

Tuvalu: Balancing Climate Change and Development Initiatives
in a Small Island Developing State

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Tuvalu: Balancing Climate Change and Development Initiatives in a Small Island Developing State

By Caitlin V. Dix

Abstract

Climate change has become an important issue in the field of development, one that can strongly affect development priorities. Each country will be impacted in its own way by climate change, and socioeconomic, and political factors. Therefore balancing development initiatives and climate change efforts is crucial. Small Island Developing States are a category of countries that must deal with the effects of climate change now, and plan for the future effects that scientists are predicting. This thesis explores the different perspectives of what constitutes an optimal balance of attention to climate change versus development in the country of Tuvalu. This involves analyzing and comparing (1) the priorities set by the government and donor agencies for the allocation of time, effort, and money, with those of the local citizens, and (2) how the state of development indicators today compares with the situation twenty years ago, prior to the emergence of concern about climate change.

April, 2011

Dedication

To my mother

For always listening to my newest crazy idea of where my life could take me next, and for not only supporting me, but for coming up with a plan to make sure I got there.

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Thank you to my supervisor, Dr. Tony Charles, for pushing me to create a thesis I am proud of and for your much needed guidance. Dr. Ryan Isakson and Dr. Irene Novaczek, thank you for being a part of my committee and contributing to my academic work.

I am thankful to have had such support over the last three years from my family and friends. Thank you to my parents who have supported me through all of my crazy ideas and passions and have never stopped believing in me.

To my grandparents who have inspired me to pursue academia, and who have always known that I have had it in me, even when I was unsure; I am truly grateful.

To Jessica, who throughout this process has always answered the phone, and listened to me ramble on about my thesis. Thank you for being such an amazing sister and an incredible friend.

Above all I would like to thank the people of Tuvalu, for welcoming me into their lives, and allowing me to experience such an incredible and unique place.

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Forward

This thesis has become a part of me; the country of Tuvalu has become my passion. I believe that this country deserves the chance to develop and prosper, and I feel it is unfair that this chance might be taken away by climate change; a global problem that they really did not contribute to. I have spent over four years studying this country and finishing this thesis is bitter sweet. While doing field research I was able to live a dream, and experience a culture, few have the opportunity to. I have learned a lot not just from Tuvalu but from the process of writing a thesis. I have made many mistakes along the way, but I have been able to learn my own strengths and weaknesses. This thesis is about balancing climate change and development, and my life the last few years has been about balancing this thesis and my other priorities. Climate change is an issue that after this thesis I would like to continue to explore and understand. I am not certain if I will continue to study Tuvalu but I am beyond thankful that I have had this opportunity. This thesis has taught me that local people need to understand what is going on around them, and that government needs to do their best to make sure their people have this understanding, if not, the love for a country and way of life, can only last so long.

List of Acronyms and Abbreviations

ADB	Asian Development Bank
AOSIS	Alliance of Small Island States
AUD	Australian Dollar
AusAid	Australian Governments Overseas Aid Program
CAD	Canadian Dollar
CIA	Central Intelligence Agency
EEZ	Exclusive Economic Zone
EVI	Environmental Vulnerability Index
FTF	Falekaupule Trust Fund
GHG	Green House Gas
IPCC	Intergovernmental Panel on Climate Change
MDG	Millennium Development Goal
MEAs	Multilateral Environmental Agreements
MESC	Tuvalu Ministry of Education, Sports and Culture
MIRAB	Migration, Remittances, Aid, Bureaucracy,
MNREE Tuvalu	Ministry of Natural Resources, Energy and Environment
MP	Member of Parliament
NAPA	National Adaptation Programme of Action
NGO	Non Governmental Organization
NZAid	New Zealand Aid
PAC	Pacific Access Category
PICCAP	Pacific Island Climate Change Assistance Program
PSIDS	Pacific Small Island Developing States
SIDS	Small Island Developing States
SOPAC	South Pacific Applied Geosciences Commission
SPC	Secretariat of the Pacific Community
SPREP	South Pacific Regional Environmental Programme
TPF	Tuvalu Provident Fund
TTF	Tuvalu Trust Fund
UN	United Nations
UNDESA	United Nations Department of Economic and Social Affairs
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar

Chapter 1: Introduction

Climate change is an important issue in the field of development, one that has the potential to change the way in which countries interact with one another. Each country will be impacted differently from the effects of climate change, though the consensus among those in the environment and development field is that developing countries will be heavily impacted due to various socioeconomic, geographic, and political factors. Therefore finding an optimal balance between essential development efforts and emerging climate change efforts is important. This thesis will look at how climate change is interacting with development in small island developing states.

Linkages between climate change and development are increasingly recognised. Climate change is largely the result of human-induced greenhouse gas emissions that are driven by socio-economic development patterns characterised by economic growth, technology, population and governance. These socio-economic development patterns, in turn, determine vulnerability to climate change and the human capacity for mitigation and adaptation. The impacts of climate change on human and natural systems in turn influence socio-economic development patterns and thereby greenhouse gas emission (Klein et al., 2005 p.586).

There are many developing countries that are currently being affected by the impacts of climate change, and there is the potential for many more countries to be affected in the future. Small Island Developing States (SIDS) are a category of countries that have to deal with the effects of climate change now, and plan for the future effects that scientists are predicting. "Small islands have repeatedly been identified in science

and climate policy discourse as natural systems particularly vulnerable to climate change” (Barnett, 2005). SIDS are highly vulnerable to environmental changes which gives them reason to have concerns for their future, based on observational records, experience with current patterns and consequences of climate variability, and climate model projections (Mimura et al., 2007). These climate change issues are putting heavy strains on SIDS which are already struggling to make ends meet. This thesis will focus on Small Island Developing States (SIDS) with a case study of one SIDS in particular, Tuvalu, to show the interactions between climate change and development initiatives.

The issues that are of major concern for SIDS include (but are not limited to): sea-level rise, access to clean freshwater, erosion and submersion of land, tropical storms, saltwater intrusion, loss of coral reefs, and health issues (Pacific SIDS, 2009; Pelling and Uitto, 2001; Lal et al., 2002). Many Small Island Developing States must tackle similar barriers when dealing with development challenges. These barriers may be expanded and resources exhausted because of the effects of climate change, given that small islands are particularly vulnerable to climate change because of their small size, and their high ratio of shoreline to land area (Barnett, 2005).

