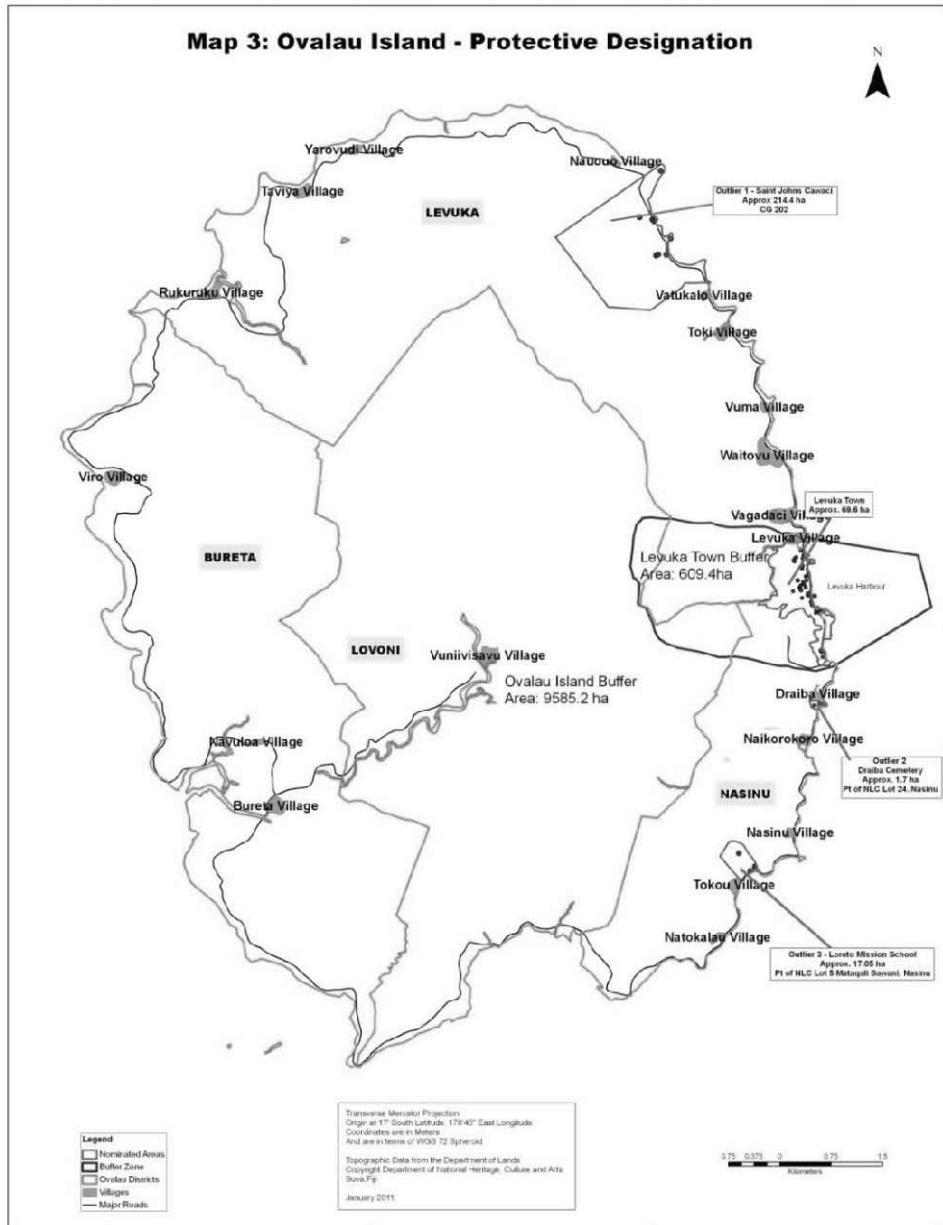
### **2.0 Introduction**

This research was conducted in three villages on the island of Ovalau, Fiji: Rukuruku in the North-East, Nasinu in the South-East, and Lovoni in the interior. A description of these three villages, their location, history, traditional roles, worldviews and knowledge systems will be made in this chapter. The chapter ends with an explanation of why these sites were chosen for the study.

Ovalau is located on the North East of Viti Levu, in the Lomaiviti archipelago, which is situated in the centre of the Fiji Islands. The island hosts twenty two villages which are grouped into the following *Tikina* (districts) for administration purposes, namely: Bureta, Levuka, Lovoni and Nasinu. *Tikina Bureta* is made up of three villages: Naiviteitei, Nasoga and Navuloa. *Tikina Levuka* is the biggest with the following ten villages, Rukuruku, Taviya, Yaravudi, Nawowo, Vatukalo, Toki, Vuma, Waitovu, Vagadaci and Levuka. *Tikina Lovoni* consists of six villages: Vunivisavu, Nasaumatua, Lovoni, Nacobo, Nukutocia and Visoto. *Tikina Nasinu* consists of five villages: Draiba, Naikorokoro, Nasinu, Tokou and Natokalau.

Ovalau is a volcanic island with rugged terrain except for Lovoni which is located in a valley in the center of the island being surrounded with thick vegetation. Four wind directions affect different parts of Ovalau during different times of the year: the *Cagi mai na Vualiku* (Northerly wind) and the *Cagi mai na Ceva* (Southerly wind) as well as the *Cagi mai wai* (wind from the sea) and the *Cagi vanua* (wind from the land). The *Cagi mai na Vualiku* (Northerly wind) brings dry weather, high temperatures and light breezes to the villages located in the South Eastern part of Ovalau however, the *Cagi mai na Vualiku* (Northerly wind) brings strong winds and rain to the north western side of the island.

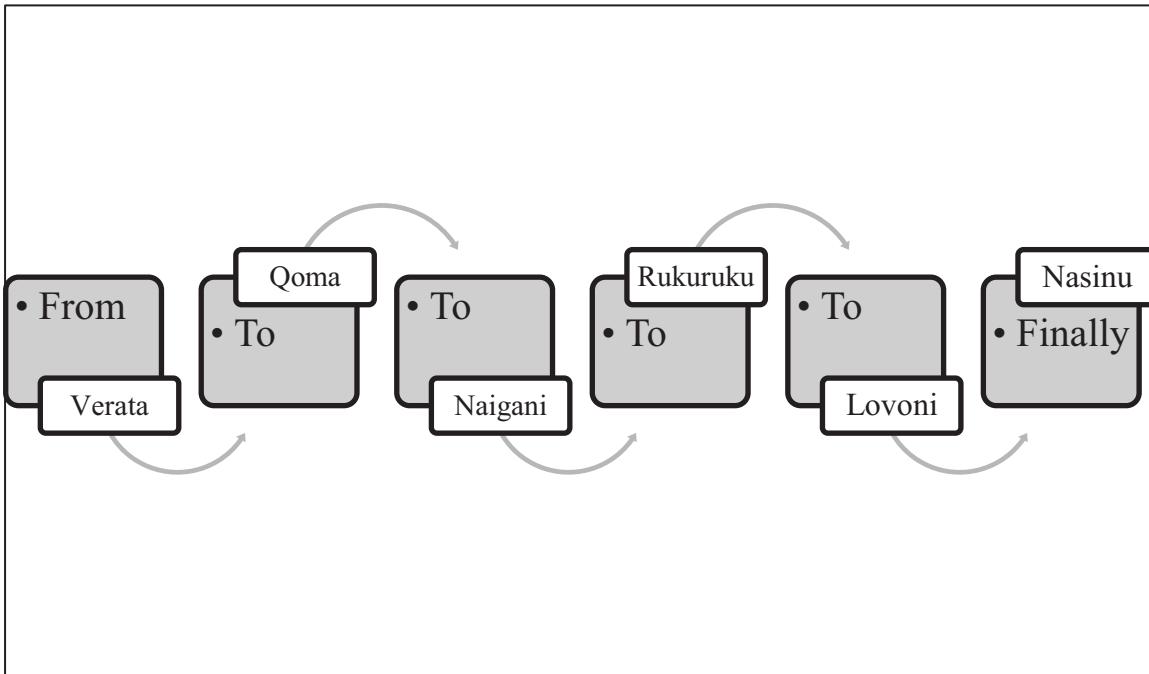
*Figuure 2.0 Map of Ovalau<sup>1</sup>*



<sup>1</sup> [http://www.webmedia-staging.com/ntlheritage/?page\\_id=228](http://www.webmedia-staging.com/ntlheritage/?page_id=228)

## 2.1 Oral History of Ovalau

Figure 2.1 Migration route to Ovalau



Oral traditions suggest that the first people to inhabit Ovalau were Rakavono, who was originally from Verata, Tailevu and his wife Adi Laginiwasa: who came from Naigani Island, in Verata, Tailevu. Rakavono is said to have been the son of Kumilevu, the chief of Verata village. The stories say that Rakavono had been chased from Verata by his father's *Matanivanua* (herald) because he ate the *Vudi* (banana) that was supposed to be given to the chief as an offer to the gods. (Traditionally, the first harvest from the land or the sea was offered to the chief as an offer to the gods in order to have a good harvest and for the maintenance of *sautu* (prosperity) in the *Vanua*.

Crops that matured before the *vula i sevu* (traditional month for offering the first crops) were usually buried in a *lovo* (pit oven) to be preserved until it was time to offer them to the chief. After Rakavono had been told off and banished from Verata, the son of his father's herald decided to accompany the man. The story tells that they walked along the Verata coast until they arrived at a small island which they named Nukuvuto - because they have had to *vuto* (wade) to the island - from the *veinuku* (beach) to the island - and they decided to settle there. Halfway on

the way from Nukuvuto the herald's son felt weak and he had to carry him across to the island. When they arrived on the island, his companion died. So he named the island *Qalomama* (swam halfway). Nowadays the island's name is the short form of the original name : Qoma.

After laying his companion to rest, Rakavono decided to swim across to Naigani Island which lies just off the coast of Qoma. He found the island to be inhabited and requested to speak to the chief of the island. He asked to stay until he had regained his strength so he could swim on and find his own island to settle on. His wish was granted. It is told that while in Naigani he befriended Naivodore's daughter Adi Laginiwasa and they fell in love. Often they would go out spear fishing together and when hungry, Rakavono would pull out a *niu vara* (sprouting coconut), cut it in half and they would eat its *vara* (spongy flesh). After eating, he would bury the coconut again. The place where Rakavono had taken the coconuts from was named after this event: *Niucavu*.

*Figure 2.2 Naigani Island as viewed from Rukuruku Bay*<sup>2</sup>



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<sup>2</sup> View of Naigani Island from Rukuruku, Photograph by Ms R K Lagi

After some time it is said that Naivodre discovered young coconut seedlings that had withered and the chief blamed Rakavono for it who was banished from yet another island. Adi Laginiwasa followed her love and together they left the island. The spot from where they started their journey from is called Nabaumuri (to follow someone) and some locals still believe that the sea water of their path is warmer and can be used to guide swimmers safely ashore. Adi Laginiwasa and Rakavono swam to a large island which was uninhabited. They claimed it and named it Ovalau (*ova* meant to swim; and *lau* meant to *strike* or to find). Rakavono declared *na vanua o Ovalau* (the island of Ovalau) his. *Vanua* according to one of the participants is:

*Vanua sa i koya na tamata, qele, manumamu, koro kei na veiwakan ni veikabula kece; na veikabula ni ra solia mai na ivakatakilakila ni draki kei na gauna ni vuata, teitei, qoli keina gauna e cava kina na yabaki* (*Vanua* includes the people, land, animals, village and the relationship with all living things; the behaviour of living things show signs for the approaching weather, seasons and the end of a year).

She also highlighted that *e vakatawani na veiyasana ni vanua kece ka tabu na vakasosa* (all spaces in the *Vanua* are occupied and it is forbidden to make a noise). It is seen as disrespectful to make loud sounds. Therefore, ‘*e bibi na vakadirorogo, vakarokoroko kei na doka na veiyasani vanua kece*’ (silence, honor and respect is to be maintained for every parts of the *vanua*) (Mrs M Wati, 2013: pers. comm).

This knowledge of the *Vanua* is passed on to the next generation using the Rukuruku dialect. Knowledge is transferred via stories, chants, songs, *meke* (traditional dances) and by parents being role models.

According to locals:

*Vanua* means *tamata, keina na bibi keina rokovi ni veiliutaki vakavanua kei na itutu ni veiqaravi* (people and their traditional roles, the significance of and the respect for leaders in a village (Mr S Qarau, 2013: pers. Comm). Another interviewed highlighted that *Vanua* stands for *itutu vakavanua, qele mamaca kei na iqoliqoli*, (traditional status, dry land and fishing grounds (Mr S Tamani, 2013: pers. comm) yet another one defined *Vanua* as *tamata; tamata ga e na qarava na vanua*, (people and it’s the people who are caretakers of the land) (Mr I Vakaduadua, 2013: pers. comm). The same sentiments were echoed by the *Tui Wailevu* (chief of Lovoni) who said that

*Vanua* meant *tamata, qele, itovo/ valavala vakavanua, veilomani kei na cakacaka vata vaka kawatamata* (people, land, indigenous customs and traditions, love, and working together as people of the same root (Mr S.Rogoyawa, 2013: pers. comm).

*Vanua* according to the participants of this study can be summarized as referring to people, land, sea, traditions and customs, traditional status and leadership, relationships, space, spirit, silence, respect and honor that is accorded to every part of the land and every relationship among all living things. It can be said that when Rakavono declared ownership of the *Vanua*, he was not only referring to ownership of the physical land but to its social, spiritual and knowledge system as well.

## 2.2 Socio-Cultural Structures of the Research Sites

### 2.2.1 Lovoni

Rakavono and Adi Laginiwasa settled in the valley where they had declared their ownership of the island. Stories say that they named it Lovoni. This name is related to the Fijian word Lovo, the name for pit ovens which were used for cooking and preserving foods.

Figure 2.3 3D Map of Ovalau<sup>3</sup>



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<sup>3</sup> 3D Map of Lovoni; [http://www.iapad.org/applications/plup/photo\\_gallery\\_ovalau.htm](http://www.iapad.org/applications/plup/photo_gallery_ovalau.htm)

Lovoni as seen in figure 2.3 is located in the centre of Ovalau and is protected by the surrounding mountains. Oral history suggests that Lovoni was one of the most powerful and well protected villages of Fiji with its rugged terrain making it difficult to climb and conquer. Locals say that it also homed skilful, fearless and powerful warriors who remained undefeated during tribal wars.

Tikina Lovoni consists of six villages, three of those are located in the valley and three are located along the coast. The three villages that are located in the valley are Lovoni, Vunivisavu and Nasaumatua and together they are commonly referred to as Lovoni Vanua because they are located in-land. The three villages located on the coastline are Nukutocia, Visoto and Nacobo collectively known as Lovoni i Wai because they are located near the *waitui* (sea). This research focuses on Lovoni village, which is the *yavusa Turaga* (chiefly clan) of the *tikina* Lovoni.

Rakavono and Adi Laginiwasa raised three children in the valley: Sauturaga, Waseilovoni and Tabacaca. After some years Rakavono is said to have taken other wives, one of which was called Adi Niukula. Stories say that he had brought her from Malaita, one of the Solomon Islands. Rakavono is said to have had many children with different wives, who inhabited the villages of Ovalau.

Before the colonial era, the twenty two villages of Ovalau were ruled by a centralized leadership in Lovoni. Later on colonial administration divided Ovalau into four *tikina* (districts) namely: Lovoni, Bureta, Levuka and Nasinu. All these villages kept their traditional links to Lovoni even after the colonizers changed the official system.

## Worldview

The people of Lovoni view *Vanua* holistically. *Vanua* includes every living being; their customs and traditions, kinship and cooperation for the smooth running of the village. It is knowing ones place in the village and performing one's allocated roles and respecting people's space so that *e sautu na Vanua* (there can be peace and prosperity) in the *Vanua*. Elders are supposed to be role models for the young. Children are expected to learn their place, role and responsibilities towards each family member and their *Vanua*. If children do not fulfill these expectations it brings shame to the family and the *Vanua*. Elders are responsible for the misbehaviors of younger generations and are expected to teach them how to behave in a sensible manner.

## Traditional Roles

The Indigenous Fijian *Vanua* can be split up into *Yavusa* (Tribe), *Mataqali* (Clan) and *Tokatoka* (extended family). Every person is part of all three categories. Members of a *Yavusa* (tribe) are supposed to take up their traditional roles in order to protect their *vanua* and to ensure that affairs within it run smoothly. There are seven major traditional roles in a *Vanua* namely: *Turaga* (Chief), *Sauturaga* (Chief Executive), *Matanivanua* (Herald), *Bete* (Priest), *Bati* (Warrior), *Mataisau* (Craftsmen) and *Gonedau* (Fisher folks). These roles are occupied by the older generations. The younger ones are supposed to follow and observe them so in later time they can imitate what they have seen and learnt. Despite newly introduced administrative structures, the people of Ovalau continue to perform their traditional roles, as they think it necessary for a functioning vanua. The people from Rukuruku, for example, who officially are under the rule of the *Tikina* Levuka still provide fish for traditional functions of the original *Tikina Lovoni*.

*Table 1- Traditional Roles - Lovoni*

Traditional Role	<i>iCavuti</i> Title	Description of Role	Village in Ovalau
<i>Turaga</i> Chief	<i>Wailevu, Na Turaga na Tui Wailevu</i>	He leads the <i>vanua</i> and is responsible for the welfare of the people under him. He also holds the title of <i>Turaga ni Yavusa</i> (Tribe Leader). He is also supposed to be wealthy as this demonstrated how well his people are thriving. His wealth should also be used for the benefit of the people under him.. His wealth is a reflection of his people's work. But, his wealth is used for the benefit of his people.	Lovoni
<i>Sauturaga Bati Balavu</i> Chief Executive	<i>Mataqali Utori Tui Wailevu</i>	Installs the <i>Tui Wailevu</i> (Chief of Lovoni) and gives him the <i>sau</i> (power, blessings) of the <i>vanua</i> . As a chief executive he advises the <i>Turaga</i> (chief) and helps enforcing his decisions.	Visoto
<i>Bati lekaleka/ Tora/ Mataisau</i> Craftsmen	<i>Kai Nakoro Tui Wailevu</i>	The men performing this role build the house and the canoe of the chief. The women weave his mats and also tend to his <i>iteitei</i> (garden).	Kai Nakoro
<i>Bete Priest</i>	<i>Na Bete Tui Wailevu</i>	The Priest is very close to the <i>Turaga</i> (chief). He is the only person allowed to touch his body or his food. He also provides medicine for the <i>Turaga</i> (chief). Moreover, as the link to the spiritual world, he acts as a seer. He informs the <i>Turaga</i> (chief) of future events and advises him with making important decisions.	Vunivisavu
<i>Gonedau</i> Fisher folk	<i>Tui Gavo</i>	The <i>Gonedau</i> (fisher folk) are the protectors of the sea and provide fish for the <i>Turaga</i> (chief) whenever requested and during traditional occasions.	Nukutocia
<i>Matanivanua</i> Herald	Tokatoka Navuso <i>Tui Wailevu</i>	They act as the spokesperson of the <i>Turaga</i> (chief) and delivers messages to and from him.	Wailevu

Table 1 summarizes the traditional roles of the people of Lovoni. There are six villages in the tikina (district) Lovoni and each village fulfills an allocated role. The *Tui Wailevu*, *Turga* Chief resides in Lovoni and he leads the *vanua* and is responsible for the welfare of the people under him. He also holds the title of *Turaga ni Yavusa* (Tribe Leader). He is also supposed to be wealthy as this demonstrated how well his people are thriving. His wealth should also be used for the benefit of the people under him. His wealth is a reflection of his people's work. But, his wealth is used for the benefit of his people.

The *Sauturaga/ Bati Balavu* Chief Executive come from the Utori clan in Visoto. His role is to install the *Tui Wailevu* (Chief of Lovoni) and give him the *sau* (power, blessings) of the *vanua*. As a chief executive, he advises the *Turaga* (chief) and helps enforce his decisions. The *Bati leka/ Tora/ Mataisau* Craftsmen settle in Lovoni and the men performing this role build the house and the canoe of the chief. The women weave his mats and also tend to his *iteitei* (garden). This group holds the knowledge about the local seasons and agriculture. The Craftsmen and women are the ones advising people on how to best prepare for natural disasters like drought or cyclones. The *Bete* (priest) located in Vunivisavu is very close to the *Turaga* (chief). He is the only person allowed to touch his body or his food. He also provides medicine for the *Turaga* (chief).

Moreover, as the link to the spiritual world, he acts as a seer. He informs the *Turaga* (chief) of future events and advises him with making important decisions. The *Gonedau* (Fisherfolk) clan live in Nukutocia are the protectors of the sea and provide fish for the *Turaga* (chief) whenever requested and during traditional occasions. They are the ones holding the knowledge about fishery and the climate changes related to the winds and water. The *Matanivanua* (Herald clan) come from Lovoni and they act as the spokesperson of the *Turaga* (chief) and deliver messages to and from him. For instance, if the *Matanivanua* (Fisher folk clan) advises the *Tui Wailevu* (chief of Lovoni) to restrict the amount of fish taken from the sea in order to avoid depletion of the same, it is the *Matanivanua* (Fisher folk clan) who will inform the *Tui Wailevu* (chief) and also the people of Lovoni about the decision.

Lovoni village which is the first site where the fieldwork for this study had been conducted, is governed by a *Turaga ni Yavusa* (Tribe Headman) who is the *Turaga na Tui Wailevu* (chief) and who is responsible for making decisions and leading in the affairs of the village. Other traditional roles that are important when it comes to decision making processes are: the

*Turaga ni mataqali* (Clan Headman), *Turaga ni Tokatoka* (Extended families Headman), and *Turaga ni Koro* (Village Headman). The village headman acts as a village secretary during *bose vakoro* (village meetings) which are held monthly. Also the *lewe ni vanua* (villagers) are involved in decision making processes. They listen and act upon decisions, which have been made by the *liuliu ni koro* (village leader) during *bose vakoro* (village meeting) or *bose ni tikina* (district meeting) or *bose ni yasana* (provincial meeting)

Gender roles in Lovoni village are clearly defined and traditional. Women are responsible for domestic chores such as child rearing, weaving, cooking, collecting firewood, coconut and *icoi* (concomitant to food crops) such as prawns. In addition, women sell artefacts like *voivoi* (Pandanus leaves) and mats and use their income to meet some of their financial, village and/or religious obligations. The main responsibility for men lies in the agricultural sector area of farming. They look after the fields and the harvest is sold as well as used by the families. The two main crops produced are *Yaqona* (kava) and *dalo* (taro). Due to its location, Lovoni village is blessed with a temperate climate, contributing to the high yields and a high income from farm products.

## 2.2.2 Nasinu

Figure 2.4 - A view of Nasinu from the sea<sup>4</sup>



Nasinu is located in the most western part of Ovalau. The first inhabitants of Nasinu came from Lovoni. Most people here are said to be the descendants of Ratu Kulati Kolirakavono and Adi

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<sup>4</sup> A view of Nasinu village from Sea, by Mr M.Mcindoe

Varanisese Fitorina whose children were Lorosio Koroidrakica and Sarakoro Marama. Ratu Kulati Kolirakavono is believed to have been murdered and his son Lorosio Koroidrakica took his mother Adi Varanisese Fitorina and his sister Sarakoro Marama, and fled to Nasinu. Lorosio Kolirakavono married his mother Adi Varanisese Fitorina and together they had five children: Mariana Marama I Gubo, Sera Weliweli, Siteri Yadre, Ecelina and Lusiana Lelela. The eldest of the children, Mariana Marama i Gubo, married my great-great-grandfather Aporosa Lo from Toki, originally from Mataso in Ra, and together they had four children: Saimoni Tamani, Virimi Koroi, Salimoni Naloga, Vasemaca Rokomanu, and Sikeli Dau. His eldest son Saimoni Tamani is my great-grandfather who married my great-grandmother Anaseini Civonitokalau and together they had five children: Nanise Ucudra, Vasemaca Rokomanu, Mere Wati and Aporosa Lo. Their eldest daughter is my paternal grandmother, Nanise Ucudra, who is the reason for me being raised in Nasinu. She was the wife of my grandfather Semi Qio from Naroi, a village on the island of Moala which is part of the Lau Group of Fiji.

Nasinu village consists of one *Yavusa* (tribe), *Nakorovatu* tribe led by Peni Larilo, who is originally from Lasakau, Bau. Peni Larilo's grandfather was given the title of *Buli* (Tikina colonial leader) during Cakobau's government in the 1800s and later on, registered his children in the *Vola ni Kawabula* (Register for Native Landowners) as the original inhabitants and landowners of Nasinu. During the time of registration, a gentleman from Naivuruvuru, Naitasiri by the name of Seru came to sell *rubi* (baskets) in Ovalau. He became a close friend of the *Buli* who registered him (Seru), as a member of the *Yavusa* Nakorovatu. This registration played a significant part in the leadership history of Nasinu, and will be discussed later.

There are two *mataqali* (clans) in Nasinu: *Mataqali* Wausomo which is led by Apenisa Tawake, a descendant of Seru from Naivuruvuru, Naitasiri and the *Mataqali* Makuluva led by Peni Larilo, a descendant of *Na Buli* who originally came from Lasakau, Bau. The members of the *mataqali* (clan) came from various parts of Fiji including; Nakorotubu, Ra; Vione, Gau; Naroi, Moala; Lawaki and Tovulailai, Nairai; Navuti, Moturiki; Naivuruvuru, Naitasiri; Lasakau, Bau and Nakoro, in Lovoni.

The land on which the Wausomo clan lives in was originally a piece of land in Nasinu that was gifted to Sarakoro Marama by her brother Lorosio Koroidrakica for *covi ni draudrau* (growing

vegetables and taro). Today, however, Wausomo has been claimed by Seru's descendants (Mr S Tamani, 2013: pers. comm).

## Worldview

The villagers of Nasinu village are not its original inhabitants. Some of them are *vasu* (descendants of the female line) from Lovoni and others had come from other parts of Fiji. Still they do know their place in the village and perform their roles and responsibilities as expected. Kinship is highly valued among them hence the *vasu* (people having maternal relationship) to the *vanua* Nasinu and Lovoni is very important. Children of the *vasu* Nasinu and Lovoni value honour and perform their roles and responsibilities towards the *Vanua* Nasinu and Lovoni as expected in order not to suffer traditional shame. As the population of the village expands, new relationships are formed in the village and new arrivals are taught their responsibilities towards each member of the village and the *Vanua*.

Similar to Lovoni, the elders of Nasinu are expected to teach the young ones about traditional relationships and the importance of their roles and responsibilities. Failure to teach children will lead to conflicts and confusion amongst the children and shame to the *Vanua*. Hence, everyone in the village bears a responsibility of instilling these traditional values to the children. But, the main onus is on the elders to display good behaviour and be a role model.

Like in Lovoni, the people of Nasinu perceive the *Vanua* holistically. Every member of the village, irrespective of where they come from, belongs to the *Vanua* and is therefore expected to perform their roles and responsibilities accordingly. Failure to perform these roles and responsibilities will lead to disharmony in the *Vanua*.

## Traditional Roles

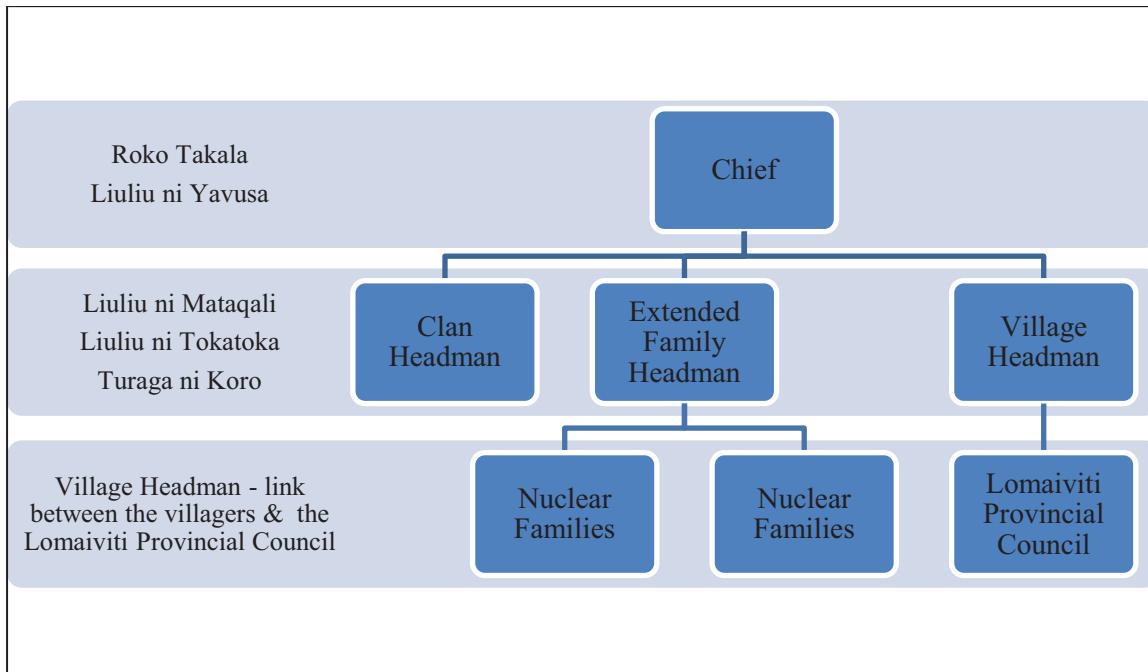
Nasinu village is governed following a traditional Indigenous Fijian hierarchical system. The highest role in this system is filled by the chief *Turaga na Rokotakala* who is the *iliulu ni Yavusa* (Tribe Headman). Under him are the *iliulu ni Mataqali* (Clan Headman), *Liuliu ni Tokatoka* (Extended Family Headman) and the *Turaga ni koro* (Village Headman) represents the villagers and the Provincial Council villagers and the Provincial Council. The *turaga ni koro* (Village Headman) is elected by the villagers during a *bose vakoro* (village meeting) and is paid by the

Lomaiviti Provincial Council. The Lomaiviti Provincial Council determines the duration of a *Turaga ni koro*'s (Village Headman's) term.

If the villagers are not satisfied with the performance of the *Turaga ni koro* (village headman) he can be dismissed and a new one will be elected. In 2013, this was the case when a former Village Headman had been replaced by the villagers with a more suitable candidate. The main tasks of this role are to make sure that the village is well represented, to call people to village meetings by blowing the *Davui* (conch shell), and, as a link between villagers and the Lomaiviti provincial council, to pass on messages such as updates on town functions and events.

Maintenance of the village is the responsibility of all villagers. Once a week everyone is expected to contribute to a clean village. This include tasks such as cleaning the drains, cutting and weeding the grass around the village *rara* (ground), roads and grave sites and maintaining the village water system.

*Figure 2.5 Nasinu Governance Systems*



Decisions about the management and governance of the village are usually made at the *bose vaka koro* (village meeting) which is held once a month. All adults are encouraged to attend.

Common topics discussed at this meeting include village maintenance, village projects and village by-laws. A meeting may also be called when important visitors such as representatives of government departments or the Native Lands Commission arrive in the village.

Usually each family of the village is expected to contribute financially to some village projects. Normally a contribution of \$ 2 towards the *soli vaka koro* (village monetary contribution) is made every month. In addition to monetary contribution, there are various social groups whose aim is to improve the life in the village. For example there are programs for young people. Often teenagers in the village form groups of five or more in order to assist each other with planting, building houses, or clearing land for a new plantation. Another group, this time for women, is called *soqooqo vakamarama* (women's organization). Members of this group assist each other with various chores such as weaving mats and baskets, which can later be sold. The money that is earned this way is at the disposal of the women's organization.

Since Nasinu is a coastal village, the sea is one of its major sources for food. In addition, each adult male has an *iteitei* (plantation) where vegetables and fruit such as cabbage, pawpaw, mango, *dawa* (Ponnetia Pinnata fruit), guava, coconut, cucumber, sugarcane and *Tarawau* (Anacadiaceae fruit) are grown. Women also cultivate smaller, more accessible plots located around their homes, where they grow vegetables such as *bele* (hibiscus manihot), *baigani* (eggplant), *rourou* (taro leaves), *dalo* (taro) and fruit trees such as guava, mango, coconut, banana and also pandanus. Pandanus leaves, which are used for weaving traditional mats, provide an important resource for the women of Nasinu, as they are used during traditional functions and as a trading item. Money earned by the women is often used for paying school fees or for purchasing items, such as pots, stove and beddings.

Table 2 Traditional Roles – Nasinu

Traditional Role	iCavuti Title	Description of Role	Village in Ovalau
Turaga Chief	<i>Roko Takala</i>	Leads the people of <i>Tikina Nasinu</i> and is responsible for the general welfare of the locals.	Makuluva, Nasinu
Matanivanua Herald	<i>Kai Navuvulo</i>	He communicates and delivers messages between the <i>Roko Takala</i> and the people of the <i>Tikina Nasinu</i> , between the <i>Roko Takala</i> , the <i>Tui Wailevu</i> and between the <i>Roko Tui Ovalau</i> .	Wausomo, Nasinu
Bati Warrior	<i>Roko Tui Ovalau</i>	Protects the <i>vanua</i> Nasinu and is responsible for carrying out burials for the <i>Vasu</i> (people with maternal links) and members of the other clans of Nasinu except the burial of <i>Roko Takala</i>	Kai Delai, Naikorokoro
Bete Priest	<i>Veimataki</i>	Protects the <i>Roko Takala</i> and performs his burial.	Natokalau
Gonedau Fisher folk	Not known	Not known	Not known
Mataisau Craftsmen	Not known	Not known	Not known
Sauturaga Chief Executive	Not known	Not known	Not known

Table 2 summarizes the Traditional roles of the people of the *Tikina Nasinu*. The *Roko Takala* Turaga Chief is from the Makuluva clan located in Nasinu. His role is to lead the people of Nasinu and he is responsible for the general welfare of the people. The *Matanivanua* (Heralds) are from the Wausomo clan from Nasinu and they communicate and deliver messages between the *Roko Takala* and the people of the *Tikina Nasinu*, between the *Roko Takala*, the *Tui Wailevu* and between the *Roko Tui Ovalau*. The *Bati* (Warrior) are from the Kai Delai clan from Naikorokoro village and their role is to protect the *vanua* Nasinu and is responsible for carrying out burials for the *Vasu* (people with maternal links) and members of the other clans of Nasinu, except the burial of *Roko Takala*. The *Bete* (Priest) live in Natokalau and their role is to protect and perform the burial rituals and procedures for the *Roko Takala*. The *Gonedau* (Fisherfolk), *Mataisau* (Craftsmen) and *Sau Turaga* (Chief Executive) clans of Nasinu cannot be confirmed by the participants.

This is due to a change in the governance system brought about by the colonial administrators. Since these roles have been lost they are left undone or sometimes members of other clans take them on. For instance, in the absence of the *Gonedau* (fisher folk) the *Bati* (warrior) whose role is to protect the *vanua* tries to carry out the role of the fisher folk since their *vanua* ecological

knowledge are similar. However, the non-existence of these clans has also contributed to the loss of their expert knowledge and skills.

### 2.2.3 Rukuruku

Figure 2.6 A view of Rukuruku village from the Northern end of the village<sup>5</sup>



Rukuruku village is located in a bay on the western most tip of Ovalau. Jovili Mua, Rakavono's son, is believed to have been the first settler in Rukuruku. Rukuruku village is named after Rakavono's behaviour when first setting foot on Ovalau. In the Lovonian dialect *ruku* means to go early to a place before someone else does; Rakavono was the first person to sight and settle on Ovalau before anyone else did.

Another meaning of the word *Ruku* is beneath or below. The Rukuruku elders believe that Rukuruku bay is where '*e rukutaki/vunitaki/ maroroi tu kina na mana se sau kei Viti*' (power, blessings and riches of Fiji is hidden) (Mrs M Wati, 2013: pers. comm). The bay where Rukuruku is located is known as *Sova ni Daniva* (basket for Sardinella). *Daniva* (Sardinella) is a type of small fish believed to be Rakavono's fish, and is said to have been traditionally offered to him by the *gonedau* (fisherfolks) who used to live in Qaliduna. Pregnant women are still not allowed to go to the *Sova ni Daniva* (basket for Sardinella) as locals believe that they would cause the fish to disappear. If this rule is broken the pregnant woman is expected to

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<sup>5</sup> A view of Rukuruku village from the Northern end of the village, by Ms R K Lagi

perform a traditional apology to *Roko Matairua* (chief of the village) in order to make the Sardinella return. Moreover, the *bête* (priest) is expected to clean the *Sova ni Daniva* to help the Sardinella return. When caught, the Sardinella is usually shared among people rather than being sold. However, the villagers are using big nets to catch the fish nowadays, which is often sold instead of being shared. Sometimes when the population of Sardinella is smaller, one of the fishermen is sent to Naigani to collect a rock, which then is placed in the sea to make the fish return to the people of Rukuruku (Mrs M Wati, 2013: pers. comm).

