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TUVALU: CLIMATE CHANGE AND MIGRATION
RELATIONSHIPS BETWEEN HOUSEHOLD VULNERABILITY,
HUMAN MOBILITY AND CLIMATE CHANGE

**REPORT
NO. 18**

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Acronyms

ABM	Agent Based Model	RCP	Representative Concentration Pathways
AOSIS	Association of Small Island Developing States	RSE	Recognized Seasonal Employers
CANCC	Coalition of Low Lying Atoll Nations on Climate Change	SDGs	Sustainable Development Goals
CSIRO	Commonwealth Scientific and Industrial Research Organisation	SPC	Secretariat of the Pacific Community
ESCAP	Economic and Social Commission for Asia and the Pacific	SPTT	South Pacific Tuna Treaty
GCF	Green Climate Fund	SWP	Seasonal Worker Program
GDP	Gross Domestic Product	TCCMM	Tuvalu Climate Change Migration Model
GEF	Global Environmental Facility	TDHS	Tuvalu Demographic and Health Survey
GHG	Greenhouse Gases	TEC	Tuvalu Electrical Cooperation
ILO	International Labour Organization	UNDP	United Nations Development Programme
IOM	International Organization for Migration	UNFCCC	United Nations Framework Convention on Climate Change
IPCC	Intergovernmental Panel on Climate Change	UNFPA	United Nations Population Fund
OHCHR	Office of the United Nations High Commissioner for Human Rights	UNU-EHS	United Nations University Institute for Environment and Human Security
NAP	National Adaptation Plan	USP	University of the South Pacific
PAC	Pacific Access Category		
PNA	Parties to the Nauru Agreement		
PRA	Participatory Research Approach		

Glossary

Agent Based Model	A research tool from computer science used to simulate social interaction	Participatory Research	A group of qualitative research tools which place people at the centre of the investigation
Climate Change Adaptation	The process whereby people, communities and institutions respond to the impacts of climate change	Relocation	A policy of planned resettlement of a community to a less risky place
Disaster Risk Reduction	The process through which exposure and vulnerability to disasters is diminished	Remittances	Flows of money sent from migrants to their families, one of the main reasons to move
Displacement	The process in which people are forced to move from their normal place of residence due to a change in the political, social, economic or environmental situation	Resilience	The ability of a community or system to absorb shocks
Environmental Migration	Movement which is directly caused by environmental change	Theory of Planned Behavior	A decision making model which posits that decisions are taken as a result of attitudes, peer pressure and the ability to manifest the decision
Exposure	The condition of being physically present in an area which could be impacted by hazards	Trapped Populations	Groups of people who are affected by a changing environment, but are unable to leave
Q methodology	A research method which seeks to gain an understanding of shared attitudes or perspectives on a particular issue	Voluntary Migration	Movements in which people were not forced to move, but chose to do so
		Vulnerability	The propensity to be affected by climate change, related to underlying socio-economic, demographic, political and cultural processes and conditions



Executive summary

The main goals of the Pacific Climate Change and Migration (PCCM) project are twofold:

- To increase protection of individuals and communities that are vulnerable to climate change displacement and migration through targeted national and regional policies; and
- To increase labour mobility opportunities for Pacific Islanders, through well-managed labour migration schemes.

The objective of the study is to build institutional capacity and knowledge to enable Tuvalu to better plan and manage the impacts of climate change on migration. Specifically, through developing migration indicators, providing information on labour migration and gathering data on community attitudes to climate change-related migration, the report can contribute to the development of climate change responses and national action strategies to mitigate the risk of displacement and enhance national capacity to effectively participate in regional, bilateral and global schemes on labour migration.

To this end, the current report presents the results of the first nationally representative empirical study of relationships between household vulnerability, human mobility and climate change in the Pacific. Findings are based upon quantitative and qualitative fieldwork carried out in Tuvalu during the early part of 2015 by researchers from the United Nations University (UNU), the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) and the University of the South Pacific (USP). Project fieldwork involved implementation

of a total of 320 household surveys in Funafuti (170), Nanumea (70), and Vaitupu (80). Participatory Research Approach (PRA) tools and a Q study were used to complement the overall analysis. The results from the fieldwork were used to build an agent based model (ABM) to project future flows of migration within and out of Tuvalu.



Key Findings

Climate related environmental hazards are already affecting households and livelihoods in Tuvalu

Ninety-seven per cent of household survey respondents in Tuvalu reported that they had been impacted by natural hazards between 2005 and 2015, with droughts and irregular rains impacting almost 90 per cent. Sea-level rise, floods and saltwater intrusion reportedly also affected the vast majority of households involved in the survey. People living on the outer islands were more likely to have been affected than people living in Funafuti.

Both internal and international migration is a common experience in Tuvalu. Some migration is triggered by environmental risks

Members of approximately three quarters of participating Tuvalu households migrated in the 10 years preceding the 2015 survey. Over half of all movements were to international destinations (54%) – primarily from Funafuti to Fiji and New Zealand. Internal migration was also common (43%). Seafaring, undertaken exclusively by men, accounted for just 3 per cent of all movements. Migrants from Funafuti are much more likely to have migrated internationally than internally in the decade prior to the survey, while migrants from the outer islands were more likely to have migrated internally than internationally. Some 41 per cent of migrants moved to acquire educational advancement, while 32 per cent moved to acquire employment. Environmental factors appear to have triggered 9 per cent of all reported movements.

Migrant households are less vulnerable than non-migrant households. This could relate to the importance of remittances enabling adaptation

Households in which one or more members migrated during the decade prior to the survey are on average less vulnerable than households in which migration did not occur at all. Households in which one or members migrated internationally tend to be less vulnerable than those in which household members migrated within Tuvalu. Notably, households receiving remittances from internal migrants report lower average incomes than those receiving remittances from international migrants.

Migration experiences of women and men are different

Men and women migrate in approximately equal numbers. However, men are more likely to migrate for work, whereas women are more likely to migrate to advance their education. Given the limited number of regional institutions through which Tuvaluans can readily pursue an education, men tend to migrate to a wider range of destinations. Migration decisions affecting women are sometimes made by male members of the household.

There is unmet demand for migration

While one or more persons in 73 per cent of households experienced migration during the 10 years preceding the survey, eight per cent of the surveyed population reported both an interest in migrating and an inability to do so. The main reason for the desire to migrate not being realized was a

lack of money, accounting for half of all instances. These potential migrants were from households with below average incomes. These households were more vulnerable than both migrant and non-migrant households.

Future migration is likely to be influenced by environmental change and household economics

The majority of surveyed household respondents feel that migration would be a necessary strategy if climate change impacts worsen their basic living conditions. Environmental factors thought likely to trigger future migration include: sea-level rise (76 % of respondents), saltwater intrusion (74%), drought (72%), and floods (71 %). When considering their own ability to migrate in the future, only 53 per cent of surveyed householders perceived that they would be able to afford the process.

Modelling clearly indicates the potential for significant future increases in migration both within Tuvalu and internationally.

The Agent-Based Model (ABM) simulates migration trends through 2055 under various climate change scenarios. Model runs indicate that by the year 2055, internal migration could increase by as much as 87 per cent, and international migration could more than double. The population of Funafuti has increased dramatically during the last two decades as a result of high birth rates and high rates of internal migration. This is placing stress on the local infrastructure and environment. According to the model, by 2055, a natural increase in the population of Funafuti will combine with in-migration to result in a 25 per cent rise in the population of Funafuti. This could significantly worsen conditions in the capital.

Policy Implications and Recommendations

1. The integration of disaster risk reduction and climate change adaptation measures should continue in Tuvalu's development policies and processes

Given its particularly low elevation and an economy based largely on agriculture and fisheries, Tuvalu is likely to be significantly affected by a range of climate change impacts. As such, in-depth assessment of climate change exposure, vulnerability and the potential for displacement of resident populations around the islands is sorely needed. Such assessment should inform the implementation of disaster risk reduction measures and climate change adaptation strategies, all of which should be thoroughly integrated into Tuvalu's strategies to achieve the 2030 Agenda for Sustainable Development and advanced through involvement in the Small Island Developing States Accelerated Modalities of Action (Samoa Pathway).

2. Migration is a common event and should be promoted. Further research is warranted on all forms of environmentally related migration

Both international and internal migration are fairly common events among Tuvaluan households. International migration appears to be associated with greater household income and reduced vulnerability, whereas internal migration appears to be related to relatively less income and higher levels of vulnerability. Meanwhile, local measures for adapting to climate change, such as retrofitting homes, is more likely to be undertaken by households in which one or more members have migrated. This is especially true on the outer islands.

This suggests remittances might be used to facilitate adaptation. While some degree of environmentally-induced migration appears to be taking place around Tuvalu, further examination of this issue is essential for effective planning and policy development. Steps should also be taken to enable those householders who decide not to migrate to live sustainably where they are.

3. Internal migration is mainly to Funafuti. In the absence of mitigating actions, additional urbanization will cause further environmental stress

At present, the vast majority of internal migration is to Funafuti, which is exacerbating social and environmental problems in the capital. The population of Funafuti has increased rapidly over the past few decades and many residents are struggling to cope with limited space, diminishing water supplies and inferior infrastructure. The ABM projects that under current population growth rates and projected climate change, flows of people from the outer islands to Funafuti will further strain scarce resources which are projected to become even scarcer under climate change scenarios. This highlights the need for disaster risk reduction and climate change adaptation measures, along with implementation of a holistic development plan for both Funafuti and the outer islands.

4. The promotion and management of international mobility could facilitate migration with dignity

International migration from both Funafuti and the outer islands has great potential for relieving social and environmental problems in the capital. This calls for measures that would improve the capacity of Tuvaluans to compete in international labour markets. Expanded bilateral agreements that would facilitate higher rates of international mobility are also called for. Tuvalu would benefit from expansion of the existing seasonal work programmes offered by Australia and New Zealand. In summary, various steps should be taken to prepare migrating Tuvaluans for life abroad.

5. Policy action can reduce the number of vulnerable and trapped people

Not being able to migrate has the potential to lead to a vicious circle in which households cannot benefit from a diversification of livelihoods, boost incomes through remittances or generate funds needed to adapt to changing environmental conditions. This challenging situation is likely to intensify as climate change impacts worsen. Steps need to be taken to reduce the initial expense of international migration so that ongoing economic benefits may be experienced and climate change impacts can be reduced over time. With regard to gender, the proportion of women who migrate is slightly less than that of men, and their destinations tend to be different. Thorough examination of any obstacles that may be preventing Tuvaluan women from migrating abroad is crucial to the future of the nation.

6. Further regional integration will strengthen Tuvalu's ability to adapt to climate change and facilitate migration

The Samoa Pathway, established in 2014, emphasizes the importance of developing and maintaining effective climate change response partnerships at all levels. Tuvalu is presently undertaking such partnerships through the Association of

Small Island States (AOSIS), the Pacific Network on Climate Change Migration, Displacement, and Resettlement, and the Coalition of Low Lying Atoll Nations on Climate Change (CANCC), among others.

7. The United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement was a qualified success for Tuvalu and presents opportunities for adaptation finance

Despite the target for global warming being set at 2°C, as opposed to 1.5°C, the Paris Agreement of December 2015 has positive implications for the people of Tuvalu. Although the agreement did not directly address the legal status of people displaced by the adverse impacts of climate change, it did call for the establishment of a task force “to develop recommendations for integrated approaches to avert, minimize and address displacement related to the adverse impacts of climate change” (UNFCCC, 2015). For the first time, the UNFCCC achieved consensus on the need for climate change adaptation and funding opportunities that can assist residents of Small Island Developing States to adapt to a rapidly changing climate. A key priority for Tuvalu is rapid development of capacity for accessing such funds and subsequent movement toward human rights-based, gender-sensitive and forward-looking approaches to migration.







1. Background

1.1 Climate change and migration: global context

It remains contested whether the negative impacts of climate change on livelihoods will lead to migration in the upcoming decades. Since 1990, the idea has developed that climate change will result in marginal environments that will trigger millions to engage in internal and international migration in search of more secure livelihoods (Lonergan, 1998). These flows would raise new challenges in fields like planning, social policy and security, leading the international community to strive for a better understanding of the relationship between climate change, environmental change and migration. Authors of the Foresight Report (2011) examined the climate change migration literature and determined that climate change can reduce resources available to people who need or desire to migrate (see also Piguet, 2013). As such, only those households who can access the necessary financial resources, social networks or alternative livelihoods are likely to be able to migrate independently. Conversely, the most vulnerable members of society are more likely to lack the capacity to move when environments deteriorate – such persons may be left behind or forced to resettle later (Warner and Laczko, 2008). This finding sparked subsequent research on the topic of “trapped” populations (Black and Collyer, 2014; Milan and Ruano, 2014; Warner and Afifi, 2014) and demonstrated the need for national and international policy options that would reduce the challenges experienced by such populations (Warner et al., 2013; Warner et al., 2014).