Within each Small Island Developing State there are likely to be different perspectives on what should be the optimal balance between climate change and development. In particular, priorities set by the government for the allocation of time, effort, and money may or may not match those of the people in the country, and/or those donor agencies which are funding major development projects in the country.

The country used as a case study for this paper is Tuvalu; a Small Island Developing State in the Pacific. This thesis attempts to answer the question: In an era of climate change are Small Island Developing States such as Tuvalu, optimally balancing development initiatives and climate change adaptation? To understand the balance between climate change and development issues in Tuvalu, four development indicators (education, health, fresh water access, and waste management) were looked at from the perspective of three sets of actors (local citizens, government, and donor agencies).

This thesis explores the different perspectives of what constitutes an optimal balance of attention to climate change versus development, in the country of Tuvalu. This involves analyzing and comparing (1) the priorities set by the government and donor agencies for the allocation of time, effort, and money, with those of the local citizens, and (2) how the state of four development indicators today compares with the situation twenty years ago, prior to the emergence of concern about climate change.

Chapter 2: Linking Climate Change and Development: the importance of the linkages for Small Island Developing States

2.1 Introduction

Discussing climate change and development together is important both for the climate change discipline and the development discipline given that the linkages between these two disciplines are currently affecting the world, and there is great potential they will continue to do so in the future. This paper attempts to take the literature on both of these disciplines and build on the limited literature that explores the linkages between climate change and development, with a focus on small island developing states. This paper will illustrate the landscape of debate in three key areas of literature: the linkages between climate change and development, how responsibility fits into those linkages, and climate change's place within small island developing states.

2.2 Linking Climate Change and Development

Poverty and Environmental Degradation

There has been said to be a link between poverty and environmental degradation (Adams, 2009). This link is important and ties into the link between climate change and development, as well as the North-South debate which is a prominent debate in the literature. Historically, countries of the North have tried to use the North-South debate to their advantage by saying that the south degrades land and other

natural resources by overexploiting the land, cutting down forests, and using improper waste management. The Brundtland Commission of the 1980s described poverty as both a cause and effect of environmental degradation. Many people living in poverty are caught in an inescapable cycle of environmentally degrading practices because they have no alternative but to degrade their resources to survive (Bruntland, 1987; Forsyth, 2005). For instance, peasants living in the Brazilian rainforests cut down and burn trees, so they are able to farm the land and feed their families. Cutting and burning trees adds to the supply of greenhouse gases in the air and worsens the problems of soil erosion since soil found in the rainforest is not very fertile. For these peasants degrading their environment is about survival they are not thinking about the negative effects to the environment (Hauss, 2002).

The linkage between poverty and environmental degradation can be seen at the state level as well. Developing countries are known to have less restrictive environmental laws than those found in developed countries. Many developing countries are willing to accept highly polluting enterprises from the North because they provide employment and investment in the country's economy. There have been many developed countries who have exported their environmentally risky operations to the developing world (Hauss, 2002). Developing countries that do have environmental laws and restrictions often do not have the capacity required to enforce the laws. A point often made in the literature is that developed countries should be held responsible for exploiting developing countries by using them as a dumping ground. Countries of the North want the countries of the south to limit their emissions and put environmental

restrictions on their current and future industry, but what will happen when the North has nowhere to dump their dirty industry (Narain, 2007).

Climate Change

The term climate change has become popular in recent years. With growing popularity come different interpretations of the term. For the purpose of this paper the definition from the United Nations Framework Convention on Climate Change (UNFCCC) Article one will be used: "Climate change means a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods" (UNFCCC, 1992).

Climate change is not just an environmental issue; it crosses disciplines, as well as international boundaries. Climate change is a global issue and therefore it needs to be considered from many levels. Climate change has the ability to affect all regions of the world, to different degrees. Developing countries are already stressed to meet the needs of growing populations and satisfy the basic needs of their citizens, and will be hard pressed to cope with climate change. Climate change is capable of slowing down the development of a country, and even deteriorating the existing structures. It gives rise to impacts on both natural and social systems such as changes in rainfall patterns affecting agriculture productivity, droughts and floods, human health effects, and sea-level rise affecting people living in coastal zones (Opschoor, 2008). The Organization for

Economic Co-operation and Development¹ (OECD) recognizes that compared to disease, poverty, and economic stagnation, climate change can seem irrelevant. Yet, climate change has the ability to directly affect the efficiency of resource investments and the achievement of many development objectives (OECD, 2005). The United Nations (UN) Secretary General Ban Ki-Moon has dubbed climate change 'a defining issue of our era' (Opschoor, 2008). The impact of climate change on developing countries is still unclear, though should this lack of clarity prevent developing countries from developing the same way that current developed countries were able to or be able to create their own path of development? This is the current debate in the international forum and it is this debate that causes climate change to become a development issue.

Over the past few decades there has been much debate over the issues of climate change, if it is happening, if it is natural or manmade, and if something needs to be done about it. In the last 5 years the message has become clear that humanity is changing the world's climate and something must be done about it (Godrej, 2006). Adger et al. recognize that "it remains difficult to unambiguously distinguish human-induced change from natural variation in climate at small scales, evidence of long-term geophysical and biological changes is now apparent in many parts of the world, such as the retreat of mountain glaciers, the earlier arrival of spring, and changes in primary production" (2003). Academics and analysts alike think we have already crossed into dangerous *terra incognita* and that we must work to avoid catastrophic and irreversible

¹ The OECD is a unique forum where the government of 30 democracies work together to address the economic, social and environmental challenges of globalization (Forsyth 2005).

climate change (Storm, 2009; Meinshausen et al., 2009; Hansen, 2008). The consensus in the scientific community is that if the “change in global mean temperature in the 21st century exceeds 2.4 degrees Celsius, changes in the planet’s climate will be large-scale, irreversible, and disastrous” (Bello, 2008). There will most likely still be debates about climate change in smaller circles but the consensus of the international forum is that climate change remains an important issue. The Intergovernmental Panel on Climate Change² (IPCC) was able to get heads of states and influential people from around the world’s attention when it came out with its fourth assessment report in 2007 stating that “Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperature, widespread melting of snow and ice and rising global average sea level” (Bernstein, 2007). The IPCC has made several predictions for the future concerning global air and ocean temperatures rising, sea-level rise and other impacts of climate change. All of the predictions they have made are backed by scientific research, and models (Ibid.2). Although they are still predictions and cannot accurately determine what will happen in the next 100 years, 10 years, or even next year. A significant amount of uncertainty concerning the global and regional impacts of climate change exists. Yet, it is clear the next 10 to 15 years is the narrow window of opportunity for action that will make a difference (Bello, 2008).