According to traditional history of Lovoni, Rakavono had twelve children. These twelve children became the leaders of the twelve tribes of Lovoni. One of the twelve tribes of Lovoni is called Qaliduna. Rukuruku is part of the *Qaliduna* tribe. The *Yavusa Qaliduna* tribe consists of three villages: Rukuruku, Taviya and Yarovudi. Rukuruku's traditional role is to be the *Matakilovoni* (herald) of the Qaliduna tribe to Lovoni. They are the spokesmen of the Qaliduna tribe who delivers messages from the Qaliduna tribe to the *Tui Wailevu* in Lovoni. Similarly, when a message is to be delivered to the *Yavusa Qaliduna* from Lovoni, the message is expected to be first communicated to the *Matakilovoni* before he will convey the message to the *Yavusa Qaliduna* (Mr S Ligaiviu, 2013: pers. comm).

## Worldview

Kinship is a key value that underlies the behaviour of most Indigenous Fijians. This also applies to vast areas of the fieldwork conducted in this thesis. For example, the *vasu* (brother's sister's children) have rights to their maternal uncle's resources which can be either land or goods. In this relationship the brother plays the important role of protecting and providing for his sister and her children. This relationship begins when the sister gets married. During her wedding, her brother and *mataqali* (clan) will gift her with a *covi ni draudrau* (piece of land) on which she and her children can live and use for farming. *Na vugodra* (their sister's children) are always cherished and respected and *vakamenemenei* (petted) and have the right to *vasuta* (take anything) from their *momo* (maternal uncle's) land. Sisters and their children reciprocate this by giving something to their maternal uncle that has equal or a higher value than what they have taken. Due to the significance of this relationship, *veivugoni* (maternal uncles and maternal nieces and nephews) may not directly speak to each other if they happen to be in the same place (avoidance or taboo relationship). However, easier relationships exist between their children, who have a 'joking' relationship with one another.

Understanding one's place in Rukuruku is important. Knowing one's place in their *Vanua* enables locals to perform their roles and responsibilities correctly. As will be discussed in the next section of this chapter, each member of the *Vanua* Rukuruku belongs to a clan and has traditional roles to play. These roles are taught to the young by the elders through observation, imitation and practise. Failing to know their place in one's clan, means not knowing one's roles and responsibilities towards the *Vanua* which is thought to lead to conflicts and instability in the *Vanua*.

Space (boundaries) is created in relationships between people and also to the *Vanua*. Each member of the *vanua* Rukuruku must know how they are related to each other and respect their relationship and space. Disrespecting the space can bring shame and conflicts in the *Vanua*. For example, for parallel cousins, it is disrespectful for them to be joking with each other. Parallel cousins who are caught doing this are normally punished or scolded.

Related to space in the *Vanua*, every person in Rukuruku knows their land boundaries and trespassing on someone else's land is not allowed. The village's traditional law punishes trespassing accordingly. In order to maintain peace and prosperity in the *Vanua*, it is paramount that people understand and respect their place and space in Rukuruku.

## Traditional Roles

During the 1870s many inter-tribal wars were fought. Locals claim that the people of Rukuruku fled and their land during wartime and left their land vacant. In the same time period the land was sold to Europeans by the Tui Levuka (Chief of Tikina Levuka). In 1951, the Native Land Commission decided to return Rukuruku to its original owners. Five hundred and seventy seven of them returned the same year. However, they were expected to use and maintain the land but were not given ownership. Many of the original people from Rukuruku believe that the sale and subsequent loss of their land has led to the erosion of their TEK as well as their customs. Some Indigenous Fijians' traditional roles such as *Sauturaga* (Chief Executive) and *Bati* (Warrior) seem to be non-existent in the village and people generally do not know about them or how to perform them, which can lead to conflicts in the village because villagers are not always aware of what they can and cannot do. (Mr M Tamani, 2013: pers comm).

As is the case in Lovoni and Nasinu, Rukuruku is governed following the Indigenous Fijians' hierarchical structure consisting of a Chief, Clan Headman, and Head of the Extended Family, Village Headman and the villagers. (See table 2.5. on page 22) A village meeting is conducted once a month in order to maintain the smooth running of the *Vanua* and in order to ensure the wellbeing of the villagers. The Village Headman acts as the secretary of the village meeting, he informs the villagers about the outcomes and decisions made at that village meeting and reports to the Provincial Council about important developments in the village.

As Rukuruku is a coastal village, the sea provides one of its main food sources. While men go deep-sea fishing, women are in charge of on-shore fishing, fish gleaning and collecting sea shells and *totoyava* (sea weed) for family consumptions. In addition, every man owns a yam, taro and cassava plantation. Boys usually follow their fathers to their fields or to the sea and girls assist their mothers with household chores like gardening, washing, cooking, fishing, collecting sea shells, weaving and child minding. Children learn from their parents as they observe and imitate

them through practice. The main source of income for the men is farming (selling crops such as taro and kava or vegetables such as cabbage, *bele* (hibiscus manihot) and *baigani* (eggplant). Women on the other hand weave and sell mats and vegetables, fruits or *ura* (prawns) and *kuita* (octopus) when they are in season.

*Table 3 Traditional Roles – Rukuruku*

Traditional Role	<i>iCavuti</i> Title	Description of Role	Name of village
<i>Turaga</i> Chief	<i>Rokomatairua</i>	He leads the people of Rukuruku and looks after the general welfare of the <i>vanua</i>	<i>Naividagumu</i>
<i>Matanivanua</i> Herald	<i>Matasau</i>	He has a close relationship with <i>Rokomatairua</i> and advises him on the welfare of the people. He also delivers messages from the people to <i>Rokomatairua</i> and vice versa.	It is believed that originally two clans were filling the role of <i>Matanivanua</i> . A clan Nakorovou which is performing the role at present and a clan from Naivara whose members are believed to have gone extinct.
<i>Bete</i> Priest	<i>Vatukaka</i>	He is close to <i>Rokomatairua</i> and advises him on things to be done in the <i>vanua</i> for the benefit of all. He is the link between <i>Rokomatairua</i> and the spirit world and possesses the gift of healing and medicinal knowledge.	<i>Nacubulei</i>
<i>Gonedau/ Tuirara</i> Fisherfolk	<i>Naiqili</i>	As ‘Kai Wai’ in (people of the water) they are responsible for protecting the sea and its resources. Also they catch fish for <i>Rokomatairua</i> and the <i>vanua</i> .	<i>Rube</i>
<i>Liga ni magiti/ Matasau/ Liga ni doko</i>	<i>Matasau</i>	They are responsible for looking after <i>Rokomatairua</i> ’s garden and providing him with food.	<i>Natiavatu</i>
<i>Bati</i> Warrior	<i>Gonenicolo</i>	They are responsible for protecting the chief.	The clan is believed to be nonexistent
<i>Mataisau</i> Craftsmen	Not known	They are responsible for building and carving for <i>Rokomatairua</i>	<i>Verata</i>
<i>Sauturaga</i> Chief Executive or also known as <i>Kaivanua</i> People of the land	Not known	They are responsible for advising the chief and executing his decisions.	<i>Naivara</i>

Table 3 above illustrates the traditional roles of the people from Rukuruku. The *Roko Matairua Turaga* Chief comes from the Naividaguni clan in Rukuruku. Their role like the chief in Lovoni and Nasinu is to leads the people of Rukuruku and looks after the general welfare of the *vanua*. The chief's role is to make decisions concerning the day to day business of the village after consulting his people. The *Matanivanua* Herald is believed to be the responsibility of two clans; Nakorovou which is actively involved at present and Naivara whose members are believed to have been non-existent. The loss of the second clan is due to people fleeing from Rukuruku during the time of intertribal wars. Only the members of the Navara clan returned. Since the village was vacant, the Tui Levuka at that time sold their land. The loss of a clan means a loss of their traditional skills and knowledge. The *Bete* (Priest) comes from the Nacubulei clan from Rukuruku. He has a close relationship with Rokomatairua (chief of Rukuruku) and advices him on what has to be done in the *vanua* for the benefit of all. The *Bete* (Priest) is also the spiritual link between Rokomatairua and the spirit world. In addition, the *Bete* (Priest) has healing and traditional medicine knowledge and skills. More so, the *Bete* (Priest) is the only person who can touch the Chief's body. The *Gonedau* or *Tuirara* (fisher folk) comes from the Rube clan from Rukuruku.

They are also known as *Kai Wai* (people of the water) who is responsible for protecting the sea and its resources and catching fish for Rokomatairua and the *vanua*. The *Gonedau* are experts in fishing and possess a vast knowledge about the climate, its changes and how to adapt to them. The *Mataisau* (craftsmen), also known as *Liga ni magiti* or *Liga ni doko* come from the Natiavatu clan and are experts in gardening and are responsible for preparing the Chief's food. This clan possesses *vanua* ecological knowledge that allows them to forecast the seasons and climate. They hold farming skills and agricultural knowledge that permits them to know the appropriate time and place to cultivate. The *Mataisau* (Craftsmen) are based in Verata, Tailevu and their role is to construct and provide maintenance to *Roko Matairua*'s the chief's house. They have *vanua* ecological knowledge so they know what trees are suitable for different types of constructions and where to find them. The *Gonenicolo* clan which provide the *Bati* (Warriors) are responsible for protecting the *vanua* and *Roko Matairua* does not exist anymore. The Naivara clan which provides the *Sauturaga* (Chief Executive), responsible for advising the chief and executing his decisions are also nonexistent. Similar to the case in Nasino, the extinction of a clan leads to new

clans taking over the roles and responsibilities. For instance, the *Gonedau* (Fisherfolk) clan of Rukuruku: whose role is to protect the sea and its resources are using their ecological knowledge to assist in advising the *Roko Matairau* (Chief of Rukuruku) on matters concerning the protection of the *vanua*.

## Summary

The locals of the three villages used for the fieldwork of this thesis all belong to the *Vanua* o Ovalau. They share the understanding of the meaning of *vanua* as physical, social, cultural, and spiritual knowledge systems of a place. Rakavono was the first to settle on the island and declared ownership of it. He and his descendants established various villages on the island. The three villages used as research sites therefore have been related. This means that they share some knowledge and values. Some aspects of the initial knowledge and values have been lost due to colonization processes and during times of intertribal wars. The three research sites had a traditional governance system that assisted with the organization of daily activities. This governance system was changed due to colonization processes leading to the loss of some traditional roles such as the *Bati* (Priest) and *Sauturaga* (Chief Executive) in Rukuruku, which contributed to a somewhat dysfunctional nature of the village. Understanding one's traditional role and performing it as expected is vital in the smooth running of the *Vanua*. As shown in this section, there are seven clans with specific traditional roles, skills and knowledge in the *vanua* o Ovalau. The seven clans are the *Turaga* (Chief) whose role is to lead the *vanua* and make important decisions for the *vanua*, the *Sauturaga* (Chief Executive) whose role is to advise the chief and execute the decisions made by the *vanua*. Also, the *Sauturaga* (Chief Executive) holds the *sau* (power) of the *vanua* and bequeaths it to the chief during his installation. The *Matanivanua* (Herald) is the chief and *vanua*'s spokesperson. Their role is to speak on behalf of the people to the chief and vice versa. The *Bati* (Warrior) is responsible for the maintenance and protection of the *vanua*. In addition, it is the role of the *Bati* to cultivate and prepare the chief's food hence they possess traditional farming skills and knowledge. The *Bete* (Priest) forms a spiritual link and has healing skills and knowledge. In addition, he has the gift of being able to foresee the future hence he is also responsible for advising the chief about future events. Another important role of the *Bete* is to perform the burial processes of the chief. The *Gonedau* or *Tuirara* (Fisher - folk) are responsible for protecting its resources and providing sea food for the

*vanua*. They possess weather, seasonal forecasting and fishing skills. Finally, the *Mataisau* (Craftsmen) are responsible for building the chief's house, boat and craft. They possess specific carpentry and craftsmanship skills.

It is important for each member of the *vanua o Ovalau* to pick up the necessary skills in order to fill their role within the community effectively. If the knowledge is not passed on correctly it may affect the smooth running of the *vanua*. This can have severe consequences, for example if a cyclone is approaching. In order to make full use of the TEK and to prepare for such a natural event the *Bati* (Warrior), *Bete* (Priest) and *Gonedau* or *Tuirara* (Fisher folk) have to work together. The *Matanivanua* (Herald) also plays an important role during this time as he passes on the advice given by the climate experts to the individuals of the villages. After the cyclone has passed it is the *Mataisau* (Craftsmen) who are needed in order to assist with repairing homes. Also the *Bati* (Warrior) and the *Gonedau* (Fisher folk) play a role in the aftermath of a cyclone, helping rebuilding farms and providing food for the Vanua. This example shows why it is vital that the *Vanua* knowledge of Ovalau is researched, documented and passed on to younger generations. Failure to do this may result in the loss of traditional knowledge which is important for the *Vanua o Ovalau*'s daily activities, relationships, survival and continuity as a *kawa tamata* race.

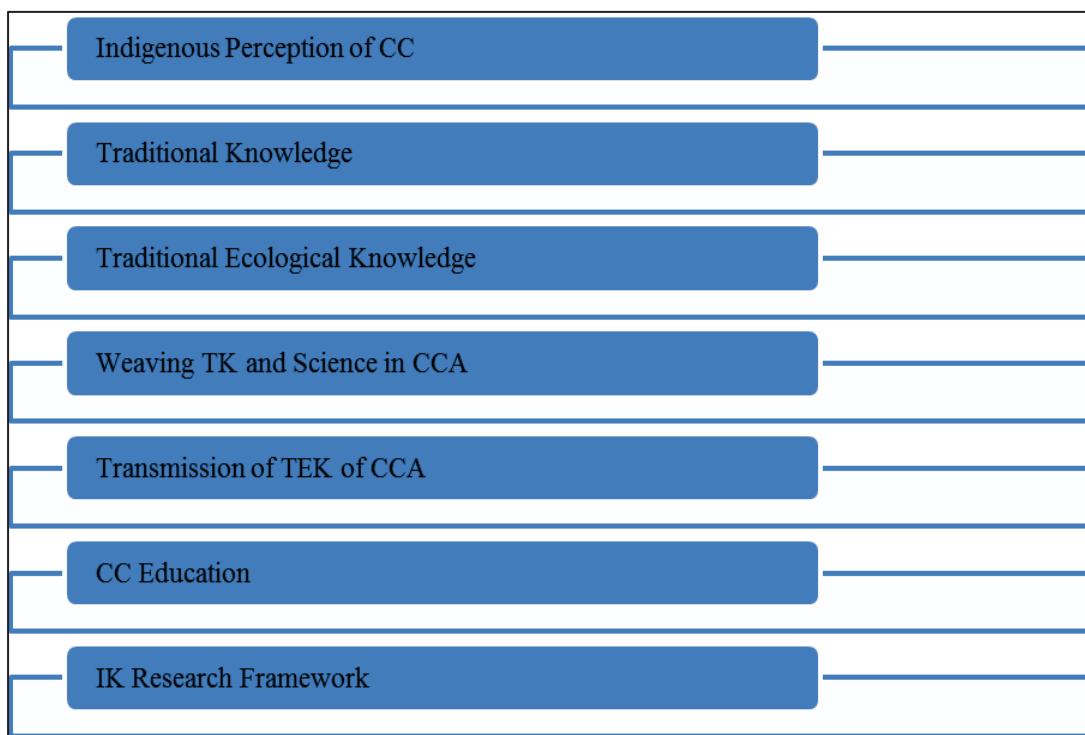
This chapter has outlined the history and geography of the research sites as well as their socio-cultural settings, including the people's traditional roles and worldviews. These are important for understanding their perceptions of CC and CCA. A review of the relevant literature will follow in the next chapter.

# Chapter Three | Literature Review

This chapter reviews the relevant literature that was consulted in relation to the research questions including publications about Indigenous people and their perceptions of CC; the importance of documenting TK of CC as much of these are fast disappearing; how TK and Scientific Knowledge can be integrated for CCA, and finally the literature on how TK may be integrated into the school curriculum in Small Pacific Island states.

The diagram below summarizes how this chapter is organized.

*Figure 3.0 Literature Review Outline*



## 3.1 Indigenous Perceptions of Climate Change

The United Nations Framework for the Convention of Climate Change (1992) describes CC as ‘a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods’(p.2). This definition complements the one offered by the Pacific Islands Framework for Action on Climate Change (2006-2015) which refers to CC as

‘any change in climate over time both as a result of human activity and natural variability’. The Indigenous Fijians’ Climate Change Glossary (2012) which has been derived from the UNFCCC’s definition of Climate Change states:

*Na draki veisau ni vuravura e vu mai na veika e vakavuna ka cakava na tamata ena nona bula me vaka na musu kau, na buliyaya, na misini, na veilakoyaki ka ra vakavurea na kasi cevuraki me moica vakatani na ituvaki ni draki ni vuravura.* A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and is in addition to natural climate variability observed over comparable time periods (p.8).

Research conducted by Bynoe (2012) in Guyana and Suriname suggests that although 25.5% of the people could not explain what CC was, many stated that CC was an increase in temperature and decrease in rainfall which had led to decreased farm outputs, frequent and severe flooding, prolonged droughts and an increased number of health problems including Malaria, skin rashes and other water borne diseases, which ultimately made people change their lifestyle. People from Guyana and Suriname have developed various coping strategies such as practicing multi-cropping, relocating and planting crops that mature early, such as cassava. However, these coping strategies only work to a limited extent. Locals are still facing challenges because they cannot always predict the weather, the large number of invasive species endangers local ones, the geographic location of the countries limit the alternative lifestyles and some residents are ignorant of CC. As a solution for these challenges, Bynoe (2012) recommends the implementation of a more ‘bottom up’ approach in CCA programs. If communities are more involved, she argues, changes would be more sustainable.

A study by Sanchez-Cortes and Chavero (2011) with the Zoque, an indigenous tribe of Mexico, found that the local perception of CC can be summarized as a decrease in rainfall and an increase in temperature affecting their corn planting season and the need to introduce new crops suitable for hotter and dryer climates.

The local’s perception is mostly based on their daily agricultural and weather experiences. The changes in climate affect people’s agricultural practices and their traditional ways of living.

Similarly, Davydov and Mikhailova (2011) in a study about the Nenets people of Vaigach in the Arctic, found that the indigenous people of this region view CC as a twofold approach; climate and weather events that controlled people's livelihoods and behaviour. Hence, CC for the Nenets means colder and longer winters, and shorter summers. The local people's perception of CC based their observation on snow melting, the arrival and disappearance of birds, and the changes in vegetation. Climate change according to the locals has drastic impacts on their environment, economic activities and public health; it threatens their survival.

Codjoe, Owusu and Burlett (2013) conducted a study in metropolitan Accra, Ghana, which suggests that CC is caused by a combination of deforestation and burning of rubbish and firewood. Few local people associate CC with the burning of fossil fuel since they are not aware of the fact that CC can be caused by such activities. Interviewed locals believe that CC contributes to the increase in poverty and hardships among the poor. CC is also thought of as a contributing factor towards low yields of crops. Several adaptation strategies that have helped people cope with CC include: the traditional climate indicators, such as birds and insect behaviour, which can forecast an approaching natural disaster. The people of metropolitan Accra have a close community bond that has contributed to their success in the dissemination of information on weather patterns and trends.

In Bolivia, Boillat and Berkes (2013) found that the indigenous people associate CC with social and environmental changes such as population growth, migration, urbanization and land degradation. In addition, some saw CC as part of a cycle related to their traditional beliefs. They believe that their ancestors left the land to them and they are experiencing what had been experienced many times before. Moreover, some saw CC as the reaction of the spirits to humans' behaviour towards the environment, a punishment or reward depending on how locals had been treating their environment. Boillat and Berkes (2013) found people relied heavily on their daily experiences and observations of changes in their environment, and the authors suggest that their TK of interpreting observable phenomena need to be taken in consideration in planning, developing and implementing CCA programs.

The link between TK of CC and people's means of livelihood is also shown in a research by Oxfam (2013) conducted in Peru, Zimbabwe and Vietnam. The study found that indigenous farmers perceived CC as impacts of changing climate on their farming systems and crop

performance. Indigenous farmers recognized the impact of CC and adapted appropriate strategies to mitigate its impacts on their productivity. These farmers were using TK of weather forecasting, biodiversity management (managing the local species) guided by their traditional farming calendar. Oxfam subsequently recommended that indigenous farmers' TK be used together with meteorological data to address the gaps in people's perceptions of CC and develop workable adaptation strategies.

In Africa, a draft report by Charapa Consult (2012) highlighted that CC among the Kenyans is perceived through observing its impacts on their environment and the effects that impact the locals' daily lives and survival. According to this report, the Africans noted that CC is experienced more drastically compared to the past with droughts and floods, drying up of rivers, swamps and wetlands, changing rainfall patterns; increasing occurrence of frosts, diminished soil fertility, and escalations of pests and diseases. All these events affect crop productivity which directly impacts people's livelihoods. However, the Africans have TK of forecasting changing weather patterns, although nowadays the elders cannot predict the rainy or dry seasons anymore. The Africans possess TK about forecasting weather changes and locals used to be able to predict rain, drought and other seasonal changes by observing sun, moon, stars and local animal behavior. Nowadays, however, they often no longer do this. One reason for the loss of their ability to forecast weather changes is the migration of local animals, for example frogs, whose croaks used to be important for knowing whether rain was approaching. Africans also had traditional coping or adaptation strategies to CC, most of which are not used anymore because of the easy availability of modern technologies. The authors conclude that indigenous people of Kenya believed in the relationship between socio-political and environmental systems for a sustainable livelihood and environment and the fact that their TK of CC indicators and adaptive strategies were pretty accurate. However, they added that in many communities in Africa, such TK is not used and/or passed on to the younger generation because government policies have tended to marginalize indigenous communities by not giving them access to their communally owned land and resources which were the foundations of their culture and therefore their TK.

Furthermore, Charapa Consult (2012) states that many African indigenous communities have limited access to education and training that might allow them to have access to alternative knowledge of weather and adaptation strategies with which to cope with CC. Therefore, many

people have increased their dependence on western approaches which often can be expensive and time consuming not to mention undermining a community's self-reliance and identity.

After a two day symposium involving indigenous people from the Polar Regions, Alpine Areas, Deserts, and Tropical Rainforests, Islands and Temperate ecosystems, Salick and Byg (2007) published a paper that summarized the indigenous perception on CC to be mostly perceived through their observations and the use of cultural frameworks which mainly focus on 'spiritual balance'. Indigenous people interpreted the adverse weather conditions as an imbalance in the cosmos and as something that has upset the spirits who punish humans for their misconduct. Breaching a taboo such as hunting or harvesting in restricted areas or humans' selfishness and cruelty to the environment are some examples of activities that can upset the cosmos. Even though indigenous people generally perceive CC as a punishment from their gods, they have ways of coping with those changes. One way of dealing with the 'punishment' is diversifying their resource bases by multi cropping and through the use of shifting cultivation. They carefully observe climate and season indicators, and plant the right type of crop accordingly. The adaptation methods allow indigenous people to build a more resilient community and live through the changing climate unharmed.

The findings of the symposium suggest that indigenous people perceive CC as directly related to their everyday experiences and observations of their environment and as something that affects their daily tasks and survival. For them, CC manifests in the relationship between human action and their environment. Humans' actions on the environment cause change to the climate, which in turn has a drastic impact on their environment and consequently threatens their survival as a cultural group. However, their TK about forecasting weather changes enable them to prepare and adapt to such changes. In some places, TK cannot be used because indigenous populations no longer have access to traditional lands and resources often because they have been relocated to other areas. Another reason for the loss of TK is due to the inaccessibility of traditional education and training as well as relying too much on modern methods. Both of these reasons threaten the existence of the TK and the traditional communities.

In summary, it is evident that different communities have various ways of knowing/perceiving CC hence their adaptation strategies vary accordingly. In the Northern Hemisphere (Alexander et al (2011) in the Caribbean Bynoe (2012) and in Zoque (Sanchez-Cortes and Chavero, 2012) the

indigenous people studied perceive CC as an increase in temperature that has affected their productivity and people's health. In Bolivia (Boillat and Berkes, 2013), the Arctic (Davydov and Milkhaileva, 2012) and Ghana (Codjoe, Owusu and Burlett, 2013) the indigenous people perceive CC as a phenomena caused by man's disrespect of their environment, which has led the spirits to punish humans by disturbing their economic activities and production. In Africa (Charapa Consult et.al, 2012), and in Peru, Zimbabwe and Vietnam (Oxfam, 2013), the indigenous people perceive CC to have negatively affected the fertility of the land and the farm production. Finally, it can be concluded that indigenous communities perceive CC as a result of man's disrespect for the environment. In summary the literature demonstrates that there are many forms of traditional knowledge which people have used historically, and also in contemporary situations, to understand, explain and respond to changes in the climate and environment. These forms of knowledge have been undermined and challenged in the context of modernization but nonetheless have value which, to an extent, allows people to adapt and cope with changes in the environment and climate. However, this literature is largely silent on the adaptation methods used by locals. One of the reasons could be the loss of TK of traditional adaptation methods in Indigenous communities (Oxfam, 2013). This study, tries to address this gap by investigating the Indigenous Fijians' Traditional Adaptation methods to CC.

## 3.2 Traditional Knowledge

TK is a controversial term still debated in academia with many different definitions of it. However, in this part of the Literature Review, some definitions used in current literature consulted will be highlighted.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) (2002) defines TK as

...complex bodies and systems of knowledge, know how, practices and representations' accumulated, maintained and developed by indigenous people over years of interaction with their environment and a holistic and comprehensive view has to be taken in order for it to be understood. TK includes 'language, attachment to place, spirituality and worldview. In addition, they highlight that TK is synonymous to TEK, IK, local

knowledge, rural people/farmers' knowledge, ethno-biology/ethno-botany/ethno-zoology, ethno-science, folk science and indigenous science (p.9).

A similar definition is given by World Intellectual Property Organization (WIPO) (2005) which defines TK as a living body of knowledge which is developed, sustained and transmitted inter-generationally hence forming part of the Indigenous community's cultural and spiritual identity. It includes the Indigenous community's cultural expressions, signs and symbols, know-how, practices, skills, and innovations resulting from the intellectual activity which can be found in different contexts, such as agriculture, science, technology, ecology, medicine and biodiversity. The International Indigenous Forum on Biodiversity (2003) refers to TK as a collection of values and traditions inherited from Indigenous people's ancestors.

Another explanation is offered by The Convention on Biological Diversity (2006) which regards TK as the knowledge, innovations and practices that are developed and adapted over centuries of experience of indigenous and local communities and is communally owned and transmitted orally and practically inter-generationally in stories, songs, folklore, proverbs, cultural values, beliefs, rituals, community laws, local language, agricultural practices, fisheries, health, horticulture and forestry.

Worth noting is Dei's (1993) definition of TK. Dei (1993) defines TK as a holistic and inclusive form of knowledge that is a product of the direct experience and relationship of the indigenous peoples with nature, that it 'includes the cultural traditions, values, beliefs and worldviews of local peoples in a community...' (p.105). Hiebert and Van Rees (1998) adds to Dei's definition by stating that TK includes cultural beliefs and traditions learned through experience over a lifetime and passed on to the present generation from their ancestors for their survival. This knowledge teaches the present generation to live in harmony with their environment, highlighting the relationship between the trees, soil and water.

In support of Hiebert and Van Rees (1998) definition, Veitayaki (2010) stated that TK consists of knowledge that has been accumulated and trialled over centuries through experiences of the indigenous people with their environment; gaining knowledge from their environment for their survival; food, medicinal and cultural knowledge. He noted that this knowledge is held by elders

who are respected for their knowledge and who transmit the knowledge to their children for a sustainable livelihood.

### **3.3 Traditional Ecological Knowledge (TEK)**

UNESCO (2002) and The Convention on Biological Diversity (1992) have previously highlighted that TEK is sometimes used synonymously with TK. In response to this definition, Brook and McLachlan (2008) add that TEK refers to Indigenous Knowledge (IK) or Local Ecological Knowledge (LEK), which give valuable insights held by laypeople that work with and conduct their lives in a natural environment. They emphasize the importance of practical skills and wisdom developed through experience. Moreover, TEK is communicated orally. This knowledge accumulates over years and is built on experiences of past and present generations through mentoring, storytelling and cooperative work. In addition, the authors add that TEK evolves and responds to the changing environment and conditions in a society. It provides an affluent body of knowledge that is useful for understanding and responding to ecological problems. Hence, Brook and McLachlan (2008) propose that this knowledge can offer helpful input for policymakers, researchers and managers in addressing issues related to large scale environmental change that are becoming apparent now.

Watson, Stumpff and Meidinger (2012) emphasise the importance of recognizing how TK of the environment is transferred from one generation of the North American people to another and how the wisdom of its application can assist society in the task of making decisions to protect the wilderness and in the need to increase resiliency during this era of CC. They note that the ‘natives’ have accumulated knowledge about the different seasons of growth, development, reproduction and migration of organisms and depend on this knowledge for their survival as the environment gives signs and signals that shows the changes that are happening. Locals are sensitive to these signs and come up with ways to adapt to these changes. The authors also highlight the significance of indigenous stories of nature. These stories are powerful tools for teaching cultural ethics and give an insight into a world of animals and plants of the area, creatures of water and sky. The stories also illustrate how the native people have adapted during tough climatic conditions and how every single member of a community bears some responsibilities and is involved in this process. All in all, these stories teach humans how to live

in a respectful symbiosis with their environment (Watson, et.al, 2012). In the past natives have intervened by coming up with suitable adaptation methods to CC. One of the methods used is imposing a restriction on harvesting certain resources. In restricting the use of certain resources, are given a chance to regrow. This approach contributes to higher yields.

Similarly, Berkes, Colding and Folke (2000) support the belief that indigenous people offer complementary knowledge and views founded on their own situated practices of resource usage. The authors found a diversity of traditional practices concerned with managing the environment. Such practices have been adapted, accumulated and transmitted over generations and have been used to interpret and respond to signs from the environment in order to manage natural resources. TEK, they suggest, has two major components: First, the observational knowledge of the environment that controls people's daily activities and resource management and second the belief component of how people relate to the ecosystem.

An interesting view is offered by Dickie (2005), who studied how Pacific Islanders' religious traditions are affected by the land they inhabit and how the western world can learn from the interconnectedness prevalent in Pacific societies. She highlights that for many Pacific Islanders humans are inseparable from nature. Humans and nature rely on each other. She further notes that Indigenous people are guardians of their ecology. They belong to their ecology, which is their source of life. Their ecology nourishes supports, teaches and connects them to their past, present and their future. She suggests further that Pacific Islanders see nature as sacred and that they have an intimate relationship with it.

The destruction of nature means spiritual death for Pacific Islanders since they are connected to it. More so, Pacific Islanders believe that the material and spiritual world are woven together in a dynamic web, implying that, religious rites play an essential role in nurturing and protecting the cosmic powers and the natural world. Pacific Islanders, Dickie (2005) reports, are united in one belief, that the cosmos consists of the 'sky, earth and the spirit world in unity, creating an alive and dynamic universe,' and out of all these three, everything is created, therefore, humans are 'direct descendants of the earth' and have a responsibility towards it. Since all are created inextricably into one, spiritual power is in all things hence dedication is shown to the land and all creatures. However, Dickie (2005) highlights that many of these beliefs seem to be fast

disappearing. Due to modernization and colonialism, nature, which the indigenous people rely on for the knowledge and wisdom necessary for their survival, is destroyed.

Berkes (1999) is another author who writes about the importance of TEK. He defines TEK as a cumulative body of knowledge practice and belief systems evolving by adaptive processes and handed down through generations by cultural transmission. The term describes the relationship of living things (including humans) with their environment. He further relates TEK to discourses of environmental ethics, common property and environmental history and is rooted in, ethno science and human ecology which is used in a range of environmental management tasks such as conservation of biodiversity and protected areas, environmental assessments and ecological research. Furthermore TEK is viewed as sacred and includes ethics, aesthetics, reverence and faith which must be respected and understood and must be used with a pluralistic approach to manage resources. There is a need, Berkes claims, for universal institutions to integrate traditional and global rules and values of resource management since the traditional institutions cannot operate in isolation. Other aspects of TEK according to Berkes include the fact that it is a source of biological knowledge giving ecological insight. It is vital for creating sustainable ecosystems and community based conservation. Connecting human values with conservation values helps in reducing pressure on resources.

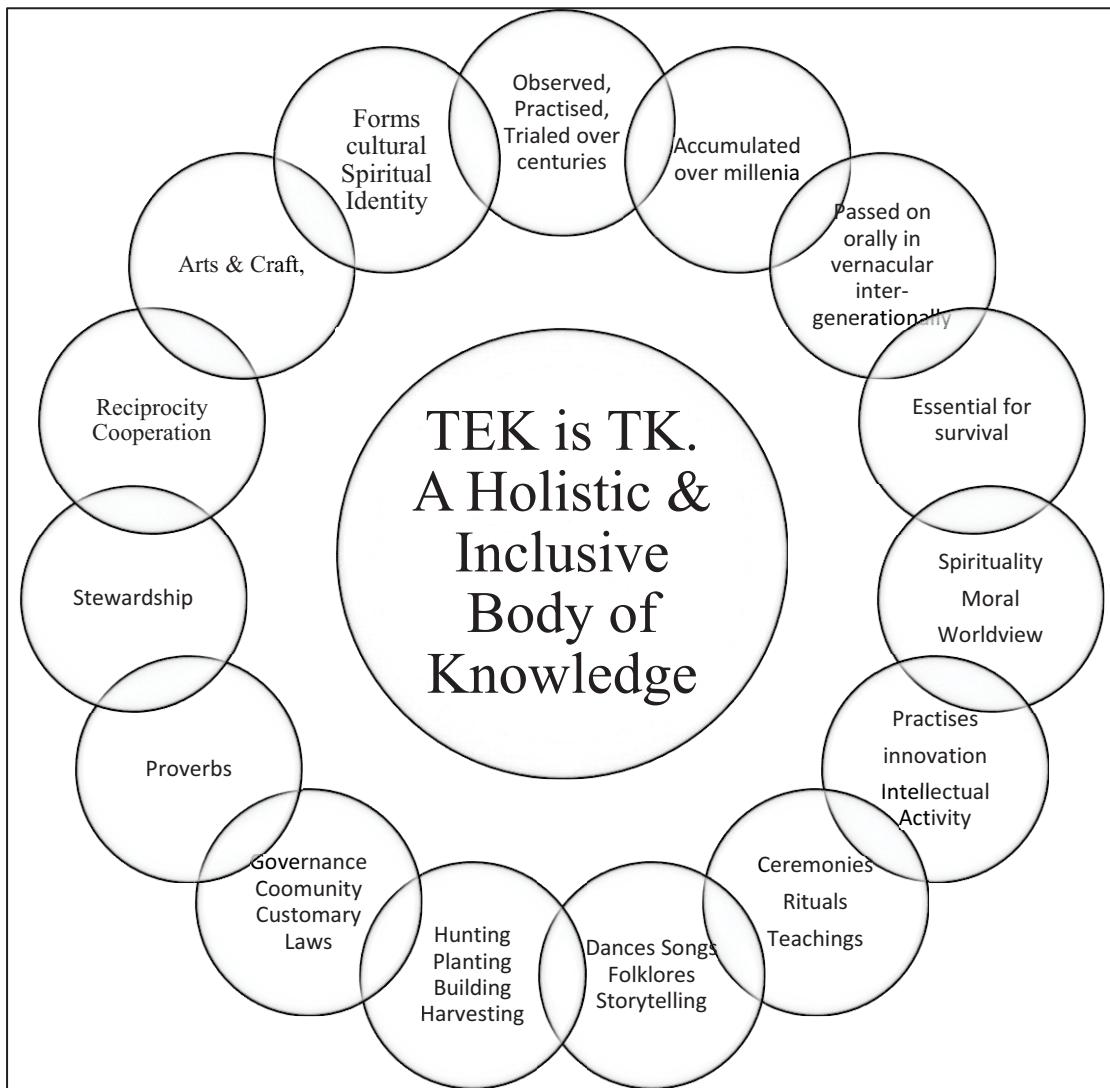
Berkes highlights that TEK is a knowledge that includes: '(i) the knowledge based on empirical observations essential for survival (species taxonomy, distribution and life cycles); (ii) the understanding of ecological processes and natural resource management (practices, tools and techniques); (iii) the socio-economic organization necessary for effective coordination and co-operation (rules and taboos) and (iv) worldview or 'cosmos vision' (religion, belief and ethics) of different peoples'. It is interesting to note that Berkes emphasises that TEK originated from Ethno-Science and Human Ecology and therefore it can be said that TEK is a sub-set of TK as also noted by UNESCO (2006), the Convention of Biological Diversity (1992); and Veitayaki (2010).