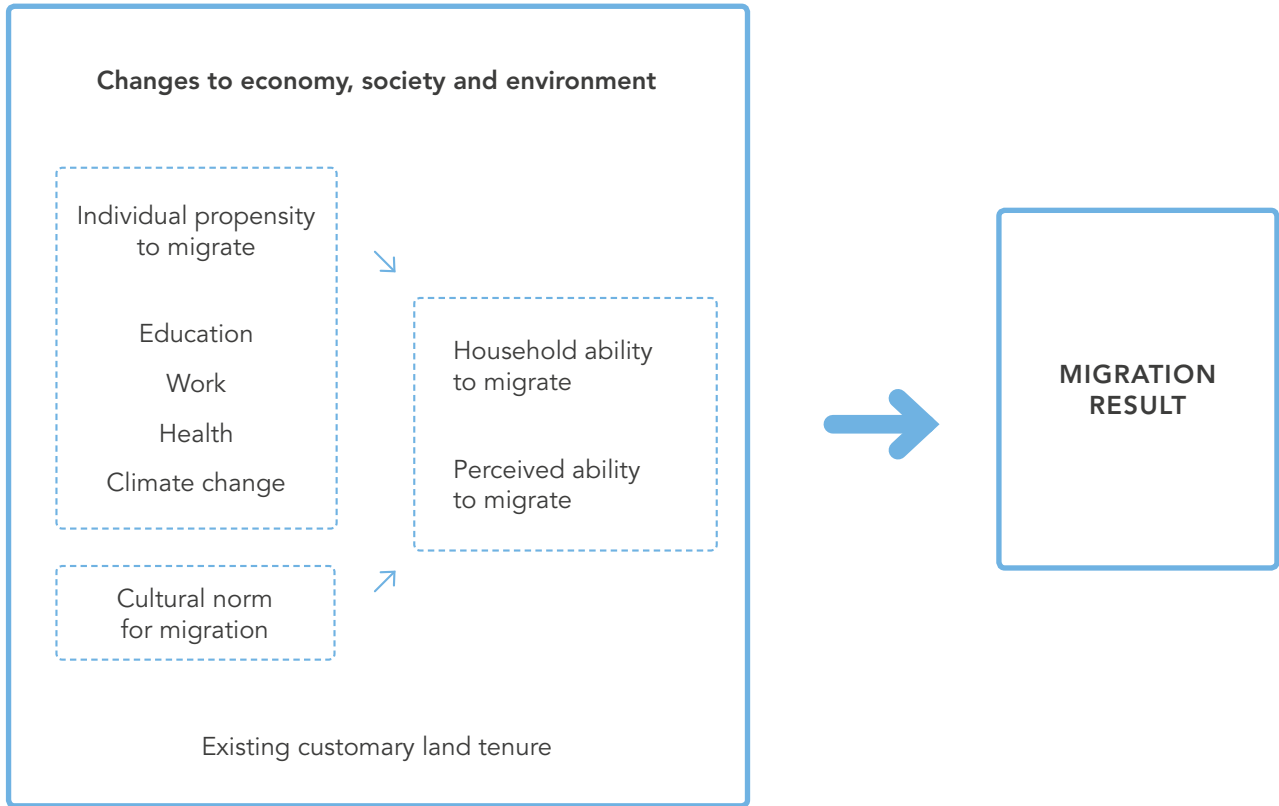


Figure 1: Conceptualization of migration decision making

Source: Adapted from Fishbein and Ajzen (1980)

Defining environmental migration

The International Organization for Migration (IOM, 2007) defines environmentally related migration as "...persons or groups of persons who, predominantly for reasons of sudden or progressive change in the environment that adversely affects their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move either within their country or abroad."

There are three main types of environmentally related mobility: voluntary migration, displacement and planned relocation (Warner et al., 2013). Voluntary migration involves a degree of choice in how and when to move. Displacement refers to the process when persons are forced from their homes as a direct result of slow or quick onset events. Planned relocation involves resettlement in new areas when staying in place is no longer a viable option.

and on influences exerted through one's social network (cultural norm for migration). The level of household vulnerability determines whether the household is able to fulfil the need or desire to move (objective ability). However, possessing sufficient funds, skills and education and the ability to obtain a visa, are not necessarily sufficient for individuals to move - such persons must also be convinced that they are able to do so (subjective or perceived ability) (Smith, 2014).

1.2 Framework of study

The study described in this report takes the view that migration decisions are made at a household-level (Stark and Bloom, 1985), and that such decisions are influenced by individual preferences and attitudes (Smith, 2014; Warner and Afifi, 2014). The project builds on the theory of planned behaviour, which conceptualizes decisions as evolving from a combination of individual and community attitudes combined with the ability to manifest a decision (Ajzen, 1980). The desire to migrate depends on a given individual's propensity to migrate for education, work, health or environment-related reasons,





2. Country context

2.1 Physical geography and environment

Tuvalu is located in the southwest Pacific Ocean. It is one of the world's smallest and most isolated island nations and comprises nine inhabited atolls and reef islands covering 500,000 km²: Funafuti (capital), Nanumaga, Nanumea, Niulakita, Niutao, Nui, Nukulaelae, Nukufetau and Vaitupu. The total land area is 26 km² with the highest elevation being five metres above sea level (Government of Tuvalu, 2011; Campbell & Warrick, 2014). Five of the islands (Funafuti, Nukufetau, Nukulaelae, Nui, and Nanumea) consist of large lagoons enclosed by coral reef. The other four islands are composed of pinnacles of land rising up from the seabed.

There are no streams or rivers in Tuvalu. Therefore, the principal sources of water are rainwater catchment, groundwater wells which tap into the freshwater lens and desalination (SPC, 2007). During periods of drought, the freshwater lens is often depleted (Mortreux & Barnett, 2008). Tuvalu experiences a hot and humid tropical climate, with a rainy season from November to April and a dry season from May to October. The mean maximum and minimum temperatures are 31°C and 25°C, respectively. Mean annual rainfall is approximately 3,400mm in the south of Tuvalu, including Funafuti, and 2,900mm in the north, including Nanumea, which has a shorter rainy season (Secretariat of the Pacific Community, 2005).

Cyclone Pam

Although cyclones may decrease in frequency due to climate change, it is likely that there will be more storms of higher intensity. Moreover, under conditions of accelerating sea level rise, storm-related flooding will become more intense.

Pam was a Category 5 cyclone that impacted Tuvalu in February 2015. The main damage resulted from the storm surge – water pushed over the islands by intense winds and extremely low barometric pressures.

The surge generated USD92 million in damage to infrastructure and crops around the country and temporarily displaced many residents. The entirety of Nui was flooded, its water sources were contaminated and the island was cut off from the rest of the world for three days.

2.2 Climate change projections for Tuvalu

Most climate models project an increase of around 1°C in global mean temperature by 2055, and a rise of more than 2.5°C by 2090. The intensity and frequency of days of extreme heat are also expected to increase throughout the 21st century. Models project an increase in sea levels of around 5–15cm by 2030, and 20–60cm by 2090. Winds and waves caused by weather phenomena will continue to provoke extreme sea-level events (Australian Bureau of Meteorology and CSIRO, 2014).

The intensity and frequency of days of extreme rainfall are also expected to rise. Extreme rainfall can result in salt water contamination of the fresh groundwater lens. Rising ocean temperatures and ocean acidification caused by increased uptake of carbon dioxide are expected to cause extensive destruction of coral reefs and diminish marine biodiversity. Agricultural production may fall in terms of crop yields due to salinization and increased transpiration, making food production costlier (UNDP et al., 2007). The incidence of tropical cyclones is expected to decline, although intensity could increase through the 21st century (Australian Bureau of Meteorology and CSIRO, 2014). Funafuti has been highlighted as a hotspot for climate change impacts due to its high population density and risks of coastal erosion,

inundation and threats to its supply of clean water (Campbell & Warwick 2014).

2.3 Demographics

The 2012 Tuvalu Census enumerated a total of 10,837 residents, an increase of 1,276 persons (+13.3%) compared with the 2002 figure – in line with a long-term trend of population growth (Tuvalu Central Statistics Division, 2015). Table 1 (p. 24) shows that over 57 per cent of all Tuvaluans were residing in the various communities of Funafuti in 2012, while in 2002, only 47 per cent of the population lived there. The increase is, due in large part, to in-migration from communities on the outer islands. Vaitupu, the location of the only secondary school in the country, was the second most populous island in Tuvalu in 2012, with 1,565 inhabitants or 14.4 per cent of the nation's population (Tuvalu Central Statistics Division, 2015).

Tuvalu has a young population with a median age of only 24.1 years. Roughly one-third of the population is under 15. Life expectancy at birth today is 65.3 years for men and 71.1 years for women, similar to the region as a whole (World Bank, 2016). The population pyramid (fig 3, p. 25) is representative of

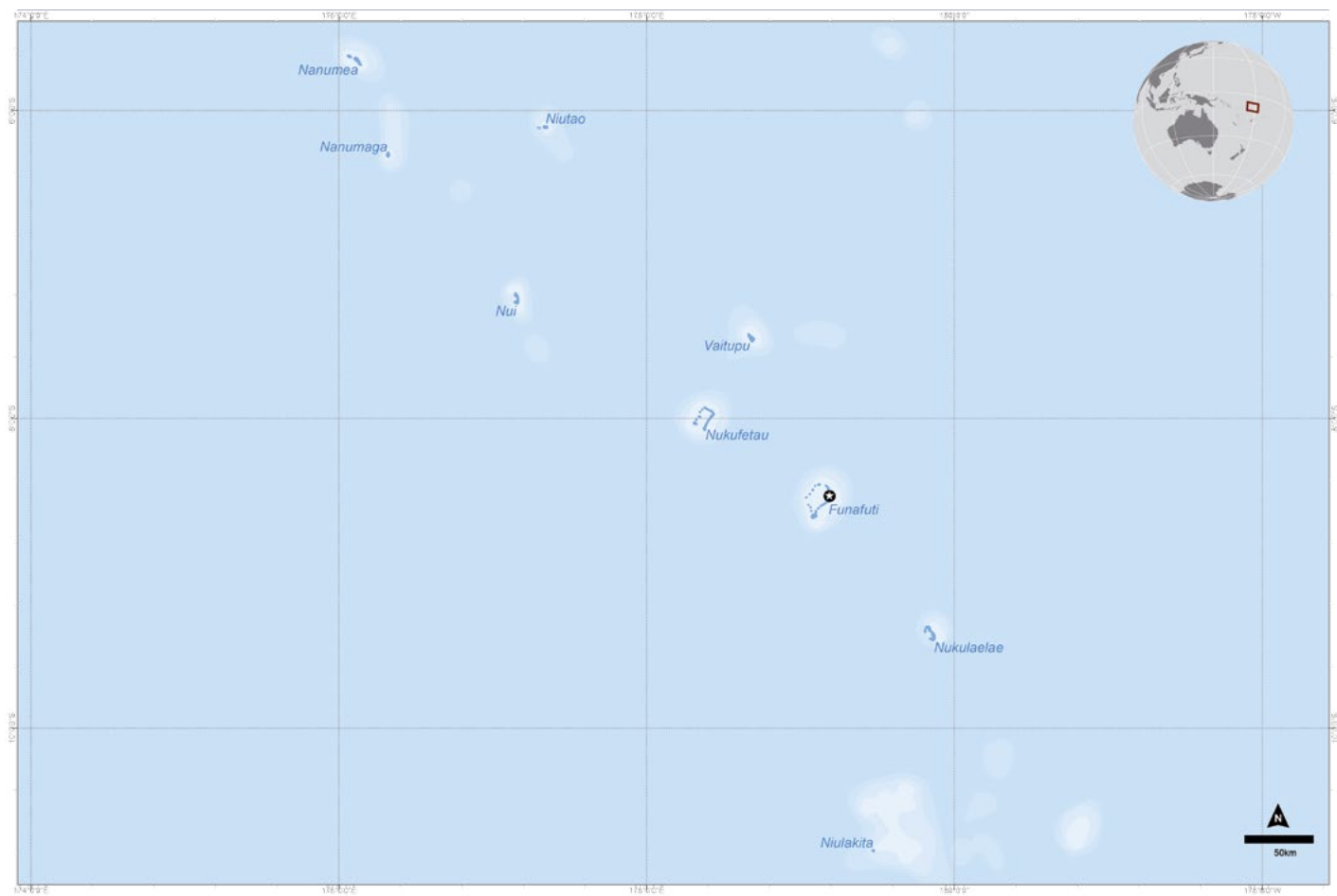


Figure 2: Location of Tuvalu in the South Pacific

Source: UNOCHA Fiji (2016). The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

ATOLLS/ISLAND COMMUNITIES	AREA (KM ²)	POPULATION 2002	POPULATION 2012	2002-2012 GROWTH RATE
Nanumaga	2.78	589	481	-18.34%
Nanumea	3.87	664	556	-16.27%
Nui	2.83	548	541	-1.28%
Nukufetau	2.99	586	540	-7.85%
Nukulaelae	1.82	393	324	-17.56%
Niulakita	0.42	35	30	-14.29%
Niutao	2.53	663	606	-8.6%
Vaitupu	5.6	1,591	1,565	-1.63%
Total Outer Islands	22.8	5,069	4,643	-11.96%
Funafuti	2.79	4,492	6,194	37.89%
Total population (Outer Islands and Funafuti)	25.6	9561	10,837	13.35%

Table 1: Total population by Outer Islands and Funafuti

Source: Tuvalu (2002; 2015)