² The Intergovernmental Panel on Climate Change (IPCC) was established by the United Nations Environmental Program (UNEP) and the World Meteorological Organization (WMO) in 1988 to coordinate international efforts to assess the likelihood and effects of climate change.

Climate Change and Development

How the world deals with climate change today will have a direct bearing on the human development prospects of a large section of humanity. Failure will consign the poorest 40 percent of the world's population—some 2.6 billion people—to a future of diminished opportunity. It will exacerbate deep inequalities within countries. And it will undermine efforts to build a more inclusive pattern of globalization, reinforcing the vast disparities between the 'haves' and the 'have nots'.

UNDP Human Development Report, 2007

The uncertainties regarding the impacts and effects that climate change will have in the future make it difficult to be fully prepared. For developing countries there are added difficulties. Many of these countries are trying to meet the basic needs of their citizens and want to industrialize and/or develop. Climate change is another obstacle that they must face to achieve development (Adger et al., 2003). Climate change has been widely recognized to be a serious risk to development (Yamin et al. 2005; IPCC 2001; Stirling 2003). The effects of climate change will affect the poor more than the rich due to the fact that it will intensify global poverty and deepen social divisions (Sachs, 2008). Developing countries have less adaptive capacities or resilience because of their high rate of vulnerabilities. Climate change will deepen these vulnerabilities and therefore deepen poverty, through loss of life, livelihoods, assets, infrastructure, "and by affecting the sectoral origins of growth, the ability of the poor to engage in the non-farm sector, and by increasing inequality" (Opschoor, 2008). Sen discusses how development is about the expansion of freedoms that enable people to live lives that they value (2007). Hans Opschoor feels that these freedoms depend on

the quality of the environment and on climatic conditions in particular, which therefore makes climate change a development issue (2008).

Each region of the world, each country, and even areas within those countries will be affected by climate change differently. This is attributed to how they generate a livelihood and wealth, as it is influenced by the ambient climate. Climate has naturally been different for these regions and they have had to develop coping strategies for the different variations in weather (Adger et al., 2003). Their vulnerabilities³ to the climate and the uncertainties of the impacts of climate change differ as well. People's vulnerability to climate change depends on the extent to which their livelihoods are dependent on their ecosystems and the way in which those ecosystems are sensitive to climate change (Barnett, 2005). The *IPCC Fourth Assessment Report* outlines the current knowledge about future impacts and discusses six different topics which need to be studied further. They are as follows: freshwater resources and their management; ecosystems; food, fibre and forest products; coastal systems and low lying-areas; industry, settlement and society; and health (IPCC, 2007). The severity and timing of these impacts will vary with the timing of climate change and the adaptive capacity⁴ of a region. By looking at the current climate predictions and the adaptive capacity of a region, a clearer picture of the future can be determined (Ibid;13-15).

³ Vulnerability – Defined by the IPCC – “is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. Vulnerability is a function of the character, magnitude, and rate of climate change and variation to which a system is exposed, its sensitivity, and its adaptive capacity” (IPCC, 2007).

⁴ Adaptive Capacity – Defined by the IPCC – “is the ability of a system to adjust to climate change (including climate vulnerability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences” (IPCC, 2007).

Climate Change and development is an important area of study for our future. Though there are many unknowns, and many adaptation and mitigation measures are based on predictions, it is important to continue studying and making the linkages between the two areas. A question that many academics and UN departments address is why people should care about the impacts of climate change. The UNDP's answer is that climate change confronts the world with 'the threat of a twin catastrophe': (i) an immediate threat to human development (for example, through the enhanced risk of not achieving development goals); and (ii) the threats to future generations. Climate change will undercut efforts to curb poverty and enhance human development and will hamper the sustained realization of the Millennium Development Goals (MDGs) (UNDP, 2007). The Brundtland report stated it clearly by saying "we have a common future" (Brundtland, 1987). No matter where we live in this world, or which region we have ties to, our lives are intertwined by the planet; everything we do affects other people. Opschoor discusses the need for strong climate stewardship, and that the optimistic ideas about future generations having the economic and technical potentials to deal with the impacts our generation make on the planet, is an extremely 'weak climate stewardship'. A 'strong climate stewardship' in Opschoor's mind would invoke the need to apply the precautionary principle (2008). The precautionary principle asks for action in cases of potential large-scale environmental change despite scientific uncertainty. Opschoor (2008) feels that the UNDP should have gone further to promulgate it as one of the foundations of sound, solidarity-based, global climate mitigation policies.

John Bellamy Foster, Brett Clark and Richard York discuss the need for an ecological revolution (2009). They feel that a fundamental reordering of relations of production and reproduction to generate a more sustainable society is required in order to prevent a planetary disaster (Foster et al., 2009). "Capitalism does not work when it comes to protecting our climate, because it is 'flying blind': it lacks the sensory organs that would allow it to understand and adjust to the climate system" (Storm, 2009). Capitalism is based around competition, "which ensures that each firm must grow and reinvest its 'earnings' (surplus) in order to survive" (Foster et al., 2009). Capital is a self-expanding value, and accumulation is its sole aim, therefore "capitalism as a system does not adhere to, nor recognize, the notion of enough" (Foster et al., 2009).

Martinez-Alier has a similar view, noting that climate change is the greatest externality the world has ever seen, but capitalism in essence is an 'externalizing machine', which is committed to keeping the real environmental cost of economic activities and their environmental liabilities off the accounting books (2009; Storm, 2009). Martinez-Alier discusses a solution that is at the heart of ecological economics: Green Keynesianism (2009). The concepts come from the idea that if public investment must grow to contain the rise in unemployment, it would be better to channel it to the welfare of citizens and to 'green' energy production, than into motorways and airports (Martinez-Alier, 2009). Martinez-Alier understands that 'Green Keynesianism' is not about preserving faith in economic growth, but it is good to increase public investment in energy conservation, photovoltaic installations, urban public transport, housing rehabilitation, and organic agriculture (2009). The current system (which is capitalism)

is driving humanity and our planet towards increased climate change; therefore literature on how capitalism is effecting climate change and solutions for dependence on economic growth, although not directly related to, is relevant when looking at the link between climate change and development.

