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# An assessment of local perceptions towards natural resource management practices in the Tuvalu Islands, South Pacific

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## Dedication

I firstly dedicate this thesis to Almighty God for giving me the strength to overcome the challenges of completing this thesis. I also dedicate this thesis in loving memories of my adopted parents, Soosoo and Finaunga and the people of Tuvalu. My special dedication goes to my husband Mr Ron Vaelei, my sons Jnr Vaelei Ron and Jnr Faletoa David Ron and baby daughter Hadassah Soosoo Ron.

I also dedicate this thesis to all my relatives in Tuvalu. To my relatives in New Zealand, Eseta & Leilua, Teuluaki & David, Peter McQuarrie, Igo & Paitilimoe, Losalini, Alea & Suia, Taumili & Moana. Thank you for your prayers.

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*Aerial view of Fogafale, Funafuti the capital island of Tuvalu from a plane, a minute away from landing.*

*(Photo: Author, 2007).*

## **Abstract**

As the role of local people in natural resource management continues to be recognized in global conservation interventions, so too does the need to understand the perspectives of local people towards various resource management practices. This study examines local perceptions in Tuvalu towards traditional versus modern resource management practices, and furthermore assesses compliance and enforcement with protected areas village rules or legislation at the community level in the Tuvalu Islands, South Pacific. A mixed method research approach was adopted that includes a nationwide questionnaire survey, a review of the literature and triangulation. The study findings emphasize the dedicated support for local government to deal with most of the aspects of resource management in Tuvalu.

The survey findings showed a strong preference by participants to have their Island Councils or Kaupules as the appropriate and responsible authority to be the key informant on the stock status of their natural resources, to manage their island land and marine resources, and to report and impose penalties for violations against their village resource management rules. Participants also indicated a strong preference for a mix resource management system that combines both scientific-based and traditional resource management approaches over a system that uses only traditional resource management strategies.

Despite the weakness in the enforcement of existing resource management legislation in Tuvalu, where a monetary fine and imprisonment are the main prosecution methods, monetary fines was strongly perceived in this study as the most preferred method to promote village compliance and enforcement of both formal and informal village laws. In contrast, there was little support to use other common discipline methods such as imprisonment, public shaming, and traditional penalties such as public beating, and feeding of the whole island community by the caught violators; however, this is argued as either being morally wrong or no longer valid due to the Church's influence and the adoption of laws pertaining to human rights.

Although the findings of this study acknowledges that demographic and socio-economic factors can influence local perceptions towards resource management, there is generally very little evidence to conclude that there were significant differences in the perceptions of survey participants based on the many years they have resided in their home islands, having held a

leadership role and age. The minor differences in the perceptions may be associated with lack of diversity in the culture of each island, small national population, weak hierarchy in economic status at the individual level as seen in other developing nations.

This research provides a deeper understanding of the uncertainties associated with the need and obligation to impose stricter or more resource management measures in small local communities in response to the global move to protect biodiversity. Most importantly, it emphasizes the argument to consider the influence and engagement of local government as an opportunity to promote resource management interventions in Tuvalu and in other local communities of similar constitutional settings.

## **Preface**

Much has been said on the need for effective resource management and conservation in local people's settings particularly in the Pacific Islands and around the globe. Yet little progress has been achieved. One of the main reasons for the slow progress points to the limited information that is available in the literature. As a Fisheries Research Officer within the Tuvalu Fisheries Department for almost a decade, the lack of proper research and documentation of local perceptions towards resource management creates a dilemma to whether the imposing of stricter management measures and legislation would improve village compliance and enforcement of resource management rules in Tuvalu. Such a dilemma needs urgent attention given the increasing number of 'conservation oriented' donor-funded projects that are coming in to the country with big budget and strict timelines.

The Government of Tuvalu, especially the main responsible agencies such as the Fisheries Department and Environment Departments in terms of human, financial and technical resource are nowhere ready to outpace the works that external donor-funded projects deliver as well as the absorptive capacity to foot the extra work load that these projects will hand over to the Island councils, and consequently the Government when these projects reach their timeframes. The recruitment and influx of foreign experts will likely to be continuous in the future who may provide demanding scientific recommendations to promote the pace of resource management interventions in Tuvalu. Their recommendations may be necessary, but may need more time for local communities and the government to familiarize with.

Addressing the discussed dilemma based on the need, challenges and the solutions to upscale resource management performances in Tuvalu through local perceptions is very important. The importance of this study is twofold whereby 1) the findings will assist interested resource managers with the formulation of specific future recommendations that are most appropriate for Tuvalu and 2) contributing to the existing literature on the role of local people in Natural Resource Management.

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## Acronyms

CBCs	Community-based Conservation Concepts
CBD	Convention on Biological Diversity
CBNRM	Community-based natural resources management
CITES	Convention on International Trade in Endangered Species
DNA	Deoxy- ribose Nucleic Acid
EBM	Ecosystem-based management
FFA	Forum Fisheries Agency
GDP	Gross Domestic Product
GOT	Government of Tuvalu
ICDPs	Integrated conservation and development projects
IUCN	International Union for Conservation
MDG	Millenium Development Goal
MOU	Memorandum of Understanding
MSY	Maximum Sustainable Yield
NEMS	National Environment Management Strategy
NRM	Natural Resource Managment
PACPOL	Pacific Ocean Pollution Prevention Programme
PIR	Pacific Island Region
SPREP	South Pacific Regional Environment Program
SPSS	Statistical Package for the Social Science
QMS	Quota Management System

**List of non-English words**

Ahupu'a	A traditional land and sea tenure ownership and management <i>system</i> in Hawaii
Fale	House
Fale Kaupule	Traditional assembly of elderly men and village chief
Fale Kaupule Act	Local Government Act
Fenua	Land or Island community body that oversee the wellbeing of the island
Kaitiagakitaga	Maori word for a local guardianship system of land and marine resources
Kastom	A traditional land and sea tenure system in the Solomo Islands
Kaupule	Island council which serves as the executive arm for the Fale Kaupule
Pologa	Specialty of a clan
Te lii	An old traditional method of harvesting coconuts usually practiced in Niutao,Tuvalu
Tufuga	Master

## CHAPTER ONE: GENERAL OVERVIEW



*A typical traditional feast during a picnic trip to the islets to welcome guests or to commemorate an island or village community celebration in the island of Nukulaelae. (Photo: Alamatiga Lusama)*

### 1.1 Introduction

Managing natural resources to ensure sustainability is a key aspect of any human society and bureaucracy (Hart, 1995; Holling & Meffe, 1996). Since contemporary social bureaucracies operating in many countries are typically structured using Western-centric ideologies (Holling & Meffe, 1996; Adams, 1998), there is a global tendency to adopt a similar trend in the practice of Natural Resource Management or NRM (Alexander, 2013). Such trend is well encouraged and is becoming widespread in local communities of the Pacific Islands and among other local-people communities of developing nations (Adams, 1998; Berkes, 2004). Of particular interest is the use of Western-based instruments such as legislation, ecological and scientific-based tools in the implementation of policies and rules for the management of marine and terrestrial resources (Holling & Meffe, 1996). These instruments are being encouraged as normal practice

in the Pacific Islands. In some respects, this approach disregards the complexity and dynamic nature of the human social systems that have long existed in most of the island communities in the Pacific to regulate the exploitation of natural resources (Vitousek & Chadwick, 2014).

Unsurprisingly, the existence of local resource management systems in parallel to scientific-based management approaches have attracted the attention of scholars and resource management practitioners worldwide (Bennett, 2014). In this study, the author examined local perceptions, attitudes and management practices within the context of a Western based approach to marine and terrestrial resource management. An important aspect of this study, is to, document the views and the voices of local communities concerning tools currently being used to implement resource management. *It is my opinion that it is very important to respect these “voices” which include traditions that have been passed down to Tuvaluans over the history of the island group.* It is considered important to do this research prior to piloting and adopting the so-called ‘integration’ of traditional and Western-centric resource management systems (Berdach, 2003; Lal et al., 2003; Cinner & Aswani, 2007; Jupiter et al., 2014) as a best strategic resource management option for the Tuvalu Islands and across the Pacific Islands ecoregion.

The present study aims to provide an assessment of the local perceptions, attitudes, knowledge and awareness regarding tools that support resource management in the atoll islands of Tuvalu, South Pacific. The author has explored the main elements of resource management implemented by both government agencies and community traditions. These include government policies, monitoring, control and compliance with designated village resource management rules such as village by-laws and protected areas controlled by both formal and informal rules. The findings of this study will provide most of the baseline information for Tuvalu that can be used to formulate specific considerations for resource management in Tuvalu and perhaps to other local people communities within the Pacific.

## **1.2 Problem Statement**

Managing the marine and terrestrial resources in Pacific Island Countries (PICs) in a sustainable manner is an ongoing challenge (Keen & Mahanty, 2006; Benett, 2014). The challenge lies in the enforcement and implementation of the designated solutions at the community and national level and to ascertain which approaches to resource management are



appropriate (Jupiter et al., 2014a). Crucial to the challenge is the inevitable issue of whether to adopt Western-based resource management strategies (Jupiter et al., 2014b) while traditional local regimes that deal with resource management and ownership are still being practiced and active in many parts of the Pacific Islands (Govan, 2009; Aswani & Ruddle, 2013). Such a challenge is important considering that many of the Pacific Islands are naturally constrained by small geographical size, limited resources and strong cultural relationships (Polidoro et al., 2011; Vitousek & Chadwick, 2014). Currently, research on the experiences and perceptions of small Pacific Island nations with respect to certain key aspects of resource management is very poor as compared to research on the topic from a scientific perspective (Vitousek & Chadwick, 2014). Therefore, it is topical and appropriate to investigate these challenges through the experiences and perceptions of local communities in Tuvalu, a small Polynesian Pacific Island nation.

### **1.3 Purpose Statement**

Little attention has been given to understanding the independent views and attitudes of local people regarding their interactions with their natural resources (Hughes, 2014) and their management practices (Keppel, 2012). Such acknowledgement establishes the main purpose of this study which is to evaluate, document and critique, in a formal manner, the perceptions of local people of the current tools for NRM, using the case of the Tuvalu Islands in the South Pacific. From the results of this study, contributions can be made towards the formal debates towards the role of local people in resource management and on the strong advocacy to integrate traditional and western-based management approaches for resource management in the Pacific Islands Region (Berkes & Ross, 2013). Thus, the purpose of this study is in line with the need to accumulate more data in conservation science and natural resource management pertaining to small local communities in the Pacific Islands.

### **1.4 Aim and Objectives of the Research**

This research aims to provide insights into the experiences of very small, local village communities with the current trends in natural resource management. This aim will be addressed through the following objectives:

- to review key sub-themes in the literature relating to communities of small island nations and the management of their natural resources

- to examine and reveal the perceptions and attitudes of small local village communities in Tuvalu regarding resource management, through a questionnaire survey, literature review and other relevant secondary data.
- to obtain and document specific information on Tuvalu relating to various aspects of resource management using a mixed-method research approach.

## **1.5 Significance of the Study**

Research that has focused on evaluating the perceptions of local communities in the Pacific Islands regarding marine and land resource management, particularly in the small and low-lying islands is scarce (Grace-McCaskey, 2014). The pioneer study of Ruddle and Johannes (1985) is one of the very few attempts to document fisheries management practices in the atoll islands of the Pacific. Ruddle and Johannes's study provided a small glimpse and limited look at Tuvalu and many other small atoll islands in Oceania. Following the recommendation of Vitousek and Chadwick (2014) to study resource use, acquisition and management in Polynesian cultures, the selection of the small Polynesian island nation of Tuvalu as a case study is considered appropriate. The significance of this study lies in its contribution to addressing the issue of limited information on the strong relationship between the central government and local village governance concerning resource management in Tuvalu.

## **1.6 Resource Management and Local People**

### *1.6.1 Introduction*

The literature on resource management in the context of local or indigenous people emphasises a need to manage natural resources sustainably (Ostrom, 1999; Hughes, 2014). From a global perspective, this need relates to the awareness of protecting and conserving the world's diminishing biodiversity (Ludwig et al., 1993; Ostrom, 1999) with a vision to securing global sustainability (Hart, 1995). The local perspective on the other hand, embraces the historical and continuously strong dependence of local people on natural resources for their livelihoods and national economic development (Johannes, 1998; Govan, 2009). In the case of the Pacific Islands, marine resources are considered the most important in terms of social, cultural and economic significance. The appropriate measures to address the need for sustainability about

what degree local communities and governments should utilise, manage and conserve their natural resources are still (Thornton & Scheer, 2012).

Discussions focusing on local people and resource management also extend to the empirical and theoretical underpinnings derived from local people's patterns of resource use and acquisition, or those that are proposed to be compatible with resource management implemented by island communities (Dwyer, 1994; Baland & Platteau, 1996; Berkes et al., 1998; Aswani & Ruddle, 2013). Motivated by these discussions, this study seeks to review and synthesise some of the prevailing discussion on certain key issues in the relationships between local people communities and resource management. The key findings from this study are expected to provide significant contributions to sharing of information and knowledge about the key issues and lessons learnt from resource management practices in small local communities' settings. Small local communities in this review are referred to those that are constrained by economic, geographic and demographic factors that are common to most of the small island states in Oceania (Krausse, 1995).

#### *1.6.2 Examination of the role of local people in the management of natural resources*

Recently, the role of local people in resource management and conservation has been recognised internationally (Alexander, 2013). The International Union for Conservation (IUCN) defines local people as “*tribal peoples in independent countries whose social, cultural, and economic conditions distinguish them from other sections of the national community, and whose status is regulated wholly or partially by their own customs or traditions or by special laws or regulations*” (Borini-Feyerabend et al., 2004, p. 8). An estimate of the worldwide population of local people is 370 million (Ritchie et al., 2013) which represents four percent of the global human population (Sobrevilla, 2008).

Although the population of local people can be considered small, local people represent 95 percent of the global cultural diversity and are legal custodians of large marine and terrestrial areas that harbour 80 percent of the world's biodiversity (Sobrevilla, 2008). Such representation may explain the consensus among scholars (Dwyer, 1994; Furze et al., 1996; Agrawal & Gibson, 1999; Johannes et al., 2000; Brosius, 2004; Sutherland et al., 2014) of the need to engage local people in resource management interventions. Based on justifications from Agrawal and Gibson (1999) and Dudley et al. (2010), meaningful conservation

interventions are those that have incorporated the role and participation of local people. In other words, Agrawal and Gibson (1999) warned of the futility to implement resource management programmes that do not consider the immediate needs, circumstances and involvement of the people whose livelihoods are likely to be affected and threatened when stricter resource management measures are imposed.

The literature provides a diverse range of viewpoints on the significance of the role local people provide in resource management (Cocklin et al., 1998; Shackleton et al., 2002). In one instance, the involvement of local people is considered important because local people have longstanding information and specialised traditional ways of utilising and managing their land and marine resources that supported sustainable principles (Berkes et al., 2000; Sobrevila, 2008). An example of traditional management system is the Kaitiakitanga or guardianship concept of New Zealand Maori for safeguarding natural resources (Roberts et al., 1995). A notable aspect of such a system is that it comprises a mixture of cultural beliefs that incorporates aspects of resource use, access, ownership and managerial rights (Berkes et al., 2000). Such a system also has a typical social hierarchical level of organisation which is normally headed by village leaders or tribal chiefs and a council of elders (Roberts et al., 1995).

Similar versions of the New Zealand Maori kaitiakitanga system can also be found in most of the Pacific Islands with the exception of Tonga and a few island territories (Berkes et al., 1998; Hassall & Tipu, 2008). For instance, the New Zealand Maori resource management system is closely related to the Kastom (Hviding & Baines, 1994) in some Melanesian cultures, the Ahupua'a system practiced by indigenous Hawaiians (Berkes et al., 2000), the *vanua* system in the Fiji Islands, the *enua* in the Cook Islands, the *puava* in the Solomon Islands, and the *fenua* stewardship system that is practised in Tuvalu (Govan et al., 2008). Though many of these traditional bodies are thought to have been eroded under the influence of western administrations and modernisation (Foale et al., 2011; Hilborn & Ovando, 2014), those that exist today are not easily transferable to central government or foreign institutions (Hassall & Tipu, 2008). The reason why such systems are still strong and active today is that they are protected or deeply embedded in national government constitutions and laws, as in the case of Tuvalu (Sauni & Fay-Sauni, 2005; Hassall & Tipu, 2008).

Alexander (2013) identified that some authors defended a moral, ethical view in which local people are entitled to or have a natural right to manage their natural resources without the

interference of foreigners. Another group of researchers (Sobrevilla, 2008; Bennett & Dearden, 2014) supports a cultural ethic by which resource management is a crucial cultural aspect of local people that should be maintained. The latter ethic is widely promoted throughout the Pacific Islands). For example, in the Pacific Islands, traditional ways to hunt or manage and to promote the value of certain marine and land resources are incorporated into dances, poems, songs and other cultural commemorations (Thomas, 2014). The cultural ethic is everywhere in the Pacific Islands when it is viewed as a logic to secure local livelihoods rather than as an influence of western thinking (Foale et al., 2011).

In some occasions, the arguments in favour of local people's involvement in resource management stemmed from authors take of a 'romantic' view of the close relationship that exist between local people and their natural surroundings (Alcorn, 1993). However, the acknowledgement of such a romantic view has been heavily criticised for generating unfounded assumptions and ideally is regarded as a misconception (Dwyer, 1994). It appears that the ways local people interact with their natural resources often leads to issues that are controversial and are difficult to resolve. For example, this can be seen in International meetings such as the Internal Whaling Commission meeting and CBD where there is clearly a group of scholars who defended the rights of local people to harvest endangered and charismatic species such as turtles, whales, dugongs and sharks because they are part of local people's culture while another group of scholars assumed that killing of such animals are an act of barbarism and inexcusable.

The growing significance of the role of local people in resource management is also linked to the increasing pressure from the international conservation community to strengthen resource management at the local level (Dudley et al., 2010). Arguably, the pressure from the international community has been accused as intentional manoeuvring owing to the failure of the Protected Areas System that was initially proposed to protect and restore natural ecosystems to their pristine state (Aswani et al, 2007; Lam, 1998; Jupiter et al., 2014a). Furthermore, international pressure for more conservation interventions appears to be biased in the case of the Pacific Islands as the tuna resources in the Pacific Islands is largely exploited by the developed nations (Pala, 2009).

Martin (2013) explained that the strong international ethic to promote the role and engagement of local people is driven by global initiatives to protect local people's existence as part of

biodiversity. Such an ethic is in disagreement with the international concerns of the rapidly growing population and settlement of local people in areas of high and vulnerable biodiversity hot spots (Alcorn, 1993). An increasing human population is a management problem because it leads to growing demand and exploitation of natural resources. As a long-term consequence, it would be very difficult for natural systems to recover to their original or sustainable states due to intense exploitation of natural resources (Contanza et al., 1997).

The literature revealed that the arguments in favour of, and also against, the role of local people in resource management and conservation are both convincing. At the forefront, the discussions favouring the role of local people are based on best-practice principles (Rutt, 2011; Bennett, 2014; Dyer et al., 2014). For instance, the participation of local people is very helpful in gaining their trust and support to enforce resource management programmes (Mora & Sale, 2011). It is important to understand this because to maintain the trust of local people can be a lifetime process (Reed, 2008; Foale et al., 2011). It has been reported on several occasions that ignoring local people has led to problems such as poaching, dislocation, violence, bloodshed and unresolved rivalries between local social groups (Alcorn, 1993; Blaikie, 2006; Sesabo et al., 2006; Singleton, 2009).

While there have been recent claims that the ignorance of local people is a ‘thing of the past’ (Furze et al., 1996; Russell & Harsbarger, 2003; Dyer et al., 2014), excluding local people in a resource management program appears to be cited as a recurring issue made by resource managers throughout the literature. Debatably, Alexander (2013) defended the view that the failure to incorporate local people is a result of miscommunications and common intolerances between local people and resource managers who are mostly foreigners. Alexander referred to such intolerances and ignorant attitudes as an ‘old time human flaw’. Moreover, Locke and Dearden (2005) contended that the focus on local people is an irrational divergence from conservation interests. In other words, Locke & Dearden (2005) complained that the time and resources involved in mobilising resource management experts have hindered the progress and efforts of the scientific community in the implementation of conservation programs that need immediate attention.

Although the claim made by Locke and Dearden (2005) may discourage the necessity of the role of local people in resource management and conservation, it is also a practical notion that must not be undermined. For example, Ritchie et al. (2013) demonstrated that making

connections between research institutions and local communities in remote areas is a lengthy, costly and complicated process. Such a situation is shared with the Pacific Islands given the vast space and isolation between the many islands in the Pacific Islands Region. Ritchie et al., (2013) also claimed that involving local people would mean more problems and difficulties to carry out natural resource management interventions regarding the complexity on land ownership rules and different mentalities. In contrast, the inclusion of local people has led to beneficial opportunities such as gaining access to protect vulnerable natural resources and ecosystems in local communities and allowing local communities to take the lead in imposing appropriate management measures to manage their natural resources (Brechin et al., 2002; Shackleton et al., 2002). In other words, engaging local people can be the key to unlock access restrictions that are often imposed on foreign resource managers and researchers.

Despite the inconveniences of engaging local people in resource management programs, educating locals on the subject of resource management is an important component that cannot be easily dismissed. Recent evidence of successful resource management programs in local settings as documented in the study of Golden et al., (2014) are those that took the time to engage the participation and support of local people. This is particularly important in local communities' settings in the Pacific Islands nations where scientific expertise is often limited and inaccessible (Jupiter et al., 2014a). For example, the practical trainings of local village communities in many parts of the Pacific Islands about conservation, has enabled several Pacific Island communities to conduct natural resource assessments and related activities themselves without relying and waiting on foreign consultants (Russell & Harshbarger, 2003).

While the role and involvement of local people in resource management is a current issue of debate, it is worth remembering that the role of local people in resource management has been subjected to 'purposeful coercion, manipulation, disputes and speculation' (Brosius et al., 1998). At the same time, there is still room for further research focusing on the benefits and disadvantages of the varying perceptions towards the role and engagement of local people in resource management. In saying so, local people should be encouraged to have an active participation in academic debates concerning resource management so that there is fair play in the views expressed by scholars. The valuable insights gained from this thesis challenges that the debates concerning local people involvement in resource management should be a continuous tradition of scholars and resource managers.

### 1.6.3 Perceptions of local people in resource management

The importance of the perceptions of local people in resource management links to the argument that local people can positively influence the outcomes of resource management programs (Bennett & Dearden, 2014). This is identified by Hughes (2014) who advocates that *“if we are to do a better job of managing fish and fishery resources, we must do a better job of relating to the public how ethical, economic, and demographic policies affect fish, fisheries, and their environments”*. It is indeed wise for resource managers to consider the views of local people, or the people who interact more closely with ecosystems of high value to global conservation initiatives. Though local perception studies have concentrated more on protected areas (Dalle et al., 2006; Takon et al., 2013), the findings can be more generally applied to the management of resource management regardless of their protection status.