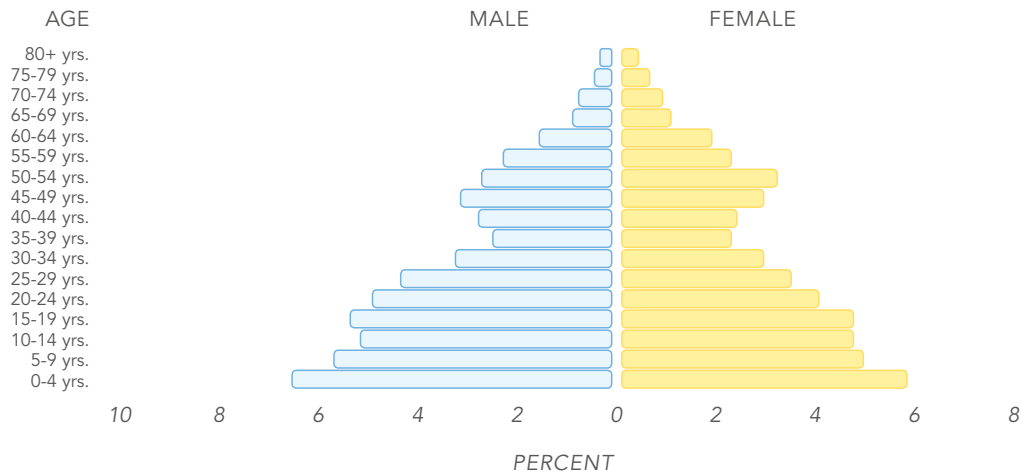


Figure 3: Population pyramid for Tuvalu

Source: Tuvalu (2015)

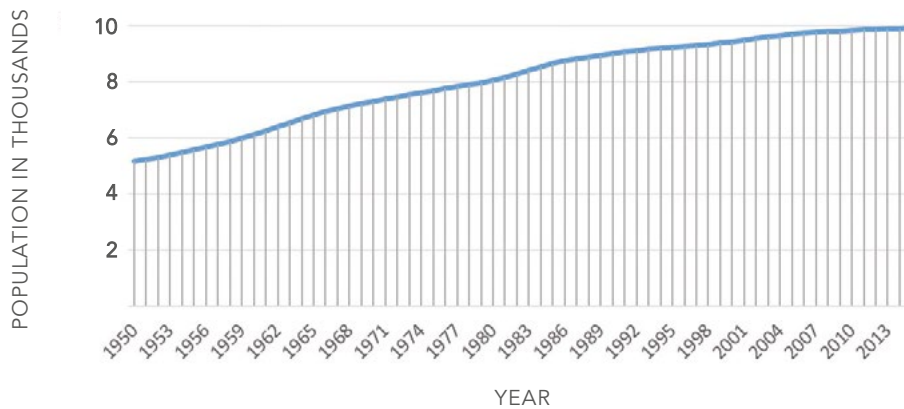


Figure 4: Population of Tuvalu from 1950-2015

Source: UNFPA (2015)

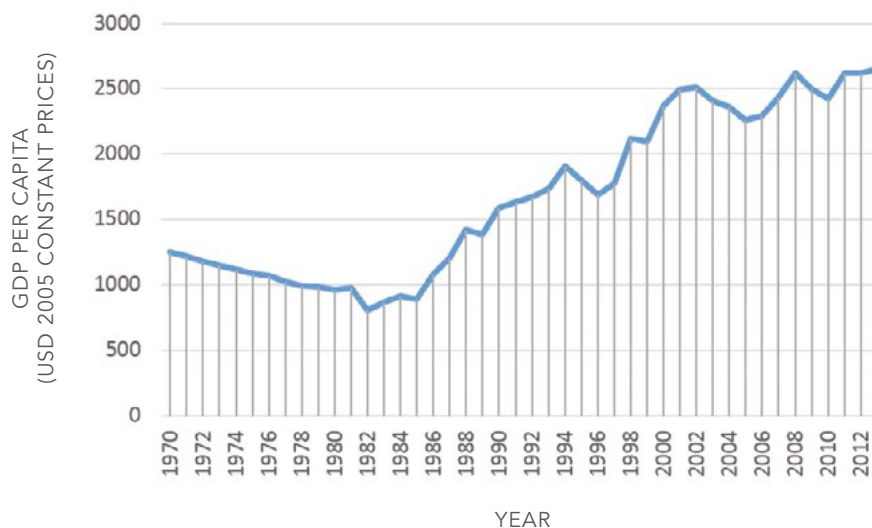


Figure 5: GDP per capita of Tuvalu from 1970-2015

Source: ESCAP (2015)

a developing country going through the demographic transition with a wide base showing a high birth rate (23.11 per 1,000) and a narrow peak indicating high mortality. It also indicates significant levels of migration because the numbers of people in their thirties is relatively low. The population of Tuvalu has risen steadily from the middle of the 20th century, although the rate of growth has slowed in recent decades (fig. 4, p. 25).

2.4 Socio-economic context

The per capita GDP has increased quite steadily since the early 1980's, but as figure 5 shows, Tuvaluan incomes are affected

by economic shocks. In 2010, 26.6 per cent of the population was living below the national poverty line (World Bank 2016). The remote location of this island nation makes imports, exports and tourism costly (World Bank, 2015). Furthermore, environmental challenges increasingly pressure the already constrained and small domestic economy. As a consequence of challenges to economic development, Tuvalu relies heavily on overseas migrant income, other off-shore sources of income and various aid flows. Despite these constraints, Tuvalu performs relatively well on certain key human indicators such as access to health services and formal education (which is almost universal), and an adult literacy rate which reaches 99% (World Bank, 2015).



Agriculture and fisheries are the principal economic activities which together account for 60 per cent of Tuvalu's GDP (World Bank, 2015). The country has fishing license agreements with Taiwan, Japan, Korea and New Zealand and with the United States via the South Pacific Tuna Treaty (SPTT), and as a participant of the Parties to the Nauru Agreement (PNA). The 2014 revision to the PNA Vessel Days Scheme increased fees for tuna fishing, which considerably increased Tuvalu's revenue from its marine resources (PNA, 2014).

Tuvalu experiences sporadic outbreaks of mosquito-borne dengue fever (SPC, 2007). Tuvaluans are prone to heart disease, diabetes and kidney failure, leading causes of mortality in the country. The country has successfully set in place different initiatives to address HIV/AIDS and tuberculosis. The traditional diet is comprised largely of seafood and the products of subsistence agriculture. Crops include coconut, taro, swamp taro (pulaka), breadfruit, bananas and pawpaw. Livestock include pigs, chicken and ducks (SPC, 2007; Mortreux & Barnett, 2008). Imported foods are increasingly consumed.

2.5 Gender

Women constitute 78 per cent of the labour force in the subsistence economy but only 37 per cent of the formal employment sector (World Bank, 2015). Furthermore, about 60 per cent of employed women in the Tuvalu Demographic and Health Survey (TDHS) earned less than their partners (TDHS, 2007). Women are still predominantly perceived as caregivers and responsible for domestic duties (SPC, 2013). Women in Funafuti tend to have achieved higher levels of education than those living on the outer islands (UNFPA,

2015). Tuvaluan law grants equal opportunities for men and women; however, there is a disparity in Parliamentary representation and participation in government. Between 1986 and 1993, only one woman was elected to the Parliament, and subsequent Parliaments consisted only of men, until 2011 when a woman was appointed as Minister of Home Affairs. Women are usually not allowed to attend the decision-making meetings of the Falekaupule (local government). The government has drafted laws to modify this rule, authorizing women to participate on an equal footing (UNFPA, 2015).

2.6 Migration within and out of Tuvalu

Tuvalu is a country of net emigration. According to the 2012 census, 2,273 Tuvaluans were born overseas, accounting for 21 per cent of the total population. However, 95 per cent of such persons consider Tuvalu their 'home'. The three main countries of birth were Kiribati, Nauru and Fiji (UNFPA, 2015). Significant circulation exists between Tuvalu and Fiji which is the main destination of Tuvaluan shipping and offers hospitals and tertiary education. Furthermore, Fiji was the destination of a few hundred Vaitupuans who, due to their expanding population, shortage of land and financial status, bought and migrated to the Fijian Island of Kioia in 1947. Tuvaluans living on Kioia were naturalized by Fiji after a decades' long struggle in the 2000's (Bedford et al. 2014).

Since the 1980's, several working schemes have enabled Tuvaluans to be seasonally employed overseas. The Pacific Access Category (PAC) was initiated in 2002 and allows an annual quota of migrants (up to 75 for Tuvalu) from Pacific Island countries to enter New Zealand and work with a residence permit. Registration depends on fulfilling requirements such as English fluency and selection is done by ballot. Another measure created to enable managed access for

Tuvaluans and other Pacific islanders to New Zealand was the Recognized Seasonal Employers scheme (RSE), established in 2007. In 2013-2014, 70 Tuvaluan workers left to work under this scheme (World Bank, 2015). Women have been preferred by some employers, especially for back-of-house work as they are often considered more disciplined than men (World Bank, 2015).

Tuvaluans are also eligible for temporary migration to Australia under the Seasonal Worker Program (SWP). Between December 2013 and May 2014, 10 workers were recruited through the SWP (World Bank, 2015). Work is mainly in sectors where there is a shortage of labour supply in Australia: horticulture, accommodation services, aquaculture and cotton and sugar cane production (Doyle & Howes, 2015). Non-farming sectors in Australia and New Zealand are currently under consideration for the RSE and SWP schemes. These initiatives offer an opportunity to address unemployment, develop skills and stimulate growth in Tuvalu through remittances (Bedford et al. 2014; Doyle & Howes, 2015). A new five year pilot programme will allow up to 200 Tuvaluan, I-Kiribati, and Nauruan citizens to access multi-year visas for employment in Northern Australia (Australian Office of the Chief Trade Advisor, 2016).

Worth AUD4 million and accounting for more than 15 per cent of GDP between 1998 and 2006, work in international shipping (seafaring) is a very important economic sector for Tuvalu, representing the main source of income for about 30 per cent of households (World Bank, 2015). Starting in the 1960's, 250 to 300 seafarers per year were recruited to work on ships, peaking to a yearly amount of about 400 in the mid-2000's. This number has fallen to less than 100 per year, mostly because of the global financial crisis. However, the number of trained seafarers who could potentially work in the sector is estimated to be between 800 and 1,000 (World Bank, 2015).

2.7 Remittances

Remittances are a key driver of the Tuvaluan economy and among the main reasons why people leave Tuvalu for work abroad (Bedford and Hugo, 2012). In the 1970's, about a third of Tuvaluans were employed as workers in the mines of Banaba (Kiribati) and Nauru and consistently sent a portion of their earnings to families at home. Before the turn of the millennium, remittances accounted for a third of Tuvalu's GDP. This figure diminished in the early 2000's when the source of phosphate on both islands was depleted and the mines closed down (UNFPA, 2015). The 2012 census revealed that around 40 per cent of Tuvalu's households had received remittances over the previous year. About 20 per cent had received remittances solely from outside of Tuvalu, eight per cent from within and outside Tuvalu, and 12 per cent solely from within the nation. Total remittances have decreased since the 2002 census, when half of the households had received remittances during the previous year. Nowadays, remittances come mainly from seafarers, seasonal workers participating in the Recognized Seasonal Employer (RSE) Scheme and Seasonal Worker Program (SWP), and from Tuvaluans who have migrated permanently overseas (UNFPA, 2015; World Bank, 2015).





3. Methodology

This section offers a brief overview of the aims and methodology underlying this research. Further details are included in the Annex, which has been published as a separate document and is available online at <http://collections.unu.edu/view/UNU:5856>.

3.1 Household survey

A representative sample of the population was interviewed through a household survey. The original materials were produced in English and then translated into Tuvaluan. The survey produced household-level data in order to investigate the relationship between household vulnerability and migration. UNU-EHS and UNESCAP trained and guided local enumerators from the University of the South Pacific (USP) who interviewed a total of 320 household representatives in Tuvaluan. A combination of stratified and opportunistic sampling was used. Three islands were sampled: the capital Funafuti, Vaitupu and Nanumea. Within these three islands, several communities were sampled to provide data. Within the communities, due to time and budgetary constraints, households were approached. The enumerators knocked on the doors of homesteads and asked to speak to the head of the household. If the head was not available, an adult was asked to partake in the survey. In the following section, the results are presented for Funafuti and the outer islands, of which Nanumea and Vaitupu are deemed to be representative. Weighting was used to account for the relative populations of the Funafuti and the outer islands. The household representa-

	HOUSEHOLDS ACCORDING TO 2012 CENSUS	HOUSEHOLDS SURVEYED
Funafuti	846	170
Nanumea	114	70
Vaitupu	227	80
All households in Tuvalu	1,764	320

Table 2: Distribution of the sample by island

Source: Tuvalu (2015)

tives provided information and migration histories of a total of 2,807 individuals who are currently part of a household on Tuvalu, representing 25.9 per cent of the total population according to the 2012 census. However, if an entire household migrated out of Tuvalu they would not show up in the survey. Likewise, if an individual is no longer deemed to be part of a household (perhaps they have set up their own household) they are not included in the data.

Household vulnerability was calculated through a correlation-sensitive multidimensional vulnerability index based on the Correlation Sensitive Poverty Index (Rippin, 2011; Rippin, 2012). The index consists of six dimensions: economic situation, education, health, housing, connectivity and community and social networks. A high value in the index

indicates high vulnerability. The nominal values of vulnerability only make sense when compared with other vulnerability values. Thus, a single vulnerability value does not allow judging the severity of the vulnerability ("high" or "low"). Therefore, for better readability, the numerical vulnerability values have been omitted from the illustrations of this report. Details on the vulnerability index are included in the annex.

3.2 Qualitative analysis

Fieldwork included a Participatory Research Approach (PRA) which aimed at complementing household survey data with

information at the community level and to ensure that local perspectives were sufficiently represented. PRA Sessions were carried out in order to better understand livelihood risks, migration decision making and the institutions and organizations which could help with migration. Additionally, a “Q” study (Brown, 1980) was conducted with 26 of the household representatives to gain a deep understanding of the range of shared attitudes on climate change and migration. Due to time constraints, the Q study was conducted only with participants on Funafuti; therefore the findings apply only to this area.