When linking climate change to development many authors discuss how climate change has the ability to affect and reverse development efforts, though development effects climate change as well (OECD, 2005; Yamin, 2004; Barrow, 2003). Development can “contribute to climate change through increased greenhouse gas emissions from carbon-intensive development pathways and through broader processes of change that are increasing vulnerabilities through a variety of socio-economic, political, environmental and cultural factors” (Yamin et al., 2005). The OECD, which is made up of 30 countries⁵ (the majority being developed) agrees that 34% of global CO₂ emissions today come from developing countries, and by 2030 they will account for 47% if current economic development continues (OECD, 2005). This brings forward the question of responsibility for climate change, and how development is linked to this responsibility.

2.3 Responsibility

The issue of responsibility is one that needs to be addressed when looking at climate change and development, since it is a reoccurring issue in the current debate.

⁵ Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Korea, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States (Welsh and Butorin, 1990).

This section will address the issue of responsibility by looking at who is consuming the resources, the North-South debate, the current environmental policies put in place, and the frameworks that have emerged as a solution.

From 1961 to 2005 humanity's demand on the planet more than doubled. In 2005 the United States and China had the largest total ecological footprint⁶, each using 21 percent of the planet's biocapacity. China had a much smaller per person footprint than the US, but it had a population more than four times as large (WWF, 2008). When it comes to overconsumption of resources the developed world wins. The developing world has many resources but it can be said that they do not use them to the same extent that the developed world does. This can be seen when looking at the range in rates of consumption between developing and developed nations (Roberts, 2007).

North – South Debate

Should developing countries be forced to accept environmental restrictions to their development, even though the developed world did not have to? There are two sides of this debate which are intertwined and it is often referred to as the North-South debate. The basis of the North-South debate stems from different conceptions of equity

⁶ The Ecological Footprint measures humanity's demand on the biosphere in terms of the area of biologically productive land and sea required to provide the resources we use and to absorb our waste. A country's footprint is the sum of all the cropland, grazing land, forest and fishing grounds required to produce the food, fibre and timber it consumes, to absorb the wastes emitted when it uses energy, and to provide space for its infrastructure. Since people consume resources and ecological services from all over the world, their footprint sums these areas, regardless of where they are located on the planet (WWF, 2008).

and environmental justice (Ikeme, 2003). The North, which consists mainly of developed countries, tends to believe that environmental restrictions should be enforced in developing countries (Roberts, 2007). The North focuses on the most economically efficient path for minimising climate impact and delivering global ecological health and stability (Ikeme, 2003). Developed countries tend to have mass consumption habits and share the majority of the responsibility for our current environmental state. While on the other hand, the South, which consists mainly of developing countries in the southern hemisphere (Roberts, 2007), puts forward an argument that is based on equality, distributive injustice, and corrective justice for historical emissions (Agarwal and Narain, 1991; Ikeme, 2003). This side holds the view that developing countries should be able to develop without environmental restrictions, because they did not cause the majority of environmental problems which are having such an irreversible effect on the planet and the climate (Roberts, 2007). The south argues against restrictions on their economic growth, the way in which the current developed countries were able to develop (Ibid; 5-7).

The North-South debate can also be viewed as a debate about priorities. The North's priority is to try and slow down and if possible reverse the effects of climate change, while the South's priority is to be able to develop freely (Ikeme, 2003). Different solutions (many of which are burden sharing formulas) have been proposed, but none have been able to balance the North-South debate issues and needs. The South favours an equal rights per capita entitlement, while the grandfathering rule is

generally preferred by countries of the North (Ikeme, 2003). Walden Bello calls it “the south’s dilemma”. Bello discusses how the South was expected to follow the “stages of growth” of the North before capitalism brought forth the full extent of ecological destabilization. Unfortunately if this happens it will have catastrophic and irreversible effects on the planet (Bello, 2008). Both China and India are good examples; currently China is on track to overtake the United States as the primary emitter of greenhouse gases. Yet China, India and other developing countries want to reproduce the North’s overconsumption-driven capitalism (Bello, 2008). The North-South debate is one of many examples of how the world is failing to deal with climate change. Instead of finding a solution it is heading towards discord and dispute (Narain, 2007). The North-South debate is simplistic in nature, and relies on the competing interests of different groups of actors within both the north and south. The north and south perspectives view environmental justice from opposite sides (Ikeme, 2003), although there are various frameworks that try to find a middle ground (some better than others). These frameworks will be discussed further in the current frameworks section (below).

Environmental Policies

The links between climate change and development can be seen in policies at the national and international scale. In 1992 at the Rio Earth Summit poor nations expressed their fear that environmental restrictions could limit their efforts to grow economically and care for the basic needs of their people (Roberts, 2007). The Earth Summit resulted in important multilateral environmental agreements, one of which was

the United Nations Framework Convention on Climate Change (UNFCCC). The objective of the UNFCCC is stated in Article 2: “stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system” in a time frame “sufficient to allow ecosystems to adapt naturally, and to enable economic development to proceed in a sustainable manner” (UNFCCC, 1992; Barnett, 2005). Unfortunately for developing nations, several powerful industrialized nations refused to change their ways of living by putting environmental restrictions in place, unless developing nations did the same (Roberts, 2007).