The literature has revealed that the perceptions of local people concerning resource management appear inadequately researched compared to aspects of the role they play (Shackelton et al., 2002). Several studies (Fiallo & Jacobson, 1995; Dalle et al., 2006; Sesabo et al., 2006; Jones et al., 2011; Szell & Hallett, 2013; Takon et al., 2013) reinforce that investigating the perceptions of local people have enabled resource managers to understand the various factors that may hinder or promote the success of long-term resource management initiatives. Examples of these factors include local ownership rights, incentives, empowerment and opportunities for income generation (Cocklin et al., 1998; Perez- Sanchez & Muir, 2003; Govan, 2009; Hoehn & Thapa, 2009), human cognitive ability (Jones et al., 2011), cultural, wisdom and spiritual aspects (Polidoro et al., 2011).

Contributions from Agrawal & Gibson (1999) and Pomeroy et al. (1997) include factors such as changes in societal, demographic developments, the benefits and costs that are associated with key stakeholders at a given resource management intervention. For example, the lack of access to funding and expertise has been reported as a common causal factor that prevent proper enforcement of protected areas rules in some local communities in Malaysia (Masud et al., 2014) and in the Pacific Islands (Govan et al., 2008). Understanding the issues and collaboration with all parties can greatly influence the involvement of local people in decision making regarding resource use or extraction and acceptance of conservation incentives (Sesabo et al., 2006; Guthiga, 2008; Reed, 2008).



In discussion of a few examples, the study of Sesabo et al. (2006) in some local African communities showed strong negative attitudes towards the creation of protect areas. The negative attitudes were linked to mentalities of insecurities. Such finding is common in local people in developing countries because resource management interventions often comes with some level of restriction of access to meet their objectives (Govan et al., 2008). Consequently, local people commonly perceive the restriction of access to harvesting grounds as a threat to their livelihoods (Szell & Hallett, 2013; Bennett & Dearden, 2014). Krauss (1995) study documented that local people perceived that resource management interventions coming from central government and foreigners were a ploy to relinquish their custodian rights to ownership and sole resource management practices (Krausse, 1995). The study by Hoehn and Thapa (2009) identified ownership and empowerment as the strongest indicators by which local communities in Kuna Yala, Panama gave strong support of their protected areas.

Notably, the perceptions and attitudes of local people towards resource management can be either positive or negative. For example, the study by Berkes et al. (1998) evaluated that resource productivity notions rather than intrinsic values mostly influence the perceptions of Maori people in New Zealand towards resource management. According to Jupiter et al. 2014), Pacific Island nations tended to support resource management activities based on national interests to generate income opportunities (Jupiter et al., 2014b). As an example, the establishing of several marine protected areas has facilitated the booming ecotourism industry across the Pacific Region (Thomas, 2011). In contrast, Fiallo and Jacobson (1995) study revealed that the perceived financial benefits of conservation failed to attract positive attitudes of some Ecuadorean local communities despite their great awareness on the benefits of conservation. Given the varying opinions of local people from around the globe, the perceptions of local people regarding resource management should not be generalised.

Potential biases often occur when dealing with local perceptions in resource management, as local people tend to view natural resources with emotions (Arnold, 2004). Arnold's study pointed out that using words like 'sea' and 'land' in social perception surveys tends to generate a stronger emotional response as compared to using similar words like ocean and terrestrial. These observations may justify the conclusions of McCarthy et al., (2014) that Maori people see and care most for their natural resources. Irrespective of how locals and scholars view local perceptions, there is the cautionary aspect to be mindful of that –social perceptions in resource

management can be strongly influenced by changes in societal and demographic developments (Pomeroy et al., 1997; Agrawal & Gibson, 1999).

Social perceptions on resource management can be influenced by personal emotions. Example of emotional responses can be exemplified by the claims of Prime Minister Henry Puna of the Cook Islands in a recent Pacific Islands leaders' forum. Puna professed that “... *conservation of the ocean is part of our DNA... We were born into the ocean, and we will die in the ocean. Our lives are so inter-connected with the sea...*” (Pareti, S. 2014, August 30). Press Release – Secretariat of the Pacific Regional Environment (SPREP) retrieved from <http://www.sprep.org/general-news/>). Looking back at the bias views in the literature, there is room to argue that exaggeration is not missing in the perceptions and arguments of both local people and resource managers. While the discussed arguments may be well justified when viewing the interests of local people and resource managers, further investigations of local perceptions across various cultural and geographical settings must be ongoing.

#### *1.6.4 Resource Management Practices in the Pacific Island Region (PIR)*

Recently there has been renewed interest among scholars and resource managers in the resource management practices of the South Pacific Islands. Resource management practices in the Pacific Islands Region (PIR) are comprised of a mixture of traditional and Western-based resource management strategies (Foale et al., 2011). The PIR, excluding Australia, New Zealand and Hawaii consists of three main ethnic groups: Melanesian, Micronesian and Polynesian (Doulman, 1993). The PIR is composed of 25,000 islands that differ in size and topography and are surrounded by 165 million square kilometres of ocean (IUCN 2009, as cited in Brodie et al., 2013) managed under international marine and ocean laws. Despite the application of both traditional and Western-based resource management practices in the Pacific Islands, the status of resource management in the PIR in the literature is considered poor (Kingsford et al., 2009; Jupiter et al., 2014b). One of the arguments for the poor status is that resource management practices in the PIR are mainly focused on optimal harvesting and sustainability rather than conservation principles (Drew, 2007).

Ecologically, the PIR harbours 39 ecological biodiversity hotspots (Kingsford et al., 2009). Estimates of the PIR population range from 2.6 million people, if the 5 million people of the inland areas of Papua New Guinea are excluded (Pacific Ocean Pollution Prevention

Programme (PACPOL), SPREP 2009). The people of the South Pacific Islands are considered as indigenous or local people under the IUCN classification. Using such classification, the conceptual strategies that target resource management in the context of local communities can be applied to describe resource management practices or strategies in the South Pacific Islands.

The widely cited study by Brechin et al. (2002) classified theoretical foundations of resource management that centre around local people and conservation as community-based conservation concepts or CBCs. Brechin et al. (2002) and Berkes (2004) noted that CBCs are intended to encourage the engagement and accountability of local people in the decision-making, implementation, monitoring and sustainability of resource management initiatives at the local level. These CBCs includes ‘integrated conservation and development projects (ICDPs), community-based natural resources management (CBNRM), co-management, and community-managed or indigenous reserves’.

Other related concepts that have been proposed and used to promote the well-being of local communities include the Adaptive Management Approach (Berkes et al., 2000), Integrated Coastal Management strategy (Christie, 2005), Concept of Ecosystem Services (De Groot et al., 2010) and the Livelihood Approach (Alisson & Ellis, 2001). Though these theoretical underpinnings encompass a great deal of traditional management aspects and are designed to be regulated by local communities themselves, they are commonly perceived and argued as influences from the Western world (Bennett, 2014). Another related concept is the ‘faith-based’ conservation as discussed by Polidoro et al. (2011). A faith-based conservation concept is whereby conservation initiatives are created and implemented strictly through the influence and empowerment of a religion. Although Polidoro et al. (2011) emphasised the faith-based conservation with specific cases from the Middle East region, it has been reported that such influence can also be seen in the Pacific Islands (Brodie et al., 2013). However, the management imposed by church leaders or religion in the Pacific Islands are mostly geared towards social interests – for special commemorations rather than pure conservation motives.

Occasionally, church leaders and ceremonial church functions often play major roles or have the political power to empower access and restriction measures to certain resources to suit their personal purposes in the PIR (Foster & Poggie, 1993; Johannes, 1998; Keppel et al., 2012). Considering Johannes (1998) and Veitayaki, (1997) observations in the Pacific Islands, local churches and religious influences are held in high regard with that of local spiritual or

supernatural beliefs by most of the local communities. However, given the small amount of attention in the literature on the negative influences of local churches to resource management initiatives in local communities, one could argue of possible bias views towards the positive roles of local churches in the Pacific Islands.

The literature also flagged a strong debate on the evolution of community-based resource management practices and its proliferation in the Pacific Islands (Bennett, 2014). According to Johannes (2002), the CBRM approach had emerged as a way of adapting to increasing population size given the resource limitations and geographical constraints in many of the islands. In counter agreement to Johannes (2002), community-based resource management CBRM is neither a new phenomenon nor a theoretical concept that has been introduced, since most of its components have been practice in the Pacific Islands for generations (Berkes et al., 2000; Cinner & Aswani, 2007; Foale et al., 2011). For the most part, resource management as a practice in the Pacific Islands is a complex task. Such is the case because community-based resource management strategies are part of Pacific Islands cultures and identities (Thomas, 2014). Most importantly, what constituted a ‘community’ in the Pacific Islands, in terms of ecological, economic, geographical, sociological and societal settings and interests differs significantly between each island groups and other parts of the world (Dyer et al., 2014).

Resource management practices that are thought as traditional in origin and context are known as customary resource management practices (Johannes, 1998; Jupiter et al., 2014). Customary management can be understood as ‘local practices that are designed to regulate the use, access, and transfer of resources’ in local communities’ settings (Cinner & Aswani, 2007, p. 202). Several studies (Berkes et al., 2000; Cinner & Aswani, 2007; Douman, 1993; Foster & Poggie, 1993; Govan, et al., 2006; Johannes, 1998; Ruddle & Johannes, 1988) provide an in-depth account on the different types, uses and functions of customary resource management practices. As a highlight, the customary resource management is facilitated through the use of local land and marine tenure systems and traditional ecological knowledge (Cinner & Aswani, 2007; Drew, 2005).

Traditional ecological knowledge (TEK) involves the accumulation of ‘knowledge, practice, and belief, evolving by adaptive processes and handed down through generations by cultural transmission ...’ as a result of the long interactions between local resource users and their natural environment, (Berkes et al., 2000). One critical aspect in terms of understanding

customary management and TEK practices is that they are vulnerable to internal and external changes in the socio-economic, environmental, demographic and political systems (Aswani & Ruddle, 2013). As a consequence, traditional practices can be introduced and disregarded based on the decision made by local leadership (Aswani & Ruddle, 2013). Such explanation is in line with Gadgil and Berkes (1991) observations that customary practices in the Pacific Islands have evolved through a trial-and-error basis. In essence, the adoption and discarding of a particular practice is dependent on its relevance, effectiveness and convenience to meet traditional conservation needs at a certain time (Johannes, 1998).

Some studies identify that contemporary resource management practices in the PIR have been argued as improved versions of customary or traditional resource management (Aswani et al., 2012). Much of the improvements were linked to the incorporation of Western scientific instruments or formal undertakings such as policies, legislation and scientific tools to resource management and conservation programs (Aswani & Ruddle, 2013). Yet, early observations from Lam (1998) concluded that the above formal or western-based management instruments in the colonial period have failed to promote marine resource management in PICs. Arguably, the recent study of Bennett (2014) stated that traditional management systems these days are losing their effectiveness to manage and protect natural resources as in the past. Bennett (2014) traced such ineffectiveness to the origins of traditional resource management strategies that have evolved without the presence of external factors associated with Western influences.

Other scholars defended the view that customary management holds similar interests to that of an ecosystem-based management approach (EBM), particularly in their focus on managing the attitudes of people towards the natural environment (Aswani & Ruddle, 1998; Jupiter et al., 2014). Most importantly, customary management practices were able to conserve a particular ecosystem and even keystone species. In contrast, Dwyer (1994) bemoaned the impracticality of comparing such similarities, as they will cause only further confusion among scholars and resource managers. Dwyer (1994) claims the differences between traditional versus western approaches do not include any reference to the spiritual or supernatural aspect of traditional resource management that is quite common in local settings mentioned in the study of Colding and Folke (2001). For example, Colding and Folke (2001) discussed the use of shaman wisdom and other black magic practices to assess and determine the necessary harvesting and management measures in a few local communities. Though the idea of such spiritual aspect may be off putting to the academic party, it is certainly worth a try to be investigated in a formal

manner, considering its strongholds in the beliefs of local people – especially among most of the Pacific Islands.

As the literature supports, a proposed solution to address the many complications of resource management in the Pacific Islands is by integrating Western and traditional resource management approaches (Jupiter et al., 2014). Key contributors to the topic (Cinner and Aswani, 2007; Dalle et al., 2006), suggested that such integration will act as leverage to bridge the gaps between the modern-based and traditional resource management systems. In addition, Foale et al., (2011) advocates that such integration or combination of these systems is considered a logical and beneficial intervention as they complement each other. Evidence of the specific benefits to resource management and conservation that may have resulted from such integration is however still limited. In light of this, there is a need for future investigations to investigate the success and negative aspects of the procedures being proposed or which may have been trialled in the context of resource management in the Pacific Islands.

## **1.7 Thesis Outline**

The aim of this thesis is to provide a formal assessment of the perceptions and attitudes of Tuvaluan islands communities towards important aspects of resource management and conservation. This thesis is designed and prepared in recognition of a best practice principle in resource management that relates to the need for scholars and resource managers to understand resource management from the perspectives of local people. The results of this research can be used to provide useful recommendations for the preparation and implementation of future resource management plans and policies for Tuvalu and other Pacific Island nations.

A mixed method approach has been used to address the key objectives of the study that include a literatures search, survey questionnaire, informal interviews for clarifications and triangulation of three aspects of this research: (1) indigenous exploitation of resources, (2) the need for conservation measures such as marine reserves and (3), the emergence of the new “economy of tourism.”.

## **1.8 Thesis Structure**

The thesis is comprised of seven chapters. The first chapter introduces the main purpose, aims, objectives and significance of the study, problem statement under investigation and the author's personal dedication and acknowledgements. The final part of this chapter provides a review of the literature, arranged into related thematic areas for a broader coverage and understanding of the thesis topic.

The second chapter provides a description of the study site (Tuvalu) and triangulation of relevant information on resource management in the context of Tuvalu.

Chapter three provides explanations of the research approach being used for the study, the steps that the author undertook and author's reflection concerning data collection, analysis and interpretation.

The fourth chapter presents the results of the survey conducted amongst Tuvaluan communities that has been used to gather baseline information into the problem being investigated. The results presented are based on observations of resource use practices of Tuvaluan communities and statistical analysis of the survey data.

Chapter 5 presented the discussion of the study findings and proposed recommendations based on the questionnaire survey and from the literature search and other sources from the triangulation process.

The sixth chapter of the study presents the author's concluding remarks and recommendations based on study findings for future research and resource management planning for Tuvalu.

All appendices and references are attached in the final section of this thesis.

## CHAPTER TWO: CASE STUDY SETTINGS

*“...well well, look who’s here!, they (Tuvalu Fisheries Officers) say they are here to do a fish survey in the lagoon. What! they think they can count the fishes! when the fishes in the lagoon and the sea are just like the stars in the sky, oh my, oh my ...”.*

Finiki Iosia, elderly man of Nukulaelae, 2009.



*Aerial view of the island of Vaitupu showing an orderly arrangement of village settlement. Kitchen compartments are typically placed to the lagoon side of the houses. (Photo: Polu Selu 2013).*

### 2.1 Case Study Setting

#### 2.1.1 Overview of Tuvalu

Tuvalu is the world’s fourth-smallest nation consisting of nine dispersed, low-lying reef islands situated north of Fiji in the central Pacific Ocean (Figure 1). Five of the nine islands are true atolls with lagoons, and four are coral islands with elevations of three to five metres above sea level (GOT, 2006). The nine islands namely Nanumea, Nanumaga, Niutao, Nui, Nukufetau, Funafuti, Vaitupu, Nukulaelae and Niulakita (associated with Niutao) made up Tuvalu’s total



land mass of 26 square kilometres with an Economic Exclusive Zone (EEZ) of 900,000 square kilometres (Gillett, 2009). The capital is on Funafuti, the largest atoll, with a land area of 2.79 square kilometres (Sauni & Fay- Sauni, 2005).

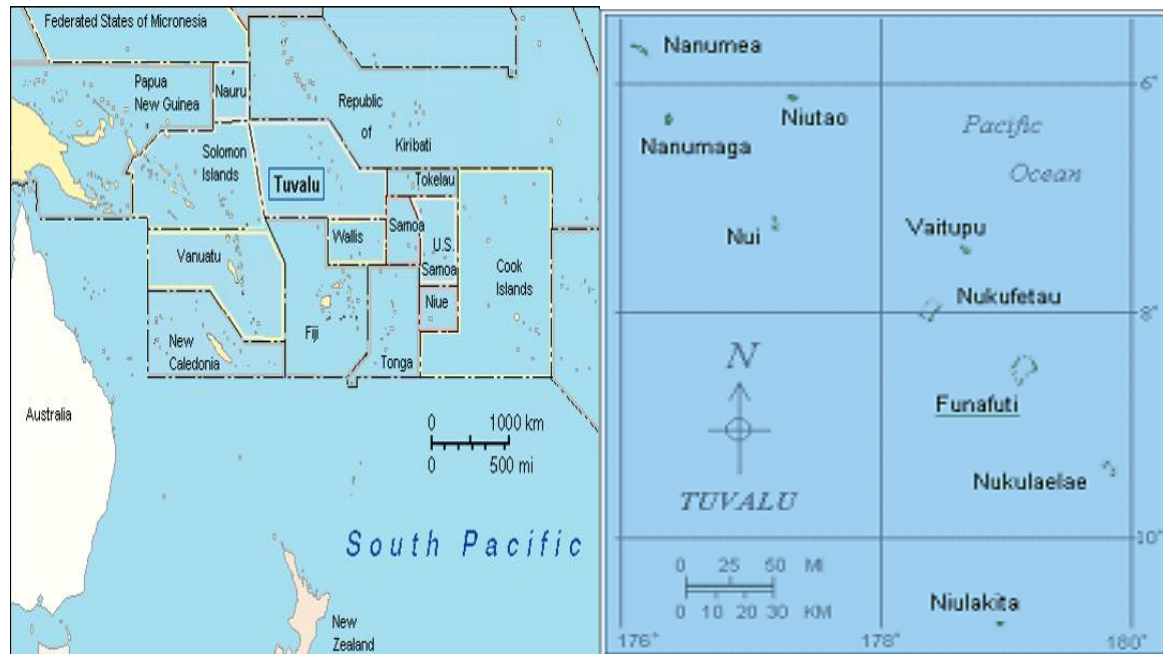


Figure 1. Map of Tuvalu (left) showing Tuvalu's location with neighbouring countries and map of the nine islands (right) of Tuvalu (Source: Tuvalu Online Website).

The 2012 Tuvalu Population Census recorded an estimate of 10,837 residents with the large majority (97 percent) following the Christian religion (Table 1). There has been a large urban shift in the Tuvalu population since the 1970's with 40–50 percent having moved to the capital island in the past few decades (GOT, 2011). Data from the recent census demonstrated that residency on the capital island is now sitting at the 60 percent margin (Tuvalu Department of Statistics, 2012). Based on historical records, the national population size of Tuvalu has increased by about 74 percent since the late 1880s (Table 1). The population of Tuvalu is indeed 'youthful' (Connell, 1999) and experiences a high disproportion between age groups (Tuvalu Statistic Department, 2012). The high population recorded for Vaitupu was largely attributed to the inclusion of high school students because the government high school is located on this island (Table 2). At the age group level, the highest contribution to the national population that is 62 percent is from the age group 15 – 64 years old and the lowest which 5 percent is represented by the 65+ age group (Figure 2).

*Table 1. Historical record of the Tuvalu national population from 1850 - 2012 extracted from Bedford et al (1980), Connell (1999) and from Tuvalu Stats Department 2012 report.*

<b>Year</b>	<b>Population</b>	<b>Year</b>	<b>Population</b>
1866	2,812	1931	3,994
1876	2,497	1947	4,487
1883	2,697	1963	5,444
1887	2,952	1968	5,782
1892	3,117	1973	5,887
1895	3,226	1979	7,349
1901	3,543	1991	9,043
1911	3,080	2002	9,561
1921	3,429	2012	10,837

*Table 2. Total population of Tuvalu by island of enumeration and Home Islands*

<b>Island</b>	<b>Land Area (km<sup>2</sup>)</b>	<b>Population (2012)</b>
Nanumea	3.87	556
Nanumaga	2.78	481
Niutao	2.53	606
Nui	2.83	541
Vaitupu	5.6	1,565
Nukufetau	2.99	540
Funafuti	1.82	6,194
Nukulaelae	2.79	324
Niulakita	0.42	30
<b>Total</b>	<b>25.63</b>	<b>10837</b>

Tuvalu is part of Polynesia and is thought to have been colonised by Polynesians from Samoa and Tonga about 2000 years ago (GOT, 2011). As a group of mostly atoll islands, Tuvalu has been a targeted study site to first test Darwin's theory of atoll creation, coral reef morphology and distribution (Woodroffe, 2008). The launching of the Tuvalu '.tv' Internet domain has also increased Tuvalu's recognition on a global platform (Sauni et al., 2008). Recent recognition of Tuvalu has come from the scientific community and media attention focusing on issues faced by Tuvalu with climate change and the global warming phenomenon.

Tuvalu was formally known as the Ellice Islands under the British colonial administration of 1877–1975 as part of the British Gilbert and Ellice Islands Colony with it gaining its

independence in 1978 (GOT, 2011). Tuvalu is also known as a least-developed country with an economy that is considered small and volatile (Iulai, 2014). For example, Tuvalu's gross domestic product (GDP) for 2014 was estimated to be US\$ 39 million (DFAT, 2014). The GDP estimates of countries neighbouring Tuvalu are as follows: Kiribati, US \$164 million; Samoa, US\$ 825 million; Solomon Islands US\$ 1,159 million; Fiji, US\$ 4.2 billion; and the biggest island country, Papua New Guinea, US\$ 16.1 billion.

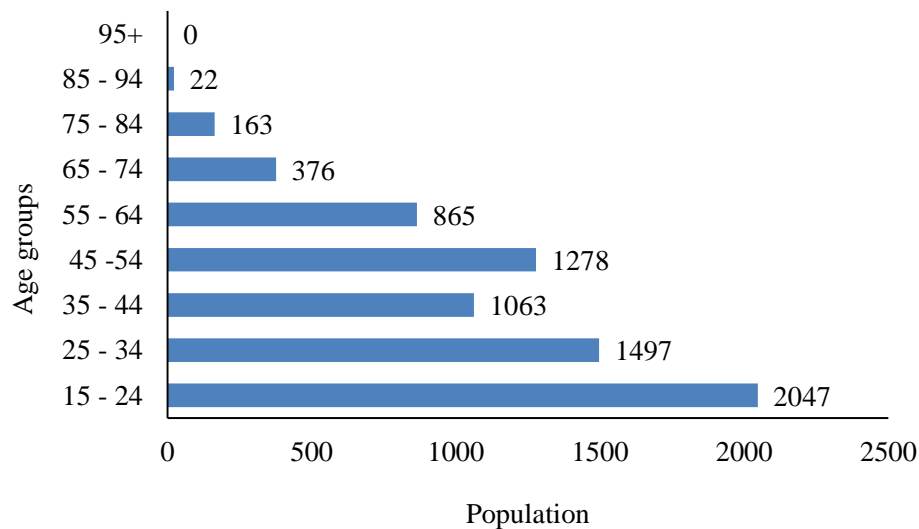


Figure 2. National population of Tuvalu from the age group 14+ extracted and modified from the Tuvalu National Census 2012 report (Source: Tuvalu Stats Department, 2012).