In conclusion it can be said that Indigenous people's TEK is holistic and embedded in their TK, which includes their traditional values of respect and relationship with their environment. Intertwined in this notion is the existence of a spirit that gives Indigenous people the wisdom to effectively use their TK for a sustainable livelihood and ensure their survival. This TEK is

passed on to the next generation orally and through observation and practice in the forms of dances, songs, artwork, poems, rituals and ceremonies. According to the Literature consulted, TEK is similar to TK (Berkes, 1999; UNESCO, 2002), a body of knowledge that has been observed, practiced, trialed and accumulated over centuries by indigenous people and has been passed on orally over generations and is essential for their survival (Brook and Mc Lachlan, 2008; Veitayaki, 2006). The essence of TEK is linked to the language in which TEK is transmitted which enables the indigenous people to understand such a complex system (Convention of Biology Diversity, 2008). Furthermore, inclusive of TEK are spirituality, worldview, practices, innovations, intellectual activity, ceremonies, rituals, teachings, dances, songs, folklores, storytelling, hunting, planting, building, harvesting, governance, community and customary laws, proverbs, religious-traditions, stewardship, reciprocity and cooperation, and morality which are unique to a culture and evolve over time as a reaction to changing environment and conditions. (UNESCO, 2002; WIPO, 2005; The International Indigenous Forum on Biodiversity, 2003; The Centre of Traditional Knowledge,; The Convention on Biological Diversity, 2006; Clarkson et.al, 1992; Dei, 1993; Herbert and Van Rees, 1998; Veitayaki, 2006).

The following diagram, Figure 3.1, summaries the main features of TEK as a holistic and inclusive body of knowledge.

*Figure 3.1 TEK in Summary*



### **3.4 Weaving TK with Science in CCA**

This section examines suggestions made in the literature about ways in which TK can be incorporated into science in order to make CCA programs more efficient and effective.

In Fiji, at The University of the South Pacific, the Pacific Centre for Environment and Sustainable Development (PACE\_SD) categorises TK as 'ideas and beliefs acquired by observation that concerns the inter-relationship between living things and their surroundings based on their innate knowledge of their local environment'. This knowledge according to PACE\_SD is passed down from generation to generation orally through stories, songs, poems, rituals and ceremonies. TK still exists in communities who understand their environment.

People's understanding of their environment contributes to communal involvement networks. Such knowledge is considered important since it is held by community leaders and elders who are significant figures in their communities. In addition, PACE\_SD suggests that TK may enhance scientific understandings of CC by providing new information about changes brought about by CC and its impacts, and divulging into new perspectives on CCA. Also, according to PACE\_SD, the TK of the changes in indigenous people's environment can fill in the gaps in climate data on local and regional levels and can also help recommend culturally appropriate adaptation methods in areas such as food security, weather forecasting, infrastructure and ecosystems. Integrating TK into SK (Scientific Knowledge) can also assist with the reduction of CC impacts on local communities. However, local communities are in danger of losing their TK due to modernization. Therefore, TK can be used in community exchange programs, workshops and radio programs so that it can be preserved. In addition, community elders can be appointed as TK facilitators to expedite the maintenance of TK (PACE-SD, 2013).

A similar sentiment is stated by Gagnon and Berteaux (2009) who emphasize the complementarities of TK and Scientific Knowledge (SK) while conducting two case studies among the Nunavut in Canada. In their research they found that the two knowledge systems often overlap and TK broadens the understanding of scientific data as it can offer viewpoints that scientific knowledge can lack. In addition, their study provides new dimensions to the perception of ecology and uncovers new research opportunities. They also suggest that TK includes values, ethics and epistemologies crucial for natural resource management and understanding how TK and scientific knowledge operate. The view of the authors is that connecting the two knowledge systems will increase scientific findings.

Correspondingly, Huntington (2013) stresses that conservation cannot be carried out by scientists alone for it needs the knowledge, experience and practices of locals to be successful. This entails that professionals and local knowledge owners must work together in a partnership so that conservation can be effective. Drawing from his experiences in Nepal amongst the Tsumba people, Huntington (2013) highlights some of the ways in which Professional and Local Knowledge Owners can collaborate to ensure the effective implementation of any conservation program. Local residents have very significant information that can be powerful if amalgamated with scientific approaches. The author highlights the fact that the indigenous people of Nepal

have rules that govern how natural resources can be used how much and when and they are respectful of tradition and of the animals which they share the resources with. One of the ways in which the Tsumba people of Nepal protect their valley from erosion is by planting trees and plants on bare slopes; this protects them from hazards and impacts of erosion and landslides. In addition, Huntington states that the Tsumba people can also learn from scientists and conservationists about weather patterns and plants that may be useful in holding soil in place. Local knowledge, ideas and aspirations can be a good foundation to building sustainable practices that will conserve a healthy environment and a healthy way of life (Huntington, 2013). He further states that local knowledge offers a deep understanding of a specific area while scientific knowledge can offer information across broad areas. The two knowledge systems according to Huntington complement each other and putting them together can create an atmosphere of mutual trust and respect and the outcome will benefit all.

Furthermore Fazey, et.al (2006) emphasise the complementary role of experiential and SK. They state that experiential knowledge plays a vital role in decision making since learning from experience is essential in conducting effective conservation activities. Also, experiential knowledge provides qualitative information that is different from the quantitative information SK produces. In addition, experiential knowledge cannot operate in isolation hence will require scientific information to elicit it further. Experiential knowledge provides an alternative view to research and practice and can complement SK.

There remain important differences between SK and TK. Ross (2011) makes a comparison between them and suggests that the Knowledge Framework for TK is holistic and integrated and consists of a range of paradigms. In contrast SK is compartmentalized and specialized and consists of a limited paradigm. TK is subjective and belongs to individuals or a group of specialists, shared between members of a society and is available to all to assist in solving practical problems. The knowledge is considered true according to the status of the knowledge holder. In comparison, SK is held by individuals or research teams and is objective and considered true because of the rigor of data gathering and theoretical framework of the knowledge researched. While TK is culturally and spiritually embedded in a social framework, SK is impersonal, data-rich and often is de-contextualized from culture and society. TK is based on both qualitative and quantitative data and, is acquired through experience and, is empirical and

requires ongoing experiential reinforcement. This knowledge is pragmatic, concrete and local. In addition, results must be experientially grounded. SK methodology is based on quantitative data that requires experiments to be replicated within the rules of logic. This knowledge is framed theoretically, is abstract and can be generalized. TK is transmitted orally including songs and dances and is peer and society reviewed. SK on the other hand is published and peer reviewed with debates and investigations to validate the knowledge, and problems are resolved through experimental researches that are based in theories. Whereas TK is socially and spiritually structured, SK is institutional.

Despite the differences, SK and TK share certain features and overlap in some instances. Ross (2011) highlights that indigenous people lived in harmony with the land and depended on their environment for knowledge necessary for their survival, in contrast to this, modern indigenous people have lost this knowledge and cannot use it for natural resource management. Despite the belief that TK is irrelevant in Natural Resource Management, there are some scientists and resource managers who recognize that Indigenous peoples have knowledge that is valid and pertinent for modern natural resource management. Some of the difficulties of including indigenous knowledge in Natural Resource Managements are pointed out by Ross. His first reason is that TK often is not recognized because it has not been scientifically validated. It does not meet the scientific standards. Another reason is that, TK cannot be translated into the theoretical framework of the scientists since TK is expressed in a social or spiritual context that is different to the institutional structure accepted by scientists. Finally, another barrier, according to (Ross, 2011) can be summarized by the term ‘space and time’. TK constructs and defines space and time differently to western counterpart.

Vinyeta (2012) suggests that even though CC is experienced globally, its impacts are not evenly distributed. Indigenous societies who rely heavily on their environment for their livelihoods often are more severely affected. These societies often also rely on their TK to understand the changes happening in their environment and to adapt to these changes. Similarly, TK according to Vinyeta can also assist scientists in understanding environmental changes and the development and implementation of CCA approaches. In order to maintain a successful long-term partnership between scientists and TEK holders it is necessary that the IKS and culture are being protected from being manipulated and misused. Vinyeta (2012) also recommends that institutional

practices and policies should accommodate this knowledge exchange by developing a framework that guides organizations and people and helps them use the culturally sensitive TEK in their planning of CCA policies and mitigation projects.

A similar study, carried out in Samoa by Lefale (2010), examines the TEK of weather and climate and found that Samoans have their own unique seasonal calendar acquired through observing the changes occurring in plants and animal behaviours in their local environment. These changes in plants and animals are key indicators for forecasting weather and climate. Some of the TEK in Samoa are: the reading of the sky and its cloud formations, the types of wind, the seasonal calendar, and observing animal and insect behaviours such as cockroaches, frigate birds and chickens. In addition, Lefale explains how activities within communities, families and other social groups are determined by the seasonal calendar and that the TK assists locals to anticipate, plan, respond and adapt to extreme weather and climate events. TK and WS are both equally successful when it comes to forecasting the weather and changes in the climate, therefore this study argues that both should be valued equally and TK should be integrated into CCA practices and the scientific understanding of weather and climate.

A similar view is put forward by McNamara and Prasad (2013). Their study highlights the fact that Pacific Island communities have developed a close relationship with their environment mostly because they depend on it for natural resources and survival. More so, they have obtained their knowledge of their environment through observing changes occurring in it. The locals use their TK for managing resources and for adapting to environmental changes such as extreme weather events. Therefore, this knowledge is understood to be a vital component in planning community based CCA as it is rooted in the knowledge and belief systems of the Indigenous people. The TK is vital in comprehending CC and planning relevant and sustainable methods to adapt to the effects of CC on a local level. One problem according to McNamara and Prasad is that this knowledge is rarely documented. The researchers of this study worked with communities in Fiji and Vanuatu exploring the ways they have adapted to local environment change or events. The findings of the fieldwork show that the communities in Fiji and Vanuatu have integrated western and indigenous adaptation methods in order to be able to adapt to changes occurring in the immediate environment. Some of the adaptation methods used in these communities include: re-vegetating coastal foreshores with native species, careful household

preparation prior to cyclones or flooding events, using innovative water storage practices during times of drought, and employing food preservation strategies during times of cyclones or drought (McNamara& Prasad, 2013).

Also, Campbell (2006) after a desktop study of traditional disaster responses concludes that Pacific Island communities have a TKS that allowed them leading to sustainable lives for millennia. The TK includes predicting adverse weather events and taking measures to ensure that communities get through natural disasters unharmed. However, the author states that while some of the traditional measures are still in use today others have disappeared. Some of the measures taken to respond to natural disasters included the use of a traditional calendar to guide them in planning agricultural activities, using sea resources, forecasting the climate and understanding different ways of preserving food so that it can be consumed during hard times. Others include cooperative strategies such as understanding their relationship with other communities and the importance of maintaining them so that they can assist each other in times of need. Finally, Campbell (2006) recommends that governments and personnel involved in post disaster relief projects need to understand and include such TK of disaster reduction strategies.

In the same way, Percival (2008) carried out a desk based study assessing Indigenous Environmental Knowledge (IEK) in the Pacific Region. He found that Pacific Islanders have a Traditional Ecological Knowledge System (TEKS) that they have been developing through observing and having a close relationship with their environment. This TEKS has enabled them to be resilient to endure hardships and adapt to changes in their environment. However the author notes that most of the TK has been lost. He also highlights that there has been little research about the Pacific indigenous people's understanding of CC and its causes. Percival (2008) further highlights that understanding IEK will assist with CCA. Moreover, he states that Indigenous Elders are guardians of TK. The elders pass on the TK to younger generations through stories that describe struggles, survival, values, love and their vision for the future. Percival also emphasises that TK is cryptic in nature and the degree of its sacredness or openness varies according to the different cultures. He adds that TK includes Explicit and Tacit Knowledge. The first is knowledge that is easy to understand such as the names and uses of medicinal plants, fruiting and harvesting seasons the latter is knowledge that is more difficult to articulate. Even though the Indigenous people in the Pacific region are vulnerable to CC

especially due to their dependence on nature, IKS relating to climate and weather are not properly documented. Therefore, the authors see the need to research this Knowledge system for fostering resilience for CC.

Pa'i (2012) explores in his study about the Samoans relationship with their environment and how their TKS allows them to forecast changes in their environment. Some of the ways in which they can forecast weather is by observing storm birds called *Atafa*. The sighting of a storm bird indicates an approaching cyclone and villagers would start preparing for the cyclone by storing food to last them during and after the cyclone. Also when the rain bird called *Tiotala* is sighted, it signifies that there is going to be rain; while sighting cockroaches flying around at night and sighting stars at night indicates that it is going to be sunny the next day; cats' pupils also indicate the changing tide. Pa'i (2012) also highlights the Samoan traditional calendar that allows locals to understand the different planting and harvesting seasons as well as a number of different medicinal plants. For Samoans, CC is related to the changes in fruiting and planting seasons, drying up of tributaries and falls, floods and droughts experienced in areas that do not usually experience them, rising sea levels, increase in temperature and loss of biodiversity. They also believe that CC has led to coral, mangrove and shoreline degradation, poisoned rivers that have reduced the prawn population and the reduction in native bird species. Some of the challenges Samoans face include having limited knowledge of CC and its impacts, a lack of documented and disseminated TK in the vernacular language and a lack of policies and regulations regarding the use of TK for CCA programs. As a response to these challenges the author suggests that all Samoans should be educated about the ways to protect the environment such as replanting coral or mangrove. Also, they should recognize and share TK, strengthen and reinforce village councils who are respected and have the power to administer environmental protection, and revive the old ways of working the land.

TK has also been applied in various institutions to assist in conservation management such as in Ra'ui, Rarotonga, Cook Islands (Mercer et.al., 2007); Roviana Lagoon, Solomon Islands (Mercer et.al, 2009); and in Kiribati. There is now a growing awareness among scientists of the value of TK with a growing demand for its integration within disaster risk reduction and predicting adverse weather conditions' (Derrick, 1951; Dyer, 1945; Mercer et.al., 2007; Campbell, 2006). It is the general view of most Pacific Islanders that TK has governed activities and survival of the

indigenous people for millennia where “it was inextricably interwoven with conservation of the environment” (Ministerial Conference on Environment and Development in Asia and the Pacific 2000). It is therefore important that such knowledge is researched, documented and possibly integrated into the modern school curriculum so that it can be passed on to young people.

Lal (2011) argues that Pacific Islanders lack expertise in CC, a view that seems to justify efforts by various Pacific governments and tertiary institutions to implement CC research and knowledge in the educational curriculum (Tagicakibau, 2011; Kannan, 2010). So far, CC Assistance Programs have used methods such as translating and distributing CC information in vernacular languages (PICCAP, 2005), using traditional seasonal closures for breeding fish and marine populations while banning fishing in *taboo* areas and “...transmitting CC knowledge through community based strategy such as drama to provide an interactive and innovative means to translate complex concepts...such as the science of CC...to a level understandable to the public” (Tawake, 2008).

Furthermore, Fazey (2010) highlights the need to deal with constant global environmental problems such as CC using TK since this provides important insights into the relationship of an individual to the environment and its complex systems. In order to appreciate, understand, and tackle chronic global social and environmental problems, greater appreciation of the importance of higher order thinking is required. Such thinking includes, the beliefs people hold about the nature of knowledge and how something is known. These beliefs have profound implications for the way individuals relate to each other and the world, such as how people understand complex socio-ecological systems (Fazey, 2010, p9).

TK is recognized as a useful tool for developing policies that enable people to cope with the effects of CC. In this context, it is interesting that Indigenous people have been recognized as powerful knowledge holders of ideas about CC and as key actors for developing policies to mitigate and cope with CC effects. In addition, Robinson and Herbert (2001) claim that in many rural communities decision making processes are based on TK and this knowledge can be used by scientists and incorporated into policies to assist people implement strategies for effective CCA. The authors further suggest that TK forms the basis for decisions being made on a local level in many rural communities. It has value not only for the culture in which it evolves, but also for scientists and planners striving to improve conditions in rural areas. Incorporating IK into CC

policies can lead to the development of effective adaptation strategies that are cost effective, participatory and sustainable (IPCC 4AR, WG II, Cross-chapter case studies, p865).

The significance of documenting TK is also emphasised by the World Bank, which suggests that a country's knowledge system is based on TK that maintains and improves the livelihood of people. According to the World Bank (1998), the basic component of any country's knowledge system is its TK. It encompasses the skills, experiences and insights of people, applied to maintain or improve their livelihood.

Veitayaki (2010), an Indigenous Fijian marine biologist, highlights the value of TK and shows how it has helped people survive in the past. He recommends that it should be incorporated into science based contemporary resource strategies and use, to encourage sustainable development. Similarly, Woodley (2002) emphasizes the importance of incorporating TEK for resource management in the Solomon Islands.

In Samoa, Lefale (2008) explains how locals rely on their knowledge about their immediate environment as changes in it assist them with coming up with adaptation strategies. In Fiji, Nainoca (2011) highlights the role of *Bula vakavanua* (traditional Fijian way of life) for implementing community based marine conservation (CBMC) , focusing on indigenous Fijian social capital and TEK. While these four authors, (Veitayaki, 2010; Woodley, 2002; Lefale 2008; Nainoca, 2011) highlight the importance of ecological knowledge for survival and sustainable development, they do not deal with the types of traditional sustainable methods that have been used by locals in the past for survival or how TK is passed down to the younger generations. This thesis thinks it important to document as well as find ways of transmitting TK to future generations of Pacific islanders in order to improve their quality of life.

Some authors suggest that TEK is complementary to SK and should be incorporated to assist with implementing CCA and coping strategies since they are practical, relevant and workable (Brook and McLahlan, 2008; Huntington, 2013; Watson et.al, 2012; Gagnon and Berteaux, 2009; Berkes et.al, 2000; Dickie, 2005; Lindenmayer and Dovers, 2006). However, some indigenous communities have lost this knowledge because it is rarely recorded and disseminated in Indigenous languages. In addition, there is a lack of policies and regulations with regards to TEK

use for CCA programs (McNamara and Prasad, 2013; Percival, 2008; Pa'i, 2012). Therefore, this study aims to inform policy writers about the significance of TK in CCA programs.

### **3.5 Transmission of Traditional Ecological Knowledge about Climate Change**

Below is a review of some of the literature about TEK and CC and how some of it might be integrated into a school curriculum. In Kiribati, Takirua, Teororo, Bureimoa, and Tebitaki, (2011) describe the activities associated with CC especially initiatives related to Climate Change Education (CCE) and the challenges faced by I-Kiribati people. . They report that while the Kiribati Curriculum Development Resource Centre has integrated CC for Years 1 – 6 in their draft syllabus, CC is covered only superficially. In the Kiribati Teachers' College (KTC), CCE is partially integrated in Environmental Science, Social Science and Science site visits but is not actually part of the college curriculum. The Kiribati Institute of Technology has no specific course on CC although environmental sustainability skills are included in the curriculum.

Some of the challenges that trainers and professionals in Kiribati face are the lack of knowledge and skills to integrate CCE into the curriculum and the difficulty of disseminating CCE to teachers in outer islands. These challenges can be addressed if CCE is well integrated into the learning and teaching processes in all learning institutions, if there is sufficient financial assistance for the training of trainers and curriculum and resource developers. Finally, if Kiribati networks with other regional countries in CCE for sustainability and support combined efforts to urge developed countries to implement appropriate policies to mitigate the effects of CC some of these challenges may be addressed. (Takirua, Teororo, Bureimoa, Tebitaki, 2011).

In Tonga on the other hand, Tupou (2011) reports that CCE has been successfully integrated in the curriculum's Key Learning Areas, in English, Tongan, Mathematics, Science, Creative Technology, Tongan Society and Culture as well as Movement and fitness.

In Vanuatu, Melteres (2011) reports that work has been done to integrate CCE in the school curriculum of Kindergarten to Year 6 with a CC sub-strand in the Social Science and Science curriculum. CC is already in Year 7 – 10 Social Science and work is still being done to include CC in Years 11 – 13. CCE is also compulsory in for the first year students and CC is taught in Year 2 of the Teacher Education program although it is yet to be included in the curriculum of

Year 3. Primary school teachers' workshops have been conducted with the assistance of the SPC GIZ to educate primary school teachers and primary curriculum writers on the topic of Environment and CC. In the non-formal education sector, the Wan Small Bag Theatre Company performs plays and produces films creating awareness of CC and Environmental issues. In the Technical and Vocation Education Teacher section, CC is included in the curriculum as steps are still being taken to include CC in the Agriculture, Forestry, Fisheries, Tourism and the Building and Construction courses. It is envisioned that CC can also be included in Family Life Education, Conservation of resources, Aquaculture and Livestock Husbandry. (Melteres, 2011)

In Fiji, Vosalevu, Kuilamu, Rawalai, Tuisawau, and Rigamoto, (2011) highlight the work of the Department of Environment in its policy objectives in which CCE is planned to feature at all levels, of both formal and non-formal education. This is to help build capacity in a coordinated manner with the aim of improving the production of teaching and learning resources and increasing individual ability to adapt and mitigate the negative impacts of CC. The 'Live and Learn Environment Education Project' is one of the partners of the Fiji MOE that aims at capacity building and resource development in CCE matters especially at the inclusions of CC in the curriculum for Class 1 to Form 7. Among writers who advocate the inclusion of CCE in the education curricula is Koya (2012) who claims that CC is a difficult situation that small island nations are facing. Life styles, beliefs, behaviours and practices have been changed by globalization and westernization leading to 'consumerism' and a lack of care about 'resource depletion and its socio-cultural and socio-ecological costs'. She believes that knowledge about CC and its consequences can be advocated through the use of art in the form of painting, dances, films, poetry, songs and music as evident in the festivals, workshops, exhibitions, recordings, and promoted by various NGOs as well as the creative works of many people in the Pacific. For instance, the 'Wasawasa Festival of Oceans' in 2008, Pacific Youth Festival in 2009, Tangata Fenua-Tangata Moana in 2010 and the production of a three volume book series of Education for Sustainable Development (ESD) in the Pacific have all highlighted the issues related to CC. This form of advocacy is culturally relevant and art is an appropriate avenue to discuss and educate people about CC. In addition, art records oral traditions and history and is a good way of engaging people in a dialogue about critical issues such as CCE.

The Western Scientific Knowledge (WSK) of CC is taught in some schools and in tertiary institutions such as the University of the South Pacific. These courses are usually taught by people who have received their training in an institution teaching mostly Western sciences and values. These teachers teach the WSK of CC and CCA using books and the Internet. However, in some small island countries in the South Pacific such as Kiribati, Tonga, Vanuatu, Samoa and Fiji their Ministry of Education is still trying to incorporate TEK of CC in their curriculum. One of the problems faced by curriculum personnel who wish to incorporate the TEK of CC is the lack of teaching materials or collections of TEK and the lack of experience about integrating such knowledge such knowledge into a curriculum. However, there are various ways of including TEK in the school curricula. The authors suggest that the TK about CC can be incorporated into subjects such as Social Science and Science and in extra curricula activities such as quizzes, Arbor week activities, dances, art and craft and different types of festivals. (Koya, 2012; Savaise et.al, 2011; Vosalevu et.al, 2011, Melterers et.al, 2011; Tupou, 2011; Takirua et.al, 2011).

### **3.6 Indigenous Knowledge Research**

A number of Pacific Research Frameworks have been developed and used by various (Pacific) scholars over the years. They include: *Kakala* Framework (Thaman, 1992); *Fa'afaletui* (Tamasese et.al 1998); *Tivaevae* (Maua-Hodges, 2000); *Vanua* (Nabobo-Baba, 2006); and *Iluvatu* (Naisilisili, 2011). The oldest of these, *Kakala*, was first introduced by Thaman (1999) and has been successfully adapted and used by well-known Pacific scholars such as Koloto (2000) and Johansson-Fua (2006). The most relevant and useful framework for this thesis is the *Vanua* Framework which has been successfully used by researchers such as Mataitonga (2009) and Vudiniabola (2011). This study has developed another framework, the *Bu ni Ovalau* that is derived from and inspired by some of the above frameworks especially the *Vanua* Framework.

*Vanua* for the purpose of this study is defined as the land, the sea, the cosmos, the people, all living things, the spirits, in a specific ‘place’ and how each of them are related to and responsible for each other. It also includes the culture, traditions, knowledge, skills, and ways of knowing, love, peace, prosperity and communalism. As an ethnographic researcher exploring my own *Vanua*, I have a responsibility in protecting my *Vanua*.

In light of this, I needed to use a framework that was appropriate for my *Vanua*. Failing to follow an appropriate approach would mean a failure in my study. Each *Vanua* has its own cultural way of doing things. It is important that a person who wishes to enter a *Vanua* knows this and follows it. If the person does not follow it, the person may not be accepted into the *Vanua* or the person will not be given what the person wants. Thus, proper *Vanua* protocols had to be followed. A *Vanua* is regulated by customs, traditions, ethics, rituals and practices. As a researcher, researching indigenous Fijian traditional knowledge in the *Vanua Ovalau* it was important that I adhered to the customs, traditions, ethics, rituals and practices of *vakasokumuni tukutuku* (gathering information). The Fijian Vanua Research Framework (Nabobo-Baba, 2006) provided a set of critical guidelines to be followed, but because the context of this study is different from the context of Vugalei used by Nabobo-Baba (2006), I had to follow the *Bu ni Ovalau* framework. This framework is derived from the Vanua Research Framework (Nabobo-Baba, 2006), and is informed by the Stand Point Theory (Barnett, 2009), and the Indigenous Fijian Ontology derived from Ravuvu (1983) and Nabobo-Baba (2006).

### **3.6.1 Fijian Vanua Research Framework**

The Fijian Vanua Research Framework (FVRF) was developed by an indigenous Fijian academic and researcher, Dr. Unaisi Nabobo-Baba. According to Nabobo-Baba (2011) the FVRF is an indigenous research framework that is grounded in the indigenous Fijians' world views, knowledge systems, lived experience, representations, cultures and values. It argues that research among Fijians should be grounded in and set up around the *Vanua* identities, cultures, languages and ways and philosophies of knowledge. *Vanua* in the FVRF 'refers to that universal whole, which is inclusive of a chief or related chiefs, their people and their relationships, their land, spiritualties, knowledge systems, cultures and values' (Nabobo-Baba, 2011, p.4). She added that the *Vanua* is essential for a Fijian as it is the essence for their identity and existence. The FVRF is based on the indigenous Fijians' values of:

‘interconnectedness of people to their land, environment, cultures, relationships, spirit world, beliefs, knowledge systems, values and God(s) and it ensures that indigenous Fijians will not only remain objects of research but are part of the decisions and processes of defining frames, methods and principles within which research knowledge is handled and filtered, processed and disseminated’ p.4.

According to Nabobo-Baba (2011) the FVRF is bound by principles that are derived from the indigenous Fijians' *Vanua* values. The principles are that researches that are carried out in indigenous Fijian *vanua* must focus on the indigenous Fijians' needs and be beneficial for the researched *vanua*. In addition, it must consider the indigenous Fijians' cultural values, protocols, knowledge processes and beliefs. More so, the researcher must be an indigenous Fijian who is fluent in the indigenous Fijian language and traditions. In addition, the researcher must acknowledge the elders and the *vanua* by sufficiently reciprocating them. Furthermore, the participants should be involved as researchers so that they can also learn in the process. Additionally, the *vanua* must give consent for the research. Finally, the researcher must report the collected data responsibly to the *vanua* before disseminating the information to a wider audience.

In carrying out a research using the FVRF, Nabobo-Baba (2011) stated that there are several procedures that need to be followed. All procedures are based on the indigenous Fijian *vanua* protocol. The procedures involved are first, *Na navunavuci* the theorizing and conceptualizing of the research, second, *Na vakavakarau* the preparation and planning of the research, third, *Na i curucuru / i sevusevu* the entry protocol, fourth, *Na talanoa/ vitalanoa* the *talanoa* or *vitalanoa* (multilogue) stage where the 'rules of engagement' are discussed, fifth, *Na i tukutuku* the reporting and analyzing of information collected, sixth, *Na vakavinavinaka* the gifting or reciprocation of the research that was carried out, seventh, *I tatau* the departure or temporary departure protocol where the researcher requests to temporarily leave the research site and finally, *Vakarogotaki lesu tale/taleva lesu* the reporting back or revisiting of the research site to honor the *vanua* by informing them of the completion of the research.

The research framework used in this study is the *Bu ni Ovalau* Research Framework that was derived from the FVRF by Nabobo-Baba (2006). Further description on the *Bu ni Ovalau* Framework can be found in the next chapter.

In conducting this study and selecting research methods to be used to gather, document, analyse and disseminate information collected, the following theories were considered useful and relevant for understanding Fijian ways of knowing, ways of being, ways of doing things and local ways of living, hence should enable the researcher to comprehend the participants' standpoint. The

theories include: Standpoint Theory, Ecological Theory, Socio-cultural Theory and Social Learning Theory.

### **3.6.2 Standpoint Theory**

In conducting research within a *Vanua*, it is important to understand the social standpoint of the participants. Barnett (2009) explains that the different experiences we make in the different situations we encounter in life determine how we perceive things. In addition, it is in lived experiences that valid information is rooted, information that can be used for addressing or countering issues faced in life or in other words to mobilize social action for change. This Standpoint Theory allows a researcher to understand people's perspectives better. Indigenous Fijian TEK has been accumulated over a long period of time and transmitted throughout generations. The different ascribed roles of Indigenous Fijian usually determine their standpoint views. For example, the standpoint of a chief will be different from that of a fisher folk because of the different expected experiences and roles ascribed to them.

### **3.6.3 Bronfrenbrenner's Ecological Theory**

Another theory that helps with understanding the *Vanua* is Bronfrenbenner's Ecological Theory. Bronfrenbenner and Evans (2000) highlight that individuals develop in a complex system (micro, meso, exo and macro system) of connections and situations (ecological system – people, settings, events, cultural values and programs) that are interrelated and influence a person's stability over time. In the indigenous Fijian's world, everything is interrelated and contributes to the overall development as well as behaviour and survival. For example, children interact with their environment, and learn from it. The children's environment includes a physical, social, cultural and spiritual plane. The children also learn skills and knowledge from their elders, parents, siblings and members of their community, they learn from reading the changes in the land, the sea, the cosmos, they learn from their socialization with others, and from their spiritual connections to people and their environment, all of which help them to understand who they are and their place in their community.

### **3.6.4 Vygotsky's Sociocultural Theory**

Understanding research participants' cultural identities is important and Vygotsky (Hoffnung et.al, 2010) highlights the importance of cultural tools like language in an individual's understanding of the world around him/her. Language is one of the important cultural tools that a child or person must have to be able to understand his/her world. In the indigenous Fijian's world, the Fijian vernacular language is a major tool for transmitting information and understanding the world. Knowledge in the indigenous Fijian world is transmitted through language in a variety of forms including songs, plays, dances, chants and stories. Such cultural tools are important for the maintenance of indigenous Fijian Traditional Knowledge in general and TEK in particular.

The Sociocultural Theory also highlights the significant roles of adults in children's learning process. In Indigenous Fijian societies the elders play a vital role in facilitating and helping children to know and practice their traditional roles that enable them to use the knowledge of the *Vanua* for their long term survival. The differences between the Elders' knowledge and the children's knowledge create the Zone of Proximal Development (in Vygotsky's theory - Hoffnung et.al, 2010). It is the role of the elders to bridge this knowledge gap and ensure that the child knows and applies knowledge effectively.

### **3.6.5 Social Learning Theory**

In researching IK and its transmittance, the Social Learning Theory proved useful. Bandura cited in (Hoffnung et. al, 2010) also highlights observation and imitation as important tools for children making sense of and understanding the world around them. Children learn by observing and imitating adults, therefore, adults have the important role of being good role models so that children can imitate good behaviour and show and practice culturally acceptable ways. This is also applicable in the Indigenous Fijian's world, in which elders have to display good behaviour so that their children will behave like them. Therefore, when children behave in unacceptable ways, the child is always told off with an indigenous Fijian saying *sa ucui tamana/tinana* (just like his father/mother) and this brings embarrassment to the child's family and *Vanua*. To avoid this from happening, every elder and member of the *Vanua* will ensure that culturally acceptable ways of doing things are portrayed and taught to the children.

In summary it can be said that the Indigenous Fijians' Traditional roles form a framework in their own right, which guides the daily socialization of Indigenous Fijian children in an Indigenous Fijian community towards their ultimate traditionally sanctioned roles. These Indigenous Fijians' traditional roles contain knowledge that needs to be experienced and lived daily and that the children, through the elders' scaffold are expected to internalize and use in order to become effective members of the society. The Stand Point Theory is a valid epistemological grounding for this research because the TEK investigated in this study is rooted and interpreted through the daily lived experiences of the participants, which only adds to the validity of this knowledge.

### **3.7 Summary**

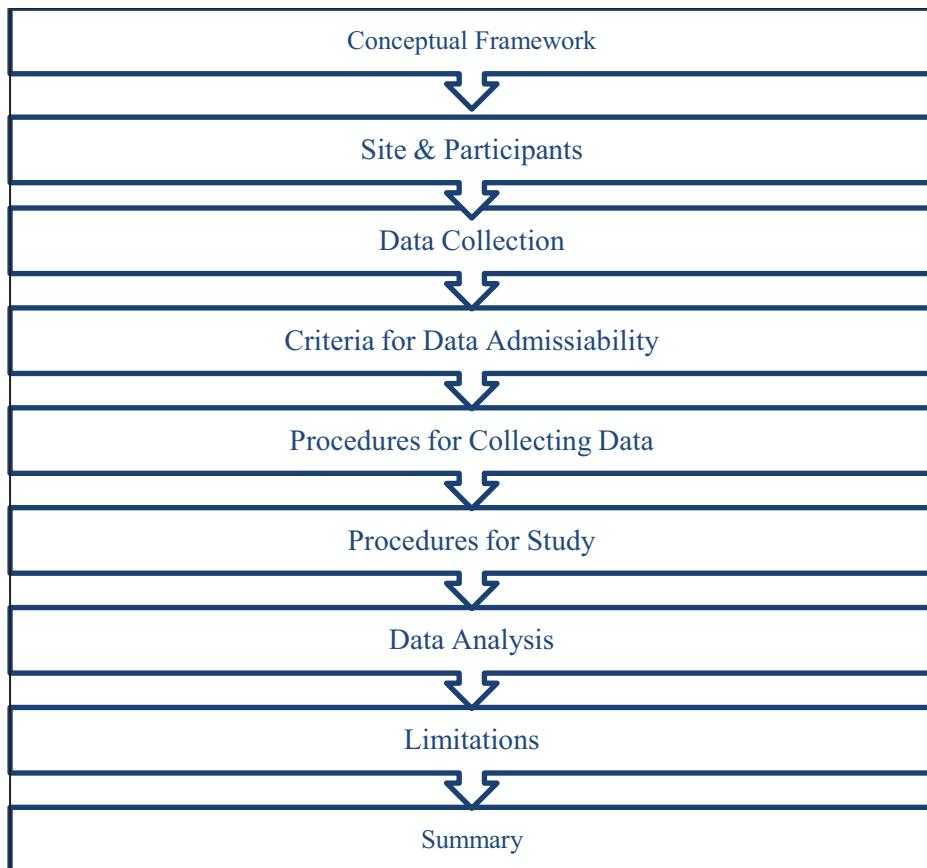
In summary, the literature reviewed highlights that indigenous people's perceptions of CC are linked to their close relationship with their physical and social environment. In addition, CC is important only insofar as it impacts the people and their resources. Furthermore, the literature reviewed emphasises the significance of TEK and TK among indigenous people for forecasting CC and CCA. Moreover, the TEK of CC and CCA is passed on through generations orally and through its practice. Unfortunately, some indigenous communities have lost this knowledge due to their reliance on technology for weather forecasting and because of their removal from their communal land, which they had relied on for their TEK. The literature reviewed also points out that the scientific knowledge of CC is part of the curricula in some Fijian and Pacific Island schools, however the TEK of CC and CCA are not or only marginally included. But, there are intentions for including the TEK of CC in their curricula in future. This chapter has also examined the literature on TK and how such knowledge may be incorporated into a formal education curriculum. Incorporating this knowledge into the curriculum may enhance students' understanding of TK and help them understand the value of TK and its usability for their survival. Finally this chapter introduces important indigenous, especially Pacific indigenous research frameworks as appropriate paradigms from which this thesis draws reference. It was important for, me, an indigenous Fijian working with and among other indigenous Fijians, to build an understanding of the issues related to CC and CCA. The chapter ends with a review of a selection of Western theories that have contributed to an understanding of indigenous people, their perceptions of CC and their ways of life. The next chapter will discuss the methodology used in this thesis.