Developing countries thought they were being heard when the Kyoto Protocol⁷ was developed which set targets for developed countries to reduce their emissions. The Kyoto Protocol can be said to be generous to rich countries as well, giving them property rights on the carbon sinks and the atmosphere in exchange for the promise of a reduction of 5 percent of their emissions relative to 1990 (Martinez-Alier, 2009). Regrettably, all countries were not on the same page when it came to the Kyoto Protocol and this was clear when President George H.W. Bush stated “the American lifestyle is not open to negotiation” (Susskind et al., 2002). Then in 1997 the US Senate voted 95 to 0 to support the Byrd-Hagel Resolution, which blocks any ‘unfair’ treaty which did not include the participation of developing countries to address the problem (Forsyth, 2005; Roberts, 2007). The fact that the US is a world power and would pass a

⁷ The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change. The major feature of the Kyoto Protocol is that it sets binding targets for 37 industrialized countries and the European community for reducing greenhouse gas (GHG) emissions. These amount to an average of five per cent against 1990 levels over the five-year period 2008-2012 (UNFCCC, 2007).

resolution of this type struck a chord with developing nations and pointed out that the average US citizen dumps as much greenhouse gas into the atmosphere as nine Chinese and eighteen Indians (Roberts, 2007). The very suggestion that developing nations should restrict their economic growth by reducing emissions and implementing environmental restrictions can be seen as unreasonable, since they should have the chance to develop in the same way that current developed countries did. During these negotiations (over the aftermath of the Byrd-Hagel Resolution) China's lead negotiator said "In the developed world only two people ride in a car, and yet you want us to give up riding on a bus" (Ibid, 4). The developing world is not asking to be able to have their citizens drive cars without passengers; they are asking to be able to obtain economic growth the same way that the current developed world did. Chancellor Luiz Felipe Lamprea of Brazil stated "We cannot accept limitations that interfere with our economic development" (Ibid, 3). The South knows what economic development can help them achieve. All they have to do is look at what the north achieved from development and economic growth, both the positive and negative aspects. For the South "its principal fear, that the North is using environmental issues as an excuse to pull up the development ladder behind them, has also not been allayed through two decades of environmental diplomacy, nor has its growing frustration at its own failure to make any substantive gains towards its cherished goal of development" (Najam, 2002).

Current Frameworks

A progressive comprehensive, climate strategy in both the North and the South is desperately needed; it must reduce growth and energy use while raising the quality of life for the broad masses of people. This will mean placing economic justice and equality at the centre of the new paradigm (Bello, 2008). This would be a shift that would integrate both climate change adaptation and development needs. The current frameworks and international agreements to reduce greenhouse gas (GHG) emissions are not working. Although the Kyoto protocol's failure can be attributed to several different reasons, the central problem goes back to the North-South debate; if South's development should be limited because of the North's overconsumption (Susskind et al., 2002). When looking at it from a justice perspective, the South should not have limitations because of what happened in the past with the North. The South should have the same opportunities to develop that the North did, although because humanity has become wiser we must learn from our mistakes. This could be implemented by the south being given technology, aid and advice on how to develop in a more environmentally friendly manner (Bello, 2008). Bello suggests that both the North and South must break away from the high-growth, high-consumption model in favour of another model of achieving common welfare (2008). The North must take this on faster than the South but the south must still follow. The overall goal must be "the adoption of a low-consumption, low-growth, high-equity development model that results in an improvement in people's welfare, a better quality of life for all, and greater democratic control of production" (Bello, 2008).

Joan Martinez-Alier discusses that economic de-growth, leading to a steady state, is a plausible objective for the rich industrial economies, since the 2008-09 world economic crisis (2009). This de-growth is supported by the South and the environmental justice movements, because they strive for an economy that sustainably fulfils the food, health, education and housing needs for all citizens. The North and South perspectives will most likely be different in the near future, though as Bello (2008) notes, the “vast majority will not commit social and ecological suicide to enable the minority to preserve its privileges”. Adams and Jeanrenaud (2008) call for an alliance between the conservation movement and the environmentalism of the poor, which pushes for the introduction of an economic language that better reflects our relations with nature, while not forgetting the legitimacy of other languages: territorial rights, environmental and social justice, livelihood, sacredness (Martinez-Alier, 2009). The question remains, when will the north and south see the need for cooperation, because the lack of implementation of international agreements and policies suggests that both sides will not back down. For example the Kyoto protocol did not put the same restrictions on the North and South, which can attribute to its dwindling strength, and the reason developed countries began backing out by not ratifying.

There are many frameworks that are trying to correct the weaknesses of Kyoto and become its successor. An emerging framework is the Greenhouse Development Rights (GDR) framework which is a proposal aimed at ending the impasse between the

North-South debates and can be seen as a fair division of the burdens of emissions reductions and adaptation to unavoidable climate change.

The Greenhouse Development Rights framework (GDRs) is, accordingly, designed to protect the right to sustainable human development, even as it drives rapid global emissions reductions. It proceeds in the only possible way, by operationalizing the official principles of the UN's Framework Convention on Climate Change, according to which states commit themselves to "protect the climate system ... on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities (Baer et al., 2009).

The GDR offers a solution to the climate crisis while supporting development in the South (Kantha et al., 2008). The GDR is based heavily on two key principles: the polluter pays principle and the principle of common but differentiated responsibility. Critics have said that it is a framework that seems to take into account the South within the North and the North within the South, but it is not perfect and it needs to be promoted more aggressively to have a chance at competing and contributing to the international climate strategies (Kossler, 2009). The GDR is one of many strategies that is currently circulating as a solution to climate change, and it brings us back to responsibility. All frameworks that are proposed have to bring in the concept of responsibility and take a side. It seems impossible that there is a solution out there which will make both sides equally happy, but this does not mean we should stop trying.

2.4 Approaches to Climate Change and Development

Climate change and development can be seen as somewhat of a newer field of study. The linkages between the two areas of study emerged only in the 1970s, but it was not until the 1990s that it became more evident in development literature. The current literature looks at many approaches to climate change and development but there are two which have become more dominant: vulnerability and adaptation.

Vulnerability

Vulnerability is key to understanding the dynamics that affect the processes of adaptations and adaptive capacity, and is a central concept in the development and climate change disciplines and the linkage between them. The concept of vulnerability has been in disaster literature as early as the 1970s. In the 1980s it spread into the climate change and development literature (Gaillard, 2010). Gaillard (2010) explains why vulnerability was put into that literature by stating that “the definitions refer to the susceptibility to suffer damage in a potentially dangerous event, either natural, economic, or political. Vulnerability thus stresses the condition of a society which makes it possible for a hazard to become a disaster.” Kates (2000) discusses how in many places previously successful traditional knowledge is no longer being relied on and implemented, and societal organized adjustments are not yet available, which causes these areas to be susceptible to extreme events.