3.3 Modelling migration

An ABM was designed to investigate future migration flows within and from Tuvalu from 2015 to 2055. There are two interrelated ways through which the desire of an agent to migrate is built into the model: the agent’s propensity to migrate as well as peer pressure from his or her social networks. Whether the desire to migrate results in migration depends on the vulnerability of the agent’s household which is calculated through the vulnerability index. The index acts as a proxy to determine whether the agent has the necessary funds, contacts, and other requirements needed to implement the migration decision.



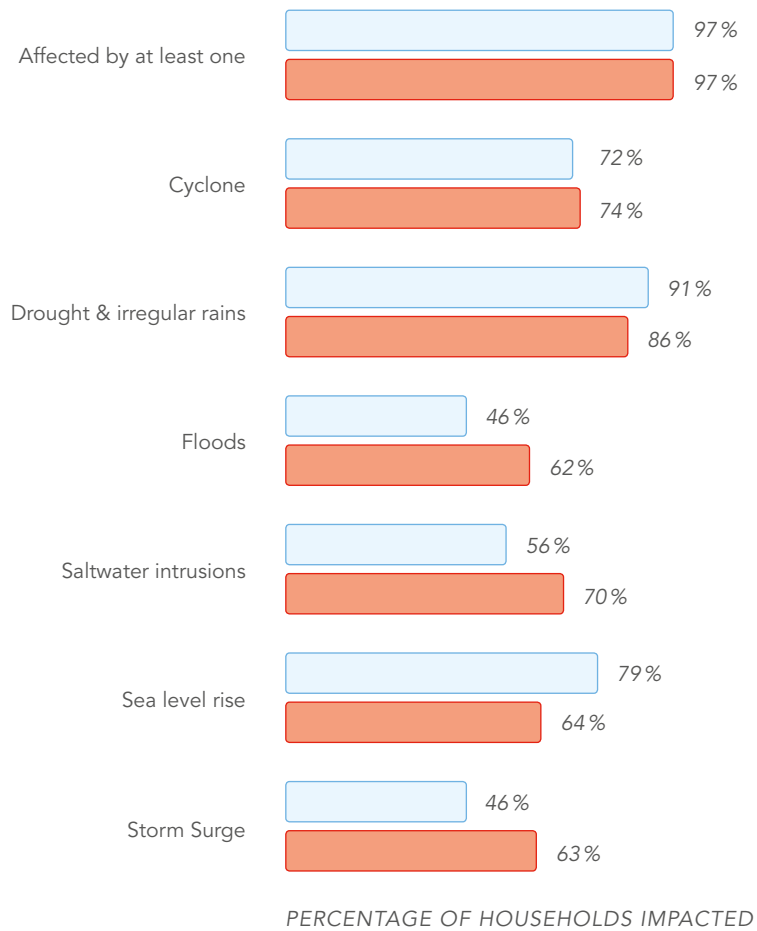


4. Findings

4.1 Climate related hazards are already affecting households and livelihoods in Tuvalu

Both the survey and the PRA exercise revealed the role of environmental factors in the migration decision making process. Overall, 97 per cent of households were affected by a natural hazard in the 10 years preceding the survey. Figure 6 (p. 36) displays the percentages of the sampled population affected by natural hazards between 2005 and 2015. The results indicate that drought and irregular rains were the hazards which have affected the greatest number of surveyed households. Cyclones and sea level rise represent the next most frequently reported natural events. Households on the outer islands have been more affected than those on Funafuti. It seems sea-level rise is more widely reported as impacting households on Funafuti, while saltwater intrusion, floods and storm surge are more common on the outer islands.

A PRA activity was carried out with groups of men and women in both Funafuti and Vaitupu to understand the main livelihood risks. The most severe risks identified by the four groups are summarized in Tables 3 (p. 37) and 4 (p. 38). It is worth noting that participants from the outer islands identified more threats than those on Funafuti, and some of these (such as health and infrastructure) could be considered basic needs. Therefore environmental risks should be viewed as one type of risk among many which Tuvaluans perceive.



□ FUNAFUTI
■ OUTER ISLANDS

Figure 6: Households affected by natural hazards 2005-2015

Source: PCCM Tuvalu Fieldwork

	RISK	POSSIBLE SOLUTION (HOUSEHOLD LEVEL)	POSSIBLE SOLUTION (GOVERNMENT/NGOs)
Women in Funafuti	Intergenerational loss of knowledge of land management	Parents teaching children	Government including this topic in school curriculum
	Excessive social and political commitments	Households prioritizing family needs in their budgets	Kaupule (town council) reducing head tax
	Loss of traditions and cultures by youth	Households practicing traditions and culture in their homes and elders teaching youth	Government publishing a book on culture
	Saltwater intrusion impacting on crops and leading to more frequently flooded roads	Households raising their garden beds and their houses	Government assisting financially
Men in Funafuti	Unemployment: particularly the young	Households encouraging children to go to school and engaging in handicrafts, fishing or farming.	Government providing employment for sailors overseas. NGOs offering training for small business.
	Lack of fresh drinking water	Households using water wisely and repairing leaks.	Government maintaining reservoirs in good condition and providing desalination machines. NGOs raise awareness on water management
	High living costs	Households improving family planning and eat local products. Living in a nuclear family can reduce the ratio of dependents per working person.	Government assisting public employees with a pay rise and providing price control.

Table 3: Livelihood risks in Funafuti

Source: PCCM Tuvalu Fieldwork

	RISK	POSSIBLE SOLUTION (HOUSEHOLD LEVEL)	POSSIBLE SOLUTION (GOVERNMENT/NGOs)
Women in Vaitupu	Strong winds in some years	Households cleaning up the island	Government building new houses and providing equipment and assistance.
	Floods	Households to plant and replant crops	Government providing assistance
	Lack of early warning systems	Preparation at households level	Government improving communication systems
	Lack of medicines	Households focusing on preventive measures	Government as well as third parties overseas supporting households
	High numbers of diabetes and hypertension	Households eating local food and a balanced diet.	Government encouraging healthy diets, with workshops and blood sugar levels tests.
	Poor housing	Households using locally available materials	Government assisting
	Poor supply of energy; prohibition of firewood; reliance on kerosene and gas	Households using charcoal stoves in the village	Government providing a more regular boat service to Vaitupu
Men in Vaitupu	Lack of water supply for households	Using gutters and recycling water used for bathing and dishwashing for livestock and plants.	Government providing water tanks, cisterns and desalination machines
	High living costs, due to power costs and imported food	Households using less electrical appliances and consuming local/home-grown foods.	Government providing solar power
	Poor transport causing lack of supply of food and fuel.	Households lobbying the government.	Government offering more boat trips to outer islands
	Power outages	None	Government improving the capacity of the existing Tuvalu Electrical Cooperation (TEC).
	Lack of proper evacuation centres; only the primary school used during cyclone Pam	Moving to high places and away from the sea.	Government building a two-storey evacuation centre.

Table 4: Livelihood risks in Vaitupu

Source: PCCM Tuvalu Fieldwork

NUMBER OF TRIPS	OVERALL	FUNAFUTI	OUTER ISLANDS
0	27%	31%	21%
1	16%	18.5%	13%
2	15%	16.5%	13%
3	14%	14.5%	13%
4	6%	2%	11%
5 or more	22%	17.5%	29%
Total	100%	100%	100%

Table 5: Migration trips 2005-2015 by household

Source: PCCM Tuvalu Fieldwork

4.2 Both internal and international migration are common in Tuvalu. Some migration is triggered by environmental risks

The household survey indicates that a total of 3,901 movements had occurred during the period 2005 to 2015. The majority of Tuvaluans had not engaged in any migration over the preceding 10 years, with approximately 65 per cent of people in both Funafuti and the outer islands not involved in migration during the period. The vast majority of migrants had only made one movement, with just 1 per cent of Tuvaluans making two movements. No respondents had made more than

two movements. Despite the fact that data do not include the exact age of the migrants at the time of migration, generalizations can be drawn based on the survey results. At the time of the survey, the majority (71%) of migrants were between 15 and 50 years old. Comparatively, 57 per cent of the overall sample was part of the same age group. Thirty four percent of the migrants were between 15 and 24 years old and 37 per cent were aged 25-49. In comparison, the overall sample is more proportionally distributed into the different age categories. When looking at migrants above 15 years of age, 37 per cent have a tertiary or technical education, this is compared to the overall sample of 28 per cent. Twenty six per cent of migrants in the same age category have completed secondary education compared to 23 per cent in the sample as

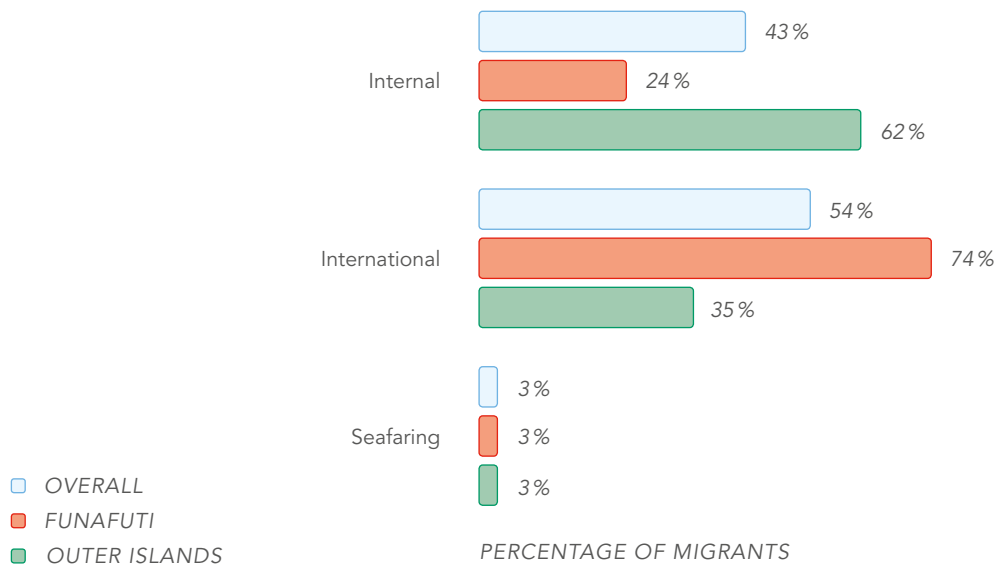


Figure 7: Internal and international migration and seafaring

Source: PCCM Tuvalu Fieldwork

a whole. This shows that migrants tend to have higher levels of educational attainment than the overall sample.

Despite the fact that most individuals did not move in the period 2005-2015, table 5 (p. 39) demonstrates that approximately three quarters of households experienced migration in the period 2005-2015. It can be seen that there are more households on Funafuti than the outer islands which have no migration experience. Households on both Funafuti and the outer islands are likely to have experienced multiple migration flows, with approximately the same proportion of households having one, two or three movements. Additionally, both areas have large numbers of households with five or more trips, which is more common for households on the outer islands.

Figure 7 (above) breaks down the migration trips into internal and international migration as well as seafaring. Most migration from the outer islands is internal, while the majority of movements from Funafuti are overseas. The number of seafaring trips in our database is smaller than the one found in a recent migration report by the World Bank (2015) which found an average of 100 seafaring trips per year from Tuvalu, which would equate to approximately 25 per cent of all trips found in the survey. It is possible the low proportion of Tuvaluans engaging in seafaring can be explained by long-term effects of the global financial crisis, as well as high competition in the seafaring labour market (World Bank, 2015). Tables 6 and 7 (p. 41) show the most popular migration destinations, depicted by study areas. For migrants from Funafuti, the most common destination is Fiji, accounting for

	TUVALU	FUNAFUTI	OUTER ISLANDS
Funafuti	56 %	N/A	81 %
Vaitupu	21 %	39 %	12 %
Other	23 %	61 %	7 %
Total	100 %	100 %	100 %

Table 6: Destination for internal movements

Source: PCCM Tuvalu Fieldwork

	TUVALU	FUNAFUTI	OUTER ISLANDS
Fiji	63 %	71 %	48 %
New Zealand	16 %	10 %	30 %
Australia	5 %	4 %	5 %
Other	16 %	15 %	17 %
Total	100 %	100 %	100 %

Table 7: Destinations for international movements

Source: PCCM Tuvalu Fieldwork

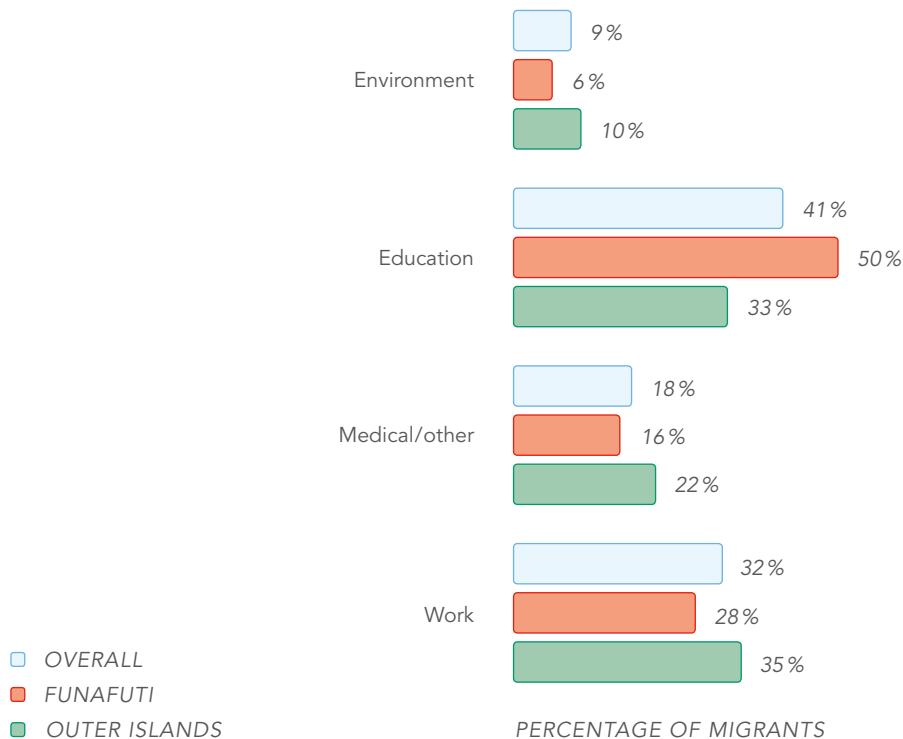


Figure 8: The main reason for migration

Source: PCCM Tuvalu Fieldwork

more than half of all movements. For the outer islands, Funafuti is the most common destination as it represents almost a half of all trips, followed by Fiji, which accounts for approximately one fifth of all trips. Aside from these, only Vaitupu and New Zealand show a proportion of movements of approximately 10 per cent. These findings are in line with the World Bank (2015) report on migration which also found migration to Fiji, New Zealand and Australia the most popular international destinations for Tuvaluans.