Tuvalu relies heavily on foreign aid or external donor funding to support its economy. Foreign aid contributions fluctuate between 30–60 per cent of GDP (Wrighton, as cited in Wrighton & Overton, 2012). By being an aid-dependent nation alongside the apparent lack of economic opportunities, Tuvalu's economy is fragile and vulnerable to external economic and environmental shocks (Iulai, 2011). The GDP of Tuvalu is made up by revenue generated from a trust fund invested overseas and from the fisheries sector through charging access fees to foreign tuna fishing companies (GOT, 2011). Other sources of revenue include philatelic and coin sales, government taxes, tourism, handicrafts, remittances by Tuvaluans overseas, and copra (Sauni et al., 2008). Remittances come largely from Tuvaluans residing in Australia and New Zealand, and from Tuvaluan seafarers working overseas.

Other commercial endeavours in the past have included the demersal snapper fishery, the bêche-de-mer trade (Poulasi, 2004) and the copra trade which were short-lived due to market, economic and geographical constraints (Connell & Conway, 2003). Some aquaculture

activities – including pearl oyster, seaweed, giant clam and milkfish farming – have also been attempted, but proved to be unfeasible and unprofitable. Agricultural opportunities in Tuvalu are also limited due to the lack of arable soil and contamination of ground freshwater with seawater (GOT, 2011). As a result, the nation relies heavily on sea resources for protein along with imported food and goods.

Tuvalu has one of the highest fish consumption rates in the Pacific Islands region and the world. For example, in an analysis of fish consumption (Bell et al., 2009) among the 18 Pacific Islands member countries of the Pacific Community (SPC), Tuvalu has the highest level of consumption at 120 kilograms per capita per annum. Bell et al. (2009) states, Tuvalu also has the highest fish consumption record for both rural and urban areas in the Pacific Islands. Creel surveys conducted in Tuvalu by Sauni et al. (2008) have shown an average consumption of 145 kilograms of fish per adult person per year which confirms the high dependence of Tuvaluans on fish resource for protein. Comparing this with a few developed countries, Speedy (2003) reported the following consumption rates of fish: New Zealand, 24.7 kilograms per capita per annum; Australia, 20 kilograms per capita per annum; while China has a rate of 49 kilograms per capita per annum.

Although the Tuvaluan fish consumption rate was not calculated in Speedy's study, there are calculations for Kiribati which amount to 76.3 kilograms per capita per annum. Kiribati's fish consumption rate can be used to reflect Tuvalu's rate of fish consumption on a global scale. From a local viewpoint, fish is a guaranteed resource that secures or maintains a traditional and a healthy diet for the people of Tuvalu. The Tuvalu fisheries sector alone has also generated an historical first, by generating the highest government domestic (49 percent) revenue of US\$23.7 million from its tuna resource through multilateral arrangement for the year 2015. Therefore, there may be negative financial consequences if more marine protected areas for both inshore and offshore resources are created or other legally binding access restrictions to reduce customary fishing and foreign fishing operations in Tuvalu's territorial waters. From a conservation perspective however, there may also be consequences if there are not sufficient measures to protect vulnerable marine resources and ecosystems. Consequently, local resource managers face the dilemma of balancing the need for conservation and the need to ensure food security and a healthy diet at the household, village and national level for Tuvaluans.

Whilst Tuvalu has very limited natural resources and land area to explore various economic developments, extreme poverty is not evident in Tuvalu given its high average life expectancy rate (Table 3). It is also acknowledged that 29 percent of household incomes in Tuvalu fall under the national poverty line according to international standards (Tilling & Fihaki, 2009). However, poverty estimation in Tuvalu may be biased as poverty indicators and parameters may not be suitable in the context of Tuvalu. For example, Tuvalu does not have squatters or homeless people as family ties and moral benevolence are still very strong. In addition, Tuvalu has a free domestic medical service for all, whether residents or non-residents. Within the past few years, the Tuvalu government has also adopted a pension scheme of AU\$70 per person per month for locals who are over 70 years old.

*Table 3. Tuvalu's population, land areas, population density and life expectancy in comparison to neighboring islands (Source: Connell & Conway, 2000 p 56).*

<b>Country</b>	<b>Population (thousands)</b>	<b>Land area (km<sup>2</sup>)</b>	<b>Population density (per km<sup>2</sup>)</b>	<b>Life expectancy</b>
Cook Islands	19	240	79	72
FSM	110	700	157	58
Kiribati	67	690	97	55
Tonga	97	700	139	66
Tuvalu	10	26	334	68
Western Samoa	163	2,934	56	66

Under the Tuvalu government's medical health scheme, the government is responsible for logistics such as travelling, daily subsistence allowances and hospital bills for local patients travelling from the outer islands to the capital, as well as Tuvaluan patients who are sent overseas for overseas medical treatments. Primary school education is free in Tuvalu while secondary education, in the only government boarding school, has a student fee of just AU\$50 per trimester. This fee covers food, accommodation and stationery. Top priorities for the government are focused on maintaining health and education when it comes to donor funding opportunities. As such, these priorities provide competition for resource management programmes, thus immediate attention on conservation interests at the national level is considered slow.

Ecologically, Tuvalu's native vegetation is dominated by coconut palms and broadleaf woodlands with a few mangrove swamps (Seluka et al., 1998). Tuvalu has a limited number of endemic and native species which include seabirds, lizards, insects, and crustaceans. Species such as chicken, duck, pig, dog, cat, and rats have been introduced as livestock, poultry and household pets (Tilling & Fihaki, 2009). Under the categories of the IUCN Red List, Tuvalu holds a list of 79 fish species of which 29 have been identified as Near Threatened or Threatened (Job, 2009).

The marine turtles that are found in Tuvalu waters are part of the Tuvaluan diet especially in important traditional celebrations. All the marine turtles found in Tuvalu waters are considered a delicacy. In fact, marine turtles can be referred as the 'fish of the island' in which it is to be freely shared. For example, in the island of Vaitupu and Niulakita, any family catching a turtle for a meal is not allowed to say no when another villager turns up to share the meal. The smallest island, Niulakita that has the highest elevation of sand dunes and known as a favourite turtle nest site has in place a unique alert call or whistle specific to turtle sightings, this verbal call is used to communicate to the other villagers the need for assistance for the catch.

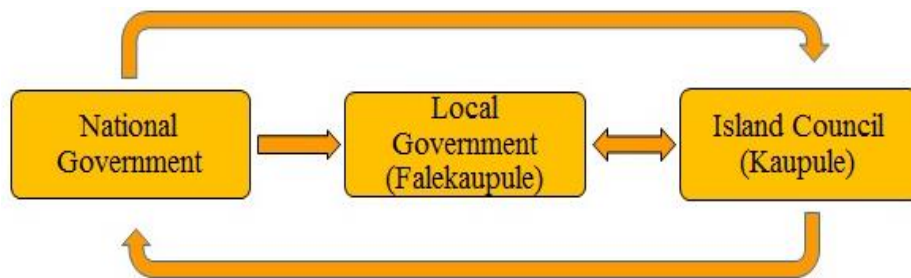
The near-shore marine environment of Tuvalu is characterised by fringes and patches of reefs that harbour several hard and soft coral species, finfish, invertebrates, molluscs, marine algae and sponges, epifaunal and infaunal marine species (Sauni, 1998). The Tuvalu territorial waters are scattered with about 60 submarine seamounts or elevated bathymetric features at heights ranging from 12–1,000 metres from the sea floor. These are associated with high levels of benthic, pelagic and deep-water fish resource aggregations (Allain et al., 2008).

## **2.2 Institutional and legal context of Tuvalu**

As a consequence of the influence of British imperialism, Tuvalu's governmental system follows a Westminster-style, democratic system with modifications to capture the national and local legal context of Tuvalu (Panapa & Fraenkel, 2008). The government is based on a simple constitution that encourages liberal democracy and is headed by the Prime Minister (GOT, 2006). Her Majesty Queen Elizabeth II, is the head of state and is represented by a Tuvaluan Governor General, whose political powers are 'greatly diminished and chiefly ceremonial' (GOT, 2006). Complementary to the national government, each island of Tuvalu has an active

local government system, locally known as the Falekaupule. The Falekaupule is the decision-making body that is represented by six chiefs in each island of Tuvalu (Falekaupule Act, 1997). In a simple direct translation of the normal vernacular, Falekaupule is compounded by three words – fale (house), kau (team or group) and pule (leader or rule).

The Falekaupule is embedded and protected in the Tuvalu constitution under the Falekaupule Act 1997 (Sauni & Fay-Sauni, 2005). The Falekaupule local assembly consists mostly of elderly males or toeaia, island chiefs, pastors and also includes women (Kofe & Taomia, as cited in Panapa & Fraenkel, 2008). The functions and decisions of the Falekaupule are carried out by its outer islands executive arm known as the Kaupule or island council. Each Kaupule is made up of six elected locals who oversee the welfare of their island's finances and health care as well as all aspects of local management and development (GOT, 2011). Based on the Panapa and Fraenkel (2008) investigation, the Tuvalu local government system is considered a successful local government model and there has been no incidence of opposing schemes causing upheaval in the national parliament. The linkage between the Tuvalu national and local governments regarding decision-making processes is illustrated in Figure 3.



*Figure 3. A simple schematic of the decision-making process within the government system of Tuvalu modified from the Tuvalu Falekaupule Act, 1997*

### **2.3 Legal framework for the management of natural resources in Tuvalu**

There are five main categories of legal instruments under the umbrella of the Laws of Tuvalu, 1987 that are known as the ‘constitution, acts of parliament, customary law, applied laws, and the common laws’ (Tilling & Fihaki, 2009 p 12). Some of the existing legislation that provides some level of protection for both marine and terrestrial flora and fauna include the Conservation Area Act 1999, the Marine Resources Act 2006, the Environment Protection Act 2007, and the Falekaupule Act 1997 (Tekinene, 2010). Other legal provisions for the

conservation of biodiversity can be found in Tuvalu's Public Health Ordinance 1926, Local Government Ordinance 1966, Foreshore and Land Reclamation Ordinance 1969, Wildlife Conservation Ordinance 1975, Plants Ordinance 1977, Fisheries Ordinance 1978, and Pesticides Act 1990 (Tilling & Fihaki, 2009).

In particular, the Falekaupule Act 1997 permits the incorporation and formal recognition of resource management mechanisms such as village by-laws and local customary practices that have been endorsed by each island's kaupule (Sauni & Fay-Sauni, 2005). Under this Act, as an example, each island council or Kaupule is fully entitled to impose resource management measures on their land and the foreshore that extends towards the 12 nautical-mile marine zone. Such legal authorities are not coincidental for Tuvalu, as 95 per cent of the total 26 square kilometres land area of the nation is legally and traditionally owned by villagers (Govan, 2008). As such, the land tenure in Tuvalu is either individual or shared between families based on family inheritance rights with no preferential treatment for island chiefs, pastors, and persons of high political or social standing as seen in other Pacific Islands. Marine areas – including the foreshore, lagoons and the 12-nautical mile marine zone – are communally shared, but ownership belongs to the whole island community or *fenua* under the management of the Kaupule.

Although the local government system of Tuvalu is considered a success, this type of system that fully protects private marine and land tenure by villagers or their local councils can also be a hindrance to resource management. It is a hindrance because despite the full ownership of the nation's resources residing with the Minister of Natural Resources under Tuvalu's Marine Resources Act 2006, an island council can still have a final say in the decision-making process regarding resource management. The experience with the *bêche-de-mer* trade in Funafuti in 2005–2006 is a classic example of the unwise exercise of resource ownership rights and political powers. For example, a gazette submitted by the Fisheries Department for parliamentary approval to ban the harvesting of sea cucumbers and to implement an urgent precautionary management approach for the sea cucumber resources was rejected.

At the policy level, the creation of the National Environment Management Strategy (NEMS) for Tuvalu in 1997 is acknowledged to have contributed significantly to resource management in Tuvalu (GOT, 2006). Conversely, the NEMS has acted as the overarching framework for key environmental policies and resource management initiatives in Tuvalu for the past two



decades (Tilling & Fihaki, 2009). Discrepancies within the National Millennium Development Goals (MDG) were notable regarding the geographical constraints faced by Tuvalu. For example, the environment and tourism sectors targeted for an integration of sustainable development principles such as reduction of biodiversity loss and tourism by 2010 versus the targets for an increase of land for agricultural farming to support local production and healthy lifestyles from the agriculture and health sector (Tilling & Fihaki, 2009). Once again, to strike a balance between protecting natural resources and utilising resources for sustainable development to meet local community and national needs is an ongoing challenge for Tuvalu.

## **2.4 Resource management mechanisms between Tuvalu and foreign partners**

Tuvalu's signing and ratification of regional and international conservation agreements plays a vital role in Tuvalu's efforts to implement resource management measures. For example, Tuvalu ratified its membership and obligations to the Convention on Biological Diversity 1992 (CBD) in 2002. Though the ratification of the CBD was a significant step for initiating formal resource management interventions for Tuvalu, such an alliance is not efficient (Tekinene, 2010). There are other international agreements that may provide species-specific management measures like the Convention on International Trade in Endangered Species of Wild Fauna and Flora 1973 (CITES) and the Convention on the Conservation of Migratory Species of Wild Animals (CMS) where Tuvalu has yet to confirm its membership (Tekinene, 2010).

Membership of regional organisations such as the Forum Fisheries Agency (FFA), the Pacific Community (SPC), and SPREP, enables Tuvalu to partake in the negotiations and decision-making processes of various regional and international fisheries management organisations and related resource management memoranda of understanding (MOU). Apart from earning a seat in the negotiations and decision-making arena, the above agreements and MOUs also enable and promote Tuvalu's access to funding and technical assistance opportunities, and collaborative networking environments. For example, the above regional organisations allow Tuvalu and the rest of the PICs to foster a successful regional collaboration with the monitoring, control and surveillance of the tuna resource in the Pacific Island region. Another example is the regional launching of the community-based resource management plans project throughout the South Pacific Islands region with funding of financial and technical assistance from SPC in the early 2000s (Sauni & Fay-Sauni, 2005; Govan, 2009).

## 2.5 Synopsis of key resource management issues and challenges in Tuvalu

Tuvalu experiences similar environmental, geographical, social demographic, ecological, economic, and political issues and challenges to other small Pacific Island nations regarding resource management. Specifically, the remoteness, small size and low-lying nature of the Tuvalu islands group are widely acknowledged as some of the key issues regarding resource management and conservation in Tuvalu. The low elevation of the Tuvalu islands accounts for poor soil formation and the poor supply of fresh ground water. Consequently, Tuvalu's species diversity, and the distribution and richness of terrestrial fauna and flora are fairly low (Seluka et al., 1998). Once again the growing population, urbanisation and departure from the traditional barter or exchange system of goods to a cash-based economic system (GOT, 2011) pose challenges for resource management in Tuvalu.

The effects of a growing population and urbanisation are more problematic on the capital island. Funafuti Island is currently facing major issues arising from coastal erosion from intense excavations of beach gravels, land and sand for construction of domestic housing, water cisterns, schools, hospitals, church buildings, government buildings and other important infrastructure such as roads, wharves and Tuvalu's airfield (GOT, 2011). Funafuti has also suffered a heavy decline in its terrestrial flora and targeted reef fish species – mainly snapper, marine turtles and the larger-sized shell fish species like *Tridacna spp* – which makes it harder to meet villagers' demands to maintain subsistence and economic livelihoods (Poulasi, 2004). Other marine and land species are being extensively harvested for handicrafts and as ornaments (Sauni & Fay-Sauni, 2005).

The high level of residency in Funafuti of people from various other islands of Tuvalu also makes it very difficult to implement and enforce resource management initiatives arising from Funafuti village by-laws and governmental gazette orders to restrict certain fishing gear and physical access to ecologically important fishing areas and marine resources. As an explanation, Poulasi (2004) associated such problems to Tuvaluans from other islands not respecting or feeling much concern about depleted fish stocks that do not belong to them. Therefore, there has been pressure for the government to implement Funafuti's request to deport non-Funafuti locals who are not working or are not on Funafuti for valid reasons. The over-crowding in Funafuti has also led to issues of improper disposal of pig and human wastes

(N'Yeurt & Iese, 2014) causing elevated marine water pollution in the form of prolonged algal blooms in the Funafuti lagoon.

The heavy reliance of Tuvalu on foreign imported goods delivered by trading ships exposes Tuvalu land and marine environments to invasive species such as the crown-of-thorns starfish (*Acanthaster planci*), land and marine organisms and several other crop pests as described by Tilling and Fihaki (2009). These authors have also reported that the percentage of non-native or alien species makes up 65 percent of Tuvalu's flora. However, the current documentation of invasive species of flora and fauna in Tuvalu, both terrestrial and marine, is not up to date. The importation of foreign goods has led to other issues of concern such as land and marine pollution from improper solid waste disposal. In the process of dealing with the increasing expansion of solid waste dumping areas, significant native vegetation has been removed.

One of the justifications for reduced vegetation and potential damage to the marine environment that is rarely mentioned is the effects of World War II. In a written documentary by McQuarrie (1994) based on Tuvalu and WWII, three of the islands – Nanumea, Nukufetau and Funafuti – became temporary military bases for the US Marines during the Pacific War. Nanumea suffered three bombing attacks by the Japanese, while Funafuti suffered more than seven bombing raids from March to November 1943. It was also reported that the two bombs dropped as friendly fire on the reef of Nui Island have affected the subsistence livelihood of the locals on Nui.

McQuarries (1994) recorded that more than 100 Japanese bombs ranging from 57–100 kilograms were dropped on Funafuti alone; of the two longest bombing raids experienced, one lasted for three hours and the other for a whole night. Considering the land area of Funafuti is only 2.9 square kilometres, the direct hits on the island and surrounding waters would have caused serious destruction of vegetation and marine life with long term ecological effects. There is also the instance of the US Navy blasting and dredging a very large and beautiful coral outcrop rising toward the surface in the Funafuti lagoon and outer reef edges to give safe passage to the US and allied naval ships.

Other major challenges faced by Tuvalu, as mentioned in detail in Tilling and Fihaki (2009), include the lack of local expertise to keep pace with research, monitoring and reporting needs relating to resource management in the country, ignorance of protected-rules and regulations,

and the limited knowledge of local communities regarding the major threats to resource management and the long-term benefits of resource management initiatives. While Tuvalu has not suffered the fate of nuclear weapon testing, it is however expected that the ecological effects that are starting to surface as a result of leakage from the Fukushima nuclear plant in 2011 in Japan into the Pacific Ocean will soon reach the shores of Tuvalu. This is a necessary issue for future investigation regarding the threats to biodiversity in Tuvalu and the wider Pacific Islands region.

## **2.6 Scope of Study**

The present study aims to provide an assessment of the attitudes, perceptions and awareness of Tuvaluan small local communities on certain important aspects of resource management. These aspects include:

- I. the perceived issues for poor resource management and the responsible agencies to deal with resource management at the village and national level,
- II. perceived knowledge and local preference on the use of traditional resource management tools versus modern or scientific-based approaches and
- III. local perceptions towards compliance and enforcement of Protected Areas rules or village resource management rules.

The main objectives of the study include:

- I. Understanding how Tuvaluans local perceptions towards the selected resource management aspects may differ with:
  - a. age group, gender and Home Island or ethnicity level and
  - b. length of residency at Home Island versus having a leadership role.

Finally, the study attempts to provide a brief review of the literature review to explore the topic under investigation at a broader scope.

## CHAPTER THREE: RESEARCH METHODS



*Surveyor (right) administered the survey to a participant at Niulakita Island. (Photo: Ron Vaelei, 2014)*

### 3.1 Research approach

The aim of this study is to examine local perceptions of small local village communities in Tuvalu regarding certain aspects of resource management. The present study adopted a mixed-method approach based on its flexibility to collect, analyse, and integrate both qualitative and quantitative data that are applicable for a public perception study (Bird, 2009; Creswell, 2013). According to Caracelli and Green (1993) and Creswell (2008), adopting a mixed-method approach enables the researcher to investigate the topic from multiple social and theoretical perspectives. It combines the strengths of both qualitative and quantitative research methods and allows for a comprehensive analysis and increased validity of research data. The data collection instruments selected for this study included a survey using a structured questionnaire, non-structured informal interviews, and secondary data from the literature, national archives and other formal publications.

Bird (2009) has shown that questionnaires are a reliable tool for data collection, particularly in studies with limited time frames. A questionnaire is also a cost-effective, convenient way to collect valuable baseline information based on participants' social characteristics, behaviours, attitudes, experiences and perceptions on a given topic. As such, a structured survey was conducted nationwide in Tuvalu to gather the required information for this study. Bird (2009) has also shown that the use of questionnaires allows researchers to combine various types of questions (open-ended, closed, and ranking questions) and evaluate the qualitative and quantitative responses generated in an interchangeable manner. Based on Creswell's (2013) recommendations, the researcher's expertise or professional experience was also incorporated into relevant parts of the information acquired in this study.

### **3.2 Sample Selection**

For this study, all nine islands of Tuvalu were identified as targeted study locations to conduct the designated survey. A stratified random sampling technique was adopted to administer the questionnaire whereby subgroups or strata within the sample population were grouped based on the shared attributes and characteristics of the participants. For example, the stratified random sampling technique enabled the researcher to group the sampled population under relevant demographics such as age, gender, social status and ethnicity (although ethnicity was very predominantly Tuvaluan). The participants were grouped into six age groups that comprised of one group of young people (15–20 years of age), three groups of middle-aged adults (21–35, 36–45 and 46–55 years of age) and two groups of elderly people (56–65 and 66–80+ years of age).

Selecting all the Tuvaluan islands and adopting a stratified random sampling technique ensured a good coverage and representation of the perceived views of the targeted focus groups regarding the topic of interest for this study. A total sample size of 480 participants was identified for the study where 60 participants represented from the eight islands of Tuvalu. The island of Niulakita was combined with Niutao into one data group as both islands are inhabited by people of the same island. Therefore, the survey sample was grouped into eight island groups where each island was represented by 60 participants. It was expected that the 60 participants for each island, would be equally represented among the designated age groups.

### **3.3 Data Collection**

The nationwide questionnaire survey was launched in early June 2014 and lasted for five weeks. Eligible participants for the survey were local residents who were either residing in the capital island or in their home islands. English is a second language in Tuvalu and therefore the questionnaire forms which were translated into Tuvaluan language. For practical reasons, 25 extra copies of the questionnaire were also printed for each island for redistribution to replace survey forms that may have been lost, not collected, not returned, or incomplete along with survey forms that were considered unreliable due to suspected falsification of the answers.

Although there was no specific structured interview prepared for the study, a few informal interviews were conducted with some Ministers of Parliament (Minister of Natural Resources, Minister of Home Affairs and Minister of Education) and the Director of Fisheries Department so they could share their views on the issues and relevant resource management practices in the context of Tuvalu. The informal interviews served as a compliance to a government's protocol of paying a courtesy call to show respect, appreciation and notifying the government line ministries with a mandate to manage Tuvalu's natural resources of the intentions of the study being undertaken in Tuvalu. A member from the Funafuti local council or kaupule was also interviewed since Funafuti is the only island that has a formal conservation area.