The term vulnerability was defined in a previous section using the IPCC definition, although the UNDP states that

Vulnerability has no universally accepted definition. The literature on risk, hazards, poverty and development is concerned with underdevelopment and exposure to climatic variability – among other perturbations and threats. In this view, vulnerability is systematic, and as a consequence of the state of development...final outcomes are determined by a combination of climate hazards and system vulnerability. In this approach, the focus is on coping or adaptive capacity as the means of vulnerability reduction.

(Downing and Patwardhan, 1994)

Since vulnerability does not have an accepted definition (in the eyes of the UNDP), many interpretations of the term arise, and this causes difficulties when countries are trying to understand what makes them vulnerable, and the ways in which they can mitigate these vulnerabilities. Gaillard's (2010) recent paper concludes that "the root causes of vulnerability in the face of climate-related and other natural hazards are yet intimately embedded in development failure for those who suffer from disasters. In return, these disasters leave a heavy toll on development". Schipper (2007) has a similar view when looking at both vulnerability and adaptation strategies for linking development and climate change, and feels that it is vulnerability reduction that should be integrated into development policy, rather than the creation of explicit adaptation strategies. By focusing on adaptation before aligning the development processes through the creation of enabling conditions for adaptation, it is putting the cart before the horse (Schipper, 2007). Climate change will exacerbate problems already faced by developing countries, such as vulnerability. These countries are vulnerable because of their poverty and lack of power which has put them in harm's way and often has nothing to do with the climate (Gaillard, 2010). This brings forward the 'Vulnerability Reduction Approach'

discussed by Schipper (her other approach is the Adaptation Approach which will be discussed in the next section). In Schipper's vulnerability approach

development processes help reduce vulnerability to climate change. By reducing the vulnerability, impacts of climate hazards are also reduced, as there is less sensitivity and exposure to the hazards. This translates into a process of adaptation to climate change (2007).

A country and/or region's vulnerability can determine the extent of which it will be affected by climate change. It is vulnerability which will determine if adaptation is possible and what level of adaptive capacity is needed. Therefore vulnerability can be seen as the dominant link between climate change and development.

Adaptation

"Adaptation is the process or outcome of a process that leads to a reduction in harm or risk of harm, or realisation of benefits associated with climate variability and climate change" (Connell and Willows, 2003). Adaptation has emerged as a solution to address the impacts of climate change. However this approach has not always been seen in a good light within science and policy. In the past, science and policy have leaned towards mitigation, which is a preventative approach of limiting the sources of greenhouse gases (GHGs) (Klein, 2003; Schipper, 2007). Before the year 2000 almost all efforts to address global climate change focused on preventative action to limit greenhouse gasses rather than adaptation (Kates, 2000). Kates points out that the subtitle of volume II of the IPCC report: 'Impacts, Adaptations, and Mitigation of Climate Change: Scientific – Technical Analyses' is misleading when it comes to adaptation, since

of the 728 pages of substantive text, only 32 pages are devoted to adaptation (2000). In recent years there have been more studies devoted to adaptation as a popular and relevant approach to climate change. Adaption can be seen as opposite to mitigation since “adaptation responds directly to the impacts of the increased concentrations of greenhouse gases in both precautionary and reactive ways” (Schipper, 2007). When looking at adaptation in the development context it is hard to decipher the different definitions. Academics define it differently and the different uses of adaptation affect how the concept might be applied in a practical way (Schipper, 2007).

The following table (from Schipper) provides a summary of popular definitions of adaptation.

Table 1. Summary of adaptation definitions	
<i>Source</i>	<i>Definition</i>
Burton <i>et al.</i> (1998)	Refers to all those responses to climate change that may be used to reduce vulnerability.
Burton (1992)	Adaptation to climate is the process through which people reduce the adverse effects of climate on their health and well-being and take advantage of the opportunities that their climatic environment provides.
Downing <i>et al.</i> (1997)	Adaptation is synonymous with “downstream coping”.
Füssel and Klein (2002)	All changes in a system, compared to a reference case, that reduce the adverse effects of climate change.
IPCC (2001)	Adjustment in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. This term refers to changes in processes, practices, or structures to moderate or offset potential damages or to take advantage of opportunities associated with changes in climate. It involves adjustments to reduce the vulnerability of communities, regions, or activities to climatic change and variability.
Pielke (1998)	Refers to adjustments in individual, group and institutional behaviour in order to reduce society’s vulnerabilities to climate.
Rennie and Singh (1996)	Adaptive strategies are ways in which local individuals, households and communities have changed their mix of productive activities, and modified their community rules and institutions in response to vulnerabilities, in order to meet their livelihood needs.

Scheraga and Grambsch (1998)	Adaptive actions are those responses or actions taken to enhance resilience of vulnerable systems, thereby reducing damages to human and natural systems from climate change and variability.
Smit (1993)	Involves adjustments to enhance the viability of social and economic activities and to reduce their vulnerability to climate, including its current variability and extreme events as well as longer term climate change.
Stakhiv (1993)	Means any adjustment, whether passive, reactive or anticipatory, that is proposed as a means for ameliorating the anticipated adverse consequences associated with climate change.

(Schipper, 2007)

The dominant discourses perceive adaptation as a process that can be smoothed through international development transfers (Adger et al., 2003). Another way of looking at adaptation is “because of the nature of the new challenges brought about by climate change in natural resource management and other areas of governance, adaptation will inevitably be characterized both by processes of negotiated adjustments involving individuals, civil society and state, and by renegotiation of risk-bearing and sharing between them” (Adger et al., 2003).