Main reason for migration

Figure 8 (above) depicts the main reasons for migration, revealing that education is the most common reason (41%) followed by work (32%). Medical reasons and environmental factors appear to be subordinate motivations. Education is comparatively more important in Funafuti, while each of the other motivations is more important in the outer islands, with work a more important motivation than education. This could be explained by the fact that many of the households which

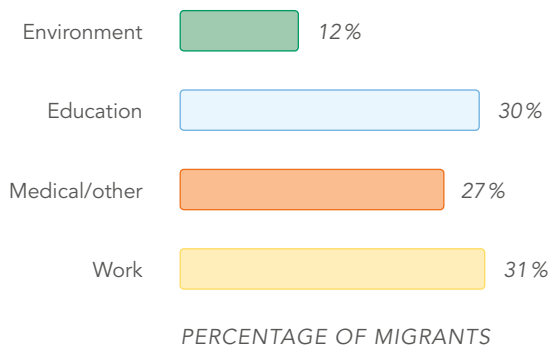


Figure 9: Internal movement by reason

Source: PCCM Tuvalu Fieldwork

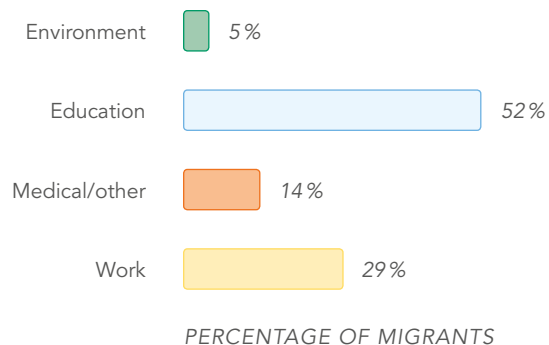


Figure 10: International movement by reason

Source: PCCM Tuvalu Fieldwork

represent the outer islands are from Vaitupu and will have less need to migrate for education as Tuvalu’s only secondary school is located there.

Looking at internal and international migration, principal motivating factors for each group of migrants are presented in Figure 9 and 10 (p. 43, left). Most internal migrants mentioned moving for work, followed by education, then for medical reasons. Internationally, most people migrated for education, followed by work. Again medical reasons ranked third, with the environment being relatively less important.

Looking at migrants moving for specific reasons to certain destinations offers a more detailed understanding of Tuvaluan migration. Four-fifths of migrants leaving the country for education go to Fiji; this is because it is the main site of the University of the South Pacific. Movements motivated by work are mainly to Fiji or New Zealand, reflecting the relative ease of access of the former and the possibilities offered through working schemes to the latter. Medical trips are mainly to Fiji.

Funafuti and Vaitupu, in that order are the most popular internal destinations for migration, reflecting the opportunities which these islands have relative to the other islands. Medical migrants go almost exclusively to Funafuti as the best facilities in Tuvalu are located there. Two thirds of migrants motivated by climate related reasons also go to Funafuti despite its degraded, overpopulated environment, which suggests that future climate change is likely to intensify existing social and environmental problems in the capital.

The PRA fieldwork gave a more nuanced analysis of the reasons why people might migrate. Table 10 (p. 45) shows that education, work and health are important factors, and climate change is also covered through food security thus supporting the findings from the survey. However, the existence of family, lifestyle and religion as motivations show the importance of culture in the decision making process.

DESTINATION	EDUCATION	WORK	MEDICAL	CLIMATE
Funafuti	53%	69%	86%	67%
Vaitupu	47%	23%	8%	21%
Other	0%	8%	6%	12%
Total	100%	100%	100%	100%

Table 8: Reason and destination for internal movements

Source: PCCM Tuvalu Fieldwork

DESTINATION	EDUCATION	WORK	MEDICAL	CLIMATE
Fiji	79%	28%	77%	24%
New Zealand	5%	26%	6%	38%
Australia	3%	7%	0%	12%
Other	13%	39%	17%	26%
Total	100%	100%	100%	100%

Table 9: Reason and destination for international movements

Source: PCCM Tuvalu Fieldwork

REASON	TRIGGERS
Family and culture	Partner seeking
	Multi-cultural marriage
	Adoption of children
	Cultural identity and attachment to Tuvalu
	Social commitments in Tuvalu
Lifestyle	Better lifestyle in Funafuti and overseas than outer islands
Food security	Climate and environmental change threatening food supply
	Soil becoming less fertile impacting agriculture
Legal and land issues	Need to return to or stay on Funafuti to claim land
	Insufficient land supply
	Expulsion from community for over-fishing
Religious	Religious studies on Funafuti or overseas offering opportunities
Education	Studying on Funafuti or overseas offering opportunities
Work	Opportunities in Funafuti better than in outer islands
	Funafuti being a transit destination
	Even better opportunities overseas
Health	Opportunities in Funafuti better than in outer islands
	Funafuti being a transit destination

Table 10: The reasons for migration in and out of Funafuti from PRA exercise

Source: PCCM Tuvalu Fieldwork

REASON	TRIGGERS
Health	Need for medical assistance outside of Vaitupu
Climate	Warmer climate of the island motivating Vaitupians to return
	Sea level rise could motivate Vaitupians to leave
Income	Lack of income implying need to return from overseas
	Opportunities motivating emigration
	Chance to send remittances home
Education	Opportunity to acquire new skills overseas and return once training is complete
Lack of choice	Government workers being sent overseas or back home
Attachment to family and place	Attending festivities in Vaitupu
	Retiring to Vaitupu
	Preferring the local customs, culture and food motivating return to Vaitupu
	Emigrating to visit or assist family members

Table 11: The reasons for migration in and out of Vaitupu from PRA exercise

Source: PCCM Tuvalu Fieldwork

Table 11 (above) shows the results of the same exercise in Vaitupu, with a different range of answers. It is interesting to note that compared to participants of the Funafuti session, participants in Vaitupu mainly mentioned factors that influence immigration decisions for returnees; there was no mention of reasons that may attract residents of other islands to move to Vaitupu. This could be due to the difficulties of acquiring land; ownership is generally hereditary among men, which can prevent others from entering the market, especially women (OHCHR, 2015).

Figure 11 (p. 47) shows that household decisions are generally made within relatively small social networks. Exactly half of

household representatives discuss decisions with between one and three people outside of the household, while 12 per cent of household heads do not confer with anyone. In order to assess the role of institutions, a PRA activity was undertaken in which participants placed cards on a table to represent sources of support for migration. The yellow cards represent the institutions that provide help and the blue cards the individuals. The bigger the cards, the more helpful they are perceived. Participants were also asked to rank the stakeholders in terms of the ease of access to them; the easier the access to the individual/institution, the closer to the centre its card was placed. According to outcomes of the session in Funafuti, the most important and easier to access agents and

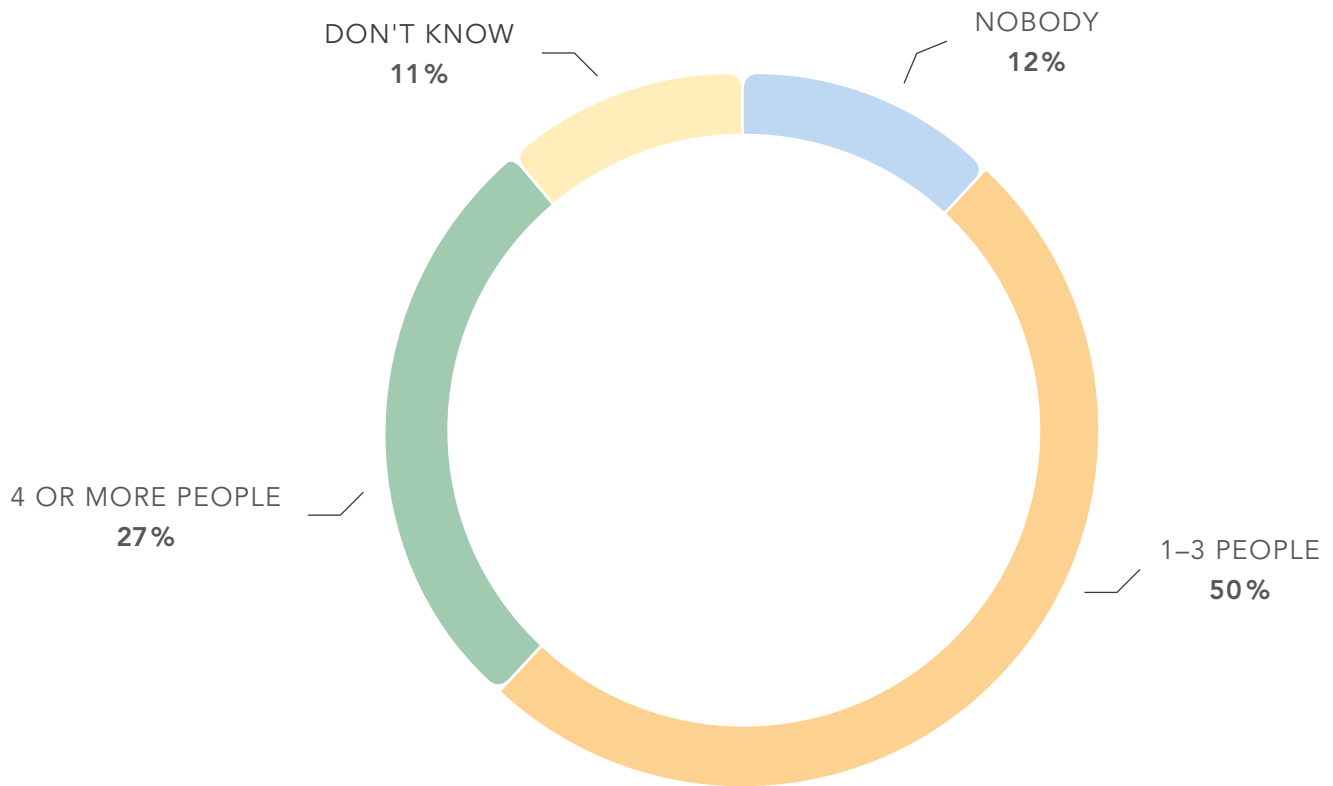


Figure 11: The number of people outside of the household consulted for decisions

Source: PCCM Tuvalu Fieldwork



Figure 12: Conducting a PRA activity in Funafuti



Figure 13: Outcome of the PRA activity on institutions in Vaitupu

institutions which can support households in times of need are their families, Members of Parliament, the Red Cross of Tuvalu, government officials, the banks, international aid agencies and the Tuvalu Meteorological Service.

Figure 13 (above, right) shows that the results of the session on Vaitupu are similar to those of Funafuti, although more actors were identified than in the capital. The Vaitupu participants identified more local actors and institutions as crucial agents that provide assistance in times of crisis. They consider the most important and easiest to access actors to be their families, friends and neighbours, which is similar to the results for Funafuti. However, as a second group they named the police, the Disasters Committee, the Island Council as well as the Youth Group, which were not mentioned in the Funafuti Venn Diagrams session. They also mentioned the Red Cross Tuvalu, villages, the Island Elders Group and the Tuvaluan

Government. As a last group of actors, the participants identified the Australian and New Zealand Governments, the French Government, the Canadian Government and finally the United Nations.

4.3 Migrant households are less vulnerable than non-migrant households. This could be related to remittances enabling adaptation

Figure 14 (p. 49, above) shows that households with migrants who moved internally in the last 10 years are more vulnerable than the average. In contrast, households with members who

moved internationally or engaged in seafaring are associated with below-average vulnerability. Households which engaged in no movements also have a higher vulnerability score than the average.

Figure 15 (below, left) shows the relationship between household vulnerability and duration of migration. Short-term movement (up to one year) is associated with substantially lower levels of vulnerability than no movement and long-term movement (over a year). The sample size for repeated, or circular movement was too small to be included.