# Chapter Four | Methodology

## 4.0 Conceptual Framework

The previous chapter reviewed some of the literature related to Indigenous Knowledge of Climate Change and Climate Change Adaptation as well as various research approaches and theories considered useful for this study. The methodology used in this thesis is sourced from qualitative, phenomenological, interpretive and indigenous research approaches which were found to be the most useful since they helped to make sense of participants' perceptions and behaviour towards CC and CCA. This chapter discusses the research design, the process and the methods of data collection, as well as the selection of study participants, and the analysis of data collected. An illustration of the structure of this chapter is shown in Figure 4.0.

*Figure 4.0 Chapter 4 Summary*



## 4.1 Qualitative Research

Qualitative research is usually used for exploring why humans behave the way they do and it assists in developing reasons for why things are the way they are. Consequently, qualitative research helps researchers understand the social features of our world and inquires about how opinions and attitudes are formed, why people behave in certain ways, how people are affected by the events that happen around them and why and how cultures have changed the way they have. Qualitative researchers are interested in the opinions, experiences and feelings of research participants. Furthermore, qualitative research depicts social phenomena as they happen in a most natural way (Hancock, 2002). A qualitative approach was used for this research because it is a relevant approach to be used when conducting a study that enquires about the Indigenous Fijians' perception about CC, the Indigenous Fijians' knowledge and traditional adaptation method to CC, and how this knowledge is passed on to the younger generations.

Data was collected through direct interaction with the participants through personal and/or group interviews alongside personal or group observations. Collecting data through interviews and observations is very time consuming. Therefore only a representative sample of people could be used in the fieldwork for this study (Hancock, 2002). In the first phase of the research, four elders were selected from each of the research sites and personally observed and interviewed through *Talanoa* so their perceptions, attitudes and behaviour towards CC could be understood. *Talanoa* according to Nabobo-Baba (2006) is 'a process in which two or more people talk together, or in which one person tells a story to an audience of people who are largely listeners' p.27. She further elaborates that *talanoa* may be conducted in either a formal or informal context. *Talanoa* was chosen for this research as it is the normal approach used for sharing information in Ovalau. In the second phase of the research, a group *talanoa* (participatory workshop) involving parents, children and elders who did not participate in the first phase was conducted to gather data on the group's perception, attitude and behaviour towards CC and CCA.

A number of research approaches were found to be relevant for this study. They include Interpretivism, Phenomenology and Indigenous research Framework.

### **4.1.1 Interpretivism**

The Interpretive method allows the researcher develop an understanding of the subject matter in the course of the research instead of having a pre-determined concept. Hence, it allows the researcher to be impartial of the outcome of the research instead of pre-determining it, therefore validating the outcome (Yanow and Schwartz-Shea, 2006). Bevir and Kedar (2008) discuss that interpretive methodologies encompass an experience-near orientation that sees human action as meaningful and historically contingent. It is important that the Interpretive approach is used because this study is about people interacting with their social setting and what they do in different contexts. To better understand the participants' perceptions and behaviour the researcher interacted with the participants, sharing knowledge and experience learnt from the study. More so, being an 'insider outsider' the researcher could relate to a lot of the information relayed by the participants. Some of the varieties of interpretive method are participatory action research and case study analysis. These varieties were used in this research to allow for a clearer understanding of the concept being studied. In the second phase of the research, the children and parents who did not participate in Phase 1 of the research took part in a participatory workshop. Their participation enabled the researcher to understand the differences in perceptions, attitudes and behaviour towards CC and traditional adaptation methods between the older and the younger generations.

### **4.1.2 Phenomenology**

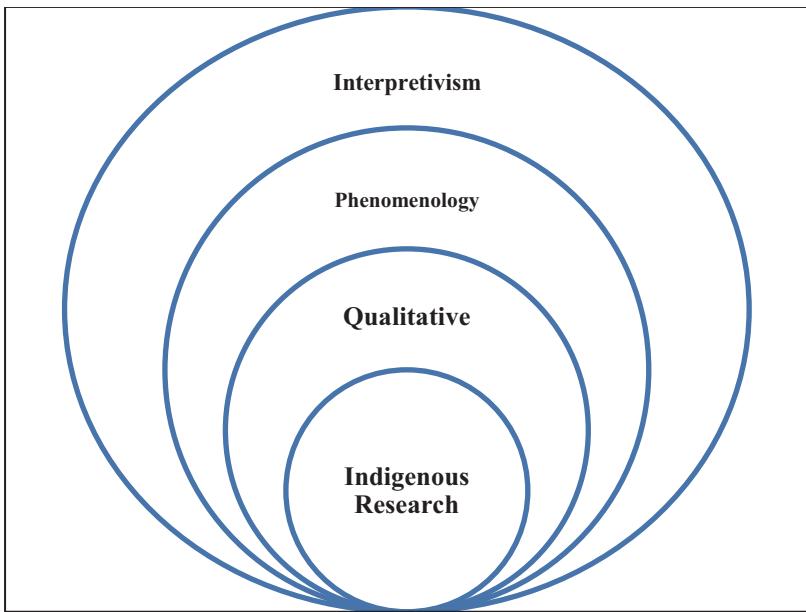
The purpose of this approach is to understand the specifics of phenomena from the perspective of an individual; in other words, it means to study the experiences of the participants and to try to gain profound insights into the participants' actions and purposes. The researcher can gain understanding of the participants' actions and purposes by interacting and observing the participants (Lester, 1999). To some extent, this approach may overlap with the qualitative and interpretive method, however, it is unique in that it tries to gain a deeper insight of the participants' experiences and how those experiences influence their perspectives and behaviour. It is vital in this research to have a thorough understanding of the purpose of the participants' perception of Climate Change, the reasons for using the traditional adaptation methods they employ and more importantly to know the reasons why this knowledge is not known and used by the younger generation.

### **4.1.3 Indigenous Research**

Indigenous Pacific Research uses IK and values people and their worldviews. In addition, Pacific Research aims at providing ethical, meaningful and relevant information. Moreover, the methods used for collecting data value indigenous' protocols and the culture of the participants (Thaman, 2012). This study used the *Bu ni Ovalau* Framework derived from the FVRF as described in the previous chapter. In using this framework, the researcher and the participants co-construct the process of knowledge sharing from a range of sources for example, *talanoa*, stories, songs, chants and dances. These are important sources of information for indigenous people (Chilisa, 2009). Additionally, this approach allowed the use of indigenous Fijian TK and epistemology.

To understand participants' perceptions of CC, it is appropriate to use the Qualitative and Phenomenological approaches since these approaches enable a researcher to gain an in-depth understanding of the participants' opinions, experiences and feelings about CC and CCA. In order to better understand participants' behaviour and perceptions, it was crucial to use the Interpretivism approach which allowed the researcher to interpret the participants' behaviour and perceptions through examining data that had been collected using Qualitative and Phenomenology approaches. The data collected reflected participants' perceptions that had been embedded in an indigenous knowledge system. Hence, it was important that an indigenous research framework '*Bu ni Ovalau Framework*' was the foundation of the research approach. (An illustration of the methodology used for this thesis can be seen in Figure 3.6).

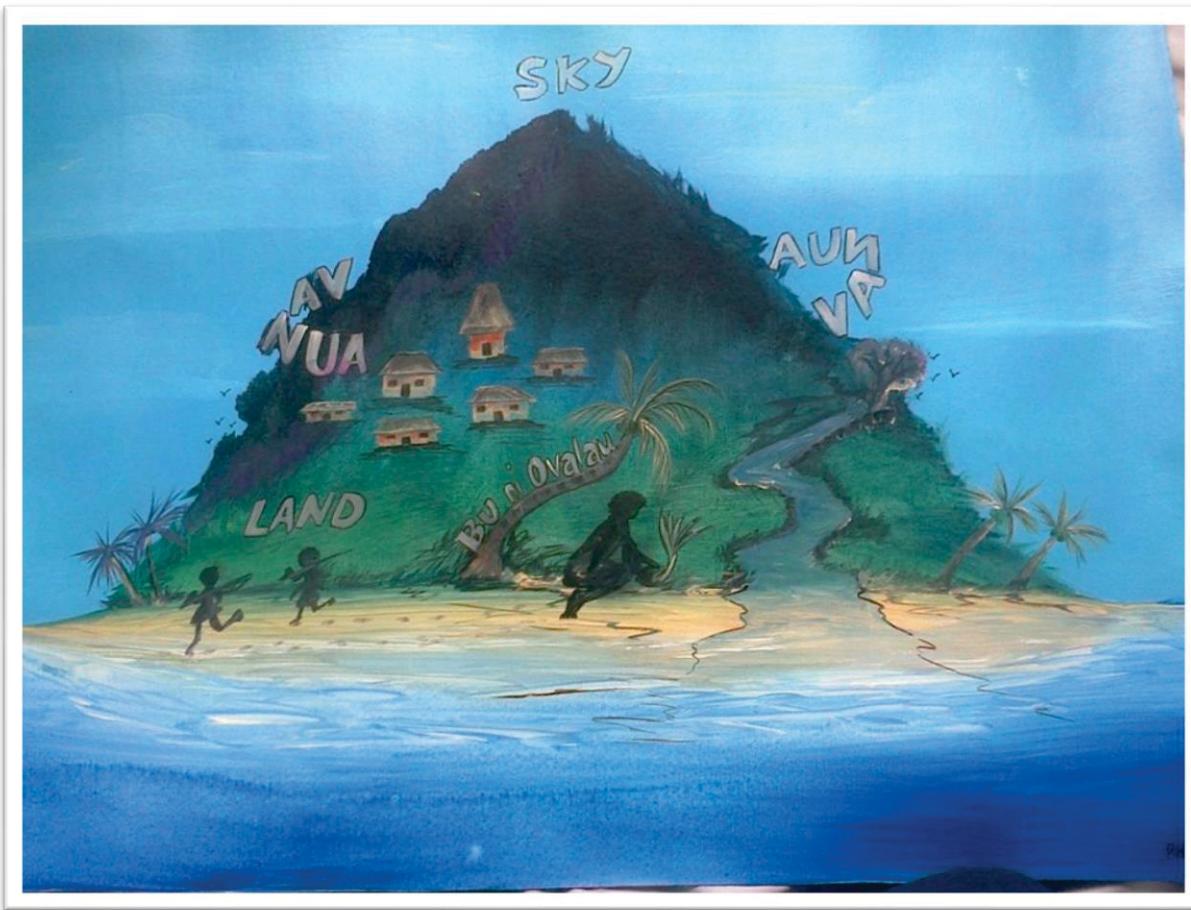
*Figure 4.1 Methodologies in Summary*



#### **4.1.3.1 *Bu Ni Ovalau* Research Framework**

The Fijian term *Bu ni Ovalau* refers to a coconut that is endemic to Nasinu village, one of the research sites. It is a unique type of coconut palm because of its height and its sweet fruit. The *Bu ni Ovalau* coconut's shell is orange. This type of coconut fruits from a very tall coconut tree that *kala* (slant) at the top end of the tree. The *Bu* (young coconut fruit) is not only used for refreshing drinks but also for medicinal purposes. It is a common belief of the area that if someone tastes the *Bu ni Ovalau*, he/she will always crave more of it because of its sweetness. Because the *Bu ni Ovalau* is endemic to Nasinu village only, it needs to be nurtured to ensure its survival.

Figure 4.2 *Bu ni Ovalau* Research Framework<sup>6</sup>



The *Bu ni Ovalau* framework is grounded in the *Vanua* and surrounded by it. The roots of the *Bu ni Ovalau* represents the elders (those who are present and those who have passed on and exist in the form of spirits) of the *Vanua* who are the custodians of the *Vanua* Knowledge. The leaves of the *Bu ni Ovalau* symbolize the western influence that the *Vanua* is exposed to. The trunk of the *Bu ni Ovalau* stands for balance and resilience which is an outcome of the work of integrating western and traditional knowledge through in a culturally inclusive education system. The *Bu* (young coconut fruit) epitomizes a wise marginal child who is prepared to live successfully,

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<sup>6</sup> *Bu ni Ovalau* Research Framework illustrated by Pita Waqanui

sustainably, anywhere in the world. The space around the *Bu ni Ovalau* represents the *Vanua* which is not an empty space but a living space that contributes to the growth of the *Bu ni Ovalau*.

In order for the *Bu ni Ovalau* to grow successfully, its gardener must follow certain planting and nurturing procedures. Similarly, in researching Ovalau's Traditional Knowledge a researcher must follow the *Vanua o Ovalau* protocol so that the elders may give their *sau* (blessing) for the study to be successful; successful in the sense that it will be a worthwhile study and will be useful for the people of Ovalau. In receiving the *sau* (blessing) from the elders the researcher will need to reciprocate the *sau* (blessing) by continuing to *raica na vanua* (look after the *Vanua*).

### ***Vanua o Ovalau Protocol***

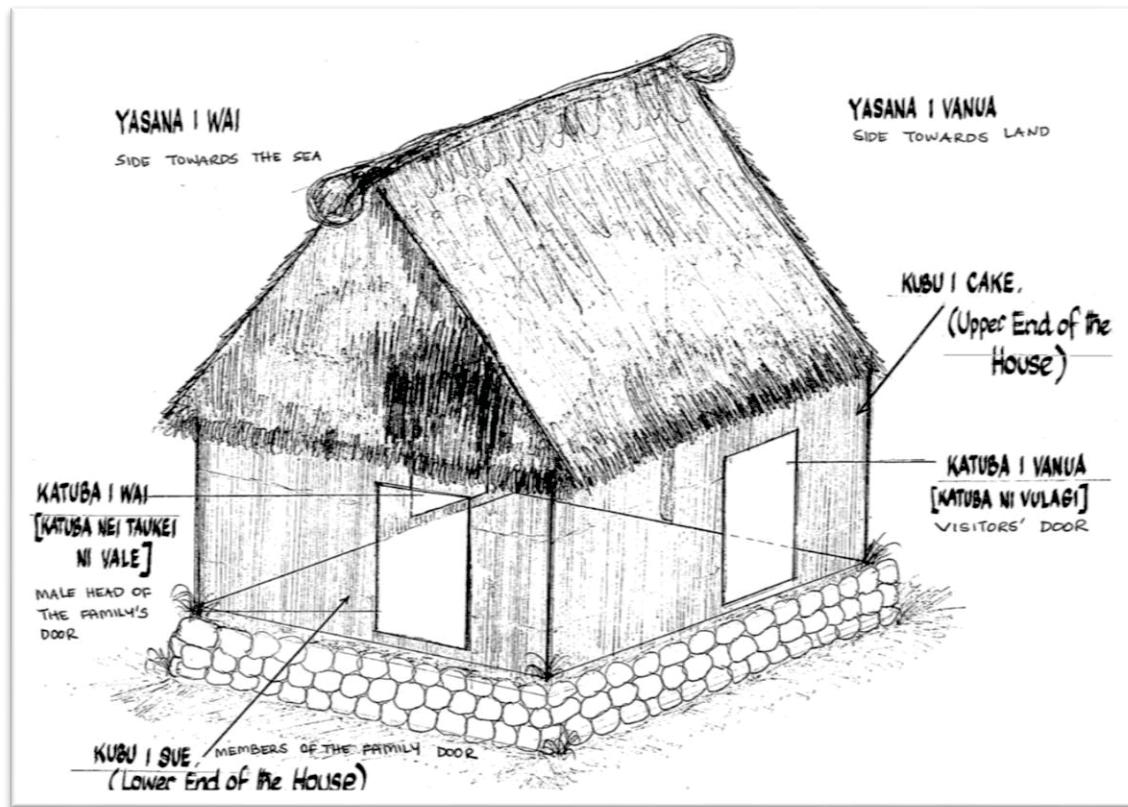
The *Vanua* is important for research on indigenous Fijians since, as Nabobo-Baba (2006) emphasised, it shapes the process as well as the product of the research. In addition, the knowledge that is generated reflects the knowledge of the people in the *Vanua*. This is particularly so in regard to ethical procedures that needs to be followed. These are an integration of the *Vanua o Ovalau* ethical procedures into Western research ethics. The *Vanua o Ovalau* ethical procedures include ensuring that the research benefits the *Vanua* and no harm is done to it; for instance only publishing information authorized by the *Vanua* and not publishing information that may damage relationships. Also, the researcher must follow culturally appropriate procedures such as presenting the *isevusevu* when entering the *Vanua* to request to conduct a research. When entering the village the researcher must wear appropriate attire such as *suluvakatoga* (sarong) or *jaba* (long skirt and blouse). Also, the researcher must use an appropriate tone and language. Furthermore, the researcher must make correct gestures such as not making eye contact with the elders. In addition, when addressing elders, the researcher must use *kemuni* (formal pronoun (you) instead of *iko* (informal pronoun (you) used when referring to someone of lower or same status as the speaker). Moreover, the researcher must sit at the lower end of the house until the researcher is asked to move up. Finally, the correct gifting methods should be used when invited to a *Vanua* function such as *roqoroqo* (presenting gifts for new born baby) or *reguregu* (presenting gifts to the family of the deceased) (Nabobo-Baba, 2006).

As highlighted in the definition of *Vanua*, culture and tradition are encompassed in the concept of *Vanua*. Hence, in conducting research in Ovalau, the *Vanua o Ovalau* protocol needs to be

followed. The *Vanua o Ovalau* protocol includes *isevusevu* and *ikerei* (request for entry and to research), two important protocols or rituals related to the traditional request to enter the village and to collect and use information. It includes wearing appropriate attire, adhering to social linguistic rules, observing communication etiquette and understanding the *va* (personal space and space between the self and others) (Thaman, 2009); knowing whom you can speak to and to whom you cannot speak, understanding *tabu* (restrictive relationships- especially between parallel cousins, cross aunty and uncles and in laws). It also includes knowing where you can sit or stand or walk, and appropriately reciprocating what the *Vanua* has done and provided for you. At the end of a visit, it is important that an *itatau* (traditional request for permission to leave) is presented in order for the *Vanua* to give its blessings for the return journey and future prosperity. The responsibility of the researcher does not end when the research is completed. After the study is documented, the researcher must return to the *Vanua* for the *vakarogotaki* (report) to the *Vanua*. When the report has been presented, the researcher may publish the findings. After the publication, the *Vanua*, in celebration of the success of the study, may hold a *vakacirisalusalu* (feasting and celebration) to thank everyone for his or her contribution to the success of the study. The outcome of the study therefore does not really belong to the researcher alone but is shared with the *Vanua*.

In both the talanoa sessions with elders as well as in the workshops, it was important that the *Vanua* protocol was adhered to. For example the researcher need to enter a house from the *katuba i sue* or the door at the lower end of the house and not from the side of the house since the side door is only for the chief and the male head of the household. Furthermore, when entering the house it is appropriate to sit at the lower end of the house and move up only if asked to do so.

Figure 4.3 Illustration of an Indigenous Fijian House<sup>7</sup>



The top part of the house is reserved for the male head of the family and the chief, women and visitors are to sit at the lower end of the house unless they are asked to move up. Moreover, the researcher needed to follow the traditional women style of sitting, with my legs together on the side since it is considered disrespectful for women to sit cross - legged like men or with legs stretched out to the front. While having a *Talanoa* it is a taboo for the researcher to raise her voice or laugh loudly, as women who speak and or laugh loudly are seen as women seeking men's attention.

This protocol had to be followed throughout the research period and whenever the researcher re-enters the village. All in all, in order to collect data successfully, one should follow the *Vanua* Protocol and be part of the *vanua*. Once the researcher has been accepted as part of the *vanua* participants feel comfortable about giving out information without reservations.

<sup>7</sup> Illustration of a Bure, by Manasa

## Fijian Ontology

This study uses the Interpretivist Research Paradigm where its ontological assumption is that knowledge is created through social and contextual understanding. A person's participation in the context in which they live and interact in allows the person to create and understand knowledge. This perspective complements the epistemological standpoint that people create knowledge through a continuous process of socialization. In the indigenous Fijian society, TEK exists in the *vanua* and is learnt and interpreted throughout a human's life through socialization (orally, and through observation, imitation and guided practice).

Ravuvu (1983) explains that the *Vanua* has four dimensions that are interrelated: the physical, social, cultural and spiritual dimension. The social and cultural systems are set up as a foundation for a harmonious, prosperous and cohesive society. They provide members of the *Vanua* an identity and a sense of belonging to the *Vanua*. The *Vanua* functions as a source of *mana* (power) and is the place where one's ancestors and elders keep an eye on what their descendants are doing and what might become of their *Vanua*. Ancestors advise their descendants through dreams or in person through elders for the purpose of maintaining and nurturing the *vanua*. When descendants do not follow the advice that was given, they may receive the *kudru ni Vanua* (anger of the land) and are punished, usually in the forms of sickness or death.

## Physical Dimension

The physical dimension of the *Vanua* represents the land and water which the *lewe ni vanua* (flesh or members of the *Vanua*) use for gardening, hunting, fishing or building traditional ancestral house sites or foundations. Every indigenous Fijian is said to have a *yavutu* (connection) with the *Vanua*. There are no marked land boundaries as they are said to 'live' in the minds of the indigenous Fijians whose land is owned communally and shared by everyone.

## Social Dimension

The social plane includes social hierarchies and the relationships between people in the Vanua. All indigenous Fijians are related and bear responsibility for taking care of one another. The social hierarchies include basic relationships from a *vuvale* (nuclear family) to an *itokatoka* (an

extended family), *mataqali* (clan) and *yavusa* (tribe). Relationships within this system are organized in a way that ensures the survival and the continuity of the *Vanua*. Kinship is important for indigenous Fijians and through it a person's rights in terms of access to land is determined. It is through blood relations and marriage that land ownership is decided.

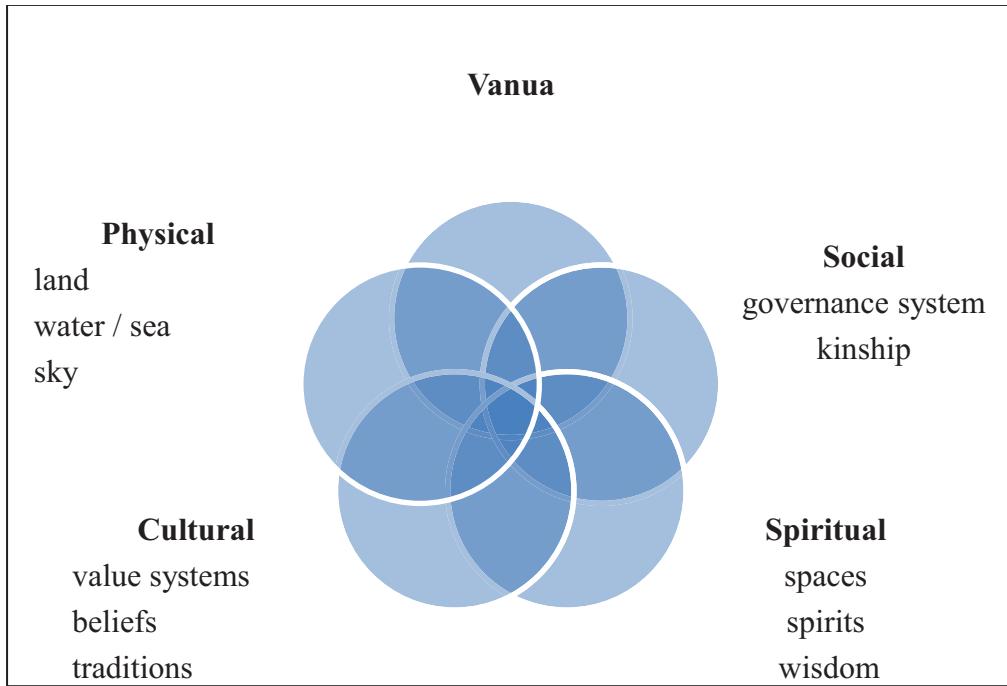
## Cultural Dimension

The values, beliefs and acceptable ways of doing things are embodied in the cultural dimension. Caring and sharing are two major aspects of the indigenous Fijians' value system qualities that manifest in people's actions. Indigenous Fijians should be *yalomalua* (humble), have *vakarokoroko* (deference), *veivukei* (helpful), *veinanumi* (be considerate), *veilomani* (loving), *vakarorogo* (attentive and compliant) and *yalovata* (work together) to ensure the survival of their kinsmen.

## Spiritual Dimension

Indigenous Fijian people believe in the presence of the spirits of the owners of the *Vanua* in a *Vanua tabu* (sacred place). The *Vanua tabu* (sacred place) are feared, revered and respected by the people. These sacred places include the *Sau Tabu* (burial sites) for chiefs, *yavu* (house foundations) and *Vanua sauvi* (land and sea areas restricted to be used so they can restore their power and wealth). The existence of spirits is nothing new to indigenous Fijians for they always have been a part of their lives. The spirits are believed to be invisible but have the power to implicate good or evil. Therefore, they are respected and revered.

*Figure 4.4 Concept of Vanua in Summary*



In the Fijian ontology, the spirit or the inner being gives wisdom and grounds the people in their sense of place and space. It enables them to access and use their TEK that cuts across the social, cultural and spiritual dimension to ensure the survival and continuity of the indigenous Fijian descendants. To ensure the indigenous Fijians connection to and grounding in their *Vanua* a ceremony of the *vakalutu buto ni gone* (burying of a new-born's umbilical cord) is done four nights after birth.

In addition, the Fijian ontology is the foundation of the indigenous Fijians' ways of knowing, ways of being, ways of doing and ways of living. The indigenous Fijians' ways of knowing inform the indigenous Fijians, their ways of being shape their ways of doing things (customs and traditions) and determine their daily ways of living to ensure their survival and continuity.

The *Vanua* concept can also be described with using a *salusalu* (garland) where different flowers resemble the different parts of the *Vanua* (physical, cultural, social and spiritual); each flower performing its own roles complementing each other ensuring the existence of the *Vanua*. If one of the flowers falls it will lead to the falling apart of the entire *salusalu* (garland). Similarly if one of the members of the *Vanua* does not perform his or her roles and responsibilities, it can lead to the destruction or discontinuity of the *Vanua*.

Figure 4.5 *Salusalu Metaphor - Vanua*<sup>8</sup>

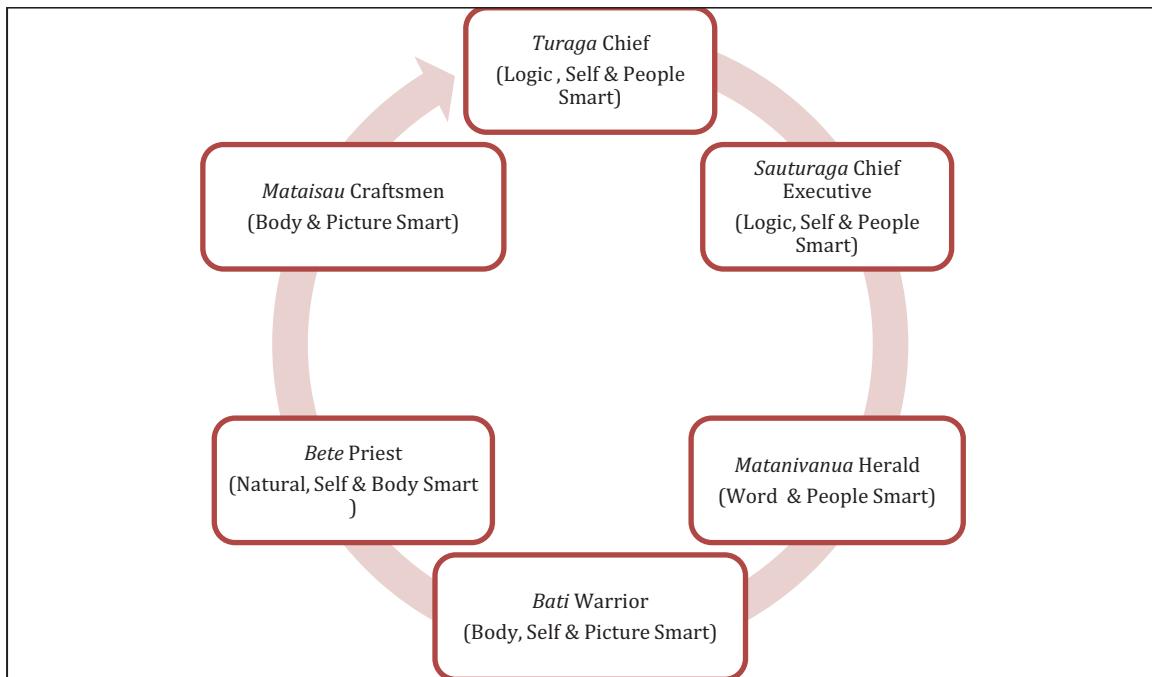


The *Vanua* concept can also be linked to Bronfrenbrenner's Ecological Theory, where all systems in a society work together for the purpose of a child's development. Furthermore, it can be aligned with Gardner's Multiple Intelligence Theory (1993) highlighting that there are distinctive types of intelligence and or ways of adapting to the environment that reflect the influence of society and culture. It is important to link Gardner's theory to the Indigenous Fijians' traditional roles because these roles involve specific expert knowledge and skills that are needed for filling these roles adequately. The knowledge and specific skills are similar to those discussed in Gardner's Multiple Intelligence Theory. Relevant traditional Fijian roles include: *Turaga* (Chief), *SauTuraga* (Chief Executive), *Matanivanua* (Spokesperson), *Mataisau* (Craftsmen), *Bete* (Priest), *Gonedau* or *Tuirara* (Fisherfolk) and *Bati* (Warrior). These roles are clan specific or clan devised and must be performed with expertise by the members of the clan to ensure the smooth running of a village. The members of the clans are traditional experts, who learned from

<sup>8</sup> Salusalu Metaphor – Vanua by R.K.L

their elders through observation, imitation, experience and through practice. Elders usually ensure that children are taught different roles and may be embarrassed when adults and children are not able to perform their roles as expected. The different roles pertain to indigenous Fijians and how they can be related to Gardner's Multiple Intelligence Theory is shown in Figure 4.5 below.

*Figure 4.6 Indigenous Fijians' Traditional Roles*



It is interesting to note that the indigenous Fijians traditional roles can be linked to Howard Gardner's Multiple Intelligence Theory which include Linguistic Intelligence (word smart), Musical Intelligence (music smart), Intrapersonal Intelligence (self-smart), Interpersonal Intelligence (people smart), Naturalistic Intelligence (natural smart), Bodily Kinesthetic Intelligence (body smart), Spatial Intelligence (picture smart) and Logical Intelligence (logic smart (Gardner, 1993). Gardner's Linguistic and Interpersonal Intelligence corresponds with the *Matanivanua* (Heralds) or spokesperson's role who are usually experts in language and use their linguistic skills and knowledge to effectively communicate with the chief and the members of the communities. Intrapersonal and Naturalistic Intelligence is similar to the *Bete* or priests' who are spiritual experts, whose skills enable them to commune with the spiritual world. Bodily

Kinaesthetic and Spatial Intelligence can be linked to the *Mataisau* or carpenter's role whose artistic and carpentry skills assists them with the effective construction of houses in the village. Likewise, the *Bati* or warriors are endowed with combatant skills and knowledge which assist them with protecting the *vanua*. *Gonedau* (fisherfolks) are gifted with fishery skills which enable them to protect and manage marine resources. Logical Intelligence is comparable to the *Turaga* or Chief and *Sau Turaga* or Chief Executive whose critical and logical thinking skills guide them when making important decisions for the smooth running of a village.

## **4.2 Selection and Description of Site and Participants**

### **4.2.1 Research Sites**

The fieldwork of this study focused on three villages: Nasinu, Rukukuruku and Lovoni on the island of Ovalau. Ovalau is the sixth largest island in Fiji. The island is about 13 km long and 10 km wide. It covers a total area of 102.3 km<sup>2</sup> and has a population of around 9,000. It was Fiji's first capital and has a rugged landscape with very little planes and is surrounded by the Koro Sea. There are 19 villages altogether on Ovalau and the elders (mainly grandparents and great-grandparents) of the island hold traditional knowledge of how to use environmental signs for predicting climate change and of ways of living sustainably before, during and after a sudden changes in climate.

#### **Lovoni**

Lovoni is located in the interior of Ovalau. It is about an hour and a half drive up the hills from Levuka town into the interior of Ovalau. Lovoni is the first village that was established on the island. It was inhabited by Rakavono who originally came from Verata, Tailevu (see chapter 2.1).

#### **Nasinu**

Nasinu is the most western coastal village. The inhabitants of this village are descendants of Rakavono, the first person to inhabit Ovalau. Nasinu is approximately about 10 - minute truck ride from Levuka town.

## **Rukuruku**

Rukuruku is the most eastern coastal village on Ovalau and was the place where the first inhabitant of Ovalau, Rakavono, landed before he established his village in Lovoni. The people of Rukuruku are traditional fisher folks for the Tui Wailevu. Rukuruku is about a two hour truck ride from Levuka town.

### **4.2.2 Participants**

There were three components of this study: The first consisted mainly of village observations and *talanoa* (conversation) sessions with village elders, the second consisted of a workshop organized with adults and children from each village including some elders, and the third was a document analysis of educational documents for analyzing the extent to which indigenous knowledge of CC and CCA is part of the formal curriculum.

### **Participants of Phase 1: Elders**

The researcher visited the research sites twice in order to consult with and ask the chiefs for permission to conduct her research and help select a number of elders from whom information about CC and CCA could be obtained. Appropriate times were agreed upon and the researcher visited the villages for a second time in order to talk with the previously selected elders.

During the first visit, the researcher discussed with the chiefs the purpose of the research and agreed on how it was going to be conducted. In addition, the researcher requested the chiefs' assistance in selecting the participants for the first phase of the study. During this first consultation visit traditional protocol was followed including taking a number of gifts to present to the chiefs. The consulted chiefs later informed the villagers in a *bose vakoro* (village meeting) about the research and agreed upon who would be selected to take part in the study and inform the researcher.

During the second visit the researcher followed traditional protocol and presented an *isevusevu* as a traditional request for entry into the village and seeking the chiefs' approval and blessings for

the planned work. Once the chiefs accepted the *isevusevu* they gave permission for the researcher to conduct her research. The researcher conducted the research for two days and at the end of the second day presented her *itatau* traditional appreciation and farewell to the chiefs thanking the chiefs and their people for their participation and seeking their blessings in the knowledge collected and the researchers' journey.

Four elders, aged 50 to 75 years, were selected from each of the three villages, a total of 12 elders. The selected elders were both female and male. The village chiefs and the community members had selected the most suitable candidates with the best knowledge and experience of the local environment and the village life. They were seen as the custodians of indigenous knowledge and vital in the sense that their traditional roles required them to use their TEK to make important decisions about village events and life, including what to do in situations of extreme weather changes.

## **Participants of Phase 2: Elders, Parents and Children**

A workshop was conducted in each of the three villages aimed at gauging other adults as well as children's perceptions of CC and CCA. Other elders who did not participate in the first phase also joined in. There were two main purposes for this phase of the study:

- i) To obtain further information from other villagers on the study topic and to see if the information matched the one obtained from the elders and,
- ii) To allow participants to exchange information for the purpose of learning about an important issue for the village.

Each workshop was attended by around forty people, of whom twenty were adults and twenty were children under the age of 16. A conch shell was used to call people to the workshop.

Each workshop followed a 'group *talanoa* model', and a Participatory Learning Appraisal that included *talanoa* sessions guided by the researcher using questions derived from the study's objectives. This method was implemented in order to allow the participants to exchange information about various issues and at the same time to learn from one another and pass on the knowledge learnt to other members of the community. The workshops were conducted at each

village's *vale ni bose* (village meeting house), a respected house of the village where important issues regarding village affairs are normally discussed.

The participatory workshop allowed the researcher to see if workshop participants had the same knowledge as the Participants of Phase 1 of the research and if they did not share the same knowledge to explore why this was the case. The outcome of the workshops also enabled the researcher to share some of the knowledge of the elders by passing it on to all participants. The workshop provided a context for sharing to share knowledge of CC and CCA among elders, parents and their children.

### **4.3 Methods of Data Collection**

The purposes of the study as well as the main research questions influenced the selection of methods for gathering data. All were underpinned by indigenous Fijian epistemology, values and worldviews. It was important to seek information from a range of people in the villages hence the perceptions of elders, other adults as well as children were sought. The three phases of the study reflected the need not only to determine what the indigenous Fijian's TEK was but also to find out what and how it is transmitted to younger generations.

There were two kinds of data collected for this study. They were primary data and secondary data. Primary data were the responses given by the elders, adults and children questions about their perceptions of CC, their TEK of CC adaptation, how they learnt this TEK of CC and how this TEK of CC could help the people of Fiji to understand CC and CC adaptation better. This data was gathered through *talanoa* or storytelling. *Talanoa*, as defined in the previous chapter, is a process where two or more people talk together; this can be done in an informal way where it is conducted in a light-hearted manner and other people can be called to join or in a formal manner where attendance is limited and 'yaqona' may be served (Nabobo-Baba, 2006). During *talanoa* the storyteller structures the conversation while the researcher asks follow up questions. This allows the participants to express themselves permitting a multifaceted insight into the topic that enhances understanding (Farrelly and Nabobo-Baba, 2012). Since this study was conducted among indigenous Fijian communities, talanoa was selected because it was the most culturally appropriate method to use. It is important that culturally appropriate research is conducted with indigenous people (Otsuka, 2006; Nabobo-Baba 2006; Farrelly, T and Nabob-Baba, 2012).