Adaptive Capacity

It has been difficult for multi-lateral organizations to recommend an adaptation plan that will work for all countries, because even though the definitions of adaptation tend to be similar they often rely on the needs of the country. The needs of each country are different and therefore the best adaptation plan depends on the adaptive capacity of a country. Adaptive capacity as defined by the IPCC (2007) refers to “the ability of a system to adjust to climate change (including climate variability and

extremes), to moderate potential damages, to take advantage of the opportunities, or to cope with the consequences.” Smit and Pilosova (2001) have a similar view in that the adaptive capacity represents a practical means of coping with changes and uncertainties in climate (this includes variability and extremes), and the enhancement of adaptive capacity reduces vulnerability and promotes sustainable development. Brooks (2003) acknowledges that many definitions of adaptive capacity exist though “broadly speaking it may be described as the ability or capacity of a system to modify or change its characteristics or behaviour so as to cope better with existing or anticipated external stresses.” Brooks (2003) further notes

The definition of adaptive capacity must encompass all the processes that determine whether or not adaptation takes place, and to what extent, including those associated with different scales and systems, representing the environmental, economic and geopolitical context in which the system of interest is embedded. Perhaps a more appropriate term would be adaptation likelihood. While use of the term “adaptive capacity” often leads to debate as to where ‘inherent’ capacity ends and external obstacles to adaptation begin, the term ‘adaptation likelihood’ more naturally encompasses determinants at different scales.

Measuring adaptive capacity is a relevant means to determine if a country or region will be able to adapt. However the conditions for adaptive capacity are diverse; they also behave differently in different countries and regions, particularly depending on the level of development. These determinants represent conditions that constrain or enhance the adaptive capacity and hence the vulnerability of regions, nations, and communities (Smit and Pilosova, 2001). Smit and Pilosova (2001) identify six elements which are integral to strengthening adaptive capacities and which will be used in further sections

as a base framework when looking at the ability of SIDS (Small Island Developing States) to adapt to climate change.

1. A stable and prosperous economy
2. Access to technology at various levels (i.e., from local to national) and in all sectors including access to renewable, sustainable forms of technology
3. The clear roles and responsibilities for all levels of government in facilitating adaptation measures
4. Effective communications on adaptation strategies at various levels of society
5. Social institutions that ensure the equitable distribution and access to resources
6. Ensuring that existing systems with high adaptive capacity are not compromised (i.e. Traditional ecological knowledge is treated with respect)

Schipper (2007) outlines an 'adaption approach' to development. "From a policy perspective , the adaptation approach to development is simpler: it centres around mainstreaming adaptation, which comes down to taking into account climate change in social, institutional and infrastructural development planning" (Schipper, 2007).

Bilateral and multilateral organizations and policymakers in the UNFCCC context have embraced the concept of mainstreaming adaptation into the existing development agenda. However "mainstreaming will not be effective if existing development trajectories are inconsistent with objectives of adaptation, i.e. if they explicitly contribute to vulnerability" (Schipper, 2007).

2.5 Small Island Developing States

Climate change could well be the greatest challenge that humanity has ever known. I make a very strong plea to all to act quickly and responsibly, to ensure that countries like Tuvalu do not disappear.

Apisai Ielemia, Prime Minister of Tuvalu, 2006, Speech to the UN.

Climate Change

Small Island Developing States⁸ are a category of countries that have to deal with the effects of climate change, and plan for the future effects that scientists are currently predicting. Small Island Developing States (SIDS) are dealing with many of the topics discussed previously within the climate change and development field. The four regions of the world in which key SIDS are located are: the Atlantic Ocean, Caribbean Sea Islands, Pacific Ocean Islands, and the Indian Ocean Islands (Lal et al., 2002). SIDS are grouped together in the literature “due to similarities in international development and sustainability challenges, interest and approaches for overcoming those challenges” (Kelman, 2010). “Small islands have repeatedly been identified in science and climate policy discourse as natural systems particularly vulnerable to climate change” (Barnett, 2005). SIDS have high vulnerability and low adaptive capacity which gives them reason to have concerns for their future, based on observational records, experience with current patterns and consequences of climate variability, and climate model projections

⁸ Small Island Developing States are defined by SIDS network as “SIDS are small island and low-lying coastal countries that share similar sustainable development challenges, including small population, lack of resources, remoteness, susceptibility to natural disasters, excessive dependence on international trade and vulnerability to global developments. In addition, they suffer from lack of economies of scale, high transportation and communication costs, and costly public administration and infrastructure” (Sidsnet, 2007).

(Mimura et al., 2007). These climate change issues are putting heavy strains on SIDS which are already struggling to make ends meet.

Small Island Developing States must tackle similar barriers when dealing with development. These barriers may be expanded and resources exhausted because of the effects of climate change. Small Islands are particularly vulnerable to climate change because of their small size, and their high ratio of shoreline to land area (Barnett, 2005). They often have a limited ecological carrying capacity and a limited water supply. Many small islands have a narrow range of skills and low economic resilience; an economic base focused on primary production and limited natural resources (Barnett, 2001; Lal et al., 2002). There is a heavy dependence on marine resources to meet protein needs (Mimura et al., 2007), and therefore changes to the marine environment are felt throughout the entire country. The deterioration in coastal conditions through erosion of beaches and coral bleaching is expected to affect local resources such as fisheries. It is important to note that although most SIDS have been or will be affected by climate change, and they will face many of the same challenges due to their similarities, there are also differences in political orientation, economic development, population size and land area (Pelling and Uitto, 2001). The climate change consequence which is of major concern for SIDS is sea-level rise. Sea-level rise leads to many different challenges, some of which are already occurring in SIDS and others that threaten their livelihoods and existence.

Sea-Level Rise

Small Islands are greatly concerned about the effects of sea-level rise (IPCC, 2007). Sea-level rise is due to thermal expansion of the oceans resulting from global warming and the melting of glaciers and ice caps (Lal et al., 2002). Sea-level rise caused by climate change has already changed aspects of SIDS and will continue to do so. “The projected global rate of mean sea-level rise of 5 mm yr^{-1} (with a probability range of 2 to 9 mm yr^{-1}) is 2 to 4 times greater than the rate experienced in the previous 100 yr” (Lal et al., 2002). Almost all islands will be adversely affected by accelerated sea-level rise (Pelling and Uitto, 2001). Even modest rises in sea-level are likely to result in limited access to clean freshwater, significant erosion and submersion of land, an increased vulnerability to storms, loss of coral reefs, saltwater intrusion, and health issues (Pacific SIDS, 2009; Pelling and Uitto, 2001, Lal et al., 2002). “Sea-level rise will exacerbate inundation, erosion and other coastal hazards, threaten vital infrastructure, settlements and facilities, and this will compromise the socio-economic well-being of island communities and states” (Mimura et al., 2007). The Intergovernmental Panel on Climate Change (IPCC) projects that the sea level will rise 5mm per year for the next 100 years. If the predictions are true this will be catastrophic for SIDS and there is the possibility of making them uninhabitable for human populations.