Table 12 (p. 50) shows that migration is more common for people in households with lower than average incomes: the lower two quartiles account for 60 per cent of all trips.¹ Migrants from the households with higher incomes tend to migrate for education which accounts for two thirds of trips from households in the upper quartile. Those from lower income households are relatively more likely to migrate for work. The vast majority of climate related migrants (85%) and health migrants (79%) are from households with incomes in the two lower quartiles, whilst 62 per cent of working migrants also come from the bottom two quartiles. Educational migrants come from a diverse range of household incomes.

Approximately 10 per cent of households receive remittances solely from abroad, 14 per cent receive remittances from within Tuvalu, six per cent receive both type of remittances and 70 per cent of surveyed households receive no remittances. The 2002 census revealed that 50 per cent of households were receiving remittances. By 2012, this had fallen to 40 per cent and, according to the survey, the figure was likely closer to 30 per cent in 2015. It is not only the overall figures which have changed, but also the relative importance of the sources of

¹ The observations have been divided into four defined income intervals. The first quartile (the lower quartile) is the income value below which lies 25 per cent of the data. The second quartile is the value at which 50 per cent of the income data lies below and above it. The third quartile is the income value below which lies 75 per cent of the income data, and the top quartile is the income value above which are 25 per cent of the data.

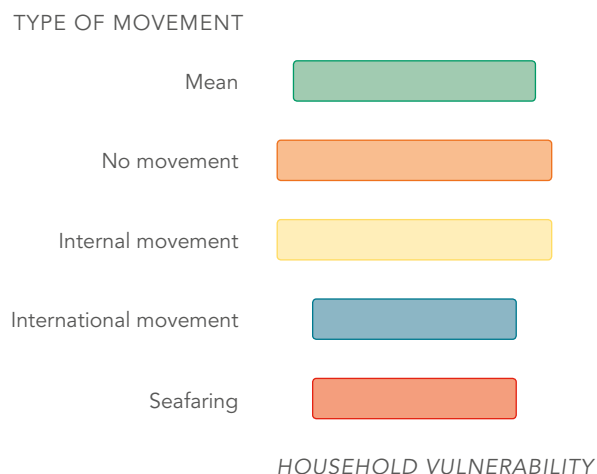


Figure 14: Type of movement and level of vulnerability

Source: PCCM Tuvalu Fieldwork

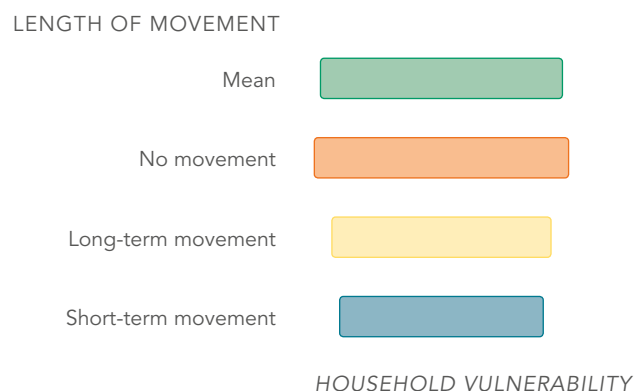


Figure 15: Duration of migration and household vulnerability

Source: PCCM Tuvalu Fieldwork

REASON FOR MIGRATION	LOWER QUARTILE	LOWER MIDDLE QUARTILE	UPPER MIDDLE QUARTILE	UPPER QUARTILE
Education	30%	45%	50%	65%
Work	37%	34%	38%	28%
Medical	22%	9%	7%	6%
Environment	11%	12%	5%	1%
Total	100%	100%	100%	100%

Table 12: Reason for migration by household income quartile

Source: PCCM Tuvalu Fieldwork

remittances. In 2012, remittances from abroad were more common, but according to the survey, more households now receive internal remittances.

Somewhat counterintuitively, households which do not receive remittances tend to have significantly higher monthly incomes. This could be because these households, typically in Funafuti, have no need to send members away to diversify income; for example they can already afford imported foodstuffs (Smith, 2013). Yet, it should be noted that migration is beneficial in most cases because it leads to substantial financial gains, and because it can reduce dependency on a domestic economy that is somewhat volatile. In second place are households receiving both international and internal remittances. While the incomes of households receiving international remittances and both types of remittances are similar, household who only receive internal remittances have the lowest mean per capita income. The question of causality arises here. It could either mean that internal transfers reach the poorest part of society, while international remittances go to the richest, or that they provide households with a higher

level of income, exacerbating existing inequality between households - which is also demonstrated by earlier studies on international remittances (Awumbila, Owusu & Teye, 2014; World Bank, 2006).

The majority of households undertook some form of adaptation to climate change in the year leading up to the survey, such as moving to a safer place on the island, using safer building materials and constructing barriers around properties (fig. 16, p. 51, left). For Funafuti, the survey data shows that an equal amount of migrant and non-migrant households adapt to climate change. When looking at the outer islands a different picture emerges, with non-migrant households less likely to take any adaptive measures. Therefore it be seen that in these islands, migration does not act as an alternative to other adaptive practices, rather that it is complementary to climate change adaptation. This is because migration contributes to the ability of households to undertake livelihood risk management strategies, or households which are able to engage in migration are also able to take other adaptive measures. The other side of the coin is that 10 per cent of the

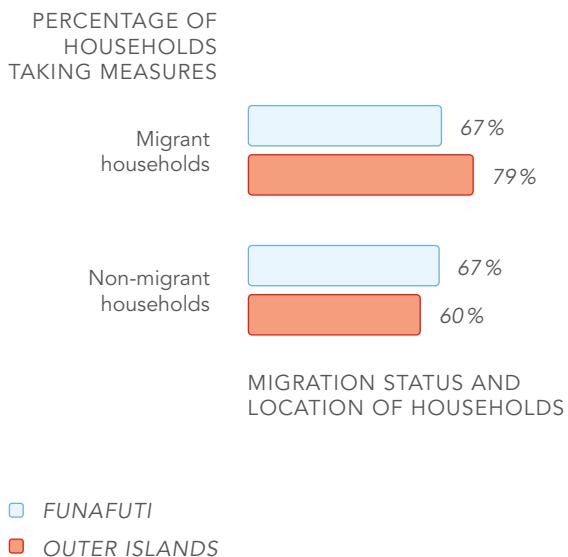


Figure 16: Percentage of households taking measures to adapt to climate change

Source: PCCM Tuvalu Fieldwork

households do not engage in migration or take any other adaptive measures and are seemingly not pursuing livelihood risk management strategies in the context of climate change.

4.4 Migration experiences of women and men are different

The proportions of migrating men and women are almost identical. However, only men engage in seafaring and women are slightly more likely to engage in both internal and international migration (fig. 17, above, right).

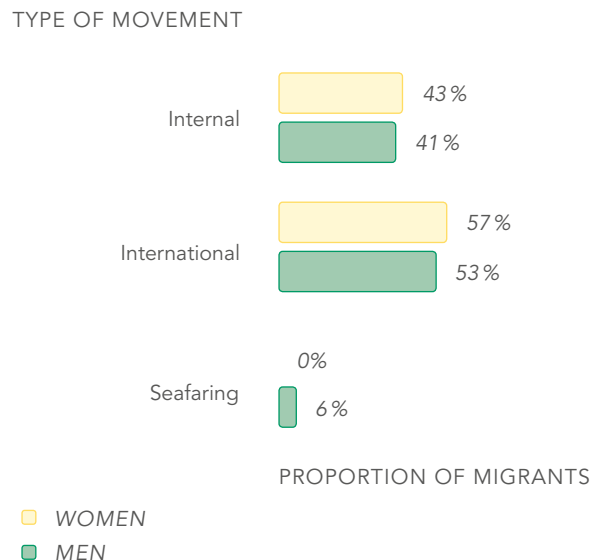


Figure 17: Type of trip by gender

Source: PCCM Tuvalu Fieldwork

Overall, the proportions of women and men travelling to different destinations are approximately equal. For international migrants, women are more likely to migrate to Fiji, while men are more likely to go to other international destinations. For internal movements, women are relatively more likely to move to Vaitupu while men are relatively more likely to move to Funafuti.

It seems that on the whole women have significant control over decisions which affect them, as 45 per cent of household representatives claim women themselves make these decisions and in eight per cent of households decisions are made by both genders. However, in 36 per cent of households the answer of "other" was given, perhaps indicative of the sensitive nature of the question.

DESTINATION	WOMEN	MEN
Funafuti	52%	62%
Vaitupu	29%	14%
Other	19%	24%
Total	100%	100%

Table 13: Internal movement destinations by gender

Source: PCCM Tuvalu Fieldwork

DESTINATION	WOMEN	MEN
Fiji	64%	57%
New Zealand	17%	16%
Australia	3%	5%
Other	16%	22%
Total	100%	100%

Table 14: International movement destinations by gender

Source: PCCM Tuvalu Fieldwork

4.5 There is significant unmet demand for migration

Approximately 8 per cent of the population wanted to migrate but were unable to move during the period 2005-2015. The reasons for not being able to leave are shown in figure 18 (p. 53, above). A lack of money is the most important limiting factor, accounting for over half of all unfulfilled trips. The mean monthly per capita income for this group was AUD 42. A lack of visa impacted individuals from households in Funafuti, reflecting the fact that most movement from the capital is international and but there is an unmet desire for further migration.

As figure 19 (p. 53) shows, those Tuvaluans who wanted to migrate but could not (potential migrants) are more vulnerable than both migrants and those who apparently choose not to migrate (non-migrants). This could be indicative of a trapped population – those who most need to move are least able to do so.

4.6 In the future migration will still be motivated by the economy, culture and the environment

Survey respondents expect that economic and cultural factors will continue to be to important motivations for human mobility (fig. 20, p. 54, left). The least likely potential triggers for migration are network related; although the favour of others towards migration and the existence of community members at the migration destination would still encourage migration for a member of approximately half of all households. Climate related events will still motivate migration as

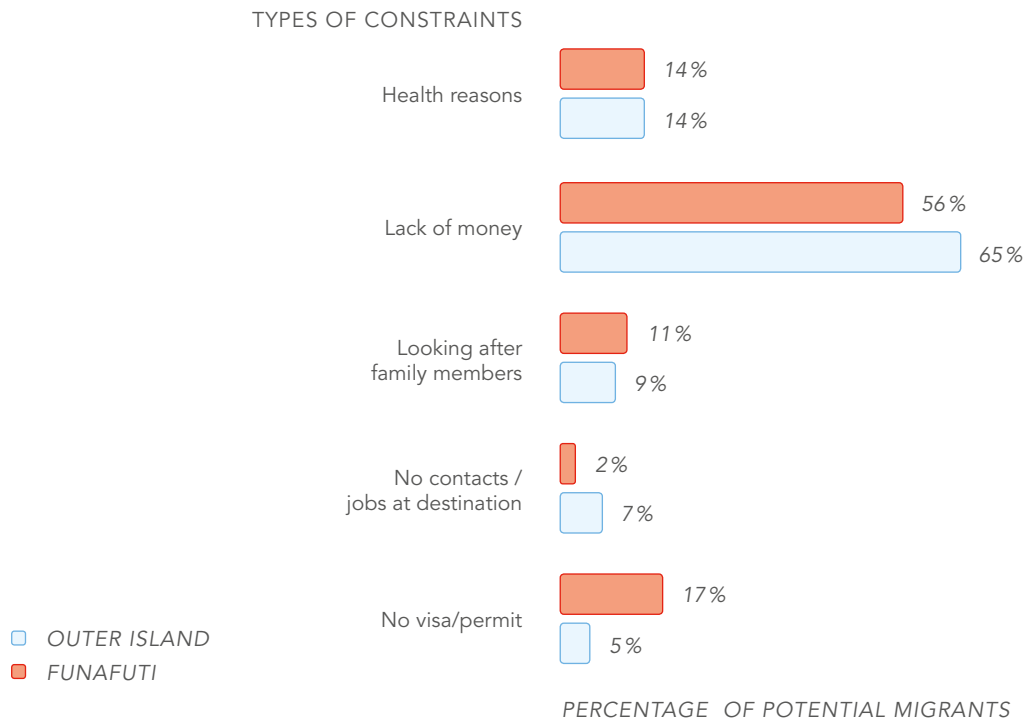


Figure 18: The constraints on migration

Source: PCCM Tuvalu Fieldwork

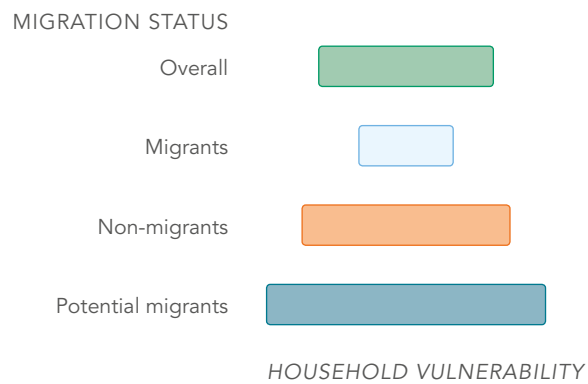


Figure 19: Migration experiences and vulnerability

Source: PCCM Tuvalu Fieldwork

PERCENTAGE OF HOUSEHOLDS WHICH WOULD MIGRATE IF FACED WITH THIS CONDITION

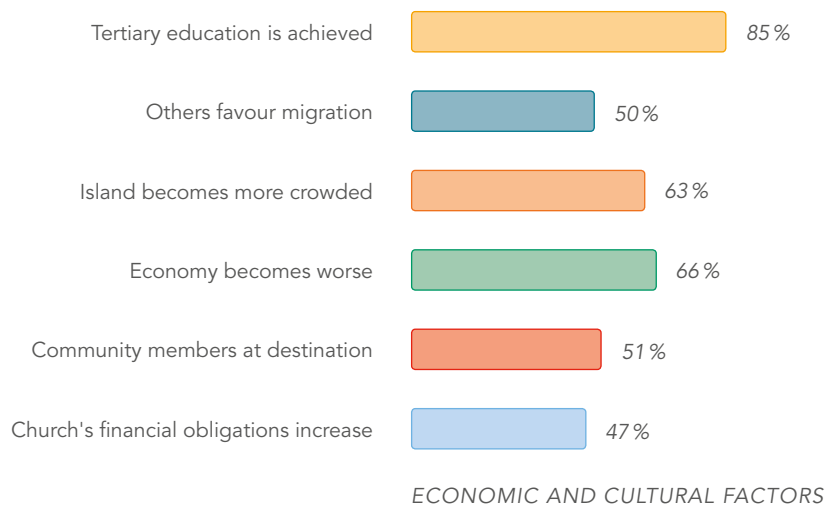


Figure 20: Perceived impact of economic and cultural factors on future migration

Source: PCCM Tuvalu Fieldwork

worsening floods, sea level-rise, saltwater intrusion and drought would encourage movement in over 70 per cent of households (fig. 21, p. 55).