Furthermore, the researcher remained in the background and did not directly participate in the distributions of questionnaire forms to avoid intimidation of participants due to researcher's affiliation with the Fisheries Department. However, the researcher was active in administering the survey forms with the elderly participants, where the questioning was conducted verbally. This was done because it was necessary to maintain consistency in the approach of asking the questions and to show respect and appreciation.

### **3.4 Questionnaire Design**

The format of the questionnaire begins with a letter thanking the participants for their time and support in participating in the survey (Appendix 1). The letter also provides a summary of the goals, expectations and significance of the study for Tuvalu. This was done to introduce the study as well as informing participants that the intention of the study mainly for proper documentation and academic purposes. By using a formal letter, the participants were

encouraged to take part as well as protecting them from feeling intimidated or any sense they were being interrogated given the researcher's affiliation with the Tuvalu Fisheries Department.

The questionnaire was designed according to guidelines from Powell (1998) and Bird (2009). For example, there are five main types of questions which cover aspects of classification, behaviour, knowledge, perception and the feelings that are useful when investigating social perceptions (Paton, as cited in Bird, 2009, p. 1312). Open-ended and closed questions were used in the questionnaire to gather valuable and relevant information. Open-ended questions allowed the participants or survey respondents to express their personal views on the topic at hand. The benefit of using open-ended questions is that they generate qualitative data which permits statistical analysis. Closed questions take the form of single choice or multiple answers from a predetermined list; responses to closed questions generate qualitative responses enabling the measurement and interpretation of the attitudes and perceptions of the sampled population. The questionnaire responses were arranged into three main categories as follows:

#### *3.4.1 Demographic Attributes*

In any social survey, it is crucial to obtain information on the demographic profiles of the sampled population to compare social views, attitudes and perceptions (Sesabo et al., 2006). As such, a range of multiple choice and short-answer questions that required the participants to provide information demographic information were provided. Other questions that were asked included whether the participants had resided at least 10 years or more at their home island and having held a leadership role for at least two years. These questions helped to differentiate a participant's private opinions on certain aspects of resource management as described in the later categories.

Asking for the participants' social roles in the community instead of occupation by profession or educational background was based on allowing the participant to feel comfortable without devaluing the importance of their roles and opinions. With such an approach, it is up to the participant to state his or her occupation by profession or role in community such as, for example, a mother, grandmother, community leader, pastor or civil servant. In addition, this question avoids awkward situations as everybody seems to know each other's intimate details of social and occupational status. For example, it is possible for the participant to feel



embarrassed when he or she does not have a professional job, or that the surveyor will feel embarrassed when asking for a participant's professional job when it is already known.

#### *3.4.2 Knowledge and Awareness*

The questions in this category were designed to investigate the participants' general knowledge and awareness on certain aspects of resource management practices on their island. Of interest, the questions were mainly concentrated on the topics of public compliance and enforcement of resource management rules and legislation. Such focus is very important as the targeted questions are in line with the aims of the study. Not only that, the questions are expected to generate specific responses and as baselines pertaining to the targeted sample population and selected study site. The resource management aspects that this study is interested in can be illustrated in a list provided below.

Aspects of resource management in the context of Tuvalu settings include:

- perceived issues to achieving effective resource management in Tuvalu
- awareness of current status of land and sea resources and their protection status
- responsible agency to deal with resource management in Tuvalu
- the use of traditional or scientific resource management strategies and their validity today
- means of accumulating knowledge about traditional resource management practices
- perceived preference on a certain type of resource management system

#### *3.4.3 Attitudes and Perceptions*

The purpose of the questions in this category was to reveal the attitudes and perceptions of Tuvaluan local communities regarding enforcement and compliance with resource management rules and regulations. Given that the most generic form of a resource management initiative in all the islands is the creation of protected areas, the questions specifically asked for enforcement and compliance with protected areas or taboo areas designated by each island.

For example, a question with more than one option asked the participants to indicate a situation in which they may ignore or not support the rules and regulations of their communal protected areas. In this question, an option for a situation where a participant would never attempt to access protected areas purposefully was also given. Conversely, a situation in which a

participant would access the protected area when the restriction or ban is lifted by their local council was not provided. This was done because it is very likely that a participant or local would select this option.

There are also questions that seek information on whether participants have witnessed or heard of violations of protected-area rules. The participants were also asked if they had heard or witnessed the prosecution of perpetrators. Such information would allow the researcher to form an understanding of the status of enforcement and compliance with protected areas rules in the context of Tuvalu. Other questions included were intended to reveal the common types of disciplines that are perceived by Tuvaluan people to be most effective in reducing violations of community rules and regulations pertaining to resource management. These questions can be matched to demographic attributes to explain and compare the participants' responses by island groups, gender and age groups in this study.

To attain further insights on participants' attitudes and how they perceived the various aspects of resource management in their island, a set of statements and questions was provided to rate their attitudes and opinions based on a 5-point Likert scale. The 5-point Likert scale was designed as follows: 1 = strongly agree, 2 = slightly agree, 3 = No opinion or I Don't Know, 4 = Disagree and 5 = Strongly Disagree. The scaled questions and statements are follow-up questions that match the multiple-choice questions (Yes, No, or Don't Know responses) that were asked earlier. There were two main purposes in using the Likert scale in this survey. Firstly, it allowed for a quantitative measurement of the opinions and attitudes which were under investigation. Secondly, it also allowed for cross-checking any contradictory or falsified answers.

### **3.5 Survey Team**

The survey team selected to launch the questionnaire was the choir group of the Tuvalu Assembly of God Church. Selection of the survey team was based on the researcher's judgement of good character, reliability, honesty, work ethic and dedication to meet set tasks, especially the study's targets and schedules. The researcher affiliation to this group provide convenience to obtain active support and dedication from the group to administer the survey on a timely basis. Prior to launching the questionnaire, the survey team was trained and briefed

by the researcher on the important logistics and how to conduct the survey on two informal meetings.

The members of the survey team were trained on the expected code of conduct when approaching participants, on the permitted level of assistance to be given to participants when explaining the questions and on the filling of survey forms. The survey team was also debriefed on selected approaches to distributing, tracking, collecting and reporting on questionnaire forms. In the end, two members of the survey team were assigned to run the survey on each island while Funafuti have 4-5 surveyors. This was done to ensure the proper distribution and tracking of survey forms to prevent one participant or household from participating twice or more. Survey in the outer islands of Tuvalu were carried out by four members of the survey team who travelled on a government outer islands official trip, where the government boat spent at least two or three days on each island.

### **3.6 Triangulation**

Triangulation is an important research element and thus was used to increase coverage of the research topic. Triangulation refers to the process of collecting information from multiple sources and opportunities (Creswell, 2013). With such scope, triangulation promotes an in-depth investigation of a research topic. Caracelli and Green (1993) have stated that the benefits of triangulation include giving equal attention to both qualitative and quantitative data, and allowing for cross-checking and validating research data thus minimising research biases. Triangulation can also reveal additional relevant information which the researchers may have not anticipated.

### **3.7 Reflections on data collection**

Although the intention of the study was to use a random sampling strategy and maintain a balance of representation for each age group, gender, and island, various obstacles were encountered where a full random sampling technique and the expected sample size was impossible to achieve. As an example, many of the youths approached during household visits took time to express their willingness to participate. As a result, by liaising with one of the senior teachers, most of the survey forms for youth groups were sent to Motufoua Secondary School on Vaitupu Island to be filled out by Form 5 and Form 6 students. A similar approach

was also conducted in Funafuti where survey forms were distributed to Form 7 students or students doing foundation courses at the Tuvalu branch of the University of the South Pacific.

There were also occasions where some participants who were approached did not want to participate and several incidences where participants took time to complete the questionnaire after several follow-up visits to collect them. To address the obstacles, other sampling techniques such as convenience sampling and purposive sampling were also considered to meet the required sample size. In this way, a questionnaire was handed out to some participants who were considered eligible, relevant and were willing to participate if an opportunity presented itself through accidental meetings and personal visits.

Keeping track of the sample of convenience was easy to monitor in the targeted study location as the survey team seemed to know and recognise everybody on each of the islands. There were also a few occasions where extra copies of questionnaires were redistributed to islands that had low response rates or a low representation in a certain age group or gender. All the questionnaires that had been collected or returned were securely packed and brought back to the affiliating institution for data entry, validation and proper storage. The entered data would also be stored in an electronic format and handed over to the Fisheries Department and the affiliating institution for proper archiving and future reference.

### **3.8 Data analysis**

Since the present study follows a mixed-method approach alongside triangulation, both qualitative and quantitative data were analysed either separately or in combination. All the survey data were entered a Microsoft Excel spreadsheet using a proper coding format for both qualitative and quantitative responses. For example, the open-ended questions that asked participants to state the issues involved in achieving effective resource management in Tuvalu were coded into recurring sub-themes or thematic groups based on the responses provided. Given the large amount of data, a trusted colleague was recruited to enter at least 10 per cent of the questionnaires collected. To maintain consistency with data coding, all the responses for the open-ended questions were entered by the researcher.

The statistical package for the social science (SPSS) was used to analyse, summarise and interpret the collected survey data. To facilitate the data analysis process, each question was

treated as an independent variable. Statistical chi-squared tests of independences were performed and used to explore the results at the 5 % level of significance. If the chi-squared assumption of having  $\leq 20$  % of the expected counts that are less than 5 was violated, the likelihood test was then used to explain the test results. A significant relationship is achieved if the test statistic p-value or probability of obtaining the observed difference (or larger) is less than 0.05 or 0.01 under a null hypothesis or a lack of difference assumption. Simple observations from the data illustrated by tables and graphs are also used to further explain the notable relationships in the survey results.

Overall the results of the survey were analysed through a segmentation approach in which results were compared across three categories or segments of gender, age group and ethnicity of participants (as home island). In this survey, participants' ethnicity or Home Island is not determined by participant's place of birth as child birthing for all the islands of Tuvalu were mainly undertaken in Funafuti. Ethnicity in this study is referred to respondents' main island of settlement through their paternal heritage or lineage. Such is the normal system of identifying ethnicity in Tuvalu, thus Home Island and ethnicity are used in this study in an interchangeable manner. For example, most female respondents whom their spouses are from different islands have identified their Home Island or ethnicity to that of their paternal heritage.

Summaries of the tabulated and statistical analysis of the 'Yes' and 'No' questions and other forms of questions that relate to the main objectives as specified in previous chapters were provided and compared at the gender, age and ethnicity level. Comparisons of main differences and tests for independent associations were mainly done using percentage differences within sub groups of each variable to avoid unintended bias from subgroups with larger sample sizes. Additional analysis of the survey data was also undertaken across the variables 'participants length of residency at their home islands' and 'participants having a leadership role' were also computed to see how these two variables affected the survey results. In summary, data analysis was structured to address the key objectives of the present study as discussed in the previous chapter.

## CHAPTER FOUR: RESULTS



*A typical island feast at Niulakita in celebration of Christmas Day and welcoming of returning students. (Photo: Liufale Mataika, 2011)*

### 4.1 Survey responses

A total of 380 out of the 460 distributed forms of the questionnaire survey were returned. Of the 380 returned forms, 328 forms were considered legitimate for data analysis whereas the other 52 were not used as they were either incomplete or suspected of falsification (as discussed in previous chapter). There were 190 (58%) male respondents and 138 (42%) female respondents (Table 4). The gender ratio of respondents varied by home island and was equal male: female on Nui. For the remaining seven islands, there was a greater response by males in all the islands except Nanumaga with 64% female responses versus 36 % males. The highest percentage of male respondents was from Funafuti (71%), Nukufetau (70%), Niutao (64%) and lowest in Nanumaga (36%). Overall, the response rate at the home island category was fairly equal. Respondents from Nui and Nukufetau shared a response rank of 15%. A 14% is

represented by Niutao that was followed closely by Nukulaelae with a 13 %. A response rate of 10% was achieved from the islands of Funafuti and Vaitupu.

At the age group category, the highest participation of 23 % was shared by the two youngest age groups; 15-20 and 21-35. The second highest of 20 % was recorded in the 46-55 age group, followed by 13% in the 36 – 45 and 56-65 age groups. The smallest percentage of respondents (9 %) was in the eldest age group of 66 years or more. The low participation from the older age group was expected in relation to their low distribution to the national population (Figure 2). The highest response of 53% in the youngest age group (15 -20 years) was from Vaitupu Island whilst respondents from Funafuti held the highest response of 18% in the 66+ age group.

Table 4. Table showing home island, gender and age group profile of survey participants

Island	Nanumea	Nanumaga	Niutao	Nui	Nukufetau	Funafuti	Vaitupu	Nukulaelae	Total
Male	55.3	36.1	64.4	50	70	70.6	52.9	61	57.9
Female	44.7	63.9	35.6	50	30	29.4	47.1	39	42.1
15-20yrs	36.8	16.7	13.3	16	20	20.6	52.9	17.1	23.2
21-35yrs	31.6	25	20.6	24.6	28	11.8	20.6	17.1	22.6
36-45yrs	13.2	19.4	17.8	22	8	5.9	8.8	4.9	12.8
46-55yrs	13.2	22.2	31.1	20	24	5.9	14.7	22	19.8
56-65yrs	5.3	16.7	13.3	10	8	5.9	2.9	31.7	13.1
66+ yrs	0	0	4.4	8	12	17.6	0	7.3	8.5
Total	11.6	11	13.7	15.2	15.2	10.4	10.4	12.5	100

Note: Green bars show gender balance on each of the islands and overall; Orange bars show age frequency distributions within islands; and blue bars show percent of respondents across all islands.

## 4.2 Demographic profiles

### 4.2.1 Residency

From the survey, two thirds (67%) of respondents indicated that they had resided for 10 or more years in their home islands while 31% of respondents did not (Table 5). The remaining 2% of respondents indicated that they were not sure if they have stayed in their Home Islands for more than 10 years. There were 128 (67%) males and 91 (66%) female respondents that have resided in their home islands for 10 years or longer. The computed likelihood test for independence ( $G^2(2) = 0.746$ ,  $n = 328$ ,  $p = 0.689$  NS<sup>1</sup>) confirmed that males were no more likely to have longer residency in their home islands than female respondents.

The 31 % of respondents who did not reside on their home island and the 2% of unsure respondents were largely represented by the three youngest age groups. The highest percentage

<sup>1</sup> For this and all following tests NS=Not significant at  $p=0.05$ ; \*= $p<0.05$ ; \*\*\*= $p<0.001$ .

of respondents who had not stayed for more than 10 years in their Home Island was from the age group 21-35 (45%), followed by the 36-45 age group (41%) and age group 15-20 (34%). The oldest age group of 66+ years recorded the highest level (96%) of Home Island domesticity (Table 5). It was expected that respondents aged 46+ were more likely to have lengthy residency at their Home Islands than respondents under 45 years ( $G^2 = 36.340$ ,  $n = 328$ ,  $df = 10$ ,  $p\text{-value} = 0.0***$ ;  $> 70\%$  versus  $< 63\%$ ).

Table 5. Summary of cross tabulations of participant's demographic attributes based across gender, age group and Home Island.

Demographic attributes	Yes	No	Don't Know	$\chi^2$	df	$p$
<u>Have you resided in your home island for <math>\geq 10</math> years or more?</u>						
<i>Gender</i>						
Male	67.4%	30.0%	2.6%	0.746	2	NS
Female	65.9%	32.6%	1.4%			
<i>Age group</i>						
15-20 yrs	63.2%	34.2%	2.6%	36.340	10	~0 ***
21-35 yrs	50.0%	44.6%	5.4%			
36-45 yrs	57.1%	40.5%	2.4%			
46-55 yrs	78.5%	21.5%	0.0%			
56-65 yrs	74.4%	25.6%	0.0%			
66 + yrs	96.4%	3.6%	0.0%			
<i>Home Island</i>						
Nanumea	50.0%	47.4%	2.6%	39.257	14	~0 ***
Nanumaga	61.1%	33.3%	5.6%			
Niutao	51.1%	48.9%	0.0%			
Nui	66.0%	34.0%	0.0%			
Nukufetau	74.0%	22.0%	4.0%			
Funafuti	94.1%	5.9%	0.0%			
Vaitupu	61.8%	32.4%	5.9%			
Nukulaelae	78.0%	22.0%	0.0%			
<u>Have you hold a leadership role in your island community for <math>\geq 2</math> years or more?</u>						
<i>Gender</i>						
Male	42.0%	56.9%	1.1%	7.670	2	0.022*
Female	27.5%	70.3%	2.2%			
<i>Age group</i>						
15-20 yrs	7.9%	92.1%	0.0%			
21-35 yrs	24.3%	71.6%	4.1%			
36-45 yrs	38.1%	61.9%	0.0%			



46-55 yrs	50.8%	49.2%	0.0%			
56-65 yrs	63.4%	36.6%	0.0%			
66 + yrs	64.3%	28.6%	7.1%	79.063	10	~0***
<b>Home Island</b>						
Nanumea	13.2%	81.6%	5.3%			
Nanumaga	22.2%	77.8%	0.0%			
Niutao	22.2%	77.8%	0.0%			
Nui	46.0%	54.0%	0.0%			
Nukufetau	44.0%	56.0%	0.0%			
Funafuti	50.0%	44.1%	5.9%			
Vaitupu	20.6%	76.5%	2.9%			
Nukulaelae	64.1%	35.9%	0.0%	51.241	14	~0***

At the home island level, the highest percentage (94%) of respondents that have resided for at least 10 years or more at their home island was from Funafuti. It is worth noting that Funafuti has the highest number of village settlements in Tuvalu (Table 6). Note also that average population size by home island sits in Tuvalu is around 600 people. There was also high indication recorded for Nukulaelae (78%) and Nukufetau (74%). The remaining islands (mostly the Northern and furthest islands from Funafuti) indicated a lower residency status in their home island that ranged from 50-66%.

Table 6. Tuvalu Islands comparisons by population, land area, total land area and villages

Atoll/Island	Main Village	Land area (km <sup>2</sup> )	Total area (km <sup>2</sup> )	Popn. (c.2012)	Number of villages
Funafuti	Vaiaku	2.40	277	6,025	9
Nanumea	Nanumea	3.87	22	544	2
Nui	Tanrake	2.83	17	542	4
Nukufetau	Savave	2.99	145	536	2
Nukulaelae	Fangaua	1.82	43	324	2
Vaitupu	Asau	5.60	10	1,555	2
Nanumanga	Tonga	3.00	3.00	481	2
Niulakita	Niulakita	0.40	0.40	27	1
Niutao	Kulia	2.53	2.53	606	2
<b>Total</b>		25.44	520	10,640	34

#### 4.2.2 Leadership roles

Where a participant had held a leadership role for at least 2 years, male respondents were more likely to have leadership roles than female respondents ( $\chi^2 = 7.670$ ,  $n = 328$ ,  $df = 2$ ,  $p = 0.022^*$ ; 42% versus 27%). Having held a leadership role was also significantly higher in older participants aged 46 years old (51-64%) and low in participants who are 45 or less years of age (<40%) given  $\chi^2 (10) = 79.063$ ,  $p = \sim 0^{***}$ .

An unusual high likelihood of having a leadership role was indicated by Nukulaelae participants (64%) as compared to than respondents from other seven islands (<50%) given  $\chi^2 = 39.257$ ,  $df = 14$  and  $P = 0.000^{***}$ .

Nanumea Island had the lowest representation (13%) of having held a leadership role was from the Nanumean participants while leadership role status from the other seven islands ranged from 22-64 %. Nukulaelae participants indicated an unusual high percentage (64%) of respondents with leadership roles as compared to Funafuti (50%), Nui (46%), Nukufetau (44%), Nanumaga and Niutao (22%), and Vaitupu (21%). In other words, such a high representation of leadership roles from Nukulaelae participants was unusual given that leadership roles in Tuvaluan local communities were limited to male elders, and a few social groups such as women, youth, and church groups.

### 4.3 Participant's knowledge and awareness on targeted aspects of resource management

#### 4.3.1 Relevance of community role to Resource Management (RM)

Most of the participants (71 %,  $f = 233$ ) felt that their community roles were related to resource management in their islands, compared to the 29% of respondents ( $f = 94$ ) who felt no relevance (Table 7). Results of the computed test for an independent association showed that male respondents were more likely to agree of the relevance of their community role to RM in their Home Islands than female respondents given  $\chi^2 (2) = 11.336$ ,  $p = 0.03^*$ ; 78% males versus 62% females.

The acknowledgement of the relevance of participants' community role to resource management was significantly more likely to be higher in Nukulaelae (93%) versus the remaining islands (55– 78 %) as  $\chi^2 (14) = 36.640$ ,  $n = 328$ ,  $p = 0.001^{***}$ . The lowest indication of 55% was from Nanumea respondents. The differences seen in responses across age groups

were significantly small given that older participants were no more likely to indicate a higher relevance of their community role to RM than the younger participants as  $\chi^2 (10) = 23.967$ ,  $df = 10$ ,  $p = 0.08$ ). At the same time, the test statistic  $p$ -value = 0.08 was almost significant at the 95% confidence level, thus the results reported can also be due to chance.

#### *4.3.2 Awareness of status of land marine resources stock status*

The level of awareness concerning current stock status in participants respective islands was less likely to differ between male versus female respondents as  $\chi^2 (2) = 5.754$ ,  $n = 328$ ,  $p > 0.05$ NS<sup>1</sup>; 55% versus 42%. At the age group comparison, more than half to three thirds of respondents (52 - 63%) who are over 36 years old indicated an awareness of the current stock status of their land and marine resources while representation from the younger age groups (15 – 20 and 21 - 35) were comparatively lower (37- 38%).

Funafuti respondents (78%) indicated a robust awareness of the status of their resources along with the participants from the four islands that are considered as true atolls - Nukufetau (56%), Nukulaelae (55%) and Nui (54%). Note that Funafuti community had been exposed to several outreach programs on resource management through various projects, researches and by relevant government agencies that deal with resource management in Tuvalu. The remaining islands that indicated a lesser awareness (<50%) do not have lagoons and islets with the lowest level of awareness from Niutao (31%).

#### *4.3.3 Awareness of a land/marine resource that is protected*

Most of the respondents (79 – 93%) agreed that they are aware that certain resources are protected (Table 7). At the ethnicity level, the highest awareness of the protection of a species or resource were reported by participants from all the islands of Tuvalu (> 86%), except Niutao (44%). Interestingly, the indication from Niutao islands was almost twice as smaller than the awareness reported by the other seven islands of Tuvalu.

Table 7. Summary of cross tabulations and tests of independence based on participants' knowledge and awareness of the status of stocks and their protection across gender, age group and ethnicity. RM refers to Resource Management.