The second form of primary data was collected from the researcher's direct observations of the participants' daily activities. In order for effective learning to take place in an indigenous Fijian community, it is vital that the learner actively participates in the learning process. While the researcher observes he or she also participates in the activity that is being carried out. Therefore, the researcher is immersed into the daily life of the participants becoming like an 'insider' and gaining more insight about the participants and their behaviour (Leedy and Ormrod, 2010: p.139).

Secondary data was obtained from the Fiji Ministry of Education's National Curriculum Framework, a document that outlines the aims, objectives, content and assessment strategies intended to be used in Fiji schools.

## **4.4 The Criteria for the Admissibility of the Data**

Primary data was collected from statements of participants and recorded by the researcher during the *talanoa* and participatory workshop sessions. Information shared or discussed outside of the *talanoa* and participatory workshop sessions were not used. However, if a piece of information was discussed to elaborate on understanding information shared during the *talanoa* and or the participatory workshop, then the information was used. The information admitted as data was obtained only from the participants.

The criteria used for the admissibility of the data were related to the research key questions. Data concerned indigenous peoples' perception of CC, indigenous Fijians TEK of CC and CCA, how the TEK of CC had been acquired, and how the knowledge could be understood better in Fiji. The participants were guaranteed confidentiality.

For secondary information, the Fiji National Curriculum Framework, 2013 was the key document used. Data collection was directly related to each of the five research questions:

**Research Question one.** The first research question asks what the indigenous Fijians' perception of CC is. The data collected were varying perceptions of indigenous Fijians about CC influenced by their gender, traditional roles and context.

**Research Question two.** The second research question is what the indigenous Fijians' TEK of CC is. The data collected was (a) the indigenous Fijians' climate indicators. (b) the indigenous Fijians traditional calendar. (c) the indigenous Fijians' traditional CCA.

**Research Question three.** The third research question asks how the indigenous Fijian TEK is disseminated. The data collected concerned (a) the ways in which indigenous Fijian children learnt TEK of CC and (b) the loss of the indigenous Fijians' TEK.

**Research Question four.** The fourth research question asks how the indigenous Fijians' TEK is similar and or different to the type of knowledge taught in Fiji schools. The data collected concerned (a) TEK of CC taught in Fiji schools and (b) ways of teaching TEK of CC in schools.

**Research Question five.** The fifth research question asks how the indigenous Fijians' TEK can be used to help the people of Fiji to understand CC and CCA better. The data collected recorded (a) the ways in which the TEK of CC could be better transmitted and understood.

## 4.5 Procedures for Collecting Data

Apart from my personal observations of village life, there were three main sources of data used for this study: *talanoa* sessions; workshop sessions and analysis of documents. In the first two phases, it was important to observe *Vanua* protocol as this was central to the success and effectiveness of the study.

The first phase of the research consisted of talanoa sessions with the village elders. The second phase, consisting of participatory workshops attended by adults, children and other elders was also an important source of data. In the third phase, the researcher conducted an analysis of documents reviewing literature related to the research questions to find out if what is transmitted by the elders is similar to what is being taught in schools in contemporary Fiji. The main reason for the different approaches of gathering data was to find out if there were differences among participants' understanding of TEK of CC and CC adaptation and to explore the reasons for them. The researcher was also interested to find out if the process of transmitting TEK of CC used by elders was similar to that used by other adults in the villages.

## **Phase 1: *Talanoa* Story telling sessions with the Elders**

*Talanoa* was chosen as a method of collecting data in this research because it is the main method of communication in an Indigenous Fijian community: important decisions, negotiations, dialogues and teaching in an Indigenous Fijian community is done via *Talanoa* (Nainoca; 2011, p.18). In addition, *Talanoa* was conducted in the *Vosa Vaka Viti* (Standard Indigenous Fijian language) as the common tongue of the elders in the Ovalau community and the language that participants would be comfortable to share their knowledge in. Since the researcher is an Indigenous Fijian and the participants are Indigenous Fijians it was appropriate that the *talanoa* was conducted in the Indigenous Fijian language. Moreover, information given by the participants will be accurate if communicated in their vernacular (Latu, 2009).

During *talanoa* sessions it became apparent that the participants preferred to have other members of their community present to verify the information given. In addition, the researcher could not simply *talanoa* (chat) with the participants. The researcher had to take part in all the *talanoa* activities and activities related to it. For instance, the researcher had to *yaca tavioka* (grate cassava) with the participant who was preparing *madrai ni viti* (Fijian bread) which was to be sold at the market. Another time, the researcher had to assist one of the participants *kari niu* (scrape coconut) since the participant was cooking lunch during the interview. In another instance, the researcher had to go out to the sea with the participant to *vakasavasavataka na lawa* (clean the fishing net) after he had returned from a fishing trip. The participants did not have ‘free time’ as they were always doing something even during *talanoa* or conversing with the researcher. In addition, one of the participants said that ‘*e sega walega ga ni dau talanoataki e dau caka tale ga me rawa ni kila kina na gone na ka e vakavulici tiko*’ (knowledge is not just passed down orally but the child needs to practice what is taught to be able to understand what is being taught) (Mrs M Wati, 2013: pers. comm).

## **Phase 2: Participatory Workshop**

Phase 2 of the data collection consisted of conducting a workshop following a group *talanoa* model for community groups in Ovalau. The Participatory Learning Appraisal included *talanoa* sessions guided by the researcher using the study questions derived from the objectives of the research. This method was implemented to allow the participants to exchange information on the

issue while learning from each other and passing on the knowledge learnt to other members of their community.

A participatory workshop session was held at each of the research sites. Its dates were selected by the participants. The reason they chose the date for the workshop was that they had other village events and did not want them to clash with the date of the workshop. A date needed to be selected when everyone would be in the village to attend the workshop.

It was attended by the children and the parents. However, the elders who participated in the *talanoa* sessions of Phase 1 decided to also attend. Their attendance was a blessing in disguise because they were able to share some of the TEK that the parents and children did not have. This fulfilled one of the objectives (bi-directional learning) of holding such an event.

The workshop started with the *isevusevu* (presentation of *yaqona* (kava) seeking traditional approval for the workshop) to the chiefs of each village. This allowed the researcher to confidently conduct the workshop and exchange ideas with the participants. In addition, after the *isevusevu* ground rules for the workshop were laid by the participants and the researcher and this contributed to the success of the event. One of the rules established and agreed on was that there would be no drinking of *Kava* (*Piper methysticum*) during the workshop in order to enable the participants to take part in the right frame of mind for the sake of gathering valid data. Kava is a traditional Fijian ceremonial drink that is sometimes used during social gatherings. Kava is a drink made from the stem and roots of the *Piper methysticum* plant. The consumption of kava can cause drowsiness and/or intoxication as well as kanikani (dry scaly skin). Hence, drinking kava would have influenced the state of mind of the people present and ultimately, the validity of the data collected.

The participants were divided into groups which were: girls, boys, men and women. The elders who participated in the *Talanoa* session decided to make up two additional groups: Elder Men and Elder Women - six groups altogether. After the participants had been divided into groups, each was given a set of questions to guide them through their discussion. Each group had 30 minutes to discuss the given questions and to present their findings to the other group at the end of the time. Resource materials like newsprints and markers were given to the people present to use to illustrate their findings. The girls were given the first chance to present, followed by the

boys, women, men, elder women and elder men. The knowledge that was presented complemented each other and the elders corrected some knowledge that they thought had been presented incorrectly by the younger participants. For example, the girl group from Nasinu that when red skies were visible in the evening that the following day would see bad weather. Elders and adults did not agree with this statement and a discussion about the true meaning of the red evening sky followed. After some negotiations, it was agreed that red skies in the evening forecasted good weather the following day.

At the end of the workshops, the traditional *itatau* was presented where the researcher thanked the participants for their contribution to the research and also requested to leave. After the farewell speeches, the researcher was sent off with *sau* blessings of the chiefs for the researcher's research and studies with the words: *Kalougata tiko mada ga na nomu vakadidike kei na vuli, Mana! Ei dina!*' Translated: ('May your research and studies be prosperous!')

## **Vakadidigo Observation**

Observation and imitation is a pedagogic approach used by Indigenous Fijians in order to learn effectively. It is important for locals to *vakadigova* (observe) and analyse an action or skill before they imitate or practise it. Therefore it was vital that an indigenous Fijian researcher was also an observer of the behaviour and actions of the participants of the research. Thus, while the researcher *talanoa* (talked) to the elders, conducted the participatory workshops and lived among the participants, observations were made and notes were taken of what was observed.

## **Phase 3: Document Analysis**

The Researcher attended two CC curriculum workshops organized by Fiji's Ministry of Education and the Secretariat of the Pacific Community GIZ. After attending these workshops an analysis of documents was done to better understand how the TK of CC is taught in schools in Fiji. In addition, the Researcher used this method for finding out if and how the TK of CC is fitted into Fiji's revised National Curriculum Framework.

## **4.6 Procedures for Conducting the Study**

Conducting a study requires deep reflections on Research Ethics. At the institutional level, the USP Human Research Ethics Guidelines (USP, 2009) provided the basic research protocols and the university's Human Ethics Form was prepared and endorsed by the Research and Post-Graduate Committee at the School of Education and on the Faculty level.

In terms of cultural protocol, approval and participation of the village chiefs and people were also sought. It was particularly interesting that the village chiefs and elders knew about the researcher's arrival without being informed. One of the elders reported that my visit was shown to a chief in a dream. In another instance a chief saw two *Vodre drokadroka* (green grasshoppers) in his home and this was taken as a sign that a visitor would come to see him twice. In addition, while the researcher was approaching one of the villages, the chief's *bête* (priest) without any forewarning came to greet the researcher and went to inform the chief that he had two *vulagi* (visitors) who are *Daunivakadidike ni matanitu* (researchers from a government department). The *bête* is the chief's spiritual leader and he has the ability to discern and see things before they take place. The information he receives through a vision or through natural signs is given to him so he can use them to protect the chief from danger.

After the USP Research Committee and the village chiefs had granted their approval, the researcher went to conduct the study at the research sites.

### **1. Questionnaires**

The researcher used an open-ended questionnaire (as in Appendix 1) derived from the research questions to guide the *talanoa*. The type of questionnaire allows the participant to express opinions and information freely and it was used by the researcher to guide participants through the *talanoa* sessions. The collected data was recorded and validated during the *talanoa* sessions at the research sites.

## **2. *Talanoa* (Storytelling)**

Six *talanoa* sessions were conducted between October 2012 and October 2013. Prior to the meetings the research questions were discussed with the chiefs before they were discussed with the participants. Since the *talanoa* sessions took place at three different research sites, four weeks were spent at each of the research sites. While each meeting with the elders lasted approximately 45 – 60 minutes the participatory workshops took between 3 – 4 hours. All the consultations were audio recorded.

## **3. Transcription and Translation**

The collected data was then transcribed and translated while the researcher was still in Ovalau. The transcription of the interview was discussed and validated during further *talanoa* sessions. No changes to the transcripts were requested.

## **4. Photographs**

The photographs taken during the fieldwork have all been taken by the researcher after having asked participants of the study for their permission to do so. The pictures should aid the reader through visualizing relevant places and events. They have also been used as key information guiding the researcher during the writing process of this thesis.

## **5. Field notes**

A notebook was used to record observations relevant to the research topic. The observations especially focused on changes in the environment and the locals' reactions to those changes. Field notes were taken both in the *Vosa Vaka-Viti* and in English. The note book was treated confidentially. In addition, the notes were triangulated with other data collected through photographs, observations, participatory workshops and *talanoa* sessions.

## **6. Documents**

The document was collected from the Curriculum Development Unit office at the Ministry of Education in Suva. An original copy of the document was given to the researcher.

## **4.7 Data Analysis**

All the data collected during the fieldwork was coded, triangulated and analysed before reporting back to the participants for validation so the work could be published. This was done partly to ensure that what was published would not ‘hurt’ the *Vanua*.

### **Coding**

Coding is a process whereby data is organized and sorted. It is a way of labeling, compiling and organizing data. In addition, coding helps with summarizing and synthesizing data, and supports the researcher to link ideas derived from the data. Moreover, coding is cyclical. Ideas derived from the first stage or cycle of coding is refined in a second and third cycle of coding (Litchman, 2013). The researcher used a notebook and coded the main thematic areas under study in order to address the research questions. The thematic areas were grouped into: 1) perceptions of Indigenous Fijians about Climate Change, 2) Indigenous Fijians’ traditional knowledge of their physical environment, 3) The way this traditional knowledge of the physical environment is interpreted and transmitted to the younger generation, 4) knowledge about Climate Change that is taught in schools, and 5) How the Indigenous Fijians’ TEK of CC might help to further enhance people’s understanding of CC and CCA in Fiji. Responses to each research question were recorded under the correct conceptual code. Then, a storyboard was established where similar responses were grouped together. Comments were also added to this storyboard to refine and analyse the collected data.

### **Triangulation**

Triangulation means linking information from different sources of data from different tools in a study, to ensure the validity of it (Guin, et.al, nd). This study used the Methodological Triangulation approach whereby information is acquired using the following multiple qualitative methods: *talanoa*, workshops and document analysis. Since information was collected through different methods, information had to be compared and similarities and differences needed to be identified. If similar responses had been collected they were treated as verified.

## **Interpretation**

Data collected during the *talanoa* with the elders and the participatory workshops was coded conceptually. Also, using the Methodological Triangulation approach, all responses were triangulated and reappearing ones highlighted and used to answer and discuss the research questions. Finally, after the interpretation of data, the results were presented to the participants for a last validation before it was published.

## **4.8 Presentation of Results**

The results of this study were presented under thematic narratives. This form of narrative is classically used to describe themes and patterns in qualitative researches that use a phenomenological research design. Tables were also used where necessary.

## **4.9 Limitations**

### **Sample of Elders**

There were only four indigenous Fijian elders living (age group of elder was determined by the chief) in each research site. Due to this, the research was limited to interviewing only these elders. Interviewing only 12 elders is not sufficient to make a generalization on the TEK of CC in indigenous Fijian communities. However, since the TEK of CC expressed by the elders of the three sites correlates, the finding may be valid. In the future, the number of elders in the villages may decrease or there may be none left, hence it may be impossible to access for the indigenous Fijian elders' TEK of CC. It is important that similar studies are carried out all over Fiji while elders are still alive.

### **Research Language**

The essence of TEK lies in the language of the knowledge holders. The participants of this study preferred to speak in the indigenous Fijian language. It seemed culturally appropriate for the researcher to be able to speak in the participants' language so that the essence of the TEK of CC could be understood clearly. Language was not a limitation for the researcher. However, the limitation lies in translating some indigenous Fijian terms into English. Some Fijian words have

no English equivalent so they needed to be described to make them meaningful. For instance, the term *kuita veiyalovi* refers to a type of octopus that stays attached to another octopus during the mating season, rather than calling it just ‘octopus’. Difficulties arising from language use are common among those who conduct research in a language that differs from the one used to report research findings. These difficulties can be overcome if the researcher uses a language translator who can assist them during the research.

## Summary

This study used a qualitative approach and employed a variety of methods for collecting data that was triangulated for validation of data. The study drew inspiration from a variety of research traditions including phenomenology and Indigenous Research. These methods included observations, *Talanoa* (conversation) with individuals as well as focus groups. *Talanoa* (conversations) were conducted in the *Vosa Vaka-Viti* (Standard Indigenous Fijian language) and transcribed and translated in English and conceptually coded under the research themes/questions. The *Bu ni Ovalau Framework* which was also used as a basis for the fieldwork is derived from the *Vanua* Framework which is an indigenous research framework. The *Bu ni Ovalau* Framework is grounded in the *Vanua* which is the main source of information for this study. To ensure collecting valid information and its usefulness to the *Vanua*, the *Vanua* protocol had to be followed by the researcher. The major research design employed was the Qualitative Approach. Observation and *talanoa* were the main research methods used. These methods are derived from the Qualitative Approach and are also culturally appropriate to be used in Ovalau as they fit into the *Bu ni Ovalau* Framework. Thus, this study can be seen to be using both western and indigenous research approaches and theories as symbolised by the leaves in the *Bu ni Ovalau* Framework. The varying perspectives from different groups under study allow for a more meaningful and contextualized discussion of the research questions thus highlighting relevant and practical responses to address the issue at hand. Finally, the research had some limitations that can be addressed in future research.

# **Chapter Five | Findings**

This chapter outlines the responses of the participants to questions related to the study's main research questions. The first part reports the Indigenous Fijians in Ovalau's perceptions of CC, the second explores TEK of CC adaptation and how this knowledge is transmitted to young people, the third discusses the extent to which Indigenous Fijians' TEK of CC is incorporated in the National Fiji Curriculum and the final section how TEK of CC adaptation could be used to enhance CC awareness in Fiji. The chapter ends with a summary of the findings. The table below shows the summary of this chapter.

*Figure 5.0 Chapter 5 Summaries*

5.1 What is the Indigenous Fijians' Perception of CC?
5.2 What is the Indigenous Fijians TEK of CC?
5.3 How does this TEK of CC manifest and how is it interpreted and transmitted to the younger generations?
5.4 How is the indigenous Fijian TEK similar to and/or different from the type of knowledge about CC that is taught in schools in Fiji?
5.5 How could we use indigenous Fijians' TEK to further enhance people's understanding of CCA in Fiji?(especially young people's)
6.0 Summary

## 5.1 What is the Indigenous Fijians' Perception of CC?

The elderly women said that CC was linked to an increase in the frequency and amount of rainfall and the changing weather patterns such as the oversupply of rainfall during the dry season which negatively contributes to mildew in Pandanus leaves (which need dry weather).

*'Ena gauna ni draki mamaca, na manumanu e kania na voivoi baleta ni suasua na lomani voivoi'* (During the dry season the Pandanus leaves are eaten by beetles) (Mrs S Taraivini, 2013: pers. comm).

Furthermore, they associated the rain with an increase in the number of insects that eat the Pandanus leaves that women use for weaving mats and baskets. Moreover, rainy weather does not help fruits ripen and many (such as papaya) do not taste sweet.

*'Sega ni dreu vinaka na vuata ka kamikamica na vuata, me vaka na weleti'* (Fruits don't ripen well and are not sweet, for instance pawpaw) (Mrs B Kamoe, 2013: pers. comm).

Elderly men on the other hand, perceived CC as the changing weather patterns that negatively affect their traditional planting season and calendar, thus contributing to lower crop yields. In addition, native fruit trees such as *dawa* (*Pometia pinnata*) and *wi* (*Spondias dulcis*) did not seem to have fruits at all and mango trees and *tarawau* (*Dracontomelon viticense*) are producing very little fruit, if any at all.

The elderly men also associated CC with rises in the sea level and severe changes in sea temperatures that were affecting the fish yields and spawning season. For example, according to the traditional Fijian calendar, *sabutu* (Bream) should spawn and be available in abundance during the months of October to November, but the men reported that the amount of Bream has decreased dramatically and a fear that in the future the Bream would become extinct. Another type of fish that is supposed to be available in abundance during the month of June is the *Kawago* (*Lethrinusnebulosus*). This fish reportedly also decreased in numbers and its size. Most of the elderly men attributed the decrease of number and size to CC.

Like the elderly women, the elderly men also associated CC with an increase in the frequency and amount of rainfall they had experienced which, many said, '*vakabulabulataka na itei me*

*vaka na dalo kei na kakana draudrau ka tavukadiridiri na voivoi'* (was contributing to the fertility of land and increasing the farm yields of dalo (*taro*), *yaqona* (*Piper methysticum*) and vegetables but pandanus leaves get mildew) (Mr S Rogoyawa, 2013: pers. comm).

Although some plants are benefitting from the increase in rainfall it has already lead to the extinction of some endemic plants like *gasau* (reeds) that are used for building *vale vakaviti* (traditional houses) and scaffolding for some crops and plants. Changes like this were seen negatively:

*'So na vuata sa sega ni vua me vaka na dawa, tarawau, maqo keina vutu. Sa so tale ga na kau vovou era sa bula mai'* (Some fruits do not fruit anymore, like *Pometia pinnata*, *Dracontomelon vitiense*, Mango and *Barringtonia* species. In addition, new species of plants have emerged) (Mr S Rogoyawa, 2013: pers. comm).

The elderly men lamented the increased unpredictability of weather with the dry and rainy seasons somehow being merged. In the past, many said, there had been dry and wet seasons. Like the women, elderly men reported that such sudden and unpredictable weather patterns affected crop and vegetable yields. Furthermore the increase in wind intensity and frequency has also led to faster coastal erosion causing landslides that damage plantations as well as rivers and marine resources. Although it was also reported that the increase in rainfall had led to better yields of some vegetables and crops.

Interestingly, the elderly men also stated that CC also means '*cala na itovo ni tamata*' which translates as wrong attitudes and behavior of people (Mr S Rogoyawa, 2013: pers. comm). They had witnessed changes in parents and childrens attitudes and behaviours, which they perceived as not always being culturally acceptable.

For instance, they mentioned children who were walking around the village *vaka ra lako tu mai e dua na raitio* like a mobile radio and the increase in kava consumption and dalo thefts by young people (Mr S Rogoyawa, 2013: pers. comm).

Indigenous women associated CC with the King Tides, increases in temperature, changes in rainfall and cyclones:

*'Na veilecayaki ni draki, dua na siga e cila na siga, karua ni siga e tau na uca keina draki veisolo'* (unpredictable weather patterns; one day the sun is shining the next day it rains) (Mrs S Vuanicau, 2013: pers. comm).

A sudden and unpredictable downpour of rain during a sunny day was also categorized as CC by the women. Men on the other hand perceived CC as sudden and extreme weather conditions including extreme temperatures and the sudden changes in wind directions and intensity. In addition some defined CC as:

*'Tokavuki kei na veicalati ni draki, me vaka, ni cila na siga ena vula i uca keina kena reva ni vua na vuata'* (Inaccurate weather patterns, such as the high number of sunny days during the rainy season and fruit trees not fruiting when they are meant to ) (Mr S Qarau, 2013: pers. comm).

In all the three villages, young people, both boys and girls, perceived CC as '*veiveisau ni draki*' (changes in the weather and rising sea levels) (Ms M Tagicakibau, 2013: pers. comm). Some added that CC could be predicted using signs such as when a nearby island became more visible (signaling good weather) or *kabukabu* (hazy) signalling bad weather. The boys also said that CC was related to increases in temperature, rain, hot sunny days and sudden changes in the weather, especially wind directions.

In summary, the indigenous Fijians of this study defined CC as the changes in weather conditions that have led to changes in their environment and affected their livelihoods.

## 5.2 What is the Indigenous Fijians TEK of CC?

Most of the participants knew about Fijian TEK and its role in forecasting the weather and adapting to CC. Weather indicators dictate the time and the type of adaptation strategy to be implemented. First, weather indicators will be described followed by the relevant adaptation methods that had been suggested by the indigenous people.

### 5.2.1 Weather Indicators

Some of the common traditional indicators of CC that were highlighted by the participants include predicting a:

- a. **Cagilaba Cyclone** – an extremely large, powerful, and destructive storm with very high winds that turn around an area of low pressure<sup>9</sup>.

According to one of the elders:

*‘Ni soki tolu se va na uto se ra vakavale e ruku ni qele na lago kata se kalove vakadia ni titoko na lawe ni vudi se ra vuka e vanua na manumanu ni cagi se Kasaqa qori e ivakaraitaki ni vakarau liwa e dua na cagilaba’* (When breadfruit trees fruit in threes or more on a branch or when bees nest underground, or the inflorescence of the banana is bent like a walking stick handle or when the flocks of frigate birds are seen flying over land, these are signs of an approaching cyclone) (Mr S Rogoyawa, 2013: pers. comm).

Figure 5.1 Breadfruit fruiting in fours is an indicator for an approaching cyclone<sup>10</sup>



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<sup>99</sup> (<http://www.merriam-webster.com/dictionary/cyclone>)

<sup>10</sup> Breadfruit fruiting in four is an indicator for an approaching cyclone by R.K.L

One of the parents stated:

*'Ni ra laurai na toa ni ra moce e ra, ya e vakaraitaki ni na liwa e dua na cagi'* (When the chicken are seen roosting on the ground, that indicates that a cyclone is approaching) (Mr L Ravonu, 2014: pers. comm).

One of the children added:

*'Ni dau laurai na manumamu vuka ni waitui ni vuka mai vanua, ya e vakairaitaki ni voleka e dua na cagilaba'* (When sea birds are seen flying inland that is an indication of an approaching cyclone) (Ms M Bale, 2014: pers. comm).

Other cyclone indicators, as shown in *Table 4*, include the blowing of the northerly winds, sighting of birds flying higher than usual, abundance fruiting of endemic fruits such as *dawa* (*Pometia Pinnata*), *wi* (*Spondias dulcis*) and *maqo* (mango) disappearance of fish from their breeding places and the increase of coastal insects and mosquito bites.

When people see these indicators the following reactions are common: A village *davuke* (fermentation food pit) is dug and crops such as breadfruit, cassava or banana are fermented and put in so they could be consumed during and after the cyclone. Cassava plants are pruned so that the plants are not shifted and damaged by the strong winds and kava plants are covered with various creepers which tend to protect them from strong winds.

Table 4 Indigenous Fijians' Cyclone Indicators

Ecological condition	Girls	Boys	Women	Men	Elder Women	Elder Men
<b>Cagilaba (Cyclone)</b>	<i>Sivia na tau ni uca</i> too much rain  <i>Laurai na manumanu vuka ni waitui ni ra vuka mai vanua</i> Seabirds are seen flying inland  <i>Toso totolo na o</i> Fast movement of the clouds  <i>Vuka na manumanu ni cagi</i> Frigate birds can be sighted  <i>Katakata sivia</i> Increase in temperature  <i>Cagicagi</i> windy	<i>Sivia na tau ni uca</i> too much rain  <i>Totolo na toso ni o</i> Fast movement of the clouds  <i>Vuka na manumanu ni cagi</i> Frigate birds seen flying  <i>Vakasova i ra na Pi</i> Bees nesting underground  <i>Vukanamanu manunicagi</i> Frigate birds flying  <i>Cagi mai na vualiku</i> Northerly wind experienced	<i>Manumamu vuka ra vuka sara i cake</i> Birds fly farther up in the sky  <i>Tausoso tolu se va na Uto</i> Breadfruit fruiting in groups of three or four on one branch  <i>Vakavale ena qele na Lago Kata</i> Bee nesting on the ground  <i>Sobi na vuata</i> Fruits fruiting in abundance  <i>Sivia na pi ena gauna ni drake katakata</i> Increase in number of Bees during the hot season is a sign of an approaching cyclone  <i>Sivia na kau vuata me vaka na mago keina uto</i> Fruits fruiting in abundance for instance mango and breadfruit  <i>Vakavale i ra na Lago Kata</i> Bees nests underground  <i>Kune na manummu ni cagi</i> Frigate birds are sighted	<i>Ra yali na toa e loma ni koro</i> Chicken can not be seen in the village  <i>Ra moce e ra na toa sega ni ra moce e na vunikau</i> Chicken will not roost on the trees but will roost on the ground  <i>Vakavale na Lago kata e ra</i> Bees nest in the ground  <i>Sobi na vuata</i> Fruits clustering and hanging heavily  <i>Laurai na manumanu vuka ni waitui na Naico e loma ni vanua</i> The seabird Naico is found inland  <i>Vakavale i ra na Lago Kata</i> Bees nests underground  <i>Vakasova ena dela ni qele na Lago Kata</i> Bees nest underground  <i>Vesokitolu se va na uto</i> Breadfruit fruiting in threes or fours on a branch  <i>Basika na matani</i> na uca	<i>Sivia na Namu</i> Unusually high number of mosquitoes  <i>Laurai na manumanu ni cagi e vanua</i> Frigate birds are sighted on land  <i>Vuka voleka i ra na manumanu ni cagi</i> Low flying frigate birds are a sign for approaching cyclone  <i>Tau soso tolu se va na uto</i> Breadfruit fruiting in three or four in one branch is a sign of an approaching cyclone  <i>Laurai na manumanu ni cagi ni vuka mai lomanikoro</i> Frigate birds can be seen flying over the village  <i>Vakasova ena dela ni qele na Lago Kata</i> Bees nest underground  <i>Vesokitolu se va na uto</i> Breadfruit fruiting in threes or fours on a branch  <i>Dau levu mai na Kasaga – manumanu ni cagi – vuka I ra,</i>	<i>Vakavale na pi ena qele</i> Bee nesting on the ground  <i>Kalove vakadia ni titoko na lawe ni vudi</i> Inflorescence of the banana is bent like a walking stick handle is a sign of an approaching cyclone  <i>Kasaga e vukaca cake na mata ni cagi sega na cagi ke drotaka na cagi e na laba na cagi</i> Frigate birds flying following in the direction of the wind  <i>Uto ni sobi ya tolu se yava</i> Breadfruit fruiting in threes or more in one branch is a sign of  <i>Sobi na dawa/ wi/ tarawau/ mago</i> Fruits such as Dawa Pometia Pinnata, Spondias dulcis and Mangoes fruiting in abundance, more than normally seen, is a sign of an approaching cyclone  <i>Laurai na manumanu ni cagi e laurai</i> Frigate birds sighted  <i>Vakavale ena ruku ni co na lago kata se pi</i> Bee nests underground  <i>Vua vakasivia na vuata</i> Fruits in abundance

				<p><i>lelevu</i> Big raindrops fall</p> <p><i>Vua vakalevu na vuata – maqo, dawa, ivi, mli maderini</i> Fruits such as mangoes are available in abundance</p> <p><i>Dro i lomaniqara na ika – sega ni katoa</i> Fish hide under the rocks – can hardly catch any fish</p>	<p><i>voleka I na qele</i> Increase in the number of frigate birds flying very low near the ground</p> <p><i>Lago kata / pi – vakavale i ra</i> Bees nesting underground</p> <p><i>Uto vua ya tolu se va</i> Breadfruit fruiting in threes or fours in a branch</p> <p><i>Vuata me tau soso (dawa, maqo, kavika, wi)</i> Fruits like Pometia Pinnata, Mangoes, Malayan Apple and Spondias dulcis clustering</p>	
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b. ***Loka (Tsunami)*** - a great sea wave produced especially by submarine earth movement or volcanic eruption: Tidal Wave<sup>11</sup>

When a Tsunami is approaching, one of the elders stated that the event is indicated by:

*'Ni di caracara na mati se ni kui na boto ni wai se ua gunu se sivia na iyayala ni ua se ra lako icolo na manumanu vuka keina manumanu i ra ya sa ivakaraitaki ni loka'* (When there is an extreme low tide, very strong and swift current or king tides; birds and animals tend to move to higher grounds, indicating to people that a tsunami is approaching and they begin to move to higher ground as well) (Mrs M Wati, 2013: pers. comm).

One of the parents added:

*'Ni dau ciri na drose se dugudugukuro ya dau ivakaraitaki ni vakarau loka na vanua'* (When Jelly fish are seen floating that indicates that a tidal wave is approaching) (Mr L Ravonu, 2014: pers. comm).

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<sup>11</sup> (<http://www.merriam-webster.com/dictionary/tsunami>)

The children in Lovoni said that they are not aware of any tsunami indicators because it does not happen inland but one of the children in Rukuruku, the coastal research site, stated:

*'Ni dau kune kune dredre na manumanuvuka, ya e ivakaraitaki ni vakarau ua loka na vanua'* (A pending tidal wave is often indicated by the absence of flying birds in the area) (Mr J Rakai, 2014: pers. comm).

Other Tsunami indicators as listed in *Table 5* include the sighting of animals running wild and king tides in the coastal areas.

During a tsunami, people consume food that has been stored in the *ilololo* as well as wild foods such as *tivoli* (wild yam) and *dalo ni tana* (arrow leaf elephant ear tuber). The leaves of these crops can also be consumed as *icoi* (concomitant to food crops - vegetables). After a tsunami, people immediately plant crops that mature quickly such as *kumala* (sweet potato) and cassava when the stored food runs out.

Table 5 Indigenous Fijian Tsunami Indicators

Ecological condition	Girls	Boys	Women	Men	Elder Women	Elder Men
Tsunami	<p><i>Sega ni kila na ivakatakilakila baleta ni sega ni yaco i vanua</i> Do not know the sign because it doesn't happen inland</p> <p><i>Kunekunedredre na manumanuvuka</i> Difficult to sight birds</p>	<p><i>Dro i delana na manumamu</i> Animals move to higher grounds</p> <p><i>Manumanuvuka na maina e vuka i vanua</i> Birds fly inland</p> <p><i>Di caracara na mati</i> extremely low tide</p>	<p><i>Dro na manumanu i na vanua cecere</i> Animals move to higher grounds</p>	<p><i>Uneune na vanua</i> Earthquakes are experienced</p> <p><i>Veicicyaki na manumamu</i> Animals go wild</p>	<p><i>E yaco ga mai wai</i> It happens in the coastal area only</p> <p>Ciri na 'drose' se 'yalove' 'dugudugukuro' Jelly fish is floating</p>	<p><i>Di caracara na mati</i> Extremely low tide is a sign for an approaching tidal wave/tsunami</p> <p><i>Kui na boto ni wai</i> swift current in the sea</p> <p><i>Ua gunu – sivia na iyalayala ni ua</i> King tides are experienced</p> <p><i>Kui na boto ni wai, yavavala sega ni tu vakadua</i> Swift current underneath in the water – does not stay still</p>

### c. *Bogi walu* (Eight nights of rain)

*Bogi walu* is a phenomenon related to when rain falls continuously for eight nights. Locals reported that this weather condition usually happens at the beginning or towards the end of a month.

One of the elders stated:

*'Ena vula o Okosita, dau basika vakalevu na Bogiwalu baleta me kakua ni dua e segata na Kawakawa'* (Bogiwalu is usually experienced in the month of August to discourage people from fishing *kawakawa* (rock cod) that spawns during this time) (Mr I Vakaduadua, 2013: pers. comm).

One of the men added:

*'Ni vuka na Kajivuka i loma ni vale, vakauaua tu na o, liwa na Vualiku, sivia na kati ni Namu, ka katoa vakasivia na ika, qo e ivakaraitaki ni bogi walu'* (During this time, when

the north wind is blowing, the flying ants fly into the house, the clouds are wavy, there are lots of mosquitoes and men catch an unusual large amount of fish - all signs for forecasting eight nights of rain) (Mr Livai Ravonu, 2013: pers. comm).

Other *bogiwalu* indicators, as illustrated in *Table 6*, include frequent thunder and lightning as well as hot and dry wind.

These weather indicators prompt people living near the coast to smoke fish and store them for the rainy days. Firewood and food crops are collected and stored for the time of eight nights of rain and since tap water and river water can be expected to turn muddy, rainwater is collected and stored in drums and bottles. Drains near homes and in the village are cleared by the villagers in order to avoid flooding and no one is allowed to go fishing or out to sea because of the strong winds and heavy rain.

After a *Bogiwalu* women usually dry bedding and mats in the sun and the men collect food and repair damages caused by the event. As the soil is still damp the time after a *Bogiwalu* is also used for weeding and planting crops or vegetables.

*Table 6 - Indigenous Fijians' Bogi walu Indicators*

Ecological condition	Girls	Boys	Women	Men	Elder Women	Elder Men
<i>Bogiwalu</i> Eight nights of rain	<i>Draki ca me rauta e walu na bogi – liwa na vualiku</i> Bad weather condition for eight nights, northerly wind experienced	<i>Lutu vakawasoma na kurukuru keina tibi ni liva</i> Thunder and lightning frequently experienced	<i>Tau na uca me bogi walu sala vata kei na cagi kaukauwau</i> Nonstop rain for eight nights, followed by strong winds  <i>Vakauaua tu na o</i> Wavy clouds	<i>Cagi katakata</i> Hot wind  <i>Liwa na cagi kaukauwa ka tau na uca me bogiwalu</i> Strong winds and rain experienced for eight nights	<i>Kati na namu Unusual mosquito bites</i>  <i>Cagitatoba me bogiwalu, tau vata keina kena uca – vakaraitaki ni sa vakarau toka e dua na vulavou</i> Strong winds are accompanied by rain for eight nights, usually happens when a new moon is approaching	<i>Kati na namu Unusual number of mosquito bites</i>  <i>Basika vakalevu ena Okosita (gauna ni kawakawa – kauta mai na bogi walu me kakua ni dua e sagai koya (ika sau)</i> Usually happens in August when the Rock Cod spawns  <i>Kaji vuka ni vuka mai lomani vale Kajivuka</i> Flies inside of the house

e. ***Uca* (Rain)** - water that falls in drops from clouds in the sky<sup>12</sup>

Traditional indicators of rain include:

*'Ni uku na loaloa, se vakatoboicu na vula kina yasana imawi, se bota icake na vanua, se momosi na isema ni yago, se sisili na pusi, se vuka ilomani vale na kokoroji, se tunumaka na vanua, se tagi na boto, qo era ivakaraitaki ni na tau na uca. Ena vula i gasau tale ga e dau namaki me levu na tau ni uca'* (Black clouds accumulating in the sky, the half moon is tilted to the left, the red sky in the morning, elders experiencing symptoms of rheumatism and/or arthritis, cats are seen licking their fur, cockroaches are seen flying inside the house, high humidity, toads are croaking; during the season when the reeds flower, rain is expected) (Mr S Tamani, 2013: pers. comm).