Household representatives generally are optimistic about their ability to support migration (fig. 22, p. 56), with just over half of households confident they can fund a movement. Two-thirds of household representatives believe that their households possess the necessary health, contacts and education for migration. These results do not suggest that over half of households feel they fulfill each criteria, rather they can fulfil some of the pre-requisites for migration. For example if a household has the necessary finances, but is not sufficiently healthy, then it is highly unlikely that they would be able to

migrate. This is borne out by the relatively low migration and high non-migration statistics.

The Q study (p.58-59) also provided data on expectations regarding future migration. Nineteen of the 26 participants in the Q study were statistically associated with exactly one of the four attitudes described below. The remaining seven participants are statistically associated with two or more of the attitudes and are excluded from the main analysis. Three attitudes identified climate change as already impacting on livelihoods in Funafuti. Attitude 1 did not perceive climate change as a risk, while attitude 2 held that the environmental situation is worsening. Attitude 3 involves a strong belief that climate change is causing scarcity of both food and

PERCENTAGE OF HOUSEHOLDS WHICH WOULD
MIGRATE IF FACED WITH THIS CONDITION

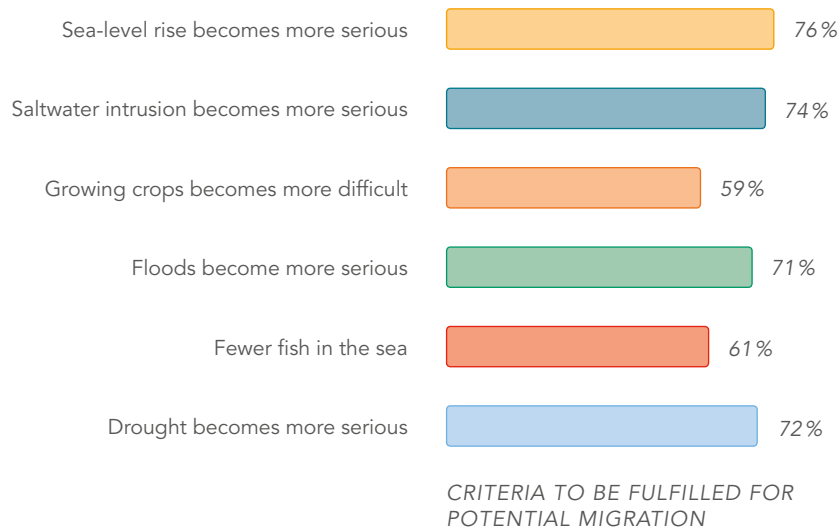


Figure 21: Perceived impact of climate change manifestations on future migration

Source: PCCM Tuvalu Fieldwork

drinking water, leading to changes in rainfall and drought, causing coastal erosion and worsening the impact of king tides. Attitude 4 involves a belief that climate change is causing shifts in weather patterns and events such as cyclones, and that sea level rise is making Tuvalu more susceptible to high tides and water salinization. The Q study also suggests that residents of Funafuti have a strong attachment to place, and that most will be reluctant to migrate away from their country. Nevertheless, the need for better opportunities and the difficulties that climate change will bring means that migration might become the most rational risk-management strategy. The following narratives summarize the attitudes of the participants. Quotation marks show the words of the participants.

PERCENTAGE OF HOUSEHOLDS
WITH THE MEANS TO MIGRATE

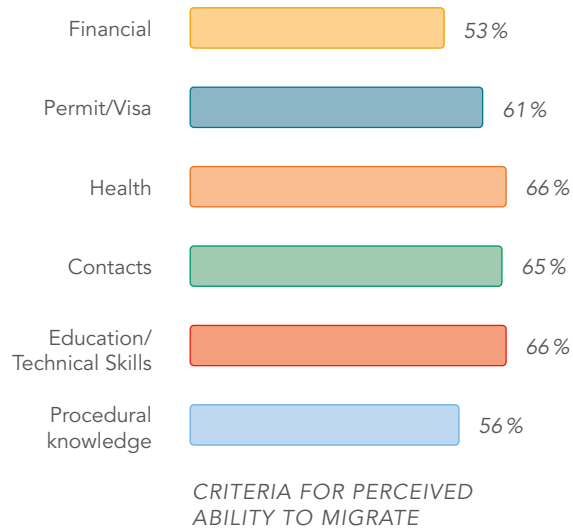


Figure 22: Perceived ability to migrate in the future

Source: PCCM Tuvalu Fieldwork



CLIMATE CHANGE AND MIGRATION ATTITUDES REVEALED BY THE Q STUDY

Attitude 1: “Resourceful people will adapt and overcome”

The five participants who share this view accept that climate change is real, but they have faith in Tuvaluans as a resourceful people who can overcome the challenges associated to a changing climate. However, they also accept that migration might be necessary as a last resort. These people are relatively optimistic about the future and believe the community can pull together to be safe. This group recognise the threats that king tides might pose, but believe that the climate change impacts are not necessarily worse than in the past. As a result, relocation is viewed as a last resort. As one participant put it “we should use our brain. If we see the island is uninhabitable then we should do something about it rather than going down with it.” They are worried about the impact that migration will have on Tuvaluan society and dismiss the idea that climate change is a result of moral wrongdoing by humanity. In their words, it is “not God given punishments,” rather climate change is happening “because of mankind’s neglect and ignorance.”

Attitude 2: “We need dignified migration from the inevitable”

For the two people who share this attitude, migration will probably be necessary, but it should be on the Tuvaluans’ terms. There is a sense of anxiety over what migration will mean for Tuvaluans and their culture. Flooding is seen as a very real threat and there is a sense that people have little power over climate change; in fact it might even be that it is God’s will, and some people may stay to the bitter end. However, there is also the belief that Tuvalu was a gift from God who promised to Noah that there will not be another flood. One interviewee explained that Tuvalu “is where I belong, my true identity and also it is where I was brought up and leaving will result in the loss of culture.” A related reason for out-migration not being viewed as favorable is that the destination might have more “crises compared to my country which is free from these problems.” At the same time there is a belief that better opportunities for work and education lie abroad.

Attitude 3: "Climate change is already here; relocation might be the only answer"

The seven people who share this attitude had a strong sense that climate change is already affecting the environment and it might be prudent to relocate before it is too late. The participants who share this attitude are worried about the impacts of flooding on crops, trees and water supply and they highlighted that changes in rainfall are occurring and "drought affects people most." The housing stock of Tuvalu was also picked out as a problem which will likely worsen under climate change. They worry that with migration, the Tuvaluan culture will be negatively impacted and relocation might be the only viable option: "we should try to think of the ways to evacuate now...before it is too late." For this attitude, the scientific understanding of climate change exists in tandem with religious faith. For example one interviewee said that "God chose me to be on this island and he promised in genesis that there will be no flood until he returns."

Attitude 4: "Our faith and community will overcome"

There were five participants who share the attitude that their religion and faith in the Pacific community will enable Tuvalu to overcome the serious problems surrounding climate change. Among this group there is a recognition that the environment is changing and that climate change poses a real threat. As one participant claimed due to the "geography and size of the land here in Tuvalu, it's possible for...everyone to die." Saltwater intrusion was also identified as a threat, with one participant explaining that "the water taste would become more saline, making it unsuitable for drinking." There is a strong sense of identity within the region: "our friends from Australia and New Zealand helped us...during Cyclone Pam." Temporary migration to these countries is not seen as desirable although a foreign education is seen an opportunity. This group rejected the idea that God's covenant with Noah offers protection from flooding. On the contrary, it seems that for this group religious faith can provide strength to the community as "the bible said we have to pray and do something, we can't do everything but we do something."

4.7 Modelling clearly indicates the potential for significant future increases in migration both within Tuvalu and internationally.

This section presents the results of the Tuvalu Climate Change Migration Model (TCCMM) designed to simulate migratory flows within and from Tuvalu in the years 2015-2055. The model shows that by 2055, migration trips within Tuvalu could increase by 87 per cent and international trips could more than double. Combined with population growth this will place stress on Funafuti, creating an environmental hotspot. Further details on the design of the model are contained in the annex.

Tuvaluans migrate for a range of different reasons: work, education, health and climate change. The prevalence for each reason is determined by the results of the question in the household survey that asked for the primary reason of each movement. The model is based on the assumption that migration for work, education and health remain fairly constant, while the number of movements motivated by the environment will increase as the climate changes over time, impacting households and livelihoods. These impacts are modelled by using projected rises in CO₂ concentrations as a proxy for the impact of climate change using the Representative Concentration Pathways (RCP) which are used in the IPCC 5th Assessment and frequently used for future projections. As there is little difference in the CO₂ concentration up to the middle of the century for RCP 4.6 and 6, was decided to not include RCP 4.6. Model runs were also recorded for no climate change, in order to show the effect that climate has on the model.

Each month, every person in the model can either stay or migrate according to observed probabilities from the household survey, while the probability of dying depends on life

tables. The probabilities to migrate for work, education, or health vary according to age, and therefore change for an individual over time. Each month the desire to migrate due to climate change is related to CO₂ concentration. As this increases each month, the probability of migrating due to climate change also increases each month.

The model generates increased flows of migrants as time progresses. Table 16 (p.59) shows a fairly large gap in total migration between the different scenarios. Looking at the breakdown of type of movement, the differences become more pronounced. Whilst seafaring remains fairly constant across the three scenarios, there is a steady increase in the number of internal trips, and a much greater increase in international trips. For RCP 6, the model generates an 87 per cent increase in trips for the period 2045-2055 compared to 2005-2015. This increase is largely due to the increase in international mobility (133%), as internal trips only increase by 62 per cent and seafaring trips are relatively constant (30% increase).

The total population of Tuvalu is projected to increase under each of the scenarios due to a natural increase, although under RCP8.5 the overall population growth relative to 2015 is low. Fertility and death rates are constant across the models, therefore it is migration flows which cause differences in size of the populations across the four scenarios. With escalating climate change impacts, the population of Tuvalu decreases since these scenarios result in additional international migration. The same pattern is true for Funafuti, but with stronger climate change the proportion of the population within Funafuti increases. For RCP 6, the population of Tuvalu rises by approximately 22 per cent and the population of Funafuti by 25 per cent relative to the 2012 census. According to the no climate change scenario, the population of Tuvalu rises by 34 per cent and the population of Funafuti by 33 per

AVERAGE ANNUAL MOVEMENTS		NO CLIMATE CHANGE (CC)	LOW CC IMPACT	MEDIUM CC IMPACT (RCP 6)	HIGH CC IMPACT (RCP 8.5)
	2005-2015	2045-2055	2045-2055	2045-2055	2045-2055
Total	370	464 (+25%)	608 (+64%)	691 (+87%)	879 (+138%)
International	163	208 (+28%)	314 (+93%)	380 (+133%)	557 (+242%)
Internal	133	150 (+13%)	194 (+46%)	215 (+62%)	247 (+85%)
Seafaring	74	106 (+43%)	100 (+35%)	96 (+30%)	75 (+1%)

Table 15: Projected average movements per year by decade

Source: PCCM Tuvalu Fieldwork

	2012 CENSUS	NO CLIMATE CHANGE (CC)	LOW CC IMPACT	MEDIUM CC IMPACT (RCP 6)	HIGH CC IMPACT (RCP 8.5)
Tuvalu	10,837	14,560 (+34%)	13,801 (+27%)	13,246 (+22%)	11,157 (+10%)
Funafuti	6,194	8,220 (+33%)	7,973 (29%)	7,736 (+25%)	6,976 (+13%)

Table 16: Total population of Tuvalu in 2055 under different climate change scenarios

Source: PCCM Tuvalu Fieldwork



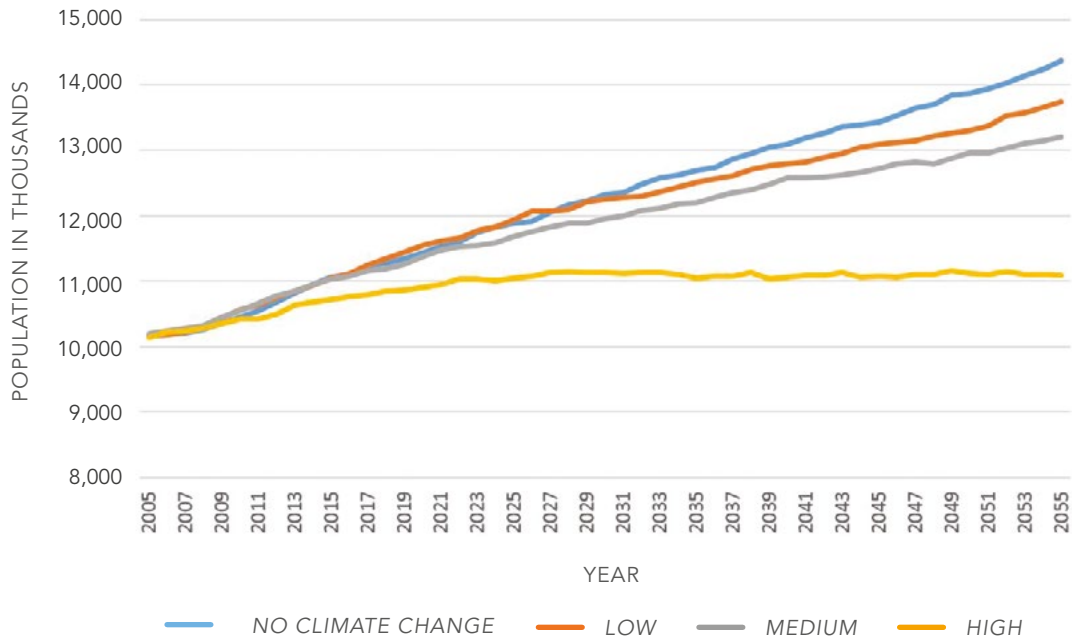


Figure 23: Population of Tuvalu 2005-2055 under different climate change scenarios

Source: PCCM Tuvalu Fieldwork

cent, demonstrating the effect of climate change on international migration.