Participants' knowledge and awareness	Yes	No	Don't Know	$\chi^2$	df	<i>p</i>
<u>Do you think your community role is related to RM in your Home Is?</u>						
<i>Gender</i>						
Male	77.9%	12.1%	10.0%	11.336 <sup>a</sup>	2	0.03**
Female	62.0%	25.5%	12.4%			
<i>Age group</i>						
15-20 yrs	58.7%	21.3%	20.0%	23.967	10	0.08 NS
21-35 yrs	62.2%	24.3%	13.5%			
36-45 yrs	69.0%	21.4%	9.5%			
46-55 yrs	87.7%	9.2%	3.1%			
56-65 yrs	81.4%	11.6%	7.0%			
66+ yrs	78.6%	14.3%	7.1%			
<i>Home Island</i>						
Nanumea	55.3%	31.6%	13.2%	36.640	14	0.001***
Nanumaga	72.2%	22.2%	5.6%			
Niutao	64.4%	11.1%	24.4%			
Nui	78.0%	16.0%	6.0%			
Nukufetau	74.0%	10.0%	16.0%			
Funafuti	64.7%	29.4%	5.9%			
Vaitupu	64.7%	20.6%	14.7%			
Nukulaelae	92.5%	7.5%	0.0%			
<u>Are you aware of your land and marine resources stock status in your home island?</u>						
<i>Gender</i>						
Male	55.0%	18.5%	26.5%	5.754 <sup>a</sup>	2	NS
Female	41.6%	24.8%	33.6%			
<i>Age group</i>						
15-20 yrs	38.2%	25.0%	36.8%	17.888 <sup>a</sup>	10	NS
21-35 yrs	37.8%	29.7%	32.4%			
36-45 yrs	52.4%	19.0%	28.6%			
46-55 yrs	62.5%	17.2%	20.3%			
56-65 yrs	58.1%	11.6%	30.2%			
66+ yrs	63.0%	14.8%	22.2%			
<i>Home Island</i>						
Nanumea	42.1%	23.7%	34.2%			
Nanumaga	47.2%	30.6%	22.2%			

Niutao	31.1%	31.1%	37.8%			
Nui	54.0%	16.0%	30.0%			
Nukufetau	56.0%	20.0%	24.0%			
Funafuti	75.8%	12.1%	12.1%			
Vaitupu	35.3%	20.6%	44.1%			
Nukulaelae	55.0%	15.0%	30.0%	25.145 <sup>a</sup>	14	*
<hr/>						
<b>Is there any land and marine resource that is protected in your home island?</b>						
<b><i>Gender</i></b>						
Male	85.3%	5.8%	8.9%			
Female	87.7%	7.2%	5.1%	1.960 <sup>a</sup>	2	NS
<hr/>						
<b><i>Age group</i></b>						
15-20 yrs	84.2%	6.6%	9.2%			
21-35 yrs	85.1%	5.4%	9.5%			
36-45 yrs	85.7%	7.1%	7.1%			
46-55 yrs	92.3%	3.1%	4.6%			
56-65 yrs	79.1%	14.0%	7.0%			
66 + yrs	92.9%	3.6%	3.6%	7.734	10	NS
<hr/>						
<b><i>Home Island</i></b>						
Nanumea	92.1%	7.9%	0.0%			
Nanumaga	86.1%	8.3%	5.6%			
Niutao	44.4%	22.2%	33.3%			
Nui	94.0%	2.0%	4.0%			
Nukufetau	88.0%	8.0%	4.0%			
Funafuti	100%	0.00%	0.00%			
Vaitupu	100%	0.00%	0.00%			
Nukulaelae	92.7%	0.0%	7.3%	79.957	14	***

#### 4.3.4 Awareness of traditional versus western-based Resource Management-strategies

Although respondents may not be fully aware of the differences between the function and the theoretical basis of traditional versus scientific resource management, questions that focussed on their awareness of traditional and modern management tools or practices were included to gather critical baseline information (Table 8). The results showed that male respondents were no more likely to have higher awareness on the use of traditional RM strategies than female respondents (73% versus 65%;  $\chi^2 = 2.622a$ ,  $n = 328$ ,  $df = 2$ ,  $p = 0.269$  NS<sup>1</sup>) as well on the use of western-based or scientific strategies (55% versus 44%;  $\chi^2 = 5.402a$ ,  $n = 328$ ,  $df = 2$ ,  $p = 0.067$  NS<sup>1</sup>).

Comparisons at the age group level showed that older participants including 66+ (85%), 56-65 (81%) and 46 – 55 (80%) were more likely to have a higher knowledge on the use of traditional resource management strategies than the younger participants whose age is 45 years old or less as their response percentages ranged from 60-63% as  $\chi^2 (10) = 23.264a$ ,  $n = 328$ ,  $p = <.05^{**}$ .

Age was the only variable that had a significant positive linear relationship ( $R^2 = 52.001a$ ,  $df = 3$ ,  $p = 0.041^*$ ) for awareness of traditional management, with knowledge and awareness shown to be higher in older participants. In contrast, the likelihood of the youngest surveyed participants (aged 15-20) knowing about the use of scientific resource management strategies was no different from the older participants as  $\chi^2 (10) = 30.892a$ ,  $n = 328$ ,  $p = 0.0018^{**}$ . In summary, respondent's awareness on the use of traditional methods to manage land and marine resources, ranged 60-85% was much higher than awareness on scientific methods as response rate was between 36-77%.

Nukulaelae respondents indicated an 85% response rate, followed by closely by Funafuti (82%), Nui (80%), Nukufetau (72%), Nanumea (66%), Vaitupu (62%), Nanumaga (55%) and Niutao (53%). This indicates, Nukulaelae participants (85%) were significantly more likely to indicate a high awareness than other islands given  $\chi^2 = 31.002$ ,  $df = 14$ ,  $p = 0.006^{**}$ . With the practice of western-based strategies, about three quarter (76%) of Nukulaelae respondents indicated an awareness that was almost double the awareness rate (40-53%) reported by participants from other islands ( $\chi^2 = 29.714a$ ,  $df = 14$ ,  $n = 328$ ,  $p = 0.008^{**}$ ).

*Table 8. Summary of cross-tabulations and tests of independence regarding participants' responses to the practice of modern/scientific and traditional resource management strategies in their Home Islands.*

Participants' knowledge and awareness	Yes	No	Don't Know	$\chi^2$	df	<i>p</i>
<u>Do you know of any traditional RM strategy being practiced in your Home Is?</u>						
<i>Gender</i>						
Male	72.9%	8.0%	19.1%	2.622 <sup>a</sup>	2	NS
Female	65.2%	12.3%	22.5%			
<i>Age group</i>						
15-20 yrs	61.8%	7.9%	30.3%			
21-35 yrs	62.2%	14.9%	23.0%			
36-45 yrs	59.5%	9.5%	31.0%			
46-55 yrs	80.0%	12.3%	7.7%			
56-65 yrs	81.0%	7.1%	11.9%			

66 + yrs	85.2%	0.0%	14.8%	23.264 <sup>a</sup>	10	**
<b><i>Home Island</i></b>						
Nanumea	65.8%	15.8%	18.4%			
Nanumaga	52.8%	19.4%	27.8%			
Niutao	54.5%	13.6%	31.8%			
Nui	80.0%	8.0%	12.0%			
Nukufetau	72.0%	12.0%	16.0%			
Funafuti	82.4%	2.9%	14.7%			
Vaitupu	61.8%	5.9%	32.4%			
Nukulaelae	85.0%	0.0%	15.0%	31.002	14	**
<b><i>Are you aware of any modern RM method being practiced in your Home Is?</i></b>						
<b><i>Gender</i></b>						
Male	54.7%	18.4%	26.8%			
Female	43.5%	18.1%	38.4%	5.402 <sup>a</sup>	2	NS
<b><i>Age group</i></b>						
15-20 yrs	35.5%	25.0%	39.5%			
21-35 yrs	47.3%	17.6%	35.1%			
36-45 yrs	52.4%	4.8%	42.9%			
46-55 yrs	49.2%	16.9%	33.8%			
56-65 yrs	76.7%	16.3%	7.0%			
66+ yrs	53.6%	28.6%	17.9%	30.892 <sup>a</sup>	10	***
<b><i>Home Island</i></b>						
Nanumea	47.4%	15.8%	36.8%			
Nanumaga	52.8%	5.6%	41.7%			
Niutao	46.7%	13.3%	40.0%			
Nui	48.0%	24.0%	28.0%			
Nukufetau	40.0%	22.0%	38.0%			
Funafuti	50.0%	32.4%	17.6%			
Vaitupu	41.2%	29.4%	29.4%			
Nukulaelae	75.6%	4.9%	19.5%	29.714 <sup>a</sup>	14	**

#### 4.3.5 Means of knowing about traditional resource management practices

Given the frequent references to what traditional RM practices in Tuvalu, participants were asked to indicate the most common methods on how they get to know about the use of traditional RM practices. Approximately one third of the respondents (37 %,  $f = 121$ ) indicated that they were aware of the use of traditional RM strategies because they know that some traditional RM practices are still in practice (Table 9). A quarter (26%,  $f = 86$ ) of respondents

did not provide an answer and a quarter (24%,  $f = 78$ ) had witnessed the practice of a traditional method, while-13% of respondents indicated that they have only heard about it from someone.

*Table 9. Respondent means of knowing about a traditional resource management practices*

<b>Perceived means of knowing a traditional RM strategy</b>	<b><i>f</i></b>	<b>%</b>
Still in practice today	121	36.9
No response	86	26.2
I witnessed it	78	23.8
I heard about it from someone	43	13.1
<b>Total</b>	<b>328</b>	<b>100</b>

#### **4.4 Preferences on a resource management system**

When asked about a preference for resource management system, the majority of the participants (63%) preferred a combination of both traditional and scientific-based management practices (Table 10). This preference for a combination was almost three times as higher than the second preferred option that refers to the use of only traditional strategies (24%). Very few respondents (6%) preferred a scientific management system while a 7% of respondents were unsure of the type of management system to manage land and marine resources in their respective islands.

In comparing gender, male respondents were no more likely to have a difference in their management preference than female respondents given the lack of a significant associations between respondents' responses and gender ( $\chi^2 = 8.587a$ ,  $n = 321$ ,  $df = 3$ ,  $p = 0.035 < .05$ ) as well as in the age group level ( $G^2 = 40.064$ ,  $n = 321$ ,  $df = 15$ ,  $p = 0.000 << .05$  and  $.01$ ). Although the eldest age group gave no indication on the use of a modern resource management system, older participants (66+) were no more likely to have a higher preference for traditional management system than the younger participants ( $\leq 65$  years of age) given  $\chi^2 = 38.474a$ ,  $n = 326$ ,  $df = 15$ ,  $p = 0.001***$ . Similarly, home island as a factor was found to have no influence (chi-squared test  $\chi^2 (21) = 39.409a$ ,  $n = 321$ , and  $p = 0.09 > .05$ ) *NS'* on the reported responses.

*Table 10. Cross-tabulation of participants' preference of a resource management system to manage their land and marine resources*



Resource management preference	Traditional	Modern / scientific-based	Mix of traditional and scientific	Don't know	Total	$\chi^2$	df	$p$
<i>Gender</i>								
Male	13.2%	5.2%	36.2%	3.4%	58.0%	8.587 <sup>a</sup>	3	0.035
Female	10.4%	0.6%	27.6%	3.4%	42.0%			
<i>Age group</i>								
15-20 yrs	8.3%	0.6%	10.7%	3.1%	22.7%	38.474 <sup>a</sup>	15	0.001
21-35 yrs	4.0%	1.8%	16.6%	0.3%	22.7%			
36-45 yrs	2.8%	1.2%	8.3%	0.6%	12.9%			
46-55 yrs	2.8%	0.9%	15.6%	0.6%	19.9%			
56-65 yrs	2.1%	1.2%	8.6%	1.2%	13.2%			
66+yrs	3.7%	0.0%	4.0%	0.9%	8.6%			
<i>Home Island</i>								
Nanumea	3.4%	1.8%	5.5%	0.3%	11.0%	39.409 <sup>a</sup>	21	0.009
Nanumaga	3.7%	0.3%	6.1%	0.9%	11.0%			
Niutao	1.2%	0.6%	11.0%	0.9%	13.8%			
Nui	3.1%	0.6%	10.1%	1.5%	15.3%			
Nukufetau	5.2%	1.5%	7.7%	0.9%	15.3%			
Funafuti	3.4%	0.0%	6.1%	0.9%	10.4%			
Vaitupu	2.8%	0.6%	6.1%	0.9%	10.4%			
Nukulaelae	0.9%	0.3%	11.0%	0.3%	12.6%			
<b>Total (f)</b>	<b>77</b>	<b>19</b>	<b>208</b>	<b>22</b>	<b>326</b>			

## 4.5 Knowledge and attitudes towards compliance and enforcement of RM rules

### 4.5.1 Perceived issues for poor resource management

There were twelve recurring thematic areas identified as reasons for the poor management of land and marine at participants' home islands (Table 11). Village communities agree to PA rules or village rules as a form of resource management in their home islands. Ignorance of these rules (32%) was almost twice that of poor awareness (18%) and misuse of the resources (15%). Very few participants considered poor enforcement of village RM rules (6%), littering (5%), limited expertise (4%), over-crowding (4 %), climate change (3%), limited funding (2%), commercial activities (2 %), and poor political support (2 %) as main reasons for the lack of effective resource management in Tuvalu.

In Table 11, males were more likely to dominate all the responses concerning the key issues for poor resource management than female respondents as  $\chi^2 (11) = 36.573$ ,  $n = 328$ ,  $p = 0.000***$ . Yet the perceived issues by which female respondents have a higher voting than males were ignorance of rules (38% versus 27%), poor awareness (25% versus 13%), and limited expertise (7% versus 2%). Poor political support was only mentioned by a few males (2%) and was not mentioned at all by female respondents.

A significant association was also found between respondents' responses and age group ( $\chi^2 = 85.460a$ ,  $n = 328$ ,  $df = 55$ ,  $p = 0.005***$ ) and among participants' ethnicity ( $\chi^2 = 103.801a$ ,  $n = 328$ ,  $df = 77$ ,  $p = 0.023**$ ). Participants in the middle age groups 36-45 (45%) mostly nominated ignorance as a main issue. Participants' nominations on poor awareness was equal among age groups while misuse was largely nominated by the youngest selected group

In considering voting at the ethnicity level, the highest percentage (42%) of respondents who perceived ignorance of rules as a main issue was from Nukufetau and Nui (Table 11). Participants from Funafuti (6%) did not perceived the issue of poor awareness as much as Nukulaelae participants (34 %), Niutao (27%) and Vaitupu (24%). Misuse as the main reason for poor resource management was largely voted by Nukufetau (26%) in comparison to the low voting from the rest of the islands (11% - 18%).

Table 11. Cross tabulations of the main reasons perceived by participants for the poor management of their land and marine resources in their respective home islands

Main issues for poor RM	Ignorance of rules	Poor awareness	Misuse	No response	Poor enforcement	Littering	Limited expertise	Overcrowding	Climate change	Limited funding	Commercial activities	No political support	Total	$\chi^2$	df	$p$
<i>Gender</i>	<i>(n = 328)</i>															
Male	27%	13%	19%	10%	7%	5%	2%	4%	5%	3%	3%	3%	58%	36.573 <sup>a</sup>	11	0.0***
Female	38%	25%	9%	5%	4%	5%	7%	4%	1%	1%	1%	0%	42%			
<i>Age group</i>																
15-20 yrs	36%	3%	22%	7%	15%	11%	8%	3%	0%	3%	4%	0%	23%	85.460 <sup>a</sup>	55	0.005*
21-35 yrs	32%	26%	12%	5%	0%	1%	5%	4%	5%	4%	3%	1%	23%			
36-45 yrs	45%	19%	5%	10%	5%	5%	2%	5%	0%	0%	0%	5%	13%			
46-55 yrs	26%	22%	20%	6%	11%	3%	0%	3%	5%	0%	2%	4%	20%			
56-65 yrs	19%	30%	12%	9%	9%	7%	5%	2%	7%	0%	0%	0%	13%			
66+yrs	9%	11%	11%	18%	7%	0%	4%	11%	4%	4%	0%	0%	9%			
<i>Home Island</i>																
Nanumea	40%	13%	13%	0%	5%	0%	5%	3%	5%	3%	0%	0%	12%	103.801 <sup>a</sup>	77	0.023**
Nanumaga	31%	8%	14%	0%	6%	14%	8%	3%	3%	3%	3%	0%	54%			
Niutao	42%	27%	11%	4%	2%	0%	4%	2%	2%	0%	0%	4%	14%			
Nui	24%	18%	16%	2%	8%	6%	4%	0%	4%	2%	4%	2%	15%			
Nukufetau	42%	12%	26%	6%	4%	4%	0%	3%	2%	0%	0%	2%	15%			
Funafuti	29%	6%	6%	9%	6%	3%	9%	18%	3%	3%	9%	0%	10%			
Vaitupu	20%	24%	12%	6%	9%	9%	6%	6%	0%	6%	0%	3%	10%			
Nukulaelae	22%	34%	18%	5%	7%	5%	0%	2%	7%	0%	0%	7%	13%			
Total ( <i>f</i> )	104	59	49	26	19	16	14	13	11	6	6	5	328			

#### 4.5.2 Likely scenario to violate PA rules

Concerning the question on compliance with protected areas rules, respondents were offered to tick more than one options or possible situations (Table 12). The most likely scenario in which respondents may not abide with their PAs rules or village RM rules was when the desired targeted species or resource in their protected area is abundant (23%). This is closely followed by respondents who felt that they will never violate their PA rules appeared to have the second rank (21%). The next likely scenario for violation incidence was in time of bad weather conditions (13%) and when a desired targeted resource (12%)

Few respondents (9%) felt that difficulties in providing food for their families and the lack of penalties (8%) given to previously caught perpetrators will not motivate them to ignore their PA rules. Almost no respondents felt that a dislike of a Kaupule member or island chief and community ownership of a PA would be a reason to commit violations of their PA rules.

Table 12. Perceived scenarios in which Protected Areas village rules can be ignored

Likely scenarios where Protected Areas or village RM can be ignored	n = 328	f	%
When the desired targeted species/resource is abundant	141	148	23.3
Never	127	130	20.5
When it is bad weather	82	82	12.9
When the desired targeted species/resource is scarce	75	75	11.8
When it is difficult to provide food for my family	54	54	8.5
When I knew that a caught perpetrator has not been penalised	48	48	7.6
When I have an immediate need for money	26	26	4.1
When nobody is around	18	18	2.8
When there are poachers already in the protected area	17	17	2.7
When the protected area belongs to another island community	13	13	2.1
When the protected area belongs to my island community	12	12	1.9
When I dislike a member of the local council or an island chief	11	11	1.7
<b>Total</b>		<b>634</b>	<b>100</b>

Note: Participants could tick more than one likely scenario if applicable to them.

#### 4.5.3 Participant's awareness of violations and prosecutions cases

One of the objectives of the study is to determine the status of compliance and enforcement of resource management rules in the Tuvalu Islands through an understanding of respondents' awareness and attitudes. Most of the respondents (Table 13), showed a strong awareness of violators being caught (68 – 85% responses) and violators being penalised (58 – 87%). Exceptions were observed in participants from Nanumaga and Niutao who gave little indication (31- 44%) of knowing about violation and penalty incidences in their islands. It was worth noting here that Nanumaga and Niutao were the only islands in Tuvalu which are known to have designated clans with specific 'pologa' or pass down speciality and responsibility to alert the village council on how, when and where to harvest or impose restrictions of access to resources.

Noting that males mostly represent the village councils in Tuvalu, the test for independent associations on these two questions indicated that gender does not significantly affect the respondent responses at the 5 % level of confidence. In other words, male respondents are no more likely to have a higher awareness of PA violation and prosecution cases than female respondents.

Table 13. Summary of cross tabulations and tests of independence based on participants' responses regarding enforcement and compliance with community Protected Area (PA) rules.

Participants' Knowledge and awareness	Yes	No	Don't Know	$\chi^2$	df	$p$
<u>Are you aware of any violation case of your Home island's PA rules?</u>						
<i>Gender</i>						
Male	70.0%	24.2%	5.8%	2.792 <sup>a</sup>	2	NS
Female	61.3%	32.1%	6.6%			
<i>Age group</i>						
15-20 yrs	68.0%	26.7%	5.3%	8.825	10	NS
21-35 yrs	68.9%	23.0%	8.1%			
36-45 yrs	54.8%	38.1%	7.1%			
46-55 yrs	69.2%	27.7%	3.1%			
56-65 yrs	69.8%	27.9%	2.3%			
66+yrs	60.7%	25.0%	14.3%			
<i>Home Island</i>						
Nanumea	76.3%	21.1%	2.6%			

Nanumaga	41.7%	55.6%	2.8%			
Niutao	31.1%	46.7%	22.2%			
Nui	68.0%	24.0%	8.0%			
Nukufetau	83.7%	10.2%	6.1%			
Funafuti	73.5%	26.5%	0.0%			
Vaitupu	70.6%	26.5%	2.9%			
Nukulaelae	85.4%	14.6%	0.0%	66.341	14	***
<hr/>						
<u>Do you know if any violator of a PA rules in your home island being penalised?</u>						
<u><b>Gender</b></u>						
Male	67.6%	22.9%	9.6%			
Female	59.6%	29.4%	11.0%	2.267 <sup>a</sup>	2	NS
<hr/>						
<u><b>Age group</b></u>						
15-20 yrs	67.1%	26.3%	6.6%			
21-35 yrs	64.4%	26.0%	9.6%			
36-45 yrs	50.0%	28.6%	21.4%			
46-55 yrs	67.2%	26.6%	6.3%			
56-65 yrs	69.0%	21.4%	9.5%			
66 + yrs	63.0%	22.2%	14.8%	10.030 <sup>a</sup>	10	NS
<hr/>						
<u><b>Home Island</b></u>						
Nanumea	57.9%	28.9%	13.2%			
Nanumaga	44.4%	52.8%	2.8%			
Niutao	34.1%	36.4%	29.5%			
Nui	66.0%	22.0%	12.0%			
Nukufetau	82.0%	12.0%	6.0%			
Funafuti	72.7%	21.2%	6.1%			
Vaitupu	67.6%	26.5%	5.9%			
Nukulaelae	87.2%	10.3%	2.6%	54.755	14	***
<hr/>						

#### *4.5.4 Responsible authority to inform participants on the stock status of their resources*

The responsible authority to inform participants on the stock status of their resources was pooled and compared at the home island as management regimes in Tuvalu are mainly govern by island councils. Table 14 showed that almost a half (48%) of the survey respondents felt that their local council or kaupule was the appropriate authority to deal with resource management in their islands than a national government agency (21%). A reasonable percentage (11%) of respondents considered themselves at the individual level to know about the current stock status of their island's land and marine resources. Scientists as an option of informants was perceived very low (6%) while a 10% of respondents indicated an unsure response. The other two options which include the ticking of multiple answers (3 %) and the no response (1.2 %) were included as they were part of the collected data.

At the home island level, about half of the participants (40 – 61%) nominated their kaupule as the key informant on the stock status of their resources. Niutao participants showed a robust reluctance (31%) to nominate their Kaupule over a high nomination for the national government (36%) and scientists (13%). In contrasts, participants from the island of Vaitupu and Nukulaelae felt no inclination for scientist to inform them on the stock status of their land and marine resources.