A parent added:

*'Ni ra dau musu voivoi ga na marama sa dau keimami kila sara ni na vakarau tau na uca'* (When women harvest Pandanus leaves we know that it is going to rain) (Mr V Robaigau, 2014: pers. comm).

Elders and adults associate rain with the harvest of pandanus leaves because '*na tegu me savata na voivoi*' the rain will fall to whiten the Pandanus leaves that they use for weaving their mats. All the children stated that when black clouds accumulate it indicates to them that it would rain.

Other rain indicators, as stated in *Table 7*, include experiencing a sudden hot and humid weather, experiencing thunder and lightning on a sunny day, sighting of dogs lying with their belly facing upwards and *sigaloa* (accumulating of black clouds on a sunny day). Kabu o Nanau (clouds appear above Nanau a mountain in Lovoni) is another sign for the people of Lovoni that rain is approaching.

When people see the indicators of rain, women take their washing off the lines, adults prepare the crops, vegetables and firewood and children are not allowed to go outdoors.

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<sup>12</sup> (<http://www.merriam-webster.com/dictionary/rain>)

Table 7 Indigenous Fijians' Rain Indicators

Ecological condition	Girls	Boys	Women	Men	Elderly Women	Elderly Men
<b>Uca (Rain)</b>	<p><i>Uku na loaloa</i> Black clouds are accumulating</p> <p><i>Katakata sivia na draki</i> Hot and humid weather conditions are experienced</p> <p><i>Ni laurai na o loaloa e ivakaraitaki ni draki ca</i> Presence of black clouds in the sky is a sign of bad weather.</p> <p><i>Vakatuloaloan a vanua</i>. The atmosphere becomes dark.</p> <p><i>Tunumaka na draki</i> The atmosphere becomes warm and humid</p> <p><i>Veivukayaki na Kokoroti</i> Cockroaches are flying around</p> <p><i>Tagi na boto</i> Toads are croaking</p> <p><i>Sili na vusi</i> Cat licking its fur</p>	<p><i>Lutu na kurukuru ka tibi na liva ni cila tu na siga</i> Thunder and lightning during good weather</p> <p><i>Uku na loaloa</i> Black clouds are accumulating</p> <p><i>Vakatoboicu na vula</i> A half-moon in a tilted position is a sign of approaching rain.</p> <p><i>Katakata tunumakana draki</i> Hot and humid weather conditions are experienced</p>	<p><i>Sili na pusi</i> Cat licking its fur</p> <p><i>Davovakatadrai cake na koli</i> Dog lies with their belly facing upwards</p> <p><i>Uku na loaloa</i> Black clouds are accumulating</p>	<p><i>Kabu o delana o Nanunu</i> Mount Nanunu will be surrounded by clouds</p> <p><i>Sigaloa</i> On a hot sunny day black clouds are seen accumulating</p> <p><i>Qarasobu na vula – me vaka na batinivuaka</i> Moon will be faced downwards like a pig's tooth</p> <p><i>Veivukayaki na kokoroti</i> Cockroaches can be seen flying around</p> <p><i>Momosi na isema ni yago</i> Rheumatism</p> <p><i>Tagi naboto</i> Toads croaking</p> <p><i>Sili na pusi</i> Cats licking their fur</p> <p><i>Draki tunumaka</i> Hot and humid weather condition</p> <p><i>Bota i cake</i> Red skies in the morning are a sign of bad weather during that day.</p> <p><i>Sere na boto</i></p>	<p><i>Kabu o Nanumu</i> Mount Nanunu is surrounded by clouds</p> <p><i>Momosi na isema ni yago</i> Arthritis</p> <p><i>Dau sasala na yago</i> Rheumatism</p> <p><i>Tagi na boto</i> Toad croaking</p> <p><i>Kari voivoi na marama – 'tegu me savata na voivoi me vulavula'</i> When women harvest pandanus it will rain so that the rain whitens the pandanus</p>	<p><i>Kabu o Nanamu</i> Mount Nanunu is surrounded by clouds</p> <p><i>Uku na loaloa</i> black clouds accumulating and <i>tumumaka na vanua</i> Humid atmospheric condition is a sign of approaching rain</p> <p><i>Sisili na pusi</i> Cat licking its fur is a sign of rain</p> <p><i>Momosi na isema ni yago/ mavoia</i> Rheumatism is a sign of approaching rain</p> <p><i>Vula kala ena yasana I mawi (sovanaauca)</i> Moon tilting to the left (pouring rain) is a sign of approaching rain</p> <p><i>Vula I gasau</i> Month that the reeds flower is the month of rain</p> <p><i>Vakatuloaloa na vuravura</i> The atmosphere gets dark</p> <p><i>sasala,</i> Rheumatism</p> <p><i>momosi ni sema ni yago</i> Arthritis</p>

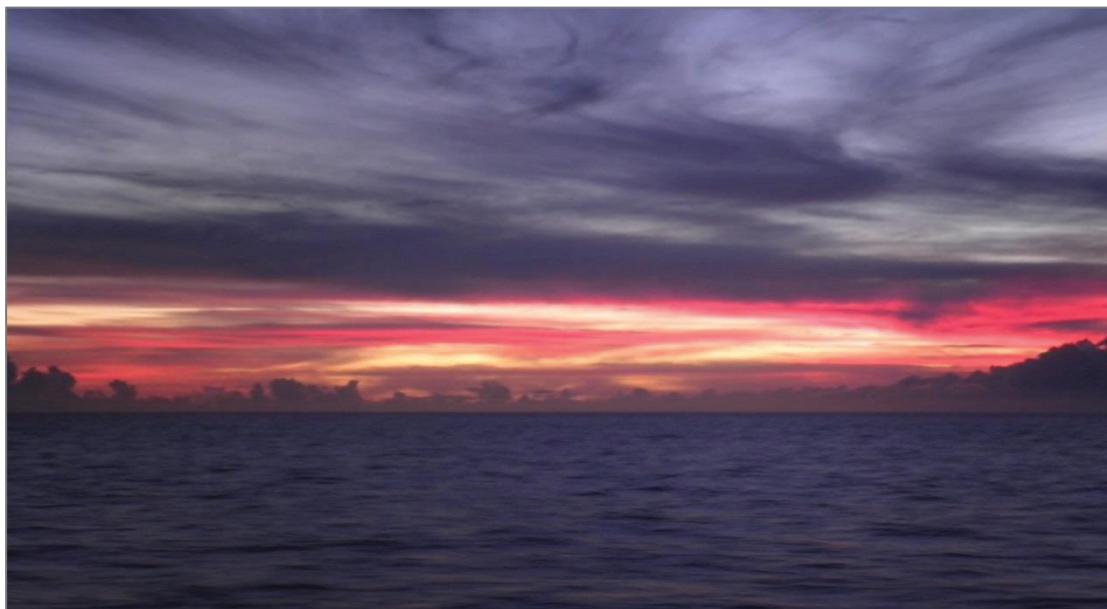
				Toads croaking		
				<i>Kati na Namu</i> Mosquitoes are swarming		
				<i>Katakata na</i> <i>vanua</i> Increase in temperature		

#### f. *Draki Vinaka* (Fine clear Day)

According to an elder good weather can be expected:

*'Ni ketekete ni bici na lomalagi se ni botaira na vanua se ni levu na kalokalo ena bogi, se tibi na liva ena gauna ni draki ca qo sa ivakaraitaki ni draki vinaka ena siga tarava'*  
(When the sky is as blue as the stomach of the branded rail (metaphor) or when there's red skies in the evening or if a lot of stars are seen at night or there's lightening – these are signs of approaching fine weather) (Mrs S Taraivini, 2013: pers. comm, 11 February).

*Figure 5.2 Bota i ra na vanua* (Red skies in the evening) an indicator for fine weather the following day<sup>13</sup>



<sup>13</sup> Bota i ra na vanua (Red skies in the evening) an indicator for fine clear day, taken by R.K.L

All the participants agreed on the relationship between red skies in the evening and approaching fine weather.

Other indicators for Draki Vinaka (fine clear day), as listed in *Table 8*, include the thundering sound of the king tide splashing against the reef. When these sounds are heard, people plan outdoor activities such as fishing and planting. Also, traditional functions are organized for such days.

*Table 8 Indigenous Fijians' Indicators for Draki Vinaka Fine Clear Day*

TEK	Girls	Boys	Women	Men	Elderly Women	Elderly Men
Fine Days	<i>Bota i ra na vanua</i> Red skies in the afternoon are a sign of good weather.	<i>Bota i ra</i> Red skies in the afternoon are a sign of good weather the following day.	<i>Tibi ni liva</i> Lightning during bad weather is a sign of approaching good weather and vice versa.	<i>Bota i ra</i> Red skies in the afternoon is a sign of good weather the following day	<i>Bota i ra na vanua</i> Red skies in the afternoon	<i>Ketekete ni bici na lomalagi ena mataka</i> clear blue sky in the morning' like the stomach of the Banded rail' is a sign of a good day  <i>Ua Loka (ualelevu)</i> cevu vakatolu na loka <i>I cakau vakaraitaki ni draki vinaka</i> King Tide splashing and making thunderous sound when the reef three times is a sign of good weather

The weather indicators used by indigenous Fijians in this study are signs that they observe and experience in the environment of their *vanua* (sky, land and sea) and form a part of their TEK.

The weather indicators are summarized in *Figure 5.3*.

*Figure 5.3 Summary of Indigenous Fijians' Climate Indicators*

Indigenous Fijians' Climate Indicators			
<p><b><i>Uca Rain</i></b></p> <ul style="list-style-type: none"> <li>1. Black clouds accumulate</li> <li>2. Half moon tilted to the left</li> <li>3. Red skies in the morning</li> <li>4. Rheumatism</li> <li>5. Cat licking its fur</li> <li>6. Cockroaches flying in the house</li> <li>7. Toad croaks</li> </ul>	<p><b><i>Cagilaba Cyclone</i></b></p> <ul style="list-style-type: none"> <li>1. Breadfruit fruitng in 3s or more</li> <li>2. Bees nesting underground</li> <li>3. Inflorescence of the banana is bent like a walking stick handle</li> <li>4. Frigate birds fly inland</li> </ul>	<p><b><i>Ua Loka Tsunami</i></b></p> <ul style="list-style-type: none"> <li>1. Extremely low tide</li> <li>2. Swift current below the sea</li> <li>3. Kingtides experienced</li> <li>4. Birds and animals move to higher ground</li> </ul>	<p><b><i>Draki vinaka Fine Clear Day</i></b></p> <ul style="list-style-type: none"> <li>1. The sky is as blue as the stomach of the Banded Rail</li> <li>2. Red skies in the evening</li> <li>3. Galaxy of stars in the night</li> <li>4. Lightening during rainy/stormy weather</li> </ul>

## 5.2.2 Traditional Seasonal Calendar

The Ovalauian Traditional Seasonal Calendar is important for understanding Fijians TEK as monthly activities are closely related to weather patterns as well as the flora and fauna of the villages. The following section briefly describes what type of weather conditions as well as some common activities related to each month. This information was obtained from the elders and parents. During the *talanoa* and participatory workshop it became apparent that elders and adults were similarly well informed about the Traditional Seasonal Calendar. This information was summarized into a written version of the Traditional Seasonal Calendar for Ovalau.

The children were not familiar with the Ovalauian Traditional Seasonal Calendar so the elders and parents discussion on this during the participatory workshop enlightened the children on this important TEK.

***Vula i Nuqalevu - Januери (January)*** –This is considered to be the cyclone season and a lot of rain can be experienced. It is the time when mangos and *dawa* (*Pometia pinnata* fruits) ripen and the flame tree flowers. If there is an approaching cyclone, *Lago Kata* (Yellowjacket bees) can be found nesting in the ground. The *daniva* (*Sardinella*) spawns and king tides can be experienced.

**Vula i Sevu - Veverueri (February)** - This month is still part of the cyclone season which means high temperatures, humidity and lots of rain. The men harvest yam and *daniva* (Sardinella) is *sevutaki* (offered) to the *Tui Wailevu* (chief) in Lovoni. In the sea, the *nuqa* (*Siganusvermiculatus*) spawns and it is a good time for catching them.

**Vula i Gasau - Maji (March)** - This is the month of rain, the *gasau* (reed) flowers and fruits become *cucula* (piercing) and fall. In the sea, the *Kabatia* (*Lethrinus*) spawns and it is a good month to catch it.

**Vula i Kelikeli - Epereli (April)** - The sea temperature is high and it is the last month of the cyclone season. The *duruka* (*Saccharummedula*) flowers as well as *moli madirini* (manderine) fruits. The *Kabatia* (*Lethrinus*) continue to spawn and the *qari* (sea crabs) matures and can be caught.

**Vula i Doi - Me (May)** - Temperature are still high and it is the last hot month when the *cagi tokalau se tokalau cevaceva* (south easterly winds) brings in the *busa* (half beak). The *daniva* (sardinella) and *sara* (white Sardinella) spawn and on land the *doi* (*Alphitoniazizyphoides*) flowers indicating that it is time to plant *dalo* (taro) if it has to mature by Christmas. The Yam leaves *bota* (turn brown) indicating that it is ready for harvest.

**Vula i Werewere - Jiune (June)** – The *wi* (*Spondiasdulcis*) flowers and the *dawa* (*Pometiapinnata*) fruits indicating that it is time to weed the Yam plantations. *Salala* (mackerels) and *seni kawakawa* (yellow finned grouper) spawn while the temperature decreases and so does the amount of rain.

**Vula i Cukicuki - Jiulai (July)** - The *tivoli* (wild yam) flowers and the *kuita* (octopus), *seni kawakawa* (yellow finned groper) and *salala* (mackerel) spawn. The temperature is still cool and the rain decreases.

**Vula i Kawakawa - Okosita (August)** – This month is the *Vula i matua* (month when crops mature). The *draladina* (*Erythrina variegata*) flowers which indicates that it is the season for *kawakawa* (yellow finned grouper) fishing. Octopus and Yellow finned groper still spawn and the sea temperature cools down. Men that drink a lot of *yagona* (kava) during this month will experience dryness in their skin because it is the cool and dry season.

**Vula i Vavakada - Seviteba (September)** – *Maqo* (mango) flowers, *bota na Tavola* (*Terminaliacatappa*) leaves turn brown which indicates that the *saku* (Swordfish) and *kuita* (octopus) are spawning. The temperature remains cool and occasional rain is experienced. At this time the vegetation grows well. During this time when fishermen go diving for Octopus, they have to watch out for *Kuita Veiyalovi* (Octopus swimming in pairs), so that when spearing one the other one does not attack.

**Vula i Balolo lailai - Okotova (October)** - Breadfruit and coconut mature, *bua ni viti* (frangipani), *kavika* (Malay apple) and *jiale* (Island Gardenia) flower, *kuita* (octopus), *saqa* (trevally), *walu* (kingfish), *dulutoga* (baby barracuda) and *lairo* (land crab) spawn. The temperature increases and *veisolo na draki* (temperature blends) indicating the beginning of the cyclone season.

**Vula i Balololevu - Noveba (November)** – *Maqo* (mango), pineapple, *kavika* (malay apple), *uto* (breadfruit) and *dawa* (*pomtiapinnata*) fruits ripen, *bua ni viti* (endemic frangipani) and *jiale* (island gardenia) flower, *saqa* (trevally), *donu* (spotted rock cod), *walu* (kingfish) spawn. It is still hot and *draki tumumaka* (hot and humid weather conditions) are experienced and *veikere na cagi tokalaucevace vata keina vualiku* (the south easterly and northerly winds blow alternatively). During this time, fishermen and people should watch out for the *ogo buidromodromo* (yellow tailed barracuda) which is poisonous.

**Vula i Nuqa lailai - Tiseba (December)** - This is still the cyclone season. The *nuqanuqa* (redup), *vaivai* (flame tree), *bua ni viti* (endemic frangipani) and *jiale* (island gardenia) flower, and the *maqo* (mango) and *kavika* (malay apple) ripen, the *nuqa* (*Siganusvermiculatus*), *vonu* turtle, *kawakawa* Yellow finned groper, Trevally, *kanace lalai* (mullet) spawn. The hot and humid weather condition continues to be experienced and the *Tokalau* (easterly winds) blows. During this time children should watch out for *lago kata se pi* (bees) since there will be a large number of them breeding.

In summary, the indigenous Fijians of the research site have a TEK of CC. Their TEK about CC is knowledge gained from their interaction with their *vanua*.

### **5.2.3 Traditional Climate Change Adaptation Methods**

CC has had positive and negative impacts on the livelihood of the Indigenous people of Ovalau in numerous ways. A positivie effect was the amount of crops harvested. It was found that there has been an increase in farm productivity. More taro, kava (*Piper methisticum*) and vegetables have been harvested due to the excellent distribution of rainfall causing high fertility of land. The increase in farm production lead to more food for the people as well as an additional income generated through selling the surplus at markets. On the other hand, a deacrease in the water temperatures (sea and rivers) affected the fishery sector negatively. It led to smaller amounts of fish and prawns available and the animals caught were smaller than the ones that were caught in the past. Smaller harvests lead to more time being spent when fishing and also less income from selling a surplus. A second negative impact of CC is the rising of waterlevels due to the increase of rain which lead to erosions in coastal areas and river banks being washed away.

Locals have developed TEK over years which help them cope with such changes and have made them resilient. Some of the adaptation methods mentioned by parents and the elders during the *talanoa* sessions and participatory workshops include:

- a. *Vanua sauvi* are land and sea areas that are restricted in how they are used. These areas are *sauvi* (restricted) from use so that the area can regain its fertility and regrow its resources. When these areas are *sauvi*, a traditional ceremony is held so that everyone is aware of the restriction and respects it. Coconut leaves are woven around the trees or poles to mark the area. Failure to respect this may lead to an *ore* (traditional punishment) for the wrong doer. In Ovalau, certain terrestrial areas and fruit trees have been *sauvi* in there usage; One of the reasons for implementing this was that there would be enough resources available during Christmas time, a time when most members of the village are present. Another reason, according to the elders, was that the forest also acts as a reservoir, filtering and storing water that humans, animals and plants use for their daily sustenance.

*Figure 5.4 Vanua sauvi in Rukuruku (Terrestrial and Marine)<sup>14</sup>*



Also, certain *iqoliqoli* (fishing or marine areas) have been *sauvi*. This is done to allow for the re-growth of marine resources. In Rukuruku the east end of the bay has been restricted in its usage for the last five years. Hence, sea resources have increased in numbers and have migrated (spill over effect) to the middle part of the bay where people can fish using fishing lines but not *jili* (net fishing). When enforcing the *vanua sauvi* (restricted fishing area) a traditional ceremony is held so locals are aware of it and respect the fishing ban. It is believed that those who violate such restrictions are punished in some form by the *vanua*. For instance, the researcher was told that one of the women from Taviya, the village next to Rukuruku, tried to go fishing in the restricted fishing area of Rukuruku. While she was paddling in her bamboo raft, her dog was following her. As she was getting close to the restricted fishing area, she heard her dog bark, and when she looked back she saw her dog being swallowed by a shark. People who disrespect the *vanua sauvi* will be *ore* (punished traditionally). The offender would be expected to take *yaqona* (kava) to the *Tuirara* (fisher folk clan in Rukuruku) and offer a traditional apology. If the person does not offer a traditional apology, the *sau ni vanua* (supernatural power of the *vanua*) is believed to continue to punish the person. The lady, in the example, paddled back ashore without hesitation and presented her traditional apology to the head of the *Tuirara* (Fisherfolk clan in Rukuruku).

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<sup>14</sup> Vanua sauvi in Rukuruku (Land and Sea) taken by R.K.L

*Figure 5.5 Vanua Sauvi in Rukuruku (Mangrove Forest)<sup>15</sup>*



Mangrove forests growing in the *vanua sauvi* area are also restricted in the way they can be used in order to allow marine resources that normally breed in this area, including bech de mer and rock cod, to be restored in their numbers. The mangrove forest acts as a nursery for the marine resources of the area. Furthermore, the mangroves protect the coast from erosion by forming a barrier between the force of the waves and the coast.

*Figure 5.6 Spill over effects: high yields of beach de mer and rod cod<sup>16</sup>*



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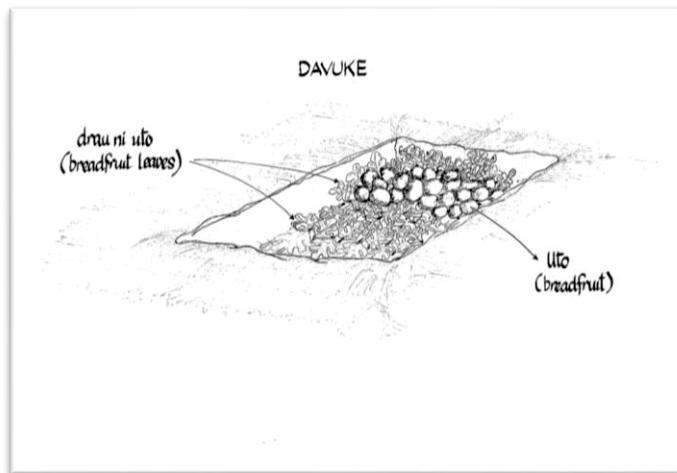
<sup>15</sup> Vanua Sauvi in Rukuruku (Mangrove Forest) taken by R.K.L

<sup>16</sup> Spill over effects: Beach de mer & Rock Cod high yields, taken by R.K.L

**b) Davuke** - is a fermentation food pit that is usually covered with *drauni uto* (breadfruit leaves).

See Fig 5.7.

Figure 5.7 Davuke – fermentation pit<sup>17</sup>



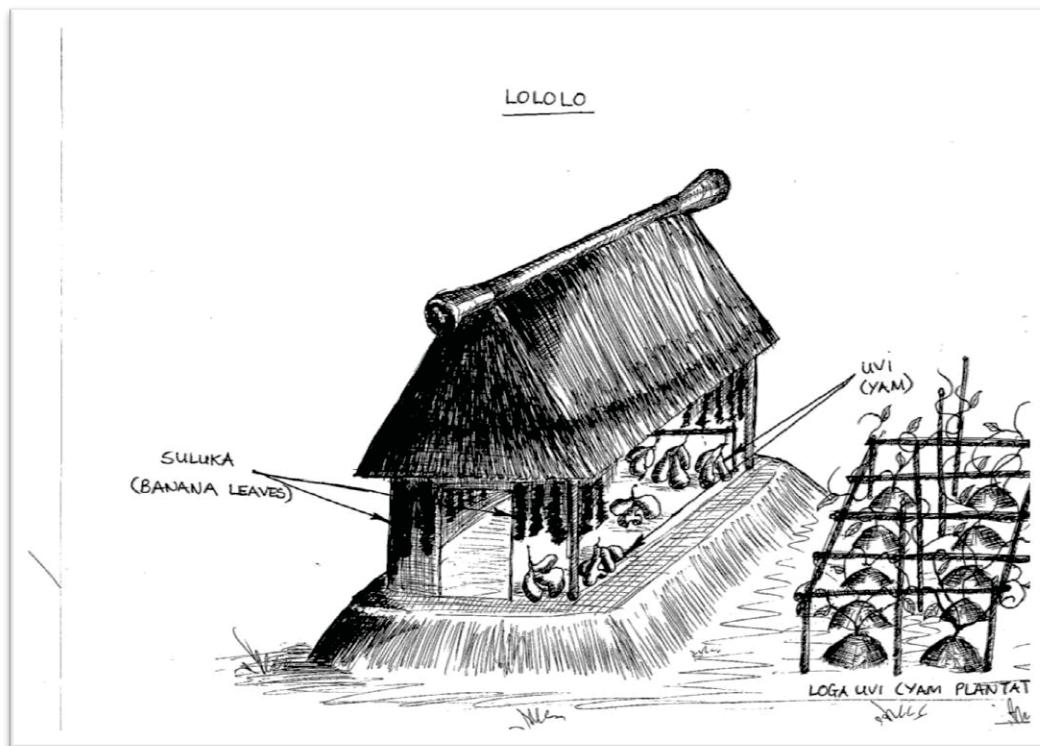
A *davuke* is used to preserve foods such as banana, breadfruit and cassava through fermentation so that they can be consumed during times of *lauqa* (famine), when there is not much food available

**c) Lololo** –refers to a thatched house made from local timber and coconut leaves in which *Yabaki* (yams) are usually stored after they have been harvested. Nowadays, other crops such as *tivoli* (wild yams) and taro are also stored in the *lololo* so they can be used in times of needs.

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<sup>17</sup> Illustration by Mr.M.Dokonivalu

Figure 5.8 *Lololo* – storage for root crops<sup>18</sup>



Yam is a root crop that is the main staple of their diet. The Indigenous Fijians plant many varieties of it and they grow into different sizes that dictate their use. Some yams are presented during traditional ceremonies; others are used for soup or, feasts or for personal consumption. The crop can be stored in the *lololo* for up to one year. Farmers are always careful to maintain the *lololo* so their crops are stored safely. Yams are usually divided into different sizes and their uses or stored in the barn. Banana leaves hang in the *lololo* to monitor the storage temperatures.

d) *iYavoi* (intercropping) is a form of farming where many different kinds of crops are planted together and while waiting for the main crop to mature, the crops and vegetables that are planted in between the main crop can be harvested and consumed. For instance, farmers in Lovoni

<sup>18</sup> *Lololo* – storage for root crops, illustrated by Mr.M. Dokonivalu

usually plant *bele* (*Hibiscus manihot*), *vudi* (*Musa sapientum*) and *jaina* (banana) in between *dalo* (taro) plants so that they can be consumed while waiting for the *dalo* (taro) to mature. Also, the *iYavoi* (plants planted in between the main crop) add fertility to the soil and help the main crop grow well.

Figure 5.9 *iYavoi* (intercropping)<sup>19</sup>



e) ***Moka*** (stone weir) - is made by arranging rocks in a U-shape to trap fish during low tide. After the fish have been trapped women or children who collect fish can put their nets around the rock and catch them. Fish and sea resources can only be caught during low tide. Related to this, is a Fijian saying *qalova ua ua na moka* that means people who try to do something at the wrong time will not be successful in what they are doing. Hence, the women or children who collect fish and marine resources from a *moka* are always careful to go at the right time.

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<sup>19</sup> *iYavoi* (intercropping) by R.K.L

Figure 5.10 Moka (Stone weir) in Rukuruku<sup>20</sup>



The *moka* is located within the *vanua sauvi* where people collect fish. In the last five years no fish could be collected from the *moka* in Rukuruku and there are already signs of regeneration in the area.

In summary, the indigenous Fijians in the three research sites of this study possess a TEK for CCA. Their CCA methods are implemented by using available resources from their *vanua*.

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<sup>20</sup> Moka (Stone weir) in Rukuruku taken by R.K.L

## 5.3 How is the TEK of CC manifested, interpreted, and transmitted to the younger generation?

The TEK of CC is manifested in the *vanua* and interpreted by the indigenous Fijians through their understanding of climate indicators. This TEK is transmitted to the younger generation via different ways as stated in *Table 8*.

*Table 9 Indigenous Fijians' Transmission of TEK*

Girls	Boys	Women	Men	Elderly Women	Elderly Men
<i>Vulici mai koronivuli</i> Learned at school  <i>Vakavulici mai vei main a qasenivuli e koronivuli, na ivola e dau wiliki ka vulici talega mai vei ira na qase</i> Taught by teachers at school, the books they read and by their grandparents	<i>Vulici mai vei ira na qase kei na qasenivuli</i> Learn from the elders and teachers  <i>Vulici mai vei qasenivuli ka vulici talega mai vei ira na itubutubu</i> Learned it at school and from parents.  <i>Tukuni vakavosa mai vei ira na qase keina nodra</i> Orally taught through parents	<i>Rogo italicootaki mai vei ira na qase ena vosa vaka Lovoni.</i> Heard from stories told in the Lovoni dialect.  <i>Vulici ena nodra dau vakadigovi ira na qase na gone</i> Learn through observation and see the difference between what use to happen then and now  <i>Tukuni vakavosa mai vei ira na qase keina nodra</i> Orally taught from elders, parents and through practise as they experience changes in weather daily.	<i>Talanoataki vei ira na gone ka ra vulica na gone mai vei ira na qase ena gauna ni cagilaba</i> Told to children through stories and children learn them through experience and practice during a cyclone  <i>Vulici ena vosa e vosataki kei na vakaraici ira na qase, qasenivuli; vulici mai koronivuli keina raitio</i> Learnt it orally and through observation from the elders, from teachers at school, the radio and also can sense the change with their body  <i>Tukunikataki mai vei ira na qase.</i> Orally told by elders.  <i>Lagataki ena sere, meke.</i> Recorded and sung in songs and traditional	<i>Dau talanoataki vei ira na Told in stories to children</i>  <i>Gone era muri ira na qase</i> Told orally to children who accompany their elders  <i>Vulici mai vei ira na itubutubu keina qase ena nodra</i> <i>tukunikataka ka bulataka</i> Learn it from parents and the elders orally and through observation  <i>Talanoa vei ira na gone.</i> Elders tell children through stories  <i>Lagataki vei ira ni ra se gone – ena vosa vakaRukuruku.</i> Sung to children in the Rukuruku dialect as lullaby when they are the young	<i>Gone dau muri ira na qase, I na iteitei Children learn them by accompanying elders to the plantation</i>  <i>Dau talanoataki vei ira na gone ena gauna ni gunu yaqona vata ena yakavi ka dau vakananumi vei ira na gone ena gauna ni Siga kei Lovoni kei na gauna ni lotu</i> Passed on to young people when they sit with adults and elders during kava drinking sessions and children are reminded during Lovoni Day and during <i>vanua</i> church functions  <i>Vulica mai vei ira na qase – sega na kena koronivuli, gone dau muri ira na qase.</i> Learnt it from the elders, orally and through observation, there is no school for it. They are naturally gifted for instance <i>Gonedau</i> fisherfolk they have the <i>sau</i> natural power gift Nowadays, only children who asks question get to know about it and children who follow the elders and listen and pay attention to them. Nowadays children spend a lot of time listening to the radio (mobile phones), watch television more than pay attention and follow the elders.  <i>Gone dau muri ira na qase.</i> Children learn by following their elders to the plantation, the sea and around the village.

			<p>dances</p> <p><i>Vakamuri talanoa.</i> Recorded in stories told by elders according to their experiences</p> <p><i>Sa ra vakavulici ena gauna ni soqo.</i> Observed and learnt during traditional ceremonies and festivities.</p>	<p><i>Vakavulici – bose vakamataqali, bose vakoro &amp; kacivaki ena lomanikoro.</i> Children are told during clan and village meetings and it is announced by the <i>turaga ni koro</i> (village headman)</p>	
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The indigenous girls and boys in this study reported that they learnt about TEK of CC from their teachers, from books, and from their grandparents. The women, men and elders on the other hand stated that they learnt about TEK of CC through observing their surroundings and orally from the elders in their community. In addition, they stated that their elders taught them orally through stories, practice, experience, and through observation and imitation. When there is an indicator for a change in the weather locals implement traditional adaptation strategies. They said that they do not usually just wait for the weather indicators, but also use the traditional seasonal calendar to predict and prepare for changes in the weather. Such knowledge has been passed down orally from the elders and through observing and experiencing life in the village.

This is particularly important during the rainy and cyclone seasons for which people must prepare in order to have the necessary types of food and resources. While the men, women and elders

reported that they knew about TEK through experience in working with and observing elders, the children stated that they had learnt mostly from their teachers since they spend most of their time at school and less time in the village with their elders.

TEK according to the participants is passed on orally through the use of songs, plays and *meke* (traditional dances) for example lullabies that are performed as *meke* all of these forms describing an event or telling a story that embeds TEK. Some of these songs, plays and dances are taught in schools. Participants reported that teachers only teach them for the purpose of entertainment, not realizing the important knowledge that is embedded in them. In addition, these songs, dances and plays, according to the teachers who participated in the participatory workshops, are in the local indigenous languages and many teachers are often discouraged from using these because English is the official language of instruction from the primary to the tertiary level. Moreover, these songs, plays, and dances are not well documented hence some teachers many do not understand the lyrics and are unable to teach them properly. Finally such songs, plays and dances, according to the teachers who participated in the participatory workshops had not been taught in teacher training courses. Finally some of the older participants reported that the introduction of new technologies has resulted in mixing some indigenous Fijian songs with English ones. They think that this has led to the loss of meaning and values that were associated with the TEK that is embedded in the songs, plays and *meke* (traditional Fijian dance).

An example of a lullaby that teaches TEK is reproduced below:

**Teitei Vudi Waiwai (by Tavenisa Laiyawa, Suva, June 1977)**

*Teitei vudi waiwai*  
*Kowa lili kowa lai*  
*Dreu na soba ka tu ki tai*  
*Ra vura mai na lewa kalou*  
*E ra mai tei vudi keitou*  
*Tevuka mawi, tevuka matau*  
*Kakaluvi tinai gasau*  
*Kaluvi au*

**Translation**

Planting banana  
Ones that are hanging, ones that have fallen  
The banana fruit top on the other side is ripe  
The young ancestral girls emerge  
to plant bananas  
spread it on the left, spread it on the right  
the reed is whistling  
whistling at me

*Teitei Vudi Waiwai* refers to the *Vula i Gasau* season when the reeds flower in the month of rain and when ripe fruit should be picked so it does not get cucula (pierced) or rot. The whistling reeds signal to the listener that the time for harvesting fruit, like bananas, has come. The lullaby also shows that women (girls) are responsible for harvesting and replanting bananas. The researcher was told that this lullaby is sung to children between the ages of five and seven but is not taught in schools in its original form. Some teachers have tried to teach another version of it (see *Figure 5.11*), a version that can also be performed as a dance.

### **Teitei Vudi Waiwai** (from Mr.Viliame Vakatale)

*Teitei vudi waiwai  
Koro lili koro wai  
Koro tutu vakalalai  
Ra ue mai na lewa kalou  
Rau mai tei vudi keitou  
Kaluva liuse  
kaluva lau  
Kalaukaluvi tinai gasau  
Moli leqe  
Dua, Rua, Tolu, Va, Lima, Ono, Vitu, Walu, Ciwa, Tini.*

The message in the new version is similar to the previous one although teachers have included the numbers one to ten in the last line to help students learn to count in their vernacular. In addition, this lullaby is no longer taught as a lullaby but as a play in the infant years at primary school. This is to help children build their vocabulary while enjoying the learning process (Mr V Vakatale, 2013: pers. comm).

*Figure 5.11 Young Indigenous Fijian boys traditionally dressed ready to perform a traditional Indigenous Fijian dance<sup>21</sup>*



As shown in Fig.5.12, TEK of CC is often learnt and disseminated orally, through observations, songs, practices, rituals, ceremonies and dances.

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<sup>21</sup> Young Indigenous Fijian boys traditionally dressed to perform a traditional Indigenous Fijian dance taken by R.K.L

Figure 5.12 How TEK of CC is disseminated



The elders of this study expressed a concern that their heirs did not possess enough *vuku ni vanua* (ecological knowledge). Some of the reasons for not knowing enough, according to the interviewees, are: Firstly, children stay up late watching movies on television or drink grog and cannot wake up in the morning to go with the elders to the plantation or perform household chores. Secondly, many children are disobedient, do not follow instructions and question everything that is taught to them. A third reason given by the elders was that many young people prefer to follow their peers instead of the elders hence do not get a chance to learn about the traditions. They also said that some children spend more time on their mobile phones either talking to their friends or listening to music and are no longer listening to their elders; they are too engrossed with technology that they are not observing and learning from their environment. They also mentioned that some parents do not know the *vuku ni vanua vanua* knowledge hence cannot teach their children.

One of the participants said:

*'Sa levu na nodra commitment i koronivuli na gone, sa sega na nodra gauna vata kei ira na nodra qase'* (Children have a lot of commitments at school and church so that they do not have time to spend with their elders who can teach them this knowledge) (Mr S Ligaiviu, 2013: pers. comm).