The population of Tuvalu remains quite constant under each of the three climate change scenarios until approximately 2025, after which the population diverges (fig. 23, above). The population for a high climate change scenario diverges earlier, and is slightly lower than the observed population in 2012, suggesting that this projection may be unrealistic for the early part of the century. Nonetheless, it is instructive in showing how through increased international migration a high migra-

tory impact of climate change might go some way to balancing a natural increase in population and result in a relatively stable population.





5. Policy Implications and Recommendations

1. The integration of disaster risk reduction and climate change adaptation measures should continue in Tuvalu's development policies and processes

The agreement reached in Paris is to limit warming to 2°C and to endeavor to prevent temperatures to exceed 1.5°C above pre-industrial temperatures. Although this is a vital, historical step, it should be noted that the amount of greenhouse gases already in the atmosphere means that Tuvalu is likely to be affected by a range of climate related impacts which will increase under projected climate change. For this reason, further risk assessment is needed on the impacts of climate change and potential displacement for each island.

Mitigation can limit the damage of the future impacts of climate change, and Tuvalu is committed to limiting its global contribution. Tuvalu has committed to reducing emissions of Green House Gases (GHG) from electricity generation by 100 per cent in 2025 through the use of solar panels. However, in order to fulfil one of the stated goals of the Niue Declaration (2008) which refers to “the desire of the Pacific peoples to continue to live in their own countries, where possible”, mitigation will not be sufficient. Rather it should take place alongside disaster risk reduction, promotion of resilience and climate change adaptation which need to be integrated into Tuvalu's development planning through the 2030 Agenda for Sustain-

able Development and the implementation of a National Adaptation Plan (NAP). Tuvalu undertook a national consultation in 2011 to develop national adaptation and relocation policies. This now needs to be turned into action through The Small Island Developing States Accelerated Modalities of Action (Samoa Pathway, 2014) which provides a way of integrating the Sustainable Development Goals (SDGs) into national policy.

The national development plan for 2016-2020, Takeega III (TK III), states that Tuvalu will continue to explore the issue of climate change-related migration. One way this could occur is through The Tuvalu Survival Fund or Trust Fund for Disaster and Climate Change. The Fund will provide emergency relief in times of natural disasters and facilitate recovery and adaptation. It was started with an injection of AUD\$5 million and can be increased through donations from others national and international sources. It can be used to disperse funding from the Global Environmental Facility (GEF), Adaptation Fund and Green Climate Fund (GCF).

2. Migration is a common event and should be promoted. Further research is warranted on all forms of environmentally related migration

Both international and internal migrations are relatively common events for Tuvaluan households and environmentally-related migration is already taking place around and out of Tuvalu. There seems to be a positive relationship between migration and reduced vulnerability. Households with seafarers have the lowest vulnerability score. Vulnerability in households with mainly international movers is lower than average and households with no migrants or mainly internal movers have a slightly higher vulnerability score than average.

Adaptation to climate change is taking place alongside migration. Households take a range of measures to adapt to climate change, such as moving to a safer place on the island,

using safer building materials and constructing barriers around property. This suggests that migration is one of several risk management strategies in Tuvalu. Such adaptation measures are more likely to be taken by migrant households, especially on the outer islands. This suggests that remittances from migrants are used to improve household infrastructure. Further steps should be taken to enable those households which decide not to migrate, to live sustainably where they are. It could be that a lack of remittances act as a constraint on the ability to take adaptive measures.

However, migration and climate change are not monolithic concepts; rather as the Q study demonstrated there is, within Funafuti at least, a plurality of understandings, risk perceptions, and preferences. Stratford et al. (2013) stress the importance of the concept of “fenua”, which explains the way in which Pacific community identity is directly linked to a specific part of an island and results in the importance of identity of place. A previous study found that many Tuvaluans will not consider migration, let alone resettlement as it will lead to a loss of sovereignty and cultural identity (Montreux and Barnett, 2009). All of these perspectives need to be acknowledged in order to facilitate dignified migration or adaptation in place.

3. Internal migration is mainly to Funafuti. In the absence of mitigating actions, additional urbanization will cause further environmental stress

At present, the vast majority of internal migration is to Funafuti. Historically these flows can be attributed to urbanization; the attraction of the city due to opportunities for work, education and other services not available in the periphery of developing countries. Further examination shows that most internal environmentally-related migration is also to Funafuti. As such, environmental pressures in the outer islands are causing the intensification of the capital as an environmental hotspot. The population of Funafuti has increased rapidly over

the past few decades and it is struggling to cope with the demands for space, water and sanitation.

The ABM projects that under current population growth and projected climate change, migration will increasingly be seen as a viable option for individuals and households in Tuvalu. By 2055, the model projects that there will be a very large increase in the number of movements within Tuvalu. Flows from the outer islands to Funafuti combined with population growth will likely put further strain on scarce resources which are projected to become even scarcer under climate change.

This scenario only highlights the need for disaster risk reduction, climate change adaptation and a holistic development plan for both Funafuti and the outer islands. In the outer islands, if this is successful and household livelihoods are sustainable, then the demand for urbanization could be reduced. However, even if the flow of environmentally-related migrants to Funafuti slows, it is very likely that it will still be the number one destination for migrants seeking work and education. As such, there is a need to absorb this demand and enable an increased population to live safe lives in the capital. Concurrently, other destinations within Tuvalu could be promoted.

The experience of Vanuatu has shown, that whilst internal relocation is fraught with complication it can be achieved (Nansen Consultation, 2013). This is only possible with the buy in of both moving and receiving communities. One of the main obstacles to overcome is land ownership. In the case of Vanuatu, the Government has the power the force the sale of customarily-held land (Nansen Consultation, 2013). This is a delicate issue but its viability could be investigated.

4. The promotion and management of international mobility could facilitate migration with dignity

The limited possibilities of internal migration which Tuvalu presents urge alternative destinations, namely international migration. International migration is both the most desired and most effective form of mobility in terms of its relation to household vulnerability. For this reason, Tuvalu would benefit from an extension of the existing seasonal work programmes offered by Australia and New Zealand to Pacific island states. Seafaring is related to lower household vulnerability and efforts should be made to enable more Tuvaluans to work in the international shipping industry.

Promoting international migration from the outer islands might relieve pressure on the already crowded Funafuti, but would be problematic without improvements in education levels in order for Tuvaluans migrants to compete in international labour markets and facilitate international mobility. The Pacific Qualification Framework and Regional Education Framework are attempts to standardize education and improve the prospects of graduates internationally. In addition, migrants would benefit from cultural awareness training (Nansen Consultation, 2013). Increased dialogue with host countries, including the diaspora can improve bilateral relationships and foster linkages to reduce network-related barriers to migration. Movements need not be unidirectional; there is also an unmet demand for return migration as Tuvaluans are constrained by a lack of suitable positions in Tuvalu after studying on another island or overseas. This is partially due to a mismatch in the subjects studied (usually at the University of the South Pacific main campus in Suva) and skills needed in Tuvalu related to the shortage of graduate level jobs, mainly in the government sector. As such, current government sponsorship schemes could be adapted, thus aligning education and migration policy.

Whether through voluntary migration, displacement or relocation, when large numbers of migrants move to another country there are a range of issues to overcome. There are already communities of Tuvaluans living on Niue and this has caused tensions among the receiving community, some of whom are now the minority in their villages. The resettlement of Tuvaluans from Vaitupu to Kioa in Fiji has been viewed as successful due to the soil fertility at the destination and the successful importation of existing culture and community leadership (Tabucanon 2012).

5. Policy action can reduce the number of vulnerable and trapped people

There is significant unmet demand for migration; 8 per cent of the surveyed population wanted to move but were unable to do so. Reasons for not being able to migrate include a lack of visa, or an insufficient level of education. But the main reason for the desire not being realized is a lack of money, accounting for half of all instances. These potential migrants all come from households with below average household incomes.

There is clearly a need to investigate and eliminate barriers to migration, and encourage more effective migrants through further training and other soft migration skills, to ensure they are well prepared for their experience. Otherwise, the situation has the potential to lead to a vicious circle in which households are not able to send out migrants who would have the potential to diversify livelihoods, boost incomes through remittances, and generate funds and skills for climate adaptation. This situation is likely to be intensified through the impacts of climate change, including the erosion of adaptive capacity. Steps need to be taken to address these issues to reduce the initial expense of supporting migration borne by households to maximize the benefits and minimize the risks associated with migration flows.

The proportion of women moving is slightly less than that of men and the destinations they travel to are different. Women are more likely to travel to Fiji compared to men, but men are more likely to travel to countries without existing diaspora than women. Further investigation into the obstacles preventing women from migrating is crucial, including men's influence over their decisions.

6. Further regional integration will strengthen Tuvalu's ability to adapt to climate and facilitate migration

A range of institutions are able to assist with migration, including government representatives and civil society. But this is not sufficient. The people of the Pacific share a history of mobility within islands and a sense of common purpose and shared destiny which has been strengthened through participation in regional and global fora on the theme of climate change. As a result, Pacific countries lend support to each other in times of crisis. For example, the Cook Islands and Samoa have an informal mutual understanding to assist in times of need (Nansen Consultation, 2013). Such an agreement could be developed by Tuvalu and its closer neighbours. The Samoa Pathway (2014) sets out the importance of maintaining and developing partnerships at all levels. Through the Association of Small Island States (AOSIS) and The Pacific Network on Climate Change Migration, Displacement and Resettlement Tuvalu is doing this at the regional level.

7. The United Nations Framework Convention on Climate Change (UNFCCC) Paris Agreement was a qualified success for Tuvalu and presents opportunities for adaptation finance

The Paris Agreement of December 2015 is a qualified success for Tuvalu. In the preceding Suva Declaration on Climate Change, Pacific states asserted their aims for the upcoming negotiations; they wanted a target of 1.5°C above pre-industri-

al levels. The Paris text includes that figure as a mark which should be strived for, with 2°C the mandated target. On April 22, 2016, the 177 countries party to the agreement signed in New York, and Tuvalu was one of the first states to also ratify the agreement. As stated at the time of ratification, the government believes the agreement to be “inadequate to prevent a global temperature stabilisation level at or above 1.5°C relative to pre-industrial levels and as a consequence, such emissions will have severe implications for our national interests”.

The agreement also adopted a global goal for adaptation, putting it on the same level as mitigation for the first time and providing more funding opportunities. Financial and technical support from richer nations amounting to a minimum of USD 100 billion per year until 2025 is reiterated and the process for disbursements has been made more efficient through the Global Environment Fund, Adaptation Fund, and Green Climate Fund. It is a priority for Tuvalu to develop the capacity to access these funds, something the creation of the Tuvalu Survival Fund will facilitate. These funds will strengthen the ability of Tuvalu and other Pacific island nations to cope with and adapt to the impacts of climate change.

The agreement did not directly address the legal status of people displaced in the context of natural disasters and adverse impacts of climate change. While those displaced within their own countries are protected by national and international laws, a legal gap still exists for cross-border migrants as a result of disasters or the impacts of climate change. States and international organisations need to further develop normative frameworks to address the needs of displaced and relocated populations (Nansen Consultation, 2013). The agreement did call for the establishment of a task force “to develop recommendations for integrated approaches to avert, minimize and address displacement related to the adverse impacts of climate change” (UNFCCC 2015). Moreover, for the first time the agreement addressed the issue

of Loss and Damage associated with the impacts of climate change. It is hoped that the Paris Agreement and these opportunities will be the first move towards human-rights based, gender-sensitive and forward-looking approaches to migration which will facilitate “virtuous” migration for Tuvaluans, whilst improving the livelihoods of those who wish to continue living in Tuvalu.





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A tropical beach scene with palm trees and a building partially obscured by fallen branches. The foreground is a sandy beach with scattered palm fronds and debris. In the middle ground, a building with a corrugated metal roof is partially hidden behind a large pile of fallen palm branches and other debris. The background shows more palm trees and a cloudy sky.

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