*Table 14. Frequency of nominations of the responsible authority to inform current stock status of land and marine resources.*

<b>Responsible authority to report resource status</b>	<b><i>f</i></b>	<b>%</b>
Kaupule	157	47.9
Gov't department	67	20.4
Myself	35	10.7
Don't know	32	9.8
Scientists	21	6.4
Tick many options	10	3.0
No response	6	1.8
<b>Total</b>	<b>328</b>	<b>100</b>

#### 4.5.5 Appropriate authority to report cases of PA violations

When asked to state the appropriate authority to which participants could report cases of violations of their PAs or village RM rules, the majority (87%) of respondents nominated their island councils (Table 15). This is a very large difference compared to the nomination of the Police (4%). This was followed by an unsure response, Family (1%), Church/pastor (1%). A few participants were unsure (2%). There was almost no indication (0.3%) of nominating a governmental department that deals with resource management namely the Fisheries or Environment department. Of notable interest, survey participants from all of the Tuvalu islands showed a very high agreement that their Kaupule was the appropriate authority to report violation cases of their PA rules (> 90%), except Niutao island represented by a 79% response rate.

*Table 15. Frequency of perceived appropriate authority to report violation of Protected Area rules or village resource management rules*

<b>Appropriate authority to report PA violation incidence</b>	<b><i>f</i></b>	<b>%</b>
Kaupule	284	91.9
Police department	12	3.9
Family of perpetrator	6	1.9
I Don't know	4	1.3
Church	2	0.6
Fisheries/Environment department	1	0.3
<b>Total</b>	<b>309</b>	<b>100</b>

When given the opportunity to agree on the validity of traditional RM strategies nowadays, slightly more than half (52%,  $f=171$ ) of respondents agreed that traditional RM strategies are still useful today. Almost a quarter (23%,  $f=77$ ) of respondents did not provide a response (Figure 4). Note that the unsure responses were difficult to analyse because it is not known whether it is based on unwillingness to provide a feedback or that the participant is unsure of the question's content. Extra categories for 'partial' and 'misinterpret' were created to pool the responses that some traditional methods are still useful and some are not useful in nowadays



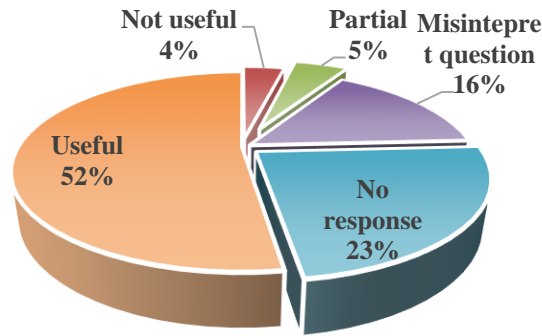


Figure 4. Participants' perceived views on the usefulness of traditional management strategies to manage land and marine resources in their respective islands in nowadays

The computed results showed that male respondents were more likely to support the usefulness of traditional methods for RM in their islands than female respondents (64 % versus 36.3 %;  $\chi^2 = 13.492a$ ,  $n = 328$ ,  $df = 5$ ,  $p = 0.019^{**}$ ). The older age groups were no more likely to have significantly differences in their responses towards against the younger age groups ( $\chi^2 = 39.409a$ ,  $n = 321$ ,  $df = 21$ ,  $p = 0.09 > .05$ ). Across the home island level, the highest support on the usefulness of traditional resource management methods was from Nukufetau (72 %) and the least acknowledgement was from Niutao participants (38%).

#### 4.5.6 Effective discipline method to promote compliance and enforcement of PA rules

The most likely discipline method perceived by respondents (Table 16) for improving compliance and enforcement of protected areas or village RM rules was monetary fines (39%). A 15% of respondents selected community work (15%). A verbal or written final warning was selected by a 14% then followed by traditional punishment and public shaming (12%) such as feeding of the whole by the violator immediate family. The least selected option was imprisonment that is represented by a 10% of respondents. Note that current or common prosecution methods being used in Tuvalu's for infringements of national regulations and formal village by-laws were monetary fines and imprisonment.

Male respondents tended to be overly represented when it came to the perceived prosecution methods for effective RM. However, this over representation was not statistically significant or dependent on their gender given  $\chi^2 (6) = 8.786a$ ,  $n = 328$ ,  $p = 0.186 > .05$  NS!. Overall, responses varied among the perceived effective discipline method for RM in the survey. For

example, the youngest age group (15 – 20 years) was the only group that perceived (42%) traditional penalties as the most effective discipline method, the 66 + and 36 -45 age group ranked imprisonment as the most effective discipline and final warning was ranked first by the 46 – 55 and 56 – 65 age group. The age group (21 – 35) ranked community work as their first option while none of the age group ranked monetary fines as a most likely method to promote compliance with Protected Areas or village informal resource management rules.

*Table 16. Views on the appropriate discipline methods to promote effective management of land and marine resource in participants respective islands.*

<b>Discipline methods</b>	<b><i>f</i></b>	<b>%</b>
Community work	49	15
Monetary fines	126	38
Imprisonment	31	9
Traditional penalty	38	12
Verbal/written final warning	46	14
No response	15	5
Tick many options	22	7
<b>Total</b>	<b>327</b>	<b>100</b>

#### **4.6 Respondent's responses across length of residency versus having leadership roles**

To ascertain perceptions of participants can be influence by demographic factors, the years spent in their home island versus having held a leadership role were extrapolated for the seven Yes and No questions (Table 17). The results showed that participant's responses were independent of the length of their residency at home islands as well as having a leadership role (chi-squared test  $p$ -values  $\leq 0.05$  and  $0.001$ ). Participants that had  $\geq 10$  years residency status showed higher awareness than participants who did not for all of the Yes and NO questions, except in the questions that asked participants to indicated their awareness on the use of modern resource management strategies in their respective islands.

Similarly, participants who have held a leadership role were significantly more likely to indicate higher awareness than participants on all the yes and no questions except on the question that asked participant to indicate their awareness of a particular species or resources that has a protection status in their home islands. Respondents that have spent  $> 10$  years (53%) in their home island were no more aware of resources that are protected compared to respondents residing less time in their home islands (46%).

Table 17. Cross-tabulations of the entire Yes and No questions using the demographic variables of residency and leadership

Participants' Residency and Leadership status	Yes	No	Don't Know	n	$\chi^2$	df	P
<u>Do you think your community role is related to RM in your Home Is?</u>							
<i>Resided at HI for &gt; 10 yrs</i>	76.1	14.7	9.2	320	7.912	1	0.05*
<i>Not resided at HI &gt; 10 yrs</i>	60.8	23.5	15.7				
<i>Has hold a leader role for &gt; 2 yrs</i>	84.6	10.3	5.1	325	16.33	1	0.00***
<i>No leader role for &gt; 2 yrs</i>	63.5	22.1	14.4				
<u>Do you know what the current stock status of your land and marine resources in your home island?</u>							
<i>Resided at HI for &gt; 10 yrs</i>	60.8	16.6	22.6	319	26.541	1	0.00***
<i>Not resided at HI &gt; 10 yrs</i>	28.4	29.4	42.2				
<i>Has hold a leader role for &gt; 2 yrs</i>	67.2	13.8	19	324	20.416	1	0.00***
<i>No leader role for &gt; 2 yrs</i>	39.4	25.5	35.1				
<u>Is there any land and marine resource that is protected in your home island?</u>							
<i>Resided at HI for &gt; 10 yrs</i>	91.3	4.1	4.6	321	16.231	1	0.00***
<i>Not resided at HI &gt; 10 yrs</i>	74.5	11.8	13.7				
<i>Has hold a leader role for &gt; 2 yrs</i>	89.7	6	4.3	326	1.779	1	0.182 NS
<i>No leader role for &gt; 2 yrs</i>	84.7	6.7	8.6				
<u>Do you know of any traditional RM strategy being practiced in your Home Is?</u>							
<i>Resided at HI for &gt; 10 yrs</i>	76.6	6.9	16.5	319	14.393	1	0.00***
<i>Not resided at HI &gt; 10 yrs</i>	54.5	16.8	28.7				
<i>Has hold a leader role for &gt; 2 yrs</i>	84.5	6.0	9.5	325	19.195	1	0.00***
<i>No leader role for &gt; 2 yrs</i>	61.2	12.0	26.8				
<u>Are you aware of any modern/scientific RM method being used in your Home Is ?</u>							
<i>Resided at HI for &gt; 10 yrs</i>	52.5	21	26.5	321	3.695	1	0.55 NS
<i>Not resided at HI &gt; 10 yrs</i>	46.1	11.8	42.2				
<i>Has hold a leader role for &gt; 2 yrs</i>	66.7	13.7	19.7	326	20.433	1	0.00***
<i>No leader role for &gt; 2 yrs</i>	40.2	21.2	38.8				
<u>Are you aware of any violation case of your home island RM or PA rules?</u>							
<i>Resided at HI for &gt; 10 yrs</i>	74.9	21.5	3.7	320	20.963	1	0.00***
<i>Not resided at HI &gt; 10 yrs</i>	49.5	39.6	10.9				
<i>Has hold a leader role for &gt; 2 yrs</i>	75.2	23.1	1.7	325	7.509	1	0.006
<i>No leader role for &gt; 2 yrs</i>	61.5	29.8	8.7				
<u>Are you aware of any caught violators of PA or village RM rules being penalised?</u>							
<i>Resided at HI for &gt; 10 yrs</i>	75.6	15.7	8.8	317	30.947	1	0.00***
<i>Not resided at HI &gt; 10 yrs</i>	41.1	45	14				
<i>Has hold a leader role for &gt; 2 yrs</i>	73.9	20	6.1	322	7.655	1	0.006
<i>No leader role for &gt; 2 yrs</i>	58.9	28.5	12.6				

## CHAPTER FIVE: DISCUSSION OF FINDINGS



*Fisher's outboard motors being used by villagers in Nukufetau to welcome the return of their island sports squad to the Tuvalu National Games (Photo: Ron Vaelei, 2013).*

### 5.1 Discussion expanded

The motivation for the present study to examine local perceptions in small islands communities is based on a best practice approach on hearing the voices of local people (Dudley et al., 2010). *For small island nations that heavily rely upon one resource for food and income, in the case of Tuvalu, fisheries; it is important for resource managers and local or indigenous people to have a mutual understanding on the views and experiences of local communities on various aspects of resource management.*

This study has provided an insight into the different approaches to managing resources in an island nation. Tuvalu has been impacted by changes imposed by a colonising Western power but since gaining independence, has been left with a hybrid between a Westminster and a traditional island governance system. A focus of this study has been to identify reactions of villagers from the different islands to the two systems of resource management and to identify the challenges inherent in changing traditional approaches to managing natural resources by invoking a new and foreign approach. Information from this research has provided specific and valuable insights on how to best encourage and promote resource management for Tuvalu can be obtained and shared within and outside the Pacific Islands. This approach can also contribute to addressing the concerns and constraints of resource management in local people settings as discussed earlier in the literature review.

Tuvalu faces the challenge of incorporating traditional forms of resource management into a central system of governance based on a British or Westminster system of managing natural resources and citizens access to these resources. It is an indication of the continuation of the acceptance of the traditional ways of managing natural resources that a full Western approach has not replaced the traditional ways. Although Tuvalu is a self-governing nation, the parliamentary system installed when Tuvalu was under British rule and known as the Ellice Islands, is in statutory conflict with traditional ways of governance. In some respects, this conflict is as a result of the need for islands that are spread across a wide archipelago to have a village system of setting rules and governed by village elders.

Villages on the islands rely heavily on marine resources such as fish and village rules are instilled to ensure the sustainability of fish stocks. The majority of the protein in a Tuvaluan diet is from fish as the terrestrial environment is depauperate in species that can provide a source of protein. For small island nations that heavily rely upon one resource for food and income, in the case of Tuvalu, fisheries; it is important for resource managers and local or indigenous people to have a mutual understanding on the views and experiences of local communities on various aspects of resource management.

Rules and regulations set by a central administration based on Western statutory instruments in the capital of Vaiaku on the island of Funafuti clash with tried and true rules that are instilled in the governance system of the different islands. Traditional rules and regulations that allow access to natural resources can be monitored by village officials on each of the nine islands.

Also, the villages on the islands can also quickly enforce penalties and punishment for transgressions. Therefore, the disconnected nature of sparsely distributed islands is not conducive to strictly replacing and imposing the Westminster system with its rigid rules upon a traditional governance system that has been in place for millennia. When considering the pressure on natural resources such as dwindling fish stocks, it can be argued that neither system of governance has addressed the critical issue of sustainably managing natural resources; especially from the marine environment.

### **5.1.1 Reflections on data collection and data analysis**

Ideally survey methods are designed to collect data that reflect the characteristics of the respondents identified in the target groups. As there are varying levels of education and ability to interpret and participate in survey research across the islands of Tuvalu, the resulting data from this study has inherent levels of variance. As briefly discussed in Chapter 3, the expectation for an equal representation of participants across the selected subgroups was not met due to several sampling difficulties. For example, the high representation of males' respondents (57.9% versus 42.1%) than females were due to giving priority to an older male figure or head of the family during household visits. Such a traditional attitude to gender has skewed the data not only towards males, but males who hold authorities positions within the villages of the different islands. Even when the approached household was reminded that the survey form should be filled by a woman in the house, some women still gave the survey form to their male spouses or elderly males in the family. Such a patriarchal expectation reflected the social hierarchy in Tuvalu whereby a male figure is the head of the family and dominates the final decisions as well as the harvesting of food crops and fishing activities in a typical Tuvaluan household. Such a hierarchy system conflicts with gender equality promoted in a modern democracy.

The low representation from the eldest age group (66+ years) was expected given the low number respondents found to be interviewed in this age group by surveyors during the launching of the survey. One of the reasons for this may be reflected in census data which shows life expectancy ranges from 64-67 years (Table 3). In addition, this low encounter with the elderly groups is also corresponded with their small contribution to the national population of Tuvalu (Figure 2). The slight variation on the response rate at the Home Island level was mainly attributed to poor coverage of the respective island by the responsible surveyors,

unwillingness to participate and from not completing correctly the survey forms which resulted in the rejection of many incomplete survey forms.

There are important follow up questions that have should been included for further analysis but were removed from the analysis (See appendix). For example, question 10 is an open-ended question that asked participants to name and describe a particular traditional management practice that they might know. The next question asked the participants to indicate whether that traditional methods they mentioned were effective in managing the resources for which they were designed. Question 12 asked participants to state whether traditional resource management practices are still currently valid. Most of the participants wrote down the establishment of Marine Protected Areas (MPAs) while other wrote down a practice that was much related to a Locally Marine Managed Area except for Niutao participants that mentioned a specific form of managing and increasing the harvest for green and brown coconuts known as 'Te li' that was historically regulated by certain clans on the island.

As noted, it was difficult, at the same time confusing to analyse such questions, given that MPAs in this study was viewed as a scientific or modern-based tool. Those that answered these questions, concentrated more on the reasons and benefits of maintaining and implementing traditional management practices in their island communities. This response is expected as traditional practices are well known and embedded into the island culture and villagers are expected to abide by the restrictions that these traditional practices impose. Some respondents wrote that they don't know and the rest provided no answer - leaving the question blank. A simpler clarification or way of asking the same question would have solved the issue in the first place and this limitation set outs a good example of a lesson learnt for future research with a similar purpose.

This lesson indicates that any new form of resource management needs to be fully understood by local people in small geographical and village settings and they need to be shown how the new practices or rules differ from traditional practices. For example, Tuvaluan people have been dealing with resource management for generations under local authority bodies and pressures such as limited land areas, limited resources, growing population and many other social issues. As pointed out in the literature review, Tuvaluan people can be one of the local people described in (Johannes, 2002) where resource management is part of their culture for generations and people who may have from time to time imposed appropriate management

strategies on a trial-and-error basis. Therefore, any new resource management strategy may not easily be regarded or understood by locals as a scientific or western-based practice. However, what could be easily distinguished as a modern-based approach to resource management from the point of view of locals would be an approach or practice that uses modern electronic equipment and technologies such as GIS mapping and satellite imagery.

### **5.1.2 Respondents' demographic attributes: Residency at home island ( $\geq 10$ years) residency at home islands ( $\leq 10$ years)**

As the islands of the Tuvaluan archipelago are widely spread, each island has a unique culture with differences in how the islands are governed and how resources are managed. Although Tuvalu was colonised by the British for a brief time, many of the traditional island governance practices remain. Tuvalu is an independent democracy but owing to its relative isolation, does not have the equivalent western style infrastructure and economy as adjoining countries such as Australia and New Zealand. Historically there has not been a lot of movement of people between the islands. This has changed recently as younger Tuvaluans become aware of education and employment opportunities on the main island of Funafuti and offshore in countries such as Fiji, Australia and New Zealand.

The highest percentage of respondents in the age group 21 - 35 (45%) who did not reside in their Home Island for 10 or more years can be related to this age group representing the bulk of the working class and students in tertiary education. Office or paid jobs opportunities in the outer islands of Tuvalu are limited. These include, a few primary school teachers, 1 clinical nurse, 2 police officers, 1 bank officer, and 1 pastor; as well as island council office bearers. This means that students undergoing tertiary education and those employed civilians in formal institutions would be residing in the capital island or would have spent many years overseas. An aspect to consider is, what level of awareness do the younger age group 21-35 years have of both types of resource management and specifically, how much of the traditional practices in resource management from their home islands has this age group retained. It can be argued that young Tuvaluans who have travelled and have been educated overseas may not relate to the traditional values inherent in the traditional ways of island life.



The national circumstances mentioned above can be used to explain the conclusion that Funafuti respondents were more likely to have longer residency in their Home Island Funafuti or the capital island than respondents from the outer islands of Tuvalu. On the same note, the low residency at Home Island represented by the younger age groups can be an influence of 'urban elite' (Connell, 1999) or the local emigration to the capital island due to youth's attraction to the social entertainments, modernised and easy lifestyle in Funafuti. Modern style night clubs in reference to lightings and liquor availability also are not present in the outer islands of Tuvalu. Cancellations of nightly social events can also happen when there is a dead body on the island from deaths occurring in the afternoons. Therefore, it makes no sense for Funafuti respondents to move or stay in outer islands for longer periods.

Some of the islands retain conservative attitudes towards certain social pastimes with restrictions or bans on liquor consumption on Sundays which are imposed and enforced by local village councils and church leaders. The restrictions extend to the strict compliance with the village rule of no walking, movement via vehicles during the evening devotion periods practiced in Vaitupu. The restriction is monitored by deacons of the Methodist church. The same restriction is also observed in the Tokelau Islands.

At this level of strong compliance with informal village rules as in the sense of 'verbal rules', it can be argued that this active form or success example of village enforcement was related to the use of realistic traditional penalties that outer island communities in Tuvalu can monitor and enforce. against the use of monetary fines and imprisonment - that can be viewed as invalid due to the prevalence of a barter system than a cash-based system and morally wrong. In another sense, these are awkward and embarrassing situations for a well-respected chief or island leader to force a villager to pay fines or to be imprisoned for trying to get food that God or nature has freely provided.

### **5.1.3 Leadership role vs Relevance of role to resource management**

Owing to a historical patriarchal system of island governance, the role of males in decisions affecting a village is prominent and an awareness of male dominance was known to affect the survey results. In many respects of island and family life, women are still confined to a subservient role. Men have a stronger agreement of the relevance of their community role to resource management and on having a leadership role in their community than women. Such a

conclusion is mainly attributed to men having a greater involvement in the decision-making process concerning resource management.

It is culturally disrespectful for women to talk in a meeting hall when the whole community gathers to make decisions and even to dominate decision making within a typical family household. Even when women are openly invited to attend and to voice out their opinions during community consultations, it is still observed nowadays that immediate improvements with women's participation are very unlikely. This finding can also be linked to the findings of Allendorf *et al.* (2006) in which males were more likely to agree on the relevance of their community role to resource management as they are the main primary gatherers of resources. This is in contradiction to women who are most often the initial facilitators or main drivers behind the organised planning, and budgeting among household and village activities in most of Tuvaluan communities.

The high reporting of leadership roles from Nukulaelae respondents (64% versus < 50% compared to the other islands) is unexpected when considering the few opportunities for an individual to have many leadership roles in a Tuvaluan local community. It is likely that the responses of Nukulaelae participants are relating their community role to resource management at the household level or simply due to respondent exaggeration. In contrast, the high leadership roles in the oldest targeted age group is easily understood as young adults have yet to gain or shoulder many leadership roles in their island communities, knowledge and experience in resource management in comparison to older respondents.

Although this survey did not record data on the aspirations of young Tuvaluans, it is relevant that future surveys should provide an understanding of what roles young Tuvaluans see themselves taking within village life. It will also be relevant to track whether attitudes toward women will change. As more young Tuvaluans move overseas for education and return to Tuvalu, it is expected that gender equality will be an issue for society to address; not only within the management of natural resources, but within all aspects of society.

The high indication of the relevance of respondent's community role to resource management in the targeted older age group (66+ years) seemed reasonable given their community role as elders, chiefs and grandparents who might have gained lots of experiences dealing with management than the younger age groups. Such similar trends were also recorded with the

other explored aspects of resource management in this study. For example, the oldest age group was also reported to hold the highest awareness and knowledge on the status of their land and marine resources (63 %), protection status of certain resource (93%), and the practice or using traditional RM strategies (85%). It is to be noted however, that the highest percentage (88 %) of respondents who considered the relevance of their community role to RM was found in the age group 46 – 55 rather than the eldest groups (78.6%).

A plausible explanation for strong awareness of the middle age groups on resource management dealings can be that the oldest age group may not be as active as the younger age groups concerning food harvesting and doing agricultural activities in a surveyed household. The salient point here is the contradiction of older men having the authority within the village but not actively participating in food harvesting and agricultural activities; whereas these activities are mainly done by women and younger men. This identifies a disconnect between the right of elders to have authority over resource management but the elders not actually managing or monitoring the status of the resources.

Irrespective of the approach to resource management, either traditional or Western style, it will be important for “resource managers” to be aware of the important indicators of the health of fish stocks, as fish is the main source of protein for Tuvaluans. These important indicators include a knowledge of the stock size (biomass) of each species, the amount of fish that can be sustainably harvested at maximum sustainable yield (MSY) thresholds and the dynamics of the recruitment and recovery processes of the targeted fish species. These indicators are essential in modern approaches to resource management such as the Quota Management System (QMS) which has been implemented by New Zealand (a Western style democracy) to manage its fisheries resources and Vessel Day Scheme adopted by Tuvalu and other PICs. The challenge for Tuvalu is whether central government and village elders can meld together a practical compromise between traditional approaches to resource management and the need for appropriate databases derived from western style management practices to ensure sustainable fisheries targets.

#### **5.1.4 Knowledge and awareness on resource management: The use of modern and traditional resource management in Tuvalu**

The awareness of using traditional methods for RM did follow the expectation that older age groups would have a higher awareness than the younger age groups. Awareness of using scientific methods was high amongst the 56-65 age group (76.7 %) This was unexpected with a possible explanation that the results do not provide the justification for the reasons respondent attitudes and perceptions differs from one group to another group. It is important to note that the number of older respondents surveyed was low and a trend seen from the responses of the ones that were questioned indicated a lower acceptance of the relevance of their community role to RM compared to the larger (and younger) age group 46 – 55 years. A point to consider here and among variables is that the survey results supported the previous observations in Sesabo et al. (2006) whereby demographic variables can influence social perceptions towards resource management at a given location and cultural setting. Therefore, the results described above as “unexpected” could be a reflection of the unequal nature of the interpretation of the role of resource management, not only across the islands, but within the villages and clans within each home island.