And another shared:

*'Sega ni vakavulica vua na luvequ baleta ni sorosoro, e sega ni rawata na bula i waitui, e sega tale ga ni dau vakarorogo, ia au vakavulica vua na makubuqu keina vale ni veivesu ka ra sa vakadinadinataka eso na kaivesu au vakavulici ira na kena vinaka na nodra kila na vuku ni vanua. Era sa lai vakayagataka ka ra sa lai rawa ka sara kina vakalevu'* (I did not teach my child because he gives up easily and he is not used to life on the sea. He also does not listen but I taught my grandchild and some prisoners who said that the TEK is very useful. They are using this knowledge and have been very productive) (Mr I Vakaduadua, 2013: pers. comm).

Another lamented:

*'E sega na kena koronivuli. O ira na gone me ra vakavulici me ra dau muri ira na nodra qase me rawa ni ra vulica mai kina na vuku ni vanua'* (There is no formalized way to teach this knowledge. The children should learn to follow their elders and observe and learn this knowledge from them) (Mr S Ligaiviu, 2013: pers. comm).

The elders also highlighted that many parents do not care about their children and spend more time drinking grog instead of keeping a watchful eyes on their children and concentrate on teaching them important values and knowledge.

Finally, the indigenous Fijians' TEK is ingrained in indigenous Fijian songs, dances, stories, chants and practices. This TEK is passed on to children orally and through practice. However, some of this knowledge has been lost since the parents do not teach their children and the schools which children spend most of their time in do not teach it too.

## **5.4.1 How is the Indigenous Fijian TEK similar to and/or different from the type of knowledge about CC that is taught in Fiji schools?**

As mentioned in Chapter 4, the participatory workshops were held at a time when most of the villagers were available. About fourteen teachers, two retired teachers and sixty primary and secondary students attended the workshops. Information gathered from the retired teachers, teachers and students at the research sites was used to collect information about the similarities and differences between TEK and knowledge about CC taught in schools. In addition, the revised Fiji National Curriculum Framework (2013) was also used to verify gathered information.

According to the teachers and the children who participated in the participatory workshop, CC is not taught as a separate subject in primary and secondary schools in Ovalau. However, some CC concepts are integrated into Social Science and Science subjects. The concept of CC was first introduced in Fiji schools through the term ‘Global Warming’. Today this term has been replaced by ‘Climate Change’. (Mr M Vakasilimi, 2013, pers.comm, 15 August). In schools the major questions discussed are:

- What is global warming?
- What are the causes of global warming?
- What are the impacts of global warming?
- How can we reduce or mitigate global warming?

The basics of CC are studied in primary school especially in Social Studies and Elementary Science. In secondary school, CC are studied more deeply in the subjects, Basic Science and Social Science in Forms 3 – 4, and in Agricultural Science, Industrial Arts, Home Economics and Office Technology in Forms 5 – 7. (Mr M Vakasilimi, 2013: pers. comm).

While the teachers and students who participated in the workshop stated that CC is taught in Fiji schools, they all agreed that the TEK of CC is not mentioned in a specific subject in school.

However, some children stated that they learnt about the traditional ways of forecasting climate through the cultural component of *Vosa Vakaviti* Fijian Language Studies.

*'Keimami a vulica na ka me baleta na draki keina vula vaka Viti ena lesoni na Vosa Vakaviti. E vakavulici na ulutaga ya ena itovo vakavanua'* (We learnt about the indigenous Fijian weather knowledge and traditional calendar in the *Vosa Vakaviti* (Fijian Language Studies) classes. It was taught in the cultural component of the subject) (Ms M Tagicakibau, 2013: pers. Comm).

In summary, CC is taught in Fiji Primary schools core subjects such as Social Studies and Elementary Science and in the Secondary school subjects such as Basic Science, Social Science, Agricultural Science, Industrial Arts, Home Economics and Office Technology. But, only a minimal component of the TEK of CC is covered in the primary schools *Vosa Vakaviti* (Fijian Language studies) thus the participants are calling for the inclusion of the TEK of CC in the wider Fiji school curriculum.

However, the second edition of the Fiji National Curriculum Framework (2013, p.28) stated that the indigenous knowledge of CC, CC mitigation and CCA would be taught in Fiji schools.

'Indigenous and cultural knowledge will form an important part of the curriculum in enabling the development of contextualized coping mechanisms for climate change strategies. Children and students will learn to value local indigenous and cultural knowledge about their immediate environments and at the same time will learn about global and scientific approaches to climate change mitigation and adaptation. In this way, they will be prepared for informed contextual decision making'.

The inclusion of IK in the Fiji National Curriculum is a step forward to achieving the indigenous Fijians dream of formalizing the teaching of TEK in schools in Fiji.

## 5.4.2 How can we use indigenous Fijians' TEK to further enhance people's (especially young people's) understanding of CCA in Fiji?

To enhance people's understanding about the indigenous Fijians' TEK and TEK of CCA in Fiji, the participants all agreed that the TEK of CC should be taught in schools. In addition, the elders agreed that the TEK of CC embedded in indigenous Fijian dances, songs and stories should be revived and taught to the young during *bose vakakoro* (village meetings) which are held monthly. Also, they suggested that it should be taught to the children and youth during their church programs. Furthermore, they concurred that parents should be reminded during the *bose vakakoro* (village meeting) and during the monthly church service to spend more time with their children and teach them their TEK of CC.

Other suggestions from the interviewees are illustrated in *Table 9*.

*Table 10 Strategies to Enhance People's Understanding of TEK of CC and CCA*

Girls	Boys	Women	Men	Elderly Women	Elderly Men
<p><i>vakavulici i na koronivuli ena gauna ni clubs</i> Should be taught during clubs at school</p> <p><i>me wasei i na Facebook se me caka na kena iyaloyalo me qai biu cake na video i na youtube se volitaki i na sitoa ni video keina vale ni volitaki vola</i> Should be shared on</p>	<p><i>biu mai i na 'Kaila' i na Fiji Times</i> To be published in the 'Kaila' in the Fiji Times (newspaper)</p> <p><i>Vakavulici i koronivuli</i> To be taught in school</p>	<p><i>veitalanoataki ena raijio keina raijio yalaoyalo</i> To be discussed on radio and television</p> <p><i>vakavulici na noda vuku ni vanua e koronivuli; dua na kena lesoni</i> Should be taught in schools; it should be taught as a separate subject on its own</p>	<p><i>veitalanoataki na noda vuku ni vanua ena raitio.</i> Vakabibi e na gauna ni 'Vakariba malamala baleta ya na gauna eda dau vakarogo raijio kece kina.</p> <p>Should be discussed on radio, especially during the <i>Vakariba malamala</i> program since many people (indigenous Fijians) tune in to this program</p> <p><i>O ira na qase era rawa ni lai vakavulici ira na gone kei na qasenivuli, me rawa ni ra kila</i></p>	<p><i>meketaki, seretaki ka talanoataki ena gauna ni bose vakoro ka dau caka tiko ena veivila</i> Be danced, sung and retold during the monthly village meetings <i>vakayagataki tiko ga i na koro me rawa ni ra raica tiko na gone ka vuli mai kina. Ka ra vakayagataka talega ena gauna eda sa yali kina.</i></p> <p>Should continue to practice our TEK in the</p>	<p><i>vakavulici vei ira na itabagone e na gauna ni nodra lotu kei na sogo ni mataveitokani'</i> The youth should be taught our TEK during their church meetings and programs.</p> <p><i>ra vakananumi na itubutubu ena gauna ni bose kei na lotu vakakoro ena vei vula me ra dau tiko vaka kei ira na luvedra ka vakavulici ira ena noda vuku ni vanua'</i> Parents should be reminded to spend time with their children and teach them our TEK</p> <p><i>lesu ga na vanua i na kena idavodavo iliu; ra vakavulici na gone ena nodra itutu vakavanua me rawa ni ka kila kina na nodra itavi kina vanua</i> The vanua should go back to the old ways. The children should be taught their traditional roles so that they can know their responsibilities to the vanua</p>

Facebook or video recorded and uploaded on You Tube or sold in video shops and book shops			<i>na noda vuku ni vanua.</i> ' Our elders can go and teach the students and teachers our TEK.	village so that our children can learn them and be able to practice them when we have passed on.  <i>Vulici i koronivuli</i> Taught in school	<i>vakavulici i koronivuli</i> Taught in school
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Some of the participants' responses to the question of how the TEK of CC and CCA can be better understood by locals were:

One of the elders stated:

*'Me meketaki, lagataki se seretaki ka talanoataki tale na noda vuku ni vanua ena gauna ni bose vakoro ka dau caka tiko ena veivula'* (Our TEK should be danced, sung and told during village meetings that are held monthly) (Mrs M Wati, 2013: pers. comm).

She added,

*'Me vakayagataki tiko ga i na koro na noda vuku ni vanua me rawa ni ra raica tiko na gone ka vuli mai kina. Ka ra vakayagataka talega ena gauna eda sa yali kina'* (We should continue to practise our TEK in the village so that our children can learn them and be able to practise them when we have passed on) (Mrs M Wati, 2013: pers. comm).

Another elder added,

*'Me vakavulici na noda vuku ni vanua vei ira na itabagone e na gauna ni nodra lotu kei na soqo ni mataveitokani'* (The youth should be taught our TEK during their church meetings and programs) (Mr M Tamani, 2013: pers. comm).

An interesting view was,

*'Me ra vakananumi na itubutubu ena gauna ni bose kei na lotu vakakoro ena vei vula me ra dau tiko vaka kei ira na lvedra ka vakavulici ira ena noda vuku ni vanua'* (Parents

should be reminded to spend time with their children and teach them our TEK) (Mr S Rogoyawa, 2013: pers. comm).

Another interesting view shared by an elder was,

*'Me lesu ga na vanua i na kena idavodavo iliu. Me ra vakavulici na gone ena nodra itutu vakavanua me rawa ni ra kila kina na nodra itavi kin a vanua. Ni ra kila na nodra itutu vakavanua, era na kila talega na vuku ni vanua e umani tu i na nodra itavi'* (The vanua should go back to its old ways. The children should be taught their traditional roles so that they can know their responsibilities to the *vanua*. When they know their traditional roles, they will also be able to know the TEK that is embedded in it) (Mrs M Wati, 2013: pers. comm).

In addition, the elders agreed with the parents that the TEK of CC should be discussed on the local radio.

*'Me veitalanoataki na noda vuku ni vanua ena raitio. Vakabibi e na gauna ni 'Vakariba malamala baleta ya na gauna eda dau vakarogo raijo kece kina'* (Our TEK should be discussed in the radio, especially during the Vakariba malamala Program because that is when we all listen to the radio) (Mr L Ravonu, 2013: pers. comm).

All the participants agreed that the TEK of CC should be taught in school as a separate subject or at least after school clubs and they should make time to teach TEK in general. They further agreed that elders in the village should be invited to schools to pass on their TEK to students and teachers.

A parent suggested,

*'Me vakavulici na noda vuku ni vanua e koronivuli. Me dua na kena lesoni'* (Our TEK should be taught in schools. It should be in a separate subject) (Mr S Ligaiviu Field, 2013: pers. comm).

Another parent added,

*'O ira na qase era rawa ni lai vakavulici ira na gone kei na qasenivuli, me rawa ni ra kila na noda vuku ni vanua'* (Our elders can go and teach the students and teachers our TEK) (Mr L Ravonu, 2013: pers. comm).

One of the children added,

*'Me vakavulici i koronivuli ena gauna ni clubs na noda vuku ni vanua.'* (Our TEK should be taught during clubs at school) (Ms M Tagicakibau, 2013: pers. comm).

The children all agreed that the TEK of CC should be stored electronically and shared in social networks or sold in video shops and book stores. Also, they stated it could be published in a children's newspaper column.

One of the children stated,

*'Na noda vuku ni vanua me wasei i na Facebook se me caka na kena vidio qai biu cake i na Youtube se volitaki i na sitoa ni vidio keina sitoa ni volitaki vola'* (Our TEK should be shared on Facebook or video recorded and uploaded on You Tube or sold in video shops and book shops) (Ms M Tagicakibau, 2013: pers. comm).

And another added,

*'E rawa mada ga ni biu mai i na 'Kaila' i na Fiji Times'* (It can even be published in the 'Kaila' in the Fiji Times) (Ms A Sovea, 2013: pers. comm).

Generally, the participants agreed that the indigenous Fijians' TEK can further enhance people's understanding of CCA in Fiji. For educating locals different strategies were suggested. The elders stated that it could be taught to children through the revival of indigenous Fijians' songs, dances and stories, through practice in the villages, through village and church meetings and through discussions on the radio. Parents agreed with the elders and the children that the indigenous Fijians' TEK can be taught in schools in a separate subject. The parents furthermore stated that the indigenous Fijian elders can be involved in teaching students and teachers in schools, educating them on the indigenous Fijians' TEK. Finally, the children all agreed that the indigenous Fijian TEK could be recorded electronically and shared in social networks websites and/or sold in video and book outlets.

## **Summary**

Indigenous people of Ovalau perceive CC as a shift or change in climate that alters people's life styles and impacts their daily lives especially their food production. Many locals associated CC with increasing temperatures and rainfall, rising sea levels, shifts and inaccuracies in the traditional calendar, smaller yields of some endemic plants, low numbers of some plant and fish species as well as the arrival of invasive species and new pests. Participants' perception of CC was similar to that of other indigenous groups who rely heavily on their environment for their tribe's survival and continuity. This study also found that Indigenous Fijians' have a TEK that helped them and their cultures to survive for centuries through the use of traditional adaptation strategies. One of the main reasons for their resilience is the fact that such TEK have been passed on through generations. TEK is transmitted orally through songs, chants, stories, dances and other traditional rituals and practices. Because this TEK never have been formally documented much of it has been lost. Another factor that contributed to the loss of knowledge could be the fact that it is currently not taught in schools. Maintaining the practice of this knowledge in villages, integrating TEK into the curriculum of formal education and recording it electronically and sharing it in the media and social networks seem to be necessary in order for TEK to survive. The next chapter will discuss the findings of this chapter.

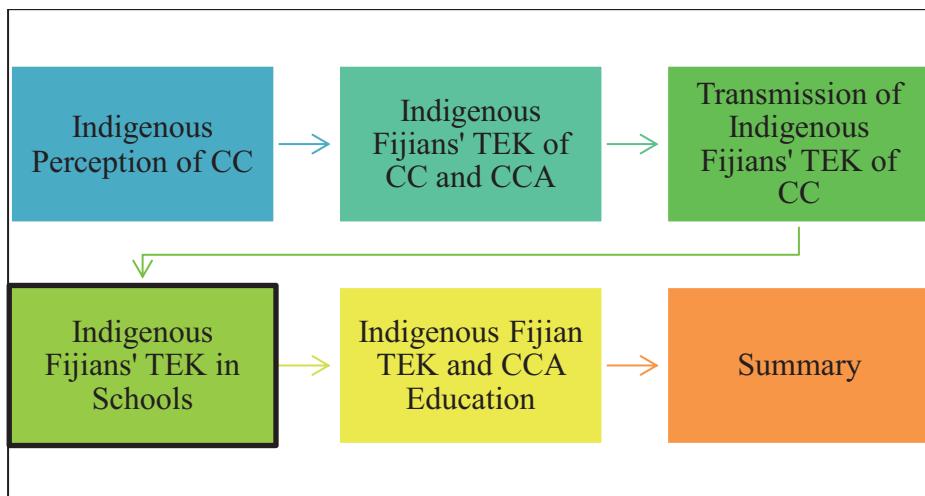
## Chapter 6 | Discussion

The purpose of this study was to document the indigenous Fijians' perception of CC and how this knowledge helps indigenous Fijians to adapt to the impacts of CC and how it is transmitted to the younger generation. A second aim of this study was to analyze the implications of the findings for the formal education sector.

Specific themes surfaced during the analyses of the data which calls for a further discussion to draw attention to the implications of this study for educators and researchers. This section is split up into five sections: indigenous perceptions of CC, indigenous Fijians' TEK of CC, transmission of indigenous Fijians' TEK of CC, indigenous Fijians' TEK in Fiji's school curriculum and indigenous Fijian TEK and CCA Education.

*Figure 6.0* below illustrates the outline of Chapter 6.

*Figure 6.0 Chapter 6's Outline*



### 6.1 Indigenous Perception of CC

This study found that indigenous Fijians' descriptions of their perceptions of CC vary. The elders and adults perceive CC as an increase in temperature, increase in frequency and amount of rainfall, increase of pests and rising sea levels. All of the mentioned aspects of CC can be seen and experienced in the daily lives of the locals in their immediate environment. Children on the other hand define CC as a change in weather, an increase in temperature and rising sea levels. In

addition, while the elders and adults could explain their experiences of CC in detail the children were not as descriptive in their opinions. The children stated that CC is the change in climate, increase in temperature and sea level rise. Elders and adults were able to comment on how the climate had changed and how those changes affected their daily lives, especially their food production. The reasons for their different perceptions may be due to the following reasons:

- a. **Gender roles** – Boys and girls are expected to work around their home and the nearby garden and sea hence do not have the same experience and exposure as the elders who head out into the bushes and out to sea to collect food. The girls for instance, are supposed to perform household chores the boys are expected to tend to garden near the house and go to the shores nearby to collect food. The male adults and elders on the other hand venture into the deep forest to do their gardening and out to the open sea to fish. Female adults and elders are expected to raise children and do house hold chores and plant pandanus, vegetables and staple crops in a garden near the village. The different responsibilities lead to different skills and knowledge. For instance while boys only need to know basic gardening and fishing skills, male adults and elders need to know specific gardening and fishing skills that will enable them to secure enough food for the family's daily consumption and the *vanua*.
- b. **Traditional Roles** – As shown in chapter two seven traditional roles (*turaga* (chief), *sauturaga* (chief executive), *matanivanua* (herald or spokesperson), *bete* (priest), *bati* (warrior), *mataisau* (craftsmen) and *gonedau* or *tuirara* (fisher folk) can be found on Ovalau. Every role encompasses specific knowledge and skills that enable the individuals to perform their role effectively. For instance, the fisher folk have TEK for fishing that will enable them to forecast weather before going to sea and knowledge about where and when they can catch enough fish. The indigenous Fijian experiences in their gender roles and traditional roles influence their perception as is highlighted in the Standpoint Theory (Barnett, 2009) in chapter 3

In summary it can be said that the indigenous Fijian's perception of CC differs according to the participants' gender, traditional roles, experience, maturity and context. The participants' gender determines their gender roles and the type of activities they are involved in hence determines the

knowledge that they acquire from their experience and the context in which they perform their roles. For instance, since girls are culturally expected to perform chores in and around their home, their perception of CC is limited to their knowledge about the temperature and the sun. On the other hand, the elders' perception of CC is broader since they have lived longer and have observed and experienced changing climate conditions and have managed to live through them using their TEK.

Like other indigenous people around the globe, the indigenous person of Ovalau's perception of CC is influenced by their experience and observation of their environment which they rely on for their survival. This is comparable to indigenous communities in Zogue (Sanchez-Cortes and Chavero, 2011), Vaigach (Davydov and Mikhailova, 2011), Bolivia (Boillat and Berkes (2013) and Africa (Chapara Consult et al., 2012).

The result highlights that the indigenous people of Ovalau's perception of CC are to some extent overlapping with western perception of CC. Both the indigenous people under study and science agree that CC has affected the environment that indigenous people rely on for their survival. Even though there is hardly any literature on the question of how TEK could be used for CCA, the participants highlighted that many weather changes could be forecasted by using their TEK and traditional seasonal calendar. In addition, when certain indicators are observed the participants are proactive in using traditional adaptation methods to address the changes in their environment. The next section will discuss the TEK of CC that indigenous Fijians use to forecast climate and adapt to the changing climatic conditions.

## **6.2 Indigenous Fijians' TEK of CC and CCA**

In order to survive the indigenous Fijians have developed a broad TEK, which is part of the vanua hence part of their daily lives. TEK is used to forecast the weather and to prepare for changing conditions accordingly. One CCA technique used by indigenous Fijians is the installment of a *davuke* (pit) for fermenting breadfruit to be consumed during and after a cyclone. Locals would also prune cassava plants to prevent them from being harmed or uprooted during a cyclone. TEK is embedded in traditional roles and a traditional seasonal calendar that guide daily practices. For instance, according to the Ovalauan calendar, the *Vula i Doi*, which usually falls in May, is when high temperatures and the South Easterly winds are experienced. The South

Easterly winds bring in the half beak fish and it is the time when the sardinella spawn. Another example from the traditional seasonal calendar is that the flowering of the *aphitoniazizyphoides* flower indicates the time to plant taro. Failure to do so would lead to insufficient stocks of the root crop for Christmas. Also, when locals see the yam leaves turn brown, they know it is ready for harvest.

The indigenous Fijians relationship with their *vanua* is paramount for their survival. The people read indicators shown by the *vanua* to help them predict the approaching season. Daily activities are therefore dictated by those predictions. It is vital that the indigenous people protect and stay connected to their *vanua* so that they can read these indicators. If the *vanua* is disturbed the *vanua* may not be able to show the accurate signs hence the indigenous Fijians may be ill prepared for the approaching climate or season. For instance, in Lovoni, the *gasau* (reed) and other endemic plants have become extinct due to an increase in rain; thus, the people of Lovoni cannot use the *gasau* as an indicator for rain any longer but have to rely on other indicators such as the croaking of toads and flying cockroaches.

‘*Ni dau se na gasau e dau ivakaraitaki ni vula i uca. Na gasau e tubu ena vanua mamaca. Na gauna qo sa sega na gasau i Lovoni baleta ni sa levu na uca. Koya ya keimami sa dau vakarogoca ga na tagi ni boto se na raica na vuka ni kokoroji me vakaraitaka ni na vakarau tau na uca*’ (When the reed flowers it indicates the month of rain. Reeds grow in dry areas. Reeds do not grow in Lovoni anymore. So, we listen to the croaking of the toads and watch cockroaches to predict rain) (Mr S Rogoyawa, 2013, pers. comm).

The indigenous Fijian traditional calendar shows how TEK is closely linked to the land, sea, atmosphere and people. It also shows what people ought to do in order to survive and adapt to the physical conditions of an environment that change with the changes in weather. Failure to appropriately respond to signs and indicators for changing weather would lead to an inability to adapt successfully. The indigenous Fijians' traditional calendar is vital for survival for the indigenous people of Ovalau. Understanding and using it enables locals to be fully informed about their environment and the seasonal changes in it, which fruit trees are fruiting, which fish is spawning, which fish is poisonous and when to harvest. Most of the children who participated in this study did not know the Ovalauan traditional calendar although they were aware of the

modern calendar that they had seen in school, a calendar that does not contain the TEK of indigenous Fijians.

According to the participants, most of the children do not possess the same level of TEK that elders have. Only a limited amount of the TEK encompassed in the traditional calendar was known by the children. They knew about the cyclone season but did not know about the fruiting and harvesting seasons. Some of the reasons for children not having as much TEK as elders could be that:

- a. The children are still learning and do not have the same experience and exposure to the environment as the elders yet. Also, children spend more time in school than in their villages or communities hence they spend less time accompanying their elders to the sea, plantation and to traditional functions which means less time for learning by observing adults and elders. For instance, today, children spend an average of nine hours per day at school with the exception of Saturday and Sunday. Sometimes, children even go to school or participate in school activities on Saturdays, thus further reducing time spent with their elders.
- b. The elders are aware of their traditional roles and the skills and knowledge needed to perform them effectively. Most of the children on the other hand have not learnt about their traditional roles hence do not possess the knowledge and skills needed for them. A change that is being criticized by elders who would prefer if villages go back to its old ways of doing things, to its traditional governance system where children could be taught their traditional roles and the knowledge and skills that are embedded in them to assist them in protecting their *vanua* and themselves during this time of CC.

*'Me lesu ga na vanua kina kena ituvatuva makawa. Me ra vakavulici na gone ena nodra itavi kei na noda vuku ni vanua'.* The vanua should go back to its old ways, so children can be taught their traditional roles and our TEK (Mr S Rogoyawa, 2013, pers.comm).

- c. TEK is not taught in schools. CC is taught in schools but the TEK of CC is not taught because it was not part of the Fiji National Curriculum. However, there is plan by the Fiji

Ministry of Education to teach about TK of CC in schools (Fiji National Curriculum Framework, 2013).

When comparing indigenous people around the globe with the locals of Ovalau it becomes clear that indigenous communities in which TK and cultural beliefs are intact, the indigenous people are able to use their TEK to adapt and cope with the changes and impacts of CC. A loss of this knowledge, on the other hand, leads to an incapability of adapting and coping with changes in the environment as in the case of indigenous communities in Africa (Chapara Consult et. al, 2012).

TEK which is needed to survive is learnt from the locals' environment as emphasized by Bronfrenbenner's Ecological Theory (Bronfrenbenner and Evans 2000). Knowledge and skills are learnt from their observation of the environment and interaction with their elders.

### **6.3 Transmission of Indigenous Fijian TEK of CC**

TEK is essential for the survival of indigenous people because it dictates how they organize their daily activities. This TEK is passed on orally and through practice to ensure that the indigenous Fijians can use this knowledge for their survival. In schools, the TEK of CC is currently in the process of being integrated into the curriculum. However, the scientific knowledge of CC is part of the curriculum and students are learning it through books, technology, art and their teachers (Vosalevu et. al, 2011; Koya, 2012).

In traditional settings like the research sites of this study, the TEK of CC is disseminated orally through observation, songs, practice, rituals, ceremonies and dances. The indigenous girls and boys of this study reported that they learnt about the TEK of CC in their vernacular lessons in schools and from their grandparents. The adults and elders had learnt their TEK of CC through observing their surroundings and orally from the elders and community members. In addition, they had been taught through stories, chants, lullabies, dances, songs and practice. Since the TEK of CC has mostly been transmitted orally a lot of its content has been lost.

Other possible reasons for the gradual loss of TEK according to the participants include:

- a. **Urbanization** – About 10% of the villagers have moved to urban areas for employment and for their children's education. Due to this, they are separated from the *vanua* where

they could learn the *vuku ni vanua* (TEK) from. Consequently, adult can no longer teach their children.

- b. Education** – TEK of CC is not taught in a separate subject in schools. As highlighted by the participants, children spend an average of 9 hours a day in school and have less time to spend with their elders who could pass on TEK. Also, children do not see TEK as worthwhile knowledge because it is not taught in school and they are not encouraged to enquire or learn about it. Children consider western science more valid because it will enable them to do well in school and get a job. The same cannot be said about TEK as it does not get you a good job (Ms M Tagicakibau, 2013, pers.comm).
- c. Language of instruction in school** – English is the official language of instruction in Fiji schools. As a consequence children are encouraged to speak in English at all times and are punished if they speak in vernacular in schools. Hence, children get in the habit of speaking in English. When children are back in the village and around their elders this can lead to a communication barrier as the children speak English and TEK is in vernacular. TEK is best taught in the indigenous Fijian language because there are indigenous Fijian names and processes that no English word can capture. For instance the word *draki veisolo* (blend of hot and humid weather condition) has not a single English word that conveys its meaning. Therefore, since the children and the elders speak different languages, the elders are not willing to teach the children about TEK as they fear misunderstandings in the translation processes.
- d. Technology** – The introduction of new technology such as mobile phones, internet and video games have reduced family time and times when elders, adults and children talk to each other. Children nowadays tend to spend a lot of their time on their mobile phones and on the internet chatting with their friends or playing online games. Moreover, as one of the elders commented, children spend a lot of their time listening to music on their mobile phones or watching television which stops them from being able to commune with nature.

‘*Sa levu ga na nodra vakarogo sere ena talevoni kei na sara iyaloyalo sa ra sega ni kila kina na noda vuku ni vakanua*’ They spend too much time listening to music on their

mobile phones and watching videos so they do not know our TEK (Mr S Rogoyawa, 2013, pers.comm).

- e. **Loss of elders** – The indigenous Fijians in Ovalau are losing many of their elders. Many have passed away. Others have been lost through marriage as in the case of women who had to move to her husband's village. Other reasons for elders leaving are immigration for finding employment or having to relocate due to developments happening in their communities as was the case in Rukuruku village where land was sold without the villagers consent in the 1940s (Mr M Tamani, 2013, pers.comm).

Loosing elders means losing a source of TEK because younger adults who are currently living in Ovalau are not the true custodians of the knowledge of the *Vanua* and cannot transmit it to their children.

In summary it can be said that indigenous Fijian's TEK is learnt through observation and practice and taught in the children's mother tongue. Children learn about it while growing up, through observing and imitating their parents and other adults as stressed in Vygotsky's Social Learning Theory (Hoffnug et.al, 2010). The importance of the indigenous Fijian languages is of particular significance to this study since it is the main tool used to transmit indigenous knowledge as highlighted by Berkes (1999). However, a lot of Fijian TEK has been lost mainly because up to know it was only passed on orally. Other reasons include rapid urbanization, a foreign education system that does not value IK, increasing use of modern technologies, and the loss of elders. A similar loss has been documented for indigenous communities of Samoa (Pa'i, 2012). New technologies as well as inaccessibility of traditional land have been the reasons for the loss of TK in indigenous communities in Africa (Charapa et.al., 2012).

The next section will discuss if the TEK of CC is taught in schools in Fiji.

## 6.4 Indigenous Fijian TEK in Fiji schools

This study found that in traditional settings as in the research sites, the TEK of CC is disseminated orally through songs, dances, practices, rituals and ceremonies. TEK is transmitted in the *Vosa Vakaviti* (standard indigenous Fijian language). In addition, the *Vosa Vakaviti* is used when practising the skills ingrained in the TEK. This knowledge which is passed on orally is

recorded in the minds of the indigenous people in forms of stories, songs, dances, rituals, ceremonies and practices.

Schools of the islands states of the South Pacific do not integrate TEK off CC into the curriculum and CC is not taught as a separate subject. However, CC topics are covered in some subjects such as Science, Social Science, Agriculture and Geography in some schools and in extra curricula activities such as quizzes, poster competitions or plant a tree initiative programs (Vosalevu et. al, 2011; Koya, 2012). However, there is a general consensus that CC should be integrated in the curriculum at all levels and that TK of CC should also be part of the content taught.

In the primary and secondary schools in Fiji, scientific knowledge of CC is taught in Social Science and Science subjects both compulsory subjects. In the secondary schools, CC is integrated into Agriculture, Vocational and Science subjects, all of which are optional subjects. The scientific knowledge is taught by teachers who pass on knowledge from media, publications and resources produced by the Ministry of Education and NGOs such as ‘Live and Learn’ and the SPC GIZ. There is a plan to integrate TEK of CC in Social Science and Science subjects beginning from Class 1 to Form 7 (Mr M Vakasilimi, 2013, pers.comm).

The traditional and scientific knowledge of CC complement each other and could be taught in schools and in communities to raise awareness about CC (Veitayaki, 2010; Woodley, 2002; Lefale, 2008; Nainoca, 2011). Knowledge of both areas enables people to use cheap, appropriate workable coping strategies for adapting to this time of CC.

The next section will discuss ways in which the TEK of CC and CCA can be used to assist in enhancing the people of Fiji’s understanding of CC and CCA.

## **6.5 Indigenous Fijian TEK and CCA Education**

Teaching TEK of CC and TEK of CCA to younger generations can be achieved through different strategies. The suggested ways of passing on knowledge differed depending on the groups that had been interviewed. Different suggestions can be related to the environments of the interviewee's.

The elders suggested that in order to understand the TEK of CC and CCA better, children should be taught in the following ways:

- a. Children should be taught by the elders during village, church gatherings/meetings and religious youth programs. Elders and adults of all three research sites viewed the village meeting, the family and the church as the basic institutions and pillars that are necessary for the smooth running of village life. Elders and adults of all three research sites viewed the village meeting, the family and the church as the basic institutions and pillars that are necessary for the smooth running of village life. They also provide the opportunities to discuss opinions and ideas. Therefore attendance of village and church meetings is important. Hence it was recommended that children would be taught during village and/or church meetings and gatherings because most community members would be present. Children's compulsory attendance would mean that no child would miss out on hearing and/or learning this important knowledge.
- b. The TEK of CC and CCA should be discussed during radio shows. The radio station broadcasted in the *Vosa Vakaviti* (standard indigenous Fijian language) reaches all the parts of Fiji Radio Fiji One – *Na Domo i Viti* airs a one-hour radio talk-back program during weekdays from 1 – 2pm. Issues concerning the people of Fiji are open to the public for discussion during this time. People call in and share their concerns and views on a daily discussion topic. The reason the elders and adults chose this method could be that CC is a nationwide issue that has affected everyone. Also, because they think that losing TEK could affect the survival of the indigenous Fijian people. It is vital that these issues are discussed nationwide so that people can share their views on how to address these issues. In addition, sharing the issues nationwide may assist in the maintenance of TEK and the TEK of CC and CCA. The TEK of CC and CCA discussed during the program could be recorded for the future generation.

- c. The villages should revive and maintain their traditional village governance system and traditional practices. Children should be taught their traditional roles so that they know their place in the *vanua* and also know their responsibilities towards their *vanua*. Special skills and knowledge are ingrained in the indigenous Fijians' traditional roles. In learning their traditional roles, the children would consequently learn the required skills and knowledge that will enable them to look after their *vanua*. As a result, they could protect and maintain the *vanua* for the future generations. Furthermore, children would continue to practice traditional roles hence could maintain the skills and knowledge rooted in them. A similar recommendation was made by Pa'i (2012) who conducted a similar study in Samoa.

Children on the other hand proposed more modern techniques for enhancing TEK and TEK of CC and CCA. Most of them included the usage of modern technologies and media. The reason for their suggestions could be due to the fact that similar resources are used in their schools for learning about new things.

The children suggested that to enhance the understanding of TEK and the TEK of CC and CCA, the knowledge should be:

- a. Recorded and stored electronically and shared on social network sites. Also, it should be sold in video stores and bookstores. Children thought that this way TEK could be saved permanently and could be passed on to and accessed by the future generations.

- b. Published in the newspaper. *The Fiji Times*, Fiji's national daily newspaper, publishes a weekly feature for children called *Kaila*. The *Kaila* is published in the three official languages of Fiji; English, *Vosa Vakaviti* (standard indigenous Fijian language) and Hindi. Since children all over Fiji read this section, the children assumed that publishing TEK and the TEK of CC and CCA there could enable the children in Fiji to have access to this knowledge. In addition, since TEK and the TEK of CC and CCA are better transmitted in the *Vosa Vakaviti*, publishing it in the *Kaila* would make this possible. If children read the TEK and the TEK of CC and CCA in the *Kaila* they would be able to understand it because it is in their own language or in vernacular. Publishing in the *Kaila* would also be a way of recording the knowledge permanently. This would contribute to the preservation or maintenance of TEK for the future.

It can be said that all the participants agree that TEK and the TEK of CC and CCA should be taught in a separate subject in school. The reason they suggested this, is so that TEK would be seen as equally important as 'western subjects'. The participants assumed that if TEK was not taught in schools, children may not see its significance. Teaching TEK in school can also contribute to the maintenance of the knowledge and skills embedded in it.

## **Summary**

The research findings show that local people believe that TEK can enhance the scientific way of understanding CC by filling in the knowledge gaps in scientific data. This would lead to more accurate weather forecasts and people would be able to prepare and adapt to changes in the weather and climatic conditions better (Veitayaki, 2010; Vinyeta, 2012). In addition, because TEK is based on respect for nature and the environment, its inclusion in the curriculum of schools and/or national policies would allow non-indigenous people to appreciate and respect IK and see its importance for the sustainable livelihood of indigenous people. Furthermore, its inclusion in the Fiji school curriculum would enable students to see its significance and be motivated to learn it for their own benefit.

This study also found that the Indigenous Fijians of the research sites are losing their TK mainly because of urbanization, new technology, loss of elders and because it is not taught in schools.

This loss has serious implications for the future of Fijian TEK. However the good news is that there are now efforts to integrate TK into the school curriculum through various initiatives including the recent decision of the MOE to introduce the TK of CC to Fiji schools. There are many possibilities for ways and strategies to raise awareness and understanding among teachers and educators about the TEK of CC and CCA so that more people can benefit from the fruits of research on CC especially at this time of growing impacts of CC. Conducting village meetings and effective usage of different media outlets can also contribute towards creating a greater awareness.

Finally, this chapter discusses how indigenous Fijians perceive CC differently. The perceptions are influenced by people's gender and traditional roles as well as the environment they live and work in. The immediate environment as well as the traditional roles encompasses TEK and TEK of CC and CCA, a knowledge that is passed on orally from the elders to the younger generations. In order to not lose this knowledge this chapter recommends that TEK and TEK of CC and CCA is taught to children in village and church meetings, through the media and also through new technologies. Not only can these strategies help with understanding traditional knowledge and skills but also it can assist with permanently recording and maintaining them. The next chapter concludes this report and considers some implications of the findings of this study.

# **Chapter 7 | Conclusion and Implications**

*'When an elder dies, a library burns'* (Lindsey, 2011)

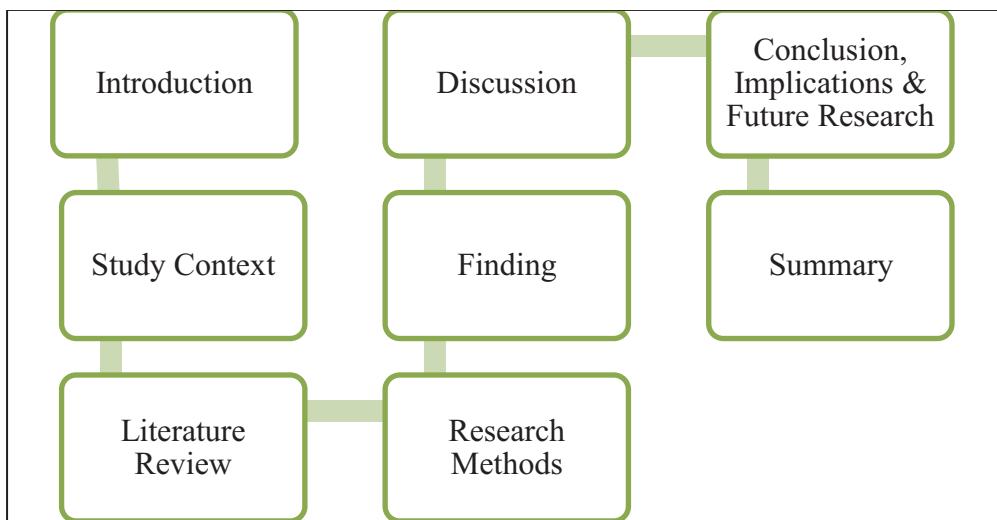
## **7.1 Conclusion**

This study began with three main intentions: First, to find out the indigenous Fijian people's perception of CC; Second, to find out if there is any indigenous Fijian's TEK of CC and if there is, to find out how it is transmitted to the younger generation; Third, to find out if indigenous Fijian TEK is taught in schools and how it can be used to enhance people's understanding of CC and CCA. These explorations are partly the result of my experience as a secondary school teacher for the Ministry of Education in Fiji and as an indigenous Fijian woman who returns home every school holiday only to find that less and smaller fish have been caught by my fisher folk cousins. Fish is the main source of protein for my village. My cousins often lament the decrease in size and amount of fish caught every time I visit them. According to my cousins the decrease in temperature and, the frequent change in climate, and the fish's intelligence are to be blamed. These responses prompted me to further explore the causes of the diminishing numbers of fish as it is important to find a solution for this problem that insures our food supply.

The research indicates that the indigenous Fijians' perceptions of CC vary according to people's gender, traditional roles and experience. Also, their TEK allows them to forecast climate and use relevant adaptation methods to live through the changing climatic conditions in a sustainable way. Moreover, the research shows that the indigenous Fijians' TEK of CC and CCA is not taught in schools but that there are plans to include it in the Fiji curriculum. Finally, this research confirms that both, traditional and western educational strategies should be used to enhance people's understanding of CC and CCA

This chapter combines the different parts of the study and considers some of the implications of the findings for different parties involved in the process of (including TEK in the Fijian curriculum. The diagram below illustrates the different sections of this dissertation.

*Figure 7.0 Summary of the Study*



### **7.1.1 Indigenous Fijian Perceptions and Traditional Ecological Knowledge of CC**

Indigenous Fijian's perception of CC varies among study participants and is influenced by age, gender and experiences in different contexts. The children perceived CC as changes in weather patterns some of which could be predicted by using their TEK as they understand it. Adults and elders perceive CC not only as just changes in the weather but also are able to elaborate how these changes have affected food production and their livelihoods. Also, adults and elders are able to forecast climate by using the indigenous Fijians' TEK that has been used in their communities for generations. Moreover, the differences in the participants' perception are due to their different standpoints as they perform and experience different roles.

### **7.1.2 Manifestation, Interpretations and Transmission of TEK of CC**

The TEK of CC is grounded in the *vauua*, which shows indicators that can be interpreted and transmitted to the younger generation orally and/or through practice. The indigenous Fijian climate indicators include signs such as cloud accumulation, flowering of certain plants or the spawning of certain fish. TK is also connected the indigenous Fijians' traditional roles. Sadly much of the TEK has been lost because of the migration of indigenous people to urban centres,

language barrier between elders and children, new technologies, loss of elders and TEK of CC and CCA currently not taught in schools.

### **7.1.3 Status of Climate Change Education in Fiji**

The continuing loss of TEK of CC and CCA is partly due to the fact that it is not taught in Fiji schools. While the scientific knowledge of CC is taught in some core subjects the TEK of CC and CCA is not taught. However the revised Fiji National Curriculum Framework (2013) confirms that the TK of CC and CCA will be included in the Fiji school curriculum. In addition, there are also extra curricula activities conducted by NGOs helping to raise public awareness of TEK among educators and members of the Fijian communities.

### **7.1.4 Indigenous Fijian TEK of CC and CCA Education**

To enhance the understanding of the TEK of CC and CCA, it is necessary to educate locals about this knowledge using different strategies. Some of the strategies suggested by the participants are:

- a. Discussions during village and religious youth meetings
- b. Discussions in various media and publishing on websites
- c. The revival of the practise and ensuring the maintenance of TEK of CC and CCA in the indigenous Fijian communities
- d. The inclusion of TEK of CC and CCA in the Fiji school curriculum so students can perceive it as worthwhile knowledge for their survival
- e. The elders should help instil this knowledge to educators
- f. The TEK of CC and CCA is to be transmitted in the *Vosa Vaka Viti*.

Being aware of and understanding this knowledge will assist the indigenous Fijians with using appropriate forecasting and adaptation methods and prepare them well for changing climatic conditions.

## **7.2 Implications of the Study**

The findings of this study have implications for policy makers and educational officers it also affects the cultural dimension and the use of language in a public discourse.

### **7.2.1 Policy**

The availability of collected information on TEK of CC will enable policy makers to value this knowledge and create policies that will enable the survival and continuity of the indigenous Fijian *Vanua*. In the case of Samoa, the lack of policies to promote the use of the TEK of CC and CCA can be related to the lack of documented indigenous TEK (Pa'i, 2012).

However this study provides a collection of TEK which could, together with similar studies which should be conducted throughout Fiji, warrant the writing of policies that promote the use of TEK in CCA education and projects.

Currently, there is a Fiji National Framework for CC but it does not highlight the use of TEK of CC as essential knowledge that should be researched, documented and used for CCA programs. In addition, although the 2013 Constitution of the Republic of Fiji emphasized the individual's right to a clean and healthy environment it does not specify the importance of the use and protection of TEK as a way towards such an environment. Therefore, it is important for policy makers to become aware of TEK of CC so their policies can include TEK for the sake of the Fijian communities.

### **7.2.2 Education**

The TEK of CC and CCA documented in this study may serve as a basis for integrating such knowledge in the Fijian school curriculum. This will enable it to be taught with respect by teachers. TEK could also act as a good foundation for learning Western Science Knowledge that is currently dominating the Fiji school curricula. In addition, including TEK may improve teachers' cultural literacy. Teachers will be able to know the link between the indigenous Fijians' traditional roles and Gardner's Multiple Intelligence hence discover more culturally appropriate teaching and learning strategies that will appeal to their students' interests. In applying these appropriate strategies students' skills and knowledge may be developed. In

addition, using suitable learning and teaching strategies may motivate students to learn consequently and learn more effectively. In doing this, students' achievement could be improved and the education system would produce graduate who could be able to live successfully in both the traditional and modern world.

The findings of this study might also help with achieving the goals of ESD which had been defined by Cutter-Mackenzie (2011) as development that meets the needs of the present without compromising the ability of future generations to meet their own needs. This study highlights the indigenous Fijians' values of sharing, thinking of others, sustainable use of resources, and if these traditions are adhered they would result in sustainable livelihoods. Understanding TEK would help students move closer to understanding the three pillars of the UN Decade of Education for Sustainable Development (DESD) namely society, environment and economy, underpinned by culture.

### **7.2.3 Culture**

The documentation of important TEK of CC and CCA in this study makes this knowledge available for young Fijians who may wish to learn it. The study has highlighted the apparent loss of some information relating to the Fijian TEK and transmitting the results of the study to the indigenous youth is an important and urgent matter. Indigenous Fijians rely on TEK for planning their daily lives and activities and enables them to ensure their survival. However, much of Indigenous Fijian TEK is not known to many indigenous children because it is not documented and taught in schools. Making TEK more accessible would help enhance cultural knowledge among children and help them to value and respect their own cultural background.

### **7.2.4 Language**

TEK is very much linked to people's languages and one of the main reasons for children's lack of knowledge of their TEK of CC is linked to elders not being able to pass on their knowledge to them because they tend to speak in a different language from those of their elders. The dominance of English in formal as well as non-formal settings has contributed to this problem. Therefore the importance of teaching and learning indigenous Fijian languages must also be stressed.

If the TEK of CC and CCA are to be taught in schools, the ideal language for teaching it would be the indigenous Fijian language. Currently, the 2013 Constitution of the Republic of the Fiji Islands mandates the compulsory teaching of vernacular languages in all primary school, and this can contribute to a more effective transmission and dissemination of TEK generally and TEK of CC and CCA in particular.

This research addresses two important goals of the DESD namely re-orienting an existing curriculum towards ESD and developing public awareness and understanding of ESD as suggested by Thaman (2006). This study would provide the Fiji MOE CDU with information that would enable them to re-orientate the content of the current school curriculum. In addition, publishing information from this study in various media outlets would help with educating and raising public awareness about the TEK of CC and, CCA and ESD. Finally, the findings of this study are in line with the Regional Pacific Education Framework (2009-2015) that identifies sustainable development as an important cross cutting theme for teaching and learning.

## **7.3 Implications for Future Research**

### **7.3.1 Educational Research**

This study is the first of its kind in Fiji to map existing TEK of CC of Indigenous Fijians in villages and Fiji schools. This study found that much of the TEK known to elders is no longer accessible to children and some adults. This research was conducted only on the island of Ovalau. There are numerous islands and villages in Fiji where similar studies should be conducted. The potential for researching and documenting TEK of CC and CCA is big and all that is needed are people who are willing to take on this task and secure funding for it.

Studies have been conducted in Tonga, Vanuatu, Samoa, Kiribati and Fiji exploring CCE. Research showed that CC is included in the curriculum but the indigenous peoples' TEK of CC and CCA are not part of it. However, there are intentions for it to be included in the curriculum (Tupou, 2011; Melterers et al. 2011; Tupou, 2011; Takirua et al. 2011, Vosalevu, 2011; and Koya, 2012)

There also is great potential for cross-cultural and multicultural research, pedagogical research and inter-disciplinary research.

### **7.3.2 Cross- and Multi-Cultural Research**

As TEK is closely linked to certain areas or cultural heritage the TEK of CC on Ovalau may be different to TEK in other parts of Fiji. Therefore, similar studies could be conducted in the Indo-Fijian communities of Fiji to document the TK of CC of Fijians of Indian descent who have lived in Fiji for more than a century originally working on sugarcane plantations. Fijians of Indian descent brought with them their TK which they may have adapted or are still using in order to survive in their environment (Deo and Devchand, 2010). Hence, researching and documenting their TEK of CC would also provide and document valuable knowledge for the next generations living in Fiji.

### **7.3.3 Pedagogical Research**

This research did not further explore ways in which TEK is recollected and how it enables students to remember it. Rodriguez (2007, p.1) stated that:

‘Memory culture is the process by which a society ensures cultural continuity by preserving with the help of cultural mnemonics its collective knowledge from one generation to the next, rendering it possible for later generations to reconstruct their cultural identity’.

Furthermore, future research may find other ways of collecting and storing TEK of CC and the different pedagogies that can be used to effectively teach this knowledge, to enable students to remember it and pass it on to future generations. There are possibilities for the use of ICT here. Another possible research topic may be on Fijian culturally relevant pedagogy derived from Gardner’s Intelligence Theory that would examine Indigenous Fijians’ intelligence, knowledge and skills. This would be a useful input for the curricula used in schools and tertiary institutions, and could promote effective learning and ensure the continuity and survival of Indigenous Fijians’ culture and *Vanua*, leading to a more sustainable and resilient Fiji.

### **7.3.4 Cultural Mapping**

This research interviewed only twelve selected elders from Ovalau. Further research with a larger group of indigenous Fijian elders is needed to validate the collected data and to document more TEK of CC and CCA in Fiji. This documented information could later be used as teaching and learning resource in schools and could also be used as reference point for policy writers.

## **7.4 Summary**

Although indigenous Fijian TEK faces the danger of slowly disappearing it is still alive today. Through the use of education, media and technology, this knowledge can be protected and transmitted to the young generations of Fiji for the sake of sustainable living, cultural survival and continuity.

This study's findings have several implications for different stakeholders. The MOE needs to follow up its decision to include aspects of TEK in the school curriculum. Institutions responsible for training the teachers of Fiji will need to adapt their curriculum so as to provide knowledge and understanding to trainees about TEK of CC and CCA in order to prepare them to implement curricula that deal with CC in schools. All these steps need funding, a revision of the curriculum and an appropriate mapping of the curriculum.

People who work in the different areas of the media would also need training in order to include aspects of TEK of CC and CCA in their program. This too would require resources such as content related as well as financial ones. There are implications for research and publication, which the USP should take a leading role in. Documenting TEK in other parts of Fiji would require human and financial resources but it would lead to a valuable global data base on TEK. And finally researching, documenting and disseminating TEK have cultural, educational, policy and financial implications for different sectors of the Fiji communities.

In concluding this study, I ponder on the *Bu* of the *Bu ni Ovalau* Framework in which they represent the children who are the main beneficiaries of this study. We are saving this knowledge for our children and future generations. Therefore the findings of this study and the recommendations drawn from them should be taken seriously. Fiji's children would be *vinaka*

*vakaniu* - resilient and sustainable, and they would be *lulu na niu lulu ki vuna* - children whose behaviour will reveal what they have been taught.

Fig. 7.1 Niu Metaphor



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# Glossary

*Baigani* - Egg plant

*Bati* – The Warrior clan, whose role is to protect the chief, cultivate the land and defend the *Vanua*

*Bele* - *Hibiscus manihot*, the leaves are consumed as a side dish

*Bete* – The priest clan whose role is to provide spiritual advice to the chief

*Bogi walu* – A weather event related to continuous rain for eight nights

*Bose ni tikina* - District meeting organised by the government

*Bose ni yasana* - Provincial meeting organised by government to coordinate provincial matters

*Bose vakoro* - Village meeting organised by the *Turaga ni Koro*

*Bota* - When leaves or plants turn brown it indicates that the crop is ready for harvest

*Bu* - Young coconut fruit

*Bula vakavanua* - Traditional Fijian way of life

*Buli*- The title is commonly given to minor chiefs in Bua and Macuata. It is usually followed by the name of the *Vanua* e.g., *Buli Raviravi*; it was borrowed by the Colonial Administration in the 1800s so that the Colonial Administration resembles the Indigenous Fijian's traditional government. The title was given to the Head of the District Council, who can be either a chief or commoner; whose role was to oversee the affairs in the district; collect district tax, organize work programs for the district, enforce Fijian regulations and ensure that births and deaths are accurately registered.

*Busa* – *Hemiramphidae*; Half beak fish

*Cagi mai na Ceva* - Wind from the South – Southerly winds

*Cagi mai naVualiku* - Wind from the North – Northerly winds

*Cagi mai wai* - Wind coming from the sea

*Cagi vanua* - Wind blowing from the land

*Civi* – To peel, for example Cassava

*Covi ni draudrau*- A piece of land that the male members of a clan gift to their daughter to plant vegetables for her family on. This is done to ensure that she and her family always have enough food to eat; that they do not go hungry, for hunger in the Indigenous Fijian culture is a sign of poverty.

*Cucula* – Refers to piercing on fruits such as Mangoes, Banana

*Dalo* – *Colocasia esculenta*; Taro; a subsistence root crop

*Dalo ni Tana* - *Xanthosoma sagittifolium*; Arrowleaf Elephant Ear; edible tuber

*Daniva* - *Herklotichthys quadrimaculatus*; Goldspot herring; Sardinella is a type of small fish

*Dau vakasavuliga* – Careless and not bothered to contribute

*Daunivakadidike ni matanitu* - (Researchers) from a government department

*Daunivucu* – Composer of poetry and chants for Indigenous Fijian dances; can also be the choreographer of the performance

*Davui* - *Charonia tritonis*; a conch shell that Indigenous Fijian village headman blow to send messages to the villagers

*Davuke* – Fermentation food pit

*Dawa* - *Ponnetia Pinnata* fruit

*Doi* - *Alphitonia zizyphoides* plant species

*Donu* – *Plectropomus leopardus*; Coral Trout; spotted Rock Cod fish

*Draki tunumaka* - Hot and humid weather condition

*Draladina* - *Erythrina variegata* plant species

*Drauni uto* - *Artocarpus altilis* breadfruit leaves

*Dulutoga* – *Sphyraena forsteri*; Forster's Seapike; baby Barracuda fish

*Duruka* – *Saccharum edule* plant species that Indigenous Fijians consume as side dish

*Gone lialia* - Unwise child

*Gone ni toko*- Favorite child

*Gonedau* – Fisherfolk clan whose role is to collect fish for the chief and the vanua

*iCoi* - Concomitant to food crops

*iLololo* – Barn; a small house usually built near the yam garden for storing yam and other crops

*iQoligoli* – Customary fishing ground; in-shore fishing areas

*iSevusevu* – The traditional presentation of kava to seek permission to enter a village and /or home

*iTatau* –The traditional presentation of kava to request permission to leave a village and /or home

*iUla* – War club that is normally thrown

*iYavoi* – Intercropping – the practise of planting different crops and vegetables in between yam or taro plants.

*Jaba* - Long skirt and blouse; an acceptable way of dressing in Indigenous Fijian villages and for traditional functions

*Jaina* – *Musa paradisiaca* - banana

*Jili* – Casting net

*Kabatia* – *Lethrinus* fish species

*Kai wai* – Refers to foreigners or people who come from the sea

*Kaivanua* - Inhabitants of the land

*Kala* – Slant

*Kanace lalai* – *Valamugil seheli*; Bleutail Mullet

*Kari niu* – Scrape coconut

*Katuba i sue/Kubu i sue* – Commonly used door at the lower end of the house, normally facing the kitchen

*Katuba i vanua* – Door facing land normally reserved for the head of the household only

*Katuba i wai* – Door that is facing the sea normally reserved for visitors only

*Kavika* - *Syzygium malaccense*; commonly known as malay apple

*Kawa tamata* - Descendants

*Kubu i cake* – Door that is at the upper end of the house normally reserved only for the chief, or for very important guests

*Kudru ni vanua* - Anger of the land

*Kuita* – Octopus sp. Octopus

*Kuita Veiyalovi* - Octopodidae; this octopus swims in pairs during mating season, when catching one octopus fishermen should be careful of being attacked by the other one.

*Lago kata* – *Vespula spp.* yellowjacket bee

*Lairo* – *Cardisoma carnifex*; land crab

*Lau* - Strike or to find

*Lewe ni vanua* – Members of a vanua; villagers

*Liuli ni koro* - Village chief

*Lololo* – Thatched house made from local timber and coconut leaves in which yams are usually stored after they have been harvested.

*Lovo* - Pit oven

*Lovo ni vudi* - Banana pit oven

*Madrai ni viti* - Fijian bread

*Mamaroi sega ni vakasabusabutaki* - The virtue of not wanting to waste.

*mana* – Power; traditional blessings

*Mata ni katuba* - Traditional link or representative in or to a place

*Matanivanua* – Spokesmen clan/traditional herald

*Mataqali* - Clan

*Moka* – Stone weir; fish trap made of rocks

*Moli madirini* – *Citrus reticulate*; mandarin

*Niu vara* - *Cocos nucifera*; sprouting coconut

*Nuqa* – *Siganus vermiculatus*; species of fish

*Nuqanuqa* – *Descaspermum fruticosum*; redup

*Ogo buidromodromo* - *Sphyraena flavicauda*; yellow tailed barracuda

*Ore* – Traditional punishment

*Ova* - Swim across the sea

*Qalova ua ua na moka* – Figure of speech used to describe an unsuccessful activity that was inappropriately timed

*Qari* – *Scylla paramamosain*; green mangrove crab

*Raica na vanua* - Look after the *vanua*

*Rakavono* – Name of the first inhabitant of Ovalau

*Rara* - Village ground usually located in the middle of the village. It is normally the venue for traditional functions and sport events

*Reguregu* - Presenting gifts to the family of the deceased

*Roko Matairua* – Traditional title given to the chief of Rukuruku

*Rokotakala* –Traditional title given to the chief of Nasinu

*Roqoroqo* - Presenting gifts for new born babies

*Rourou* - Taro leaves, a type of vegetable normally consumed as side dish

*Saku* – *Xiphias gladius*; swordfish

*Salala* – *Rastrelliger brachysoma*; club mackerel

*Salusalu* - Garland

*Saqqa* – *Caranx ignobilis*; great trevally

*Sara* - *Sardinella albella*; white sardinella

*Sau* – Power, blessings

*Sau ni vanua* - Supernatural power of the *vanua*

*Sau Tabu* - Burial sites for chiefs

*Sautu* - Prosperity; peace

*Sauturaga* - Chief Executive clan whose role is to enforce the decisions made by the chief

*Sekoula* - Flame tree flowers

*Seni Kawakawa* - *Mycteroperca venenosa*; yellow finned grouper; coral reef fish

*Sevutaki* - Traditionally offering for the first harvest

*Soli vaka koro* - Village money collection

*Soqooqo vakamarama* - Women's organization

*Soso ni Ura* – *Dolicholobium longissimum*; commonly known as *Bua ni Viti*

*Sova ni Daniva* - Basket for sardinella

*Suluvakatoga* – Sarong; cloth used to wrap around ones waist, traditional clothing

*Tabu* – Taboo; to put restriction; sacred

*Tabu na Veidogo* - Restriction on the usage of mangrove forests

*Takitaki* - Serve food

*Talanoa* – Conversation between two or more people

*Tarawau* - Anacadiaceae fruit normally eaten by Indigenous Fijian children

*Tavioka* - Cassava

*Tavola* - *Terminaliacatappa*; commonly known as tropical almond, its fruit is edible when ripe

*Tiale* – *Garden jasminoides*; commonly known as gardenia

*Tikina* - District

*Tivoli* - *Dioscorea nummularia* (*Dioscoreae*) wild yam that has a prickly stem, it was introduced to Ovalau from the Solomon Islands

*Tokatoka* - Extended family

*Tui Wailevu* – traditional title given to the chief of Lovoni

*Tuirara* - Fisher folk clan also known as the *Gonedau* in the village of Rukuruku

*Turaga* - Chief

*Turaga ni Koro* - Village Headman

*Turaga ni mataqali* - Clan Headman

*Turaga ni Tokatoka* - Extended families Headman

*Turaga ni Yavusa* - Tribe Headman

*Ucui tamana/tinana* – A saying that normally means resembling his father/mother

*Ura* – *Macrobrachium lar*; freshwater prawn

*Uvi* - *Dioscorea spp*; *Dioscorea alata*; yam

*Vakacirisalusalu* - Feasting and celebration to thank everyone for their contribution to a task well done

*Vakadidigo* - Observation

*Vakadigova* – To observe

*Vakalutu buto ni gone* – A traditional ceremony of burying of a newborn's umbilical cord; normally done on the fourth night after the baby's birth

*Vakarogotaka* – Report

*Vakarokoroko* - Deference

*Vakarorogo* - Attentive and complicit

*Vakasavasavataka na lawa* - Clean the fishing net

*Vakasokumuni tukutuku* - Gathering information

*Vanua* – Refers to the land, sea, sky, spirit, people, culture, traditions, knowledge, skills and values of a specific ‘place’ and their relationship with people

*Vanua sauvi* - Land and sea areas restricted in their usage so they can restore their power and fertility

*Vanua tabu* - Sacred place; entry to this place is restricted

*Vara* – Endosperm; spongy flesh of coconut

*Vasu* – Refers to a person’s maternal links

*Veidogo* - Mangrove forest

*Veilomani* – Loving

*Veinanumi* - Considerate

*Veinuku* - Beach

*Veisa* – Indigenous Fijian women’s way of exchanging traditional goods without the use of money

*Veisolo na draki* – Blended weather condition for instance having a hot and humid condition

*Veivukei* – Helping one another

*Voivoi* – *Angiospermae Monocotyledoneae (Pandanaceae)*; commonly known as pandanus; Indigenous Fijian women use its leaves for weaving mats, fans and other artefacts.

*Vola ni Kawabula* – An official document where Indigenous Fijians’ are registered as traditional land owners

*Vosa Vaka Viti* – Standard Indigenous Fijian language

*Vu* - Ancestral god

*Vudi* – *Musasapientum* banana species

*Vula i Gasau* – According to the Indigenous Fijian traditional calendar, this is the season when the reeds flower and there is a lot of rain. It usually is the month of March.

*Vula i matua* - Month when crops mature

*Vula i sevu* - Traditional month for offering the first crops, usually the month of February

*Vulagi* – Visitor; foreigner

*Vuto* - Waded

*Vuvale*- Family

*Waitui* – The sea

*Walu*- Kingfish

*Wi* – *Spondias dulcis*; commonly known as ambarella. It is known as golden apple. Its fruit is edible

*Yaca tavioka* - Grated cassava

*Yalomalua* – Humble

*Yalomatua* - Wise

*Yalovata* – The spirit of working together

*Yaqona* – *Piper methysticum*, plant species; kava; a traditional Fijian drink made from the dried and pounded plant. Traditionally, it is to be consumed by the village elders during traditional ceremonies.

*Yavu* – Foundation

*Yavusa* - Tribe

*Yavusa Turaga* - Chiefly clan

*Yavutu* – Original village site or home of a clan or tribe or person

# Appendices

## Appendix 1: Guiding Questions for the conducted interviews

### ***TARO ME DIKEVI (QUESTIONNAIRE)***

1. *Na cava na draki veisau?* (What is climate change?)
2. *E dau kilai vakacava ni vakarau veisau na draki?* (How do you know that the climate will change?)
3. *Na cava e dau caka ni dau vakilai ni na veisau na draki?* (What do you do when a change in climate is forecasted?)
4. *E dau vakavulici vakacava vei ira na gone na vuku ni vanua oqo (na ivakatakilakila ni veisau ni drake kei n aka me vakayacori ni sa laurai na ivakatakilakila e so)?* (How is this Traditional Ecological Knowledge of Climate Change taught to the children?)
5. *Na cava me caka me vakavinakataki cake kina na kena kilai na vuku ni vanua ni draki veisau?* (What should be done to enhance the indigenous Fijians' understanding of the TEK of CC?)

## **Appendix 2**

### **Oral History Relationship between Lovoni, Ovalau and Naroい, Moala**

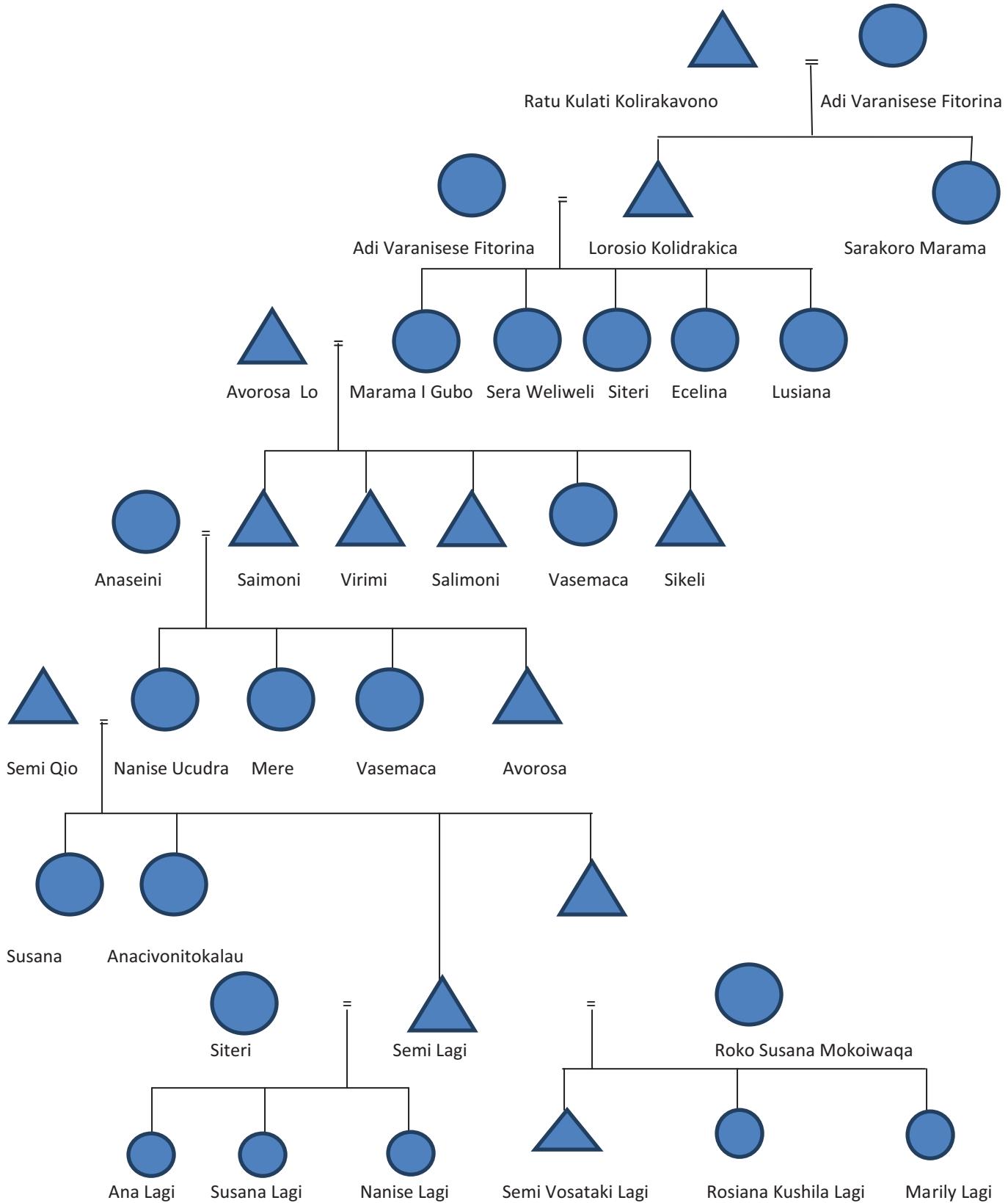
According to oral history the original inhabitants of Naroい, Moala in Lau used to reside on a hill in Namoala. One of the clans in Namoala was Navucunimasi, which is also the name of the place where this clan lived. Navucunimasi is the name of the clan where the Tui Nasau is from. He holds one of the chiefly statuses in Naroい, Moala, Lau. He holds the *sau* (blessings and power) of Moala and is supposed to bestow it to the Tui Moala during his installation. The name of the Tui Nasau's eldest daughter was Adi Salote. She was known as the *Marama Tabusiga* (Lady who does not go out in the sun) because she never walked in the sun. If she had to go outside, *dau biri na kumi a* (tapa was set up) to *tutuvitaki* (cover her). Adi Salote had a *tobu ni sisili* (bathing pool) in the sea and every evening when the sun was setting she would walk down from the hill to bathe in her pool. It is said that she would put on *waiwai yasi* (sandalwood oil) as her soap before starting her walk to the pool. Her scent would cover the whole area and people from near and far would be able to smell it and know that she was going to have her bath.

Keteicake is the name of one of the neighboring villages of Naroい. In this village lived some young men from Lovoni, Ovalau who had come for a visit to the village. Every evening while the men were in Keteicake they would smell the sandalwood oil scent. They were curious to find out where it came from. One evening, the young men decided to follow the scent. The smell lead them to Adi Salote's bathing spot and they arrived just as the beautiful girl was *ni nawa* (floating) in the water.

At this point they decided to *nakica* (trick) her and came up with a plan to kidnap her and take her to Nasaumatuа, Lovoni, Ovalau. So one day Adi Salote did not return home from her bath. She had been kidnapped by Vereniki, one of the young men to Nasaumatuа, Lovoni, Ovalau.

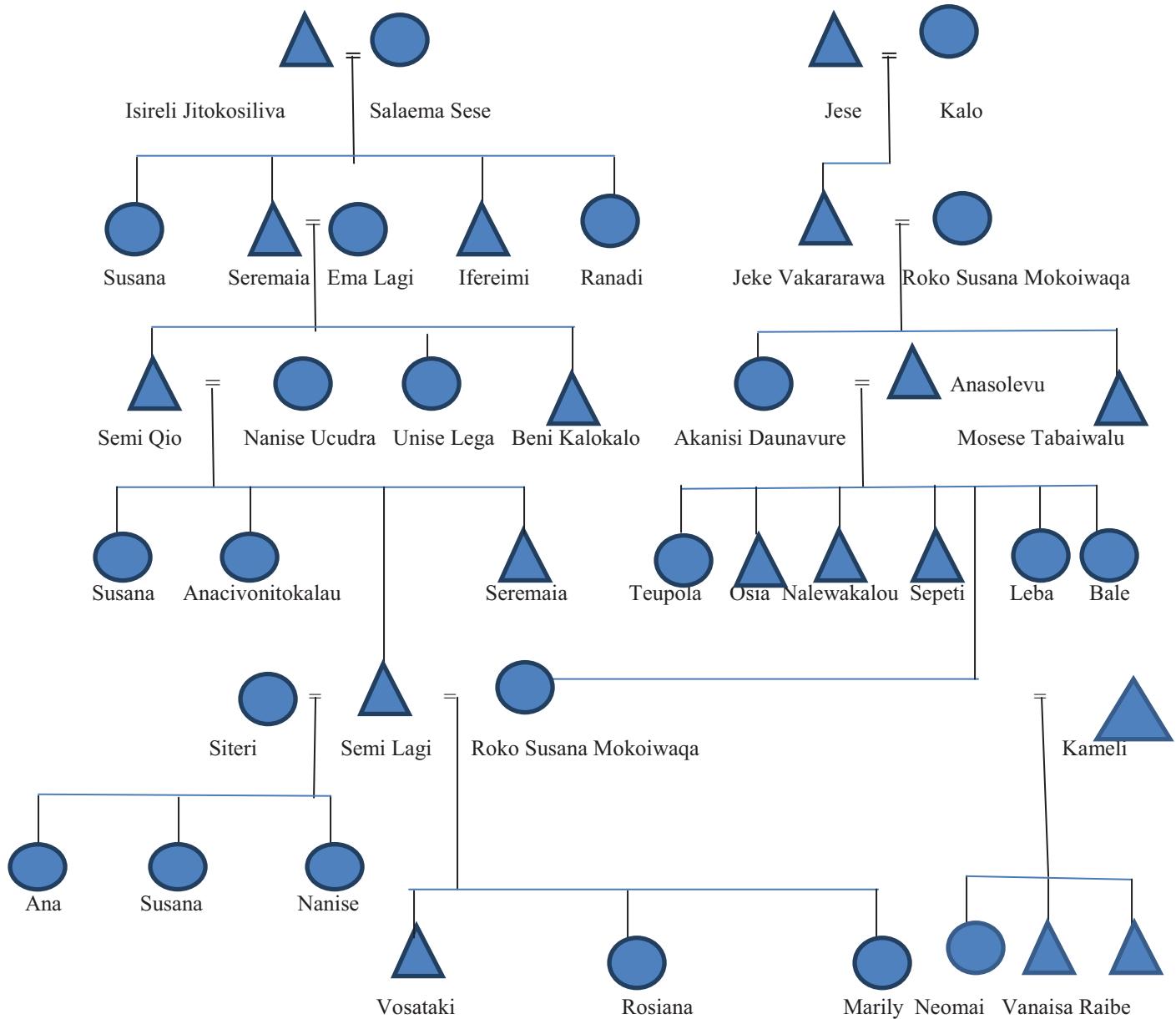
Vereniki and Adi Salote had a son, named Qarikau. It was during the years of intertribal warfare, that Vereniki told his son Qarikau to flee to his *momo* (cross uncles) in Navucunimasi, Moala so he would not be harmed. When Qarikau arrived in Navucunimasi he introduced himself to his *momo* (cross uncles) and they welcomed him as a family member. Qarikau was later installed as the first Tui Nasau of Naroい, Moala, Lau from whom both my mother and father descend from.

### Appendix 3: Family Tree - Ratu Kulati Kolirakavono (Lovoni)



## Appendix 4 - Rosiana Lagi Family Tree; Tui Nasau

(Naroi , Moala, Lau)



## Appendix 5 Participants in Rukuruku



*Rukuruku Turaga ni Koro Village Headman blowing the conch shell calling people to the workshop*



*Young Male Participants*



*Young Female Participants*



*Male elders participants*



*Young adults participants*

## **Appendix 6: Architectural Design of Homes – adapting to climate change**



## Appendix 7: Impacts of Climate Change



*Coastal Erosion*



*Pests destroy voivoi Pandanus leaves*