#### **5.1.5 Preferences for the type of resource management system**

An aspect of island life to be considered is the different approaches to enforcement and punishment. Some of the traditional methods can be seen as inappropriate and draconian such as physical punishment and public shaming. These traditional practices are inappropriate when considering modern Western style punishments which advocate monetary penalties and at the extreme level, imprisonment. With a change to Western style resource management and the strong Christianity movement, it appears there is a lack of effectiveness of the associated penalties (Western style) and a void has been left from the changeover from the more direct (lashing, beating, shaming) of traditional punishments.

Despite the poor enforcement of modern prosecution methods for violations of PA rules or village RM rules, respondents or Tuvaluans still perceive modern, monetary fines and imprisonment to be the most effective discipline methods for resource management than the common traditional methods such as public shaming or verbal warnings. What used to be very effective methods of disciplines in the past in Tuvalu such as poacher receiving a few

lashes/beatings, poacher feeding the whole island community from his land and fish harvest, putting oil by the male poacher on his female cousins and even disowning of villagers making them to sail away (out into the ocean) or banning from their home islands can no longer be imposed due to the emergence of civil rights acts in the country. Such a situation may have been the issues in the first place regarding compliance and enforcement with protected areas or village resource management rules as in the case in some islands of Tuvalu.

For example, there had been a serious case of poaching of fish items in an aquaculture project in one of the island of Tuvalu (Vaitupu Island) and the poacher did not get a penalty as everybody in the island knows that he is a victim of the leukaemia disease. There were also a few violations of PA rules in a few islands of Tuvalu committed but did not get to be penalised as everybody in the village knows of the lack of financial means, and lack of grown up sons of those violators to provide fish and food for his family. In fact, it seems very unkind and shameful to impose penalties such as imprisonment on such a case where a father is only trying to provide food for his family. Therefore, when considering the close association people have within a village, the Western style penalties of fines and imprisonment can be seen as draconian in a similar way that traditional punishments of lashings and beatings is seen as draconian and inappropriate.

Most importantly, it might look rather absurd to impose an imprisonment fine or monetary fine on household members when it is apparent that the household (especially in the outer remote islands of Tuvalu) do not have any source of income opportunities and capacity while at the same time there are plenty of fish resources to be of a great concern. These may also include the eating of small fishes, undersize fish is a common phenomenon and is more viewed by locals as a delicacy, a blessing rather than an abomination. This raises the issue of the most appropriate way to manage fisheries resources that supply villages that lead a subsistence existence.

A way forward to understand the viewpoints of locals and resource managers in resource management is to evaluate each party interpretation of some of the key words such as over-exploitation, sustainability and ‘abundance’ or ‘plentiful’. In the case of Tuvalu, the local vernacular is very limited and does not provide distinctions in terms of biomass and some other level of measurement parameters. Most of the participants and perhaps the wider population of Tuvalu may have not seen the high biodiversity of marine fishes, cetaceans and edible

invertebrates that are found in other parts of the world, particularly in places with successful examples of marine protected areas (MPAs).

The Western style resource management approaches are largely based on commercial and industrial style fishing operations. Connected with this industrial approach is the need to set aside areas as marine reserves and to impose input controls such as trawl netting exclusion zones. The subsistence approach to harvesting is not based on a profit model so transgressions cannot be rectified via fines, confiscation of property or imprisonment. Marine reserves are a component in a modern approach to marine resource management and establishing marine protected areas (MPAs). However, the imposition of an MPA over an area traditionally used to harvest food would deny a village's access to necessary protein.

#### **5.1.6 Enforcement and compliance: Main reasons for poor management**

The survey results have shown the main reasons perceived for poor management are the ignorance of PA rules or RM village rules (32%), lack of awareness (18 %) and misuse of resources (15%). It is interesting that the most prominent reason is ignorance of village rules. This maybe a reflection of the respondents not necessarily domiciled on their home island and also, being more in-tune with modern lifestyles; especially those available on the main island. 'Misuse' in this sense referred to harvesting resources, not according to what a household could consume or be able to store as a daily or weekly ration, but to what they can catch. The result of such misuse would be that most of the harvest would go to waste due to spoilage and fishers harvesting the fish resources to feed their pigs. The remaining perceived reason for poor management that are less than 10 % include: poor enforcement (6 %), littering (5%), limited expertise (4%), overcrowding (4 %), limited funding (2%), commercial activities (2 %), climate change (3 %) and poor political support (1.5 %).

Although Tuvalu has a total land area of 26 km<sup>2</sup> and is also exposed to several environmental and social problems as discussed in the earlier chapters, over-crowdedness, climate change, limited funding opportunities, small scale fishing businesses and poor political support were not perceived as main issues for poor resource management in Tuvalu (Table 11). It is pertinent to identify the lack of awareness of the impacts of climate change on the islands and their natural resources, considering that Tuvalu is very low lying and is already experiences the effects of sea level rise. Over exploitation as an issue was not considered as a thematic area as

overexploitation in the local dialogue would mean that the resource is no longer available. In some cases, overexploitation overlaps the definition of misuse, thus misuse was considered as one of the key issues identified.

The lack of access to funding and expertise has been reported as a common causal factor that prevent proper enforcement of protected area rules in some local communities in Malaysia (Masud *et al.* 2014) and in the Pacific Islands (Govan, 2009). This was not strongly supported in this study given its low ranking. However, what is important here is that caution should be taken in such analysis as local perceptions can be easily influenced by changes in societal and demographic developments in either a short or long timeframe (Agrawal & Gibson, 1999; Pomeroy *et al.* 1996).

#### **5.1.7 Awareness of the incidences of violations case being caught**

Nukulaelae participants showed a very high awareness of the incidences of violations (85.4%) of their protected areas or village resource management rules as well imposing prosecution cases (87.2%) than in other islands of Tuvalu. In contrast, a conclusion can also be made that Niutao participants were less aware of the incidences of violation of PA's rules or RM village (31.1%) and of locals receiving penalties for violating RM rules. All the Home islands showed an awareness of violation of their PA rules as well as awareness of the violators being prosecuted. This finding demonstrates the caution that should be considered when assessing the perceptions of local in very small island settings like in Tuvalu. Primarily, for example, it was being reported that violations of PA rules are very high, however, the incidences in which the respondents are thinking of are the same few incidences that is being reported by the rest of that community since they are very aware, get to know about in detail (the whole islands know about it) and thus counting may be doubling. Although, these can be improved in future studies like this when participants are to be asked of the frequency of violation incidences on a weekly, fortnightly, monthly and yearly time frames.

#### **5.1.8 Effective methods for resource management**

Ignorance of resource management rules, poor awareness and misuse of resource were the main issues perceived for the lack of effective management of land and marine resources in Tuvalu. The results here are quite different from the issues or threats to biodiversity conservation in

Tuvalu based on an earlier review of the literature by Kingsford et al., (2009). In Kingford *et al.* (2009), the four identified threats with their levels of how they affect biodiversity conservation in Oceania and these include Invasive species (100%), over exploitation (100%), habitat loss and pollution (ca. 0%). This is clearly different from the perceived issues in the present study in which invasive species was not mentioned by any participant as an issue and pollution was clearly flagged as an issue by some locals or survey participants.

The high nominations for ignorance of rules as an issue can be due to many factors. In one instant, the island communities are too small. In some occasions, the minor poaching offences and villagers taking short cuts crossing within the boundaries of a protected area to reach their land properties and open access fishing grounds may be reported as an ignorance case. It also appears that some participants do not differentiate between village's taboos that may have been passed on from ancestors (including superstitious beliefs) and what may be constituted or known to have been decreed by their kaupule in the past two to three decades. For example, most respondents from Niutao still reported the incidence of breaking a taboo (that may have happened in the past 6 decades) in which one male villager was believed to have been killed or suffered the death punishment by spirits of the island who were flying over the island to do a routine check of the island coconuts supply. The superstitious responses are difficult to remove from the analysis, otherwise the responses from Niutao towards compliance and enforcement will be removed.

#### **5.1.9 Responsible authority to inform on resources stock status and to report violations of PAs.**

Survey participants mostly agreed that their island council is the responsible agency to provide information on their resources stock status than the national government (48% versus 20%). This is an important finding that agrees with the argument that local bodies should be utilised in Tuvalu as RM becomes more structured within Tuvalu (Hassall & Tipu, 2008). Empirical applications will need to be adopted such as quantitative methods of estimating and measuring biomass. The main consideration is measuring and setting MSY.

Although science is the least preferred informant, there is cautioning to be mindful given the much higher rating for uncertain responses and those that ticked multiple answers. This finding contradicts the findings from Arnold (2009) where western countries seemed to place a higher



preference for scientists to inform them on their resource stock status. This again demonstrates the point made earlier that local people do hold different perspectives than westerners and should be evaluated separately.

#### **5.1.10 Responsible authority to report violation cases of PA rules or village RM rules.**

There is no doubt that the Kaupule or local council was highly perceived (92%) as the most appropriate authority to deal with compliance in Tuvalu in comparison to the overall voting for a governmental organisation (0.3%). Again, this is not surprising considering that RM management in the home islands is administered on an everyday basis by local bodies as a phenomenon that is common in Pacific Island countries (Govan, 2009). In contrast, the situation is slightly different with the poor recognition of local government by the national government in some East Asian countries and Africa (Sesabo et al., 2006). It seems that Tuvalu as a nation holds high respect for local councils or village leaders to reserve the power to manage and own their resources.

The local government system in Tuvalu provides an example of a good harmonisation of local stewardship and local involvement in resource management (Panapa & Fraenkel, 2008). Indeed, the process of decentralization process discussed in Hassall and Tipu (2008) may not appeared as a process to promote the handing back of access and ownership rights, accountability and good governance regimes to local government. This is because the local government system and its mandate to deal with RM in Tuvalu has never been seized by national government nor lost its power due during the British colonization. Having a strong local government system may be a disadvantage for the governmental agencies when it comes to imposing urgent resource management measures because the final decisions rest with the Kaupules. Therefore, the associated cost and mobilisation of officials to the outer island to do community consultation can impose more financial budget issues as shared with Locke and Dearden (2005) and Golden et al. (2014). The critical factor is to get a good grasp of the condition of marine resources and whether current practices are sustainable. This requires a scientific approach to gather appropriate data so trends in catch and the status (biomass) of resources such as fish stocks are tracked. Appropriate management measures are then applied.

#### **5.1.11 Knowledge on resource stock status and protection status**

The lowest indication of awareness of a ban to harvest marine and land resource by Niutao. This is expected because there are no formal and informal management measure known for Niutao. This is an interesting result as Niutao is the smallest island in Tuvalu that has only 3 km<sup>2</sup> of land area. The only known restriction method for Niutao is the banning on spear fishing methods that are prohibited such as spearfishing. The lack of designated protected areas in a small island like Niutao can be associated with feelings of insecurities over the limited access to harvesting grounds (Szell & Hallett, 2013).

#### **5.1.12 Awareness on the use of traditional resource management**

The low awareness indicated by Niutao participants can be associated with the awareness that Niutao island is widely known among Tuvaluans to have a ‘pologa’ or a specialised cultural knowledge or particular form of art or knowledge that is known only by and administered by a specific clan. For example, advices on how to manage the harvesting of brown coconuts in a sustainable manner to ensure long-term optimal harvesting as well as fish resources are from some certain families. The clan with a special skill possessed only the skill and the right to manage the skill ‘pologa’ and do not get to own the resource or get special treatment to own more land in an island. In parallel, these traditional practices is similar to the use of a shaman as described in Gadgil et al (1991).

In contrast, Funafuti and Vaitupu reported a 100% of awareness which could be related to the existence of the official Funafuti Conservation Area in Funafuti. Vaitupu on the other hand harbours the biggest mangrove swamp in the country where the mud crab (*Discoplax hirtipes*) and milkfish (*Chanos chanos*) locally existed, and these resources are strictly managed by the respective island councils.

Overall, there is an apparent lack of variability in the responses of participants across most of the variables or questions that can be associated with the lack of diversity among households based on fishing activities and wealth. For example, nearly all households in the atoll islands of Tuvalu as a nation are fishing households as well as their access to fishing and farming zones, harvesting and consumption capacity is comparable.

## 5.2 Conclusions

In a final comment made in the discussion section of this thesis, it is suggested that the data from the survey shows a lack of variability in the responses of participants across most of the variables or questions. It is concluded that this trend is explained by the lack of diversity among households when considering household income and the activities or employment from whence this income is derived or generated. The data has shown that the majority of the households surveyed for this study are involved in fishing activities; primarily to provide food (protein) for the household and the village. The indication that most households within the villages of the home islands rely upon fish resources is not unexpected as food resources from the land, especially animal protein, is essentially unavailable with only some protein from pig supplementing the Tuvaluan diet. Therefore, an obvious component in the hypothesis of this thesis is that villagers would resist any change in access to marine resources instigated by a new approach to resource management.

This research has shown that traditional approaches to both access to natural resources and practices to manage these resources are still firmly embedded in the way of life of most villages on the islands of Tuvalu. It is important to note that the rights of governance of village elders (Village Council) and their role in managing natural resources has not been seized by national government nor lost due to colonisation or western influence.

Conservation is a relatively new component of ecology, which is quickly being recognised as an important element in wildlife management practices. Governments and territorial authorities will incorporate conservation directives in statutory and non-statutory policies and objectives aimed at protecting biodiversity and allowing for sustainable exploitation of natural resources. Tuvalu has a reasonably small population (11,097 @2016), which is based on a village governance system throughout the islands of the archipelago. As this research has shown, the principles of conserving natural resources has historically guided the practices used by Tuvaluans to exploit natural resources; principally the resources from the sea. A strong incentive for incorporating a conservation ethic (Sauni 1997) into traditional harvesting practices has been a system of “sea tenure” where villages on the home islands have historical rights or limited access to exploit specific parts of the sea.

Sauni (1997) has identified that sustainable development and conservation are not new concepts in Tuvalu but that controlling access to marine resources (sea tenure) is part of traditional resource management. Although local people (island villages) perceptions in resource management can be subjected to purposeful coercion and manipulation, understanding resource management through the views and experiences of local people is still a vital task for resource managers. It is also concluded that the direct and indirect socio-economic benefits of structured resource management and conservation practices can encourage local communities to support and participate in conservation programs (Bartlett et al., 2009; Colchester, 2004).

## CHAPTER SIX: SUMMARY AND RECOMMENDATIONS



*Courtesy meeting with the Honourable Namoliki Neemia Sualiki, Minister for Home Affairs & Rural Development to introduce and notify the Government of Tuvalu of the intentions and scope of the research.  
(Photo: Liufale Mataika, June 2014)*

### 6.1 Stewardship of natural resources

This research has clearly shown that traditional resource management practices still dominate in the villages of Tuvalu and that there is an older cohort of male elders who still operate under a historical patriarchal system. This is despite this research showing that much of the actual work of planning household and village activities is done by women. A conclusion from this survey, although not a specific element in the questionnaire design, has found that women remain subservient to men when decisions are made regarding resource use and management. This research has not been clear on identifying any natural progression of younger Tuvaluans to take over the role of elders or stewards to manage the allocation and conservation of natural resources such as fish.

It is inevitable that village life will change; especially for young Tuvaluans influenced by opportunities beyond their home islands. Owing to its isolation and lack of extensive infrastructure such as universities and commerce, young Tuvaluans will seek educational and employment opportunities in adjacent countries such as Fiji, Australia and New Zealand. Although this research did not gather information on younger villagers taking on the role of village governance, it will be an issue that will need to be addressed. Traditional knowledge about resource management specific to home islands and also at the individual village level could be lost if there is not a commitment to forward this knowledge or “societal intellectual property” to younger generations. For example, it will be important for future generations to know the extent of their fishing grounds as they relate to village sea tenure agreements.

## **6.2 Island domiciled**

The Tuvalu archipelago is composed of six atolls and three islands with the largest in land area Vaitupu but the largest population on Funafuti, which is the capital. The survey has shown that between the different islands and villages, there is difference in understanding of the different approaches to resource management. Traditionally, Tuvaluans have remained domiciled in ancestral villages on their home islands but this has changed with greater movement between home islands and the capital of Funafuti, which now carries 60% (6,025 pax) of Tuvalu’s total population (10,640 pax). This survey did not record the movement of people from the home islands to the capital but it is expected that migration to Funafuti will increase. This raises the issue whether the small atoll of Funafuti (approximately 2 km<sup>2</sup>) will be able to accommodate a larger population. An associated issue will be the depopulation of the atolls with small populations such as Nukulaelae.

If there is significant movement of people from the home islands, this will raise the further issue of what is the best approach to manage the natural resources that will be required to support the burgeoning population on Funafuti. In some respects, a centralised set of policies on the allocation of access to natural resources such as fish will suit a Western style approach. If fishers are given a quota, which is within the bounds of maximum sustainable yield, the main centres of population can be supplied with adequate fish protein. However, this will clash with the traditional rights of villagers to their areas set aside in sea tenure agreements. This survey did not investigate the challenges of depopulation of the home islands, but it will be an issue

that the central government will need to address; not only in relation to resource management, but also in relation to avoiding disparity in age cohorts (shifting demographics) in the home islands (Table 6).

### **6.3 Change in harvesting practices**

Keeping in mind the changes in the demographics and age distribution of the home islands, there will inevitably be a change in harvesting practices, this will involve melding of traditional with new RM methods. With changing population dynamics in the villages of home islands, it is expected that central government will need to adopt the most appropriate aspects of traditional and new approaches to resource management. Tuvalu is an archipelago and managing population movement and the allocation of resources will need to ensure islands, and villages remain viable.

### **6.4 Key issues to maintain village viability:**

1. New RM methods not fully understood
2. Preference for traditional approach to RM remains
3. Patriarchal approach to village governance remains
4. Despite heavy influence by women in village decision making, poor representation of women on village councils
5. Inconsistency across villages of an awareness of village rules
6. Inconsistent awareness of central government legislation
7. Confusion over punishment and penalties for villagers breaking both traditional and new RM rules and regulations

### **6.5 Village Life**

In deciding on the best approach to maintaining viable village life on the islands, an assessment by both central government and village elders will need to decide what aspects of tradition/village rules work and which do not with respect to resource management.

With respect to Tuvalu as a young and developing democracy, two important issues emerge from the survey:

1. How to improve legislation (not only resource management) to benefit all the home islands and Tuvalu as a whole
2. How to incorporate traditional practices into modern policy development

It is known fishing is prominent livelihood for Tuvaluan males and that spear fishing as a fishing method was totally ban on Nui Island for many decades ago and this is followed by Niutao over the concerns to protect live corals or ‘house of the fish’ and to avoid over-exploitation of fish resources. This study has not included a full assessment of the social impacts from imposing stricter resource management rules such as the banning of spear fishing. It would be relevant to investigate in future studies if the removal of spear fishing as a livelihood will increase the number of diabetic, high blood pressure, and cardiac male patients in association with poor physical fitness.

## **6.6 Management Options**

In some respects, Tuvalu has implemented adaptive management by default. During British occupation and currently as a democratic nation, Tuvalu has exploited its natural resources to suit the interpretation of both traditional and western approach RM practices.

With respect to this adaptive management approach, the survey has found the following practices:

1. Resource management approaches can be “island sensitive” or specific to characteristics of the islands and their resources
2. Local council or kaupule was the appropriate authority to deal with resource management in their islands
3. Individual level to know about the current stock status of their island’s land and marine resources
4. Partnership approach with central government and island elders
5. Encourage assessment of local perception across age involvement in RM

## **6.7 Conservation Ethic**

Owing to the need to protect natural resources for the benefit of the entire community of an island village, conservation has been a key element in traditional practices of allocating and



harvesting natural resources such as fish and other marine resources such as turtle. In applying a conservation ethic, a number of aspects need to be considered:

1. Understanding the requirement to sustainably exploit resources – “marine ethic”
2. Prioritise the harvesting of different marine resources
3. Species/resources that have a protection status in their home islands – what about other islands; also, is the central government looking at a more extensive protection regime for the full range/distribution of species (i.e. turtle).
4. Understanding the life-history link species have between the terrestrial and marine environments (turtle breeding cycle)
5. Understanding the biological (life history) parameters of species (i.e. age @ maturity, longevity, fecundity, frequency of breeding)
6. Quota management
7. Species assemblages and species community dynamics

## **6.8 Limitations**

The limitations of this survey need to be understood when formulating recommendations that could influence how resources vitally important to all Tuvaluans, such as access to fish protein, are allocated and managed. As with all small island nations in the Pacific, there are increasing economic pressures on Tuvalu’s natural resources for both supplying the domestic need of villages and, satisfying the commitments to foreign joint ventures\* (especially fish).

\*For example - The National Fishing Corporation of Tuvalu (NAFICOT), owned by the Government of Tuvalu signed a Joint Venture (JV) agreement with Sajo Industries of Korea and O Yang Fishing Industry. <http://www.tuvalufisheries.tv/2017/06/national-fishing-of-tuvalu-naficot-and-sajo-o-yong-fishing-industry-signed-a-joint-venture-agreement/>

Any recommendation that advocates change needs to be cognizant of the fact that most villages through the home islands have a subsistence reliance on fish protein owing to very limited sources of protein from the terrestrial environment.

The limitations of this survey are listed below but important issues relating to resource management and access to natural resources is evident in the data, irrespective of its empirical strength.

1. Owing to village hierarchy, a diverse cross-section of respondents was not consistently achieved

2. There is a patriarchal approach to village governance which resulted in responses being dominated by male respondents
3. As the islands of the Tuvaluan archipelago are dispersed over relatively long distances, it was not possible to survey all villages on all the home islands
4. Some of the responses from the respondents were incorrect owing to a number of factors such as misunderstanding of the purpose of the survey

The most pertinent issues raised in this survey are included in this section on recommendations.

## **6.9 Governance**

This survey has shown that the traditional practices of resource allocation and management have largely been retained in the villages throughout the home islands. There is a “background” awareness of Western style resource management practices, but village councils composed of elders still impose rules and regulations they have traditionally used.

It is recommended that central government views the results of this survey and decide on the best approach in meeting the following governance issues:

1. Dissemination of knowledge – elder (kaumatua) to younger generation
2. What aspects of traditional resource management to retain
3. What aspects of Western style resource management to adopt
4. Examine how traditional and modern resource management practices have been blended in other countries such as New Zealand. Examine NZ as an example of the blending of traditional Maori harvesting/management approaches (input) into a structured (output) type management system (Quota Management System (QMS))

When considering governance of natural resources and the allocation of these resources, there will be a need to separate out the two demands on natural resources (such as fish), namely village subsistence quota and quota committed to foreign joint ventures and licence holders.

Although not identified by this survey, it is likely that some of the village elders who control access to fish resources are unaware of the joint venture agreements signed between central government and foreign fishing companies. An aspect of this this will be what type of resource management practices are included in these agreements and do they recognise the historical rights of villages access to marine resources (fish)?

## **6.10 Inequality of decision making**

The patriarchal approach to decision making is inappropriate and central government will need to address this inequality between the sexes. Although this issue was not fully explored in the survey, the people conducting the survey reported that it was difficult to get women and younger men to complete the survey. The main reason for this was an understanding of village hierarchy where male village elders were the authority who made decisions on resource allocation and management for the whole village. The recommendation to address this issue of inequality is suggested because the survey did find that women carried-out many of the important villages activities, irrespective of possessing accepted authority. There is a need for cooperation and transparency within a village, especially when women are the principal sex who understand the food and dietary requirements of the village and as a result, will have a greater understanding of the availability of resources such as fish.

## **6.11 Migration and movement between islands**

Historically, the population of Tuvalu has been stable with people domiciled in the villages of their home islands. Currently, the inhabitants of these villages, especially younger Tuvaluans have become highly mobile, either migrating to the capital (Funafuti, Vaiaku, 6,025 pax) or overseas to Fiji, Australia and New Zealand. Funafuti is the third smallest island/atoll but has the majority of the total Tuvaluan population. Migration and depopulation of islands within a Pacifica nation is not new or unexpected. The relevance to this research is the consequences of a mobile population influencing how natural resources should be managed. For example, the traditional method of dividing village allocations according to “sea tenure” may not be appropriate. It is recommended that central government monitors the movement of people away from home islands and develops strategies to ensure natural resources (fish) are adequately distributed but at the same time respecting the traditional approaches to harvesting. There may be some form of “village trading” required to ensure resources (fish) reach the bulk of the population and this may mean that the majority of the resource may have to be transported to Funafuti. However, it is fully understood that there are negative effects of depopulation of islands.

## **6.12 Conservation ethic**

Although not strongly identified by the survey, it is evident that the traditional harvesting methods and resource management approaches have a strong conservation ethic. This conservation ethic is necessary to ensure natural resources such as fish are equally shared amongst village members. The survey has shown that there is a lack of appropriate punishment for transgressions of village rules by individuals not respecting the conservation requirements of harvesting. It appears the reason for this is confusion over what form of punishment should be imposed. Draconian beating or shaming is seen as inappropriate to the same degree as Western style imprisonment or fining. Therefore, it is recommended that clear guidelines on the sustainable harvesting of natural resources and their management is communicated to all home islands. Also, the confusion over what punishment is appropriate is an issue for central government to solve. This survey has shown that fines and imprisonment can be as draconian as shaming and beating, as villages generally do not have money for fines and if a villager is imprisoned, they cannot provide for their family.

## **6.13 Superstitions**

Although a modern democracy operates according to rational expectations of its citizens, the survey has identified values within the traditional approaches to managing natural resources that can be considered superstitions. Some of these are taboos or restrictions to maintain order within a village society. It is recommended that central government collaborates with village elders to incorporate the sensible and appropriate taboos (directives) into any new resource management approach (Western style) it is considering. The survey has found that in some instances the Western style approach is not fully understood and villages will naturally resort to traditional approaches.

## **6.14 Last word**

Tuvalu relies heavily upon marine resources for food. This is consistent across the nine islands. After a time under British rule, ownership of natural resources essentially belonged to the colonising power. As an emerging democracy, Tuvalu is left with a hybrid of traditional and Westminster approaches to resource management. Politics may have changed but with a small overall land area and low diversity and complexity of biodiversity, Tuvaluans have always targeted what can be efficiently harvested and this is principally fish.

On a final note, modern resource management tools to promote compliance and enforcement such as formal laws and legislations is argued in the study as a prominent causal factor for the poor management of land and marine resources in the small islands of Tuvalu.

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## APPENDICES

### Appendix 1. Survey in English

#### **Survey on Perceptions of Local Communities towards natural resource management, Tuvalu, 2014**



**The Ecology & Conservation Unit  
Institute of Natural Resources  
Massey University, Albany**

**Tuvalu Fisheries Department  
Tuvalu Government**

**June 2014**

**Dear Participant,**

Thank you for taking the time and support in participating in this survey. The purpose of this survey is to document information on the experiences and opinions of Tuvaluan village communities on past and current conservation approaches that have been used to manage marine and land resources. It is anticipated that the results of this survey will be used to provide information for the people of Tuvalu, resource managers, future students and researchers in Tuvalu on subjects relating to conservation and sustainable use of marine and terrestrial resources.

If you have any query relating to this survey, please feel free to contact me anytime at [REDACTED], phone number: [REDACTED]. You may also contact any staff member in the Tuvalu Fisheries Coastal Division (688) 20 348 for assistance.

Once again, thank you for your time, support and valuable contribution.

Fakafetai Lasi

A handwritten signature in black ink, appearing to read "Moeo Finauga".

Ms Moeo Finauga

Fisheries Officer (MSc Student, Massey University, Albany, Auckland, NZ)

## **PART 1**

### **Participant's details**

**Name (optional):** \_\_\_\_\_ **Home island:** \_\_\_\_\_

Please tick where appropriate:

**How old are you?** \_\_\_\_\_

**Your gender?**

☐ Male

☐ Female

**Please tick your Age Group:**

☐ 15 -- 20   ☐ 21 -- 35   ☐ 36 --45   ☐ 46 -- 55   ☐ 56 -- 65   ☐ 66 - 80+

Date of questionnaire completion: \_\_\_\_\_

## **PART 2 – QUESTIONS**

Q1 What is your occupation/role in your community, e.g. father, mother, chief, fisherman, pastor?

**Occupation/Role:** \_\_\_\_\_

*(Please tick where appropriate)*

Q2 Is your occupation/role in your community related to managing the marine and/or land resources of your island?

☐ Yes

☐ No

☐ I am not sure

Q3 Have you resided in your home island for at least 10 years or more?

☐ Yes

☐ No

Q4 Have you hold a leadership role in your island community for at least 2 years or more?

☐ Yes

☐ No

Q5 Are you aware of the current status of the land and marine resources on your home island?

☐ Yes

☐ No

☐ I don't know

Q6 Who do you think should inform you on the status of your resources? *(Please tick **one** option below)*

☐ Kaupule

☐ Government

☐ Scientists

☐ Myself

☐ I don't know

*Note: Kaupule is the local name for Island Council*



Q7 In your opinion, what is the most important conservation issue in your island community?

Answer: \_\_\_\_\_

Q8 Is there any plant or fish species that has some sort of protection status in your home island?

☐ Yes ☐ No ☐ I don't know

Q9 Are you aware of any **traditional conservation method** practiced in your home island?

☐ Yes ☐ No ☐ I don't know

Q10 If you answered **yes above**, please indicate how did get to know about this traditional conservation method?

☐ I witnessed it in the past ☐ Still in practice today ☐ I heard about it from someone else

Q11 Please name and describe any **traditional conservation method** that you know about that was used in the old days to protect any land and/or marine species and/or resource?

Answer: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Q12 Are the traditional management methods you described above are effective in managing the land and marine resources in your home island?

☐ Yes ☐ No ☐ I am not sure

Q13 Referring to your answer to Q12 above, please suggest reasons for your answer

**Reasons why this management method do or do not work:**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Q14 Are you aware of any modern or scientific RM method being practiced in your home island?

☐ Yes ☐ No ☐ I don't know

Q15 If given a choice to choose a management system to manage land and marine resources in your island, what would you prefer? (*Please tick **one** option*)

☐ Traditional ☐ Modern ☐ Mix of traditional and modern ☐ I am not sure

### **PART 3 - QUESTIONS**

#### **Compliance and Enforcement with resource management rules and regulation**

Q16 Are you aware of anyone that has violated conservation management rules in your island community?

- ☐ Yes                      ☐ No                      ☐ I am not sure

Q17 If your answer above is **Yes**, has this person received any form of punishments for violating your community conservation management rules?

- ☐ Yes                      ☐ No                      ☐ I am not sure

Q18 Which of the authorities in the following list are you likely to first report a case of violation of management areas rules in your community to? (Please tick only one)

- ☐ Kaupule                      ☐ Local police                      ☐ Pastor/church congregation  
☐ Family members of the violator                      ☐ Fisheries/Environment Department

Q19 Which of the following form of discipline you believe would be more effective in preventing further violations of management rules in your island?

- ☐ Local community work service  
☐ Payment of a large monetary fine  
☐ Imprisonment in jail  
☐ Public shaming (or any other of traditional village punishment)  
☐ Official warning

Q20 Which of the following situations that you will likely to ignore the rules and regulations of protected areas?

(You can tick more than one box that applies)

- ☐ When the targeted species is abundant  
☐ When the targeted species is rare/scarce  
☐ When I don't like a member of the Kaupule or village chiefs  
☐ When I know that someone else has not been penalised for stealing or poaching  
☐ When it is a bad weather condition  
☐ When no one is looking or around the protected area  
☐ When there are poachers already in the area  
☐ When it is difficult to provide food for my family  
☐ When the protected area belongs to my island community  
☐ When the protected area belongs to another island community  
☐ When I immediate need for money (through selling my fish catch)  
☐ I will never ignore the rules and regulations of a protected area

## **RANKING QUESTIONS**

Please rank how much you agree or disagree with the following statements

*(Please circle only one answer)*

Statement (in relation to local village communities in the study)	Strongly agree 1	Somewhat agree 2	Neither agree disagree 3	Disagree 4	Strongly disagree 5
1. Conservation programs are a waste of time in my community	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Conservation programs in my community are effective	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Local communities should participate in decision making concerning protected areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Local communities should take full responsibility of managing their protected areas	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Political support should initiate protected area programs in local communities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. In today days, traditional management systems are still reliable for conservation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Modern management systems are <u>not</u> reliable for conservation in my island	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. There need to be stricter laws and regulations to protect resources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. The Island Council at my home island is handling very well the violations of Protected areas rules	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. If there are 2 or more MPAs are to be established in my island, I will support them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. It is very likely for the Kaupule to catch poachers in our Protected Area	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<b>12. If you see someone poaching in a MPA belonging to your island, you would report it</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>13. If you see someone poaching in a MPA belonging to another island, you would report it</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>14. Would announcing the names of the violators of MPA rules on Radio Tuvalu would be a method to reduce further violations</b>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**\*\*Congratulations!! You have completed this survey...Thank you for your support\*\***



**\*\* Fakafetai lasi lasi \*\***

**Savea ki manatu o tino ki faifaiga, aofaga, iloga o olotou ituala,  
fenua ite atafaiga fakalei o olotou maumea totino ite Tai mote  
Laukele, Tuvalu, 2014**



The Ecology & Conservation Unit  
Institute of Natural Resources  
Massey University, Albany

Tuvalu Fisheries Department  
Tuvalu Government

**Juni 2014**

**Talofa,**

E muamua o siki atu ate fakafetai lasi atu mo tou loto fiafia o lago kae kaufakatasi mai kite savea tenei. Te pogai ote savea tenei e autu tonu loa kite fakamauuga o lagona mo mafaufauga o tino mo fakapotopotoga tino kesekese mai i fenua o Tuvalu.

Te fakamoemoega maluga ote savea tenei ke fakatoka se fakamauaaga fakalei a vaega aofaga, iloga o fenua mo faifaiga faka- Tuvalu kola e masani o fakaoga mo atafai fakalei kae fakatutumau o maumea totino ite tai mote laukele. E aofia iei a faifaiga ne fakaoga i aso taumua ke oko mai ki ona aso nei. Mai I konei, e fakamaluga ei te kiloga mao me ka aoga a tusitusiga, fakamauga mo molimau konei mo tino ote atufenua Tuvalu, te malo Tuvalu, tamaliki akoga Tuvalu I olotou sukesukega kae maise mote tupulaga foou o Tuvalu mo aso mai mua.

E fiafia lasi te tino e fakateletele neia te savea tenei mote Matagaluega ote Kaufaika o avatu se fakamainaga mote fakalauefaaga e uiga mote savea tenei. Ko fesokotaki mai koe kite napa telefoni ote ofisa ote Kau Faika I taimi galue ite 20 494/ 20 836 io me ko meli iti:

██████████. NZ Numbers: ██████████ Cell: ██████████

E toe avatu te fakafetai lasi mote fakaavanoa mai o tou taimi, mafaufauga faopoopo kae maise mote loto kaufakatasi o fai se tusaga mote savea tenei. Tuvalu mo te Atua

Fakafetai Lasi

A handwritten signature in black ink, appearing to read "Moeo R Finauga".

Ms Moeo R Finauga

Matagaluega ate Kau Faika mote Massey University, Albany, Aukilani, Niusila

**VAEGA 1**

**Fakamolemole fakafonu nete tino e aia te foomu te taipola tenei.**

(Note: e mafai foki o se tusi tou igoa mase loto koe kiei):

Igoa ote tino: \_\_\_\_\_

Igoa o tou fenua (eg Niutao): \_\_\_\_\_

Fakasao te tali tonu mai lalo nei

Aofaki o ou tausaga te matua: \_\_\_\_\_

☐ A au se Tagata

☐ A au se Fafine

**Tausaga o tou matua ko nofo ite wasia:**

☐ 15 -- 20    ☐ 21 -- 35    ☐ 36 --45    ☐ 46 -- 55    ☐ 56 -- 65    ☐ 66 - 80+

**VAEGA 2 – FESILI** (Fakamolemole fakasao e tasi te pokisi foliki i tau tali)

1 Sea tau galuega tutumau ? \_\_\_\_\_

2 E mata tou tiute fai I tau galuega tena e isi sena sokoga kite atafaiga fakalei o maumea ite tai mote laukele?

☐ Ao

☐ Ikai

☐ Se mautinoa

3 E mata ne nofo koe I tou fenua tonu mose leva e 10 tausaga io me silia atu ?

☐ Ao

☐ Ikai

☐ Se mautinoa

4 E mata kai nofo aka loa koe ise tulaga takitaki ise fakapotpopotoga e tusa mote 2 tausaga io me silia atui tou fenua?

☐ Ao

☐ Ikai

☐ Se mautinoa

5 Mata e isi sau iloa me ko pefea nei te lasi io me kote mutana o maumea ite tai mote laukele i tou fenua tonu I Tuvalu?

☐ Ao

☐ Ikai

☐ Se iloa tonu

6 I tau fakatau, e mata kooi e tau o fakailoa ki tou fenua ate tulaga ite lasi mote mutana o maumea ite tai mote laukele i tou fenua?

☐ Kaupule

☐ Matagaluega te malo

☐ Saienitisi

☐ Ko au

☐ Seilola

Q7 I tou iloa, sea loa ate fakalavelave lasi e faigata iei ate atafaiga fakalei o maumea totino i tou fenua tonu I Tuvalu?

Tali: \_\_\_\_\_

8 E mata e iloa ne koe me isi ne kogaakoga I tou fenua tonu kola e puipuigina io me fakatapu te puke o mea iei? Pela ika, lakau io me sose isi mea ola aka.

☐

Ao

☐

Ikai

☐

Se iloa tonu

9 E isi nei se aofaga, iloga io mese faifaiga e fakaoga saale I aso mua I tou fenua mo puipui kae atafai fakalei ana maumea ite tai io me ite laukele I tou fenua tonu?

☐

Ao

☐

Ikai

☐

Se mautinoa tonu

10 Kafai e tali koe **Ao** ite fesili mai I luga (napa 9), e mata ne iloa ne koe pefea ate aofaga io me kote faifaiga tena e iloa ne koe?

☐

Au ne oko kiei

☐

Koi fakaoga I aso nei

☐

I tala ase tino

11 Fakamolemole e fia iloa kae e fia maina me nea a aofaga/iloga io kite faifaiga tena/konaa. Fakamolemole fakamaina aka ate fakagaluega ote aofaga/faifaiga tena kae kooi foki ate potukau e fakatele ne latou a aofaga kona I tou fenua tonu?

**Fakamatalaga ote Aofaga/iloga/faifaiga e puipui io me atafai iei ate maumea:**

\_\_\_\_\_  
\_\_\_\_\_

12 Ite faifaiga tenaa mai I luga, e mata ne lasi otena aoga mote fesoasoani o atafai fakalei ana maumea ite tai mote laukele I tou fenua?

☐

Ao

☐

Ikai

☐

Se mautinoa tonu

13 I tau fakatau, e mata nei **koi aoga** io me ko **se aoga** a faifaiga I aso taumua mo atafai fakalei a maumea totino i Tuvalu.

Fakamatala a pogai e alatu kite tali a koe:


14 E mata nei e isi ne poto foou faka saienitisi e logo atu koe e masani o fakaoga mo atafai fakalei a maumea totino ite tai mote laukele i Tuvalu nei?

☐

Ao

☐

Ikai

☐

Se iloa tonu

15 Kafai e isi se avanoaga ke filifili ne koe me tefea te aofaga lei ke puipui kae atafai fakalei a maumea ite tai mote laukele I tou fenua. Fakasino mai aka me tefea te faifaiga ka filifili ne koe mai I mea konei: (*Fakasao e I fua te pokisi*)

☐

Faifaiga loa o toku fenua

☐

Poto fou fakasaienitisi

☐

Tapanitasi a poto a toku fenua mo poto foou

☐

Se iloa tonu

16 E mata kai lavea aka loa ne koe se tino ne soli ne ia a se tulafono i Koga/Motu Tapu io me i koga e fakatapu I tou fenua tonu I Tuvalu?

☐

Ao

☐

Ikai

☐

Se mautinoa tonu

17 Manafai tau tali mai luga se **Ao**, e isi sau logo me ite tino tena ne soli tulafono ne isi sena fakasalaga ne fai io mene fakaiku ite fenua?

☐

Ao

☐

Ikai

☐

Se iloa tonu

18 Tefea mai I fakapotopotooga konei mai lalo ka lipooti ne koe kiei ase tino e maua atu e soli tulafono i Motu/Koga Tapu io me I koga e puipuigina? *Fakasao e I tali*

☐

Kaupule

☐

Faifeau/Kaulotu

☐

Kaiga ote tino e kaisoa

☐

Matagaluega ate Maloo



☐ Pulusimani te maloo

☐ Seiloa tonu ne au

19 I tau fakatau, tefea loa te fakasalaga mai lalo nei e mafai o fakamalosi te fakalogo o tino ki tulafono a Kaupule mo fenua ite tausiga olotou maumea totino I tou fenua tonu?

**!! *Fakasao e tasi te tali fakamolemole***

☐ Galue fakagamua nete Kaupule

☐ Togi tupe tena sala kise togi mafa kii loa

☐ Pei kite fale puipui

☐ Polopolooki

☐ Avatu te toe fakatonuga kiei me ka fakasala patonu aia mana toe maua atu

20 Tefea te taimi e mafai koe o puke/fakaoga se mea i loto i koga e puipuigina io me ko Koga Tapu?

**(!! *Uke au tali e mafai o fakasao ite fesili tenei mai lalo, fakasao sose fakamunaga I tali konei kolaa e mafai o fai ne koe*)**

☐ Mafai ko too uke io me ko salalau valevale ate maumea telaaa e manako au kiei

☐ Mafai ko faigata te maua te maumea totino telaa e manako au kiei (eg Ika, tupa)

☐ Mafai au se fiafia kise tino ite Kaupule io mese aliki o toku fenua

☐ Mafai e iloa neau mene isi ne tino ne poa I motutapu kae se fakasala

☐ Mafai ko masei a aso

☐ Mafai seai se tino e lavea ne ia au ka faika/ puke se mea ite Motu/Koga tapu

☐ Mafai e lavea ne au me isi ne tino e nofo mai kae faika/puke mea ite Koga tapu

☐ Mafai ko faigata te salaga o ika io mene isi maumea aka foki mo kai toku kaiga

☐ Mafai ate Motu/Koga tapu e tuu i luga i toku te fenua tonu

☐ Mafai ate Koga Tapu e pule kae tausi nete sua fenua

☐ Mafai ko manako au ke togi ne ika/Uu/isi mea aka ke maua aku sene fakavave

☐ Se fiafia au o fano o faika io me puke se mea mai I Motu/Koga tapu

### **TALI FAKAVASEGA**

**Fakamolemole, fakaasi mai me pefea te Lago mote Se Lago o koe i fakamunaaga takitasi ite taipola mai lalo nei.**

*(Fakasao e 1 fua te pokisi i tau tali E LOTO io ME LAGO koe kiei)*

FAKAMUNAAGA	Lago malosi 1	Lago malie fua 2	Seiloa tonu 3	Se Lago 4	Se taitai o lago 5
1 E fakamaumau taimi fua a polokalame ke puipui kae tausi fakalei a maumea totino I toku fenua.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2 A polokalame ke tausi fakalei a maumea ite tai mote laukele I toku fenua e lavea atu me aogaa	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3 A polokalame k e tausi fakalei a maumea ite tai mote laukele I toku fenua e SE MALOSI?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4 Fakapotopotoga kesekese I toku fenua e tau o aofia ite faiga/fakaikuga o tonu kite puipuiga o maumea ite tai mote laukele I toku fenua?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5 A tino tonu o sose fenua (se aofia iei a fapotopotoga mo tino mai i nisi atufenua) io latou te tiute o tausi fakalei olotou maumea ite tai/laukele?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6 Ate Maloo I sose fenua koia e tau o fakatele ne ia a polokalame kite atafai fakelei o maumea totino I loo o fakapotopotoga kesekese Ite fenua?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7 Koi mafai loa toku fenua o fakana, fakalagolago ki ana poto, iloga mo faifaiga I aso taumua mo puipui kae atafai ana maumea ite tai mote laukele I toku fenua tonu?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8 A poto foou mo faifaiga foou mai I saienitisi (tino poto) ese fakatuagagina mo puipui kae atafai fakalei a maumea totino ite tai mote laukele I toku fenua tonu?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

9 E tau o isi ne tulafono mo fakasalaga malosi o faite mo puipui kae atafai fakalei a maumea ite tai mote laukele I toku fenua?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>FAKAMUNAAGA</b>	<b>Lago malosi</b>	<b>Lago malie fua</b>	<b>Seiloa tonu</b>	<b>Se Lago</b>	<b>Se taitai o lago</b>
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
10 Te Kaupule I toku fenua tonu e lei kii ana fakatokaga o fakasala tino kolaa e maua atu e soli tulafono o Motu/Koga Tapu I toku fenua tonu.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11 Kafai e faopoopo e 2 io me silia atu a koga puipui mo atafai maumea ite tai mote laukele i tou fenua tonu. Sea tau fakatau kiei?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12 E faigofie kii loa o poa a tino e olo o puke funa a mea I loto I Motu/Koga Tapu I toku fenua tonu.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13 E lipooti ne koe mafai e matea tonu ne koe se tino e puke funa ne ia mea ite Motu/Koga tapu i TOU fenua tonu.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14 E lipooti ne koe mafai e matea tonu ne koe se tino e puke funa ne mea ite Motu/Koga Tapu ote SUA fenua.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15 A te fakasalalau ite Leo Tuvalu o igoa o tino e soli tulafonomea i Koga/Motu se auala e mafai o fakafoliki ote puke o mea i Koga/Motu Tapu?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**\*\*Fakamalo lasi atu!! Ko oko mai koe kite fakaotiiga ote savea...Fakafetai lasi\*\***



**\*\* Fakafetai lasi lasi \*\***