Sea-level rise will change coastlines and could lead to a reduction in island size, particularly in the Pacific. In the Pacific islands, more than fifty percent of the population lives within 1.5 km of the shore (Mimura et al., 2007). For many island countries if sea-level rises, people do not have the opportunity to move farther inland

because space is limited. It has been estimated that a 1 meter sea-level rise would lead to the submergence of 1190 tiny islands that constitute the Republic of the Maldives. In Trinidad and Tobago (South Caribbean) beach erosion rates of 2 to 4 meters yr^{-1} have already occurred (Lal et al., 2002). Low lying coral atolls⁹ are the most vulnerable to sea-level rise; Kiribati, the Marshall Islands, Tokelau and Tuvalu are comprised entirely of such atolls (Barnett, 2005). Climate change impacts on SIDS are likely to be irreversible; therefore whether SIDS will have adequate potential to adapt to sea-level rise within their own national boundaries is an important question (Lal et al., 2002), and one that can be better addressed when looking at the linkages of climate change and development.

Climate Change and Development

Small Island developing countries are extremely susceptible to climate change and each region has different weaknesses, but what all regions have in common is that the impacts of climate change in all probability will affect their ability to develop. The ways in which climate change affect each country are different, which means that discussions about impacts on SIDS should be understood as generalizations masking significant variation (Barnett, 2005). SIDS tend to have small land area and low overall population as compared to more developed countries. If 100 people were displaced in Tuvalu, the majority of the world may see this as insignificant, but since this is ~1% of

⁹ Atolls are islands built by coral reefs on the rims of ancient volcanoes; they are small, isolated, fragmented, and extremely susceptible to rises in sea level (Roberts, 2007).

their population it would most likely have a devastating effect on the country. This is because SIDS experience relatively high 'proportional impacts' and 'proportional vulnerability'. Ilan Kelman discusses these terms, and the fact that they are important and should not be neglected in development policy (2010). "International development policy needs to factor in both absolute and proportional metrics, with SIDS exemplifying the challenges of proportionality through their climate and disaster experiences" (Kelman, 2010).

Responsibility

Now that SIDS have been identified as being vulnerable and susceptible to climate change, and that climate change is happening and the effects will continue to increase in the near and far off future, the question of responsibility comes back to the table in the SIDS context. This section will address the question of responsibility and where SIDS fit into the debate, and then the policies SIDS have put in place to address environmental changes.

"While small island developing states are among those that contribute least to global climate change and sea-level rise, they are among those that would suffer most from the adverse effects of such phenomena and could in some cases become uninhabitable" (United Nations, 1994). Any economic development that may be achievable for SIDS in the next few decades is under threat of being literally swept away because of human induced climate change. It is clear that the contribution to human

induced climate change from SIDS is small (Najam et al., 2003). Najam et al. point out that

emissions from developing countries is growing with their development and that somewhere in the next two decades the total emissions from all currently developing countries would equal the total emissions from all currently industrialized countries. Although stylized, this is factually correct. However, it needs also to be noted even in such a scenario the vast bulk of the global population would still be living in developing countries, and each individual in the north would still be emitting far more proportionally than their individual counterparts in the south. In essence, the citizens of the north will continue to remain disproportionately responsible for global emissions well into the future, despite whatever growth in emissions might happen in the south over the next few decades. The result is that those who have been least responsible for creating the crisis are, and are likely to remain, most at risk by its ravages (2003).

Unfortunately for the most vulnerable SIDS the future holds uncertainty. Climate change predictions have identified that SIDS are vulnerable of becoming uninhabitable.

For the Pacific Small Island Developing States [PSIDS], the most fundamental threat to security emanates from rising sea levels that threaten the territorial integrity and sovereignty of PSIDS countries and lead to conflict and unrest over resources and land. Several countries are facing the danger of disappearing entirely (Pacific SIDS, 2009).

PSIDS are limited by their economic and environmental vulnerabilities, which puts them on the frontlines of climate change impacts and their survival is at stake. All countries in the world should take responsibility for climate change and work towards adaptation, stopping the effects and even reversing them (if it is possible) because PSIDS are only the first countries to be affected; other countries will follow (Pacific SIDS, 2009).

Climate change is already being felt around the world, and although the effects are not

spread out evenly they will not stop at the PSIDS, or the SIDS, or the LDC, they will continue to the industrialized nations.

Environmental Policies

Small Island Developing States have been able to work together as a united front. They have done this by creating different regional organizations, groups, and networks which have incorporated climate change into their strategies and activities. Appendix A is a set of pages from a UNFCCC (2007) document that lists some of the organizations, groups and networks that SIDS have formed and the objectives of each. Some of the organizations that have been active and successful at having a strong voice heard on the international stage are: the Alliance of Small Island States (AOSIS), The Secretariat of the Pacific Community (SPC), and the South Pacific Regional Environmental Programme (SPREP) (UNFCCC, 2007; AOSIS, 2009).

The Alliance of Small Island States (AOSIS) compiles research and statistics about the vulnerability to climate change (UNFCCC, 2007; AOSIS, 2009). The AOSIS formed during the Second World Climate Conference in 1990. It aims to influence negotiations on environmental issues. The group is guided “by clearly stated principles, including the principle of preventative action, the precautionary principle, the “polluter pays” principle, the duty to cooperate and the principle of equity” (Barnett, 2005). The Secretariat of the Pacific Community (SPC) creates programs that aim to develop technical assistance, professional, scientific and research support, and planning management capability, by working with member countries (UNFCCC, 2007). The South

Pacific Regional Environmental Programme (SPREP) promotes cooperation in the Pacific Island region and provides assistance to protect and preserve the environment while ensuring sustainable development (UNFCCC, 2007).

It is important for SIDS to have different regional organizations and groups because though each country has the ability to be heard, the reality is that many of the islands' population and size is comparable to that of a city in many larger developed countries. By uniting, SIDS have the opportunity to voice their concerns on the international stage. Many SIDS are signatories to a large number of global and regional multilateral environmental agreements (MEAs). MEAs have been effective in developing appropriate environmental policies on biodiversity and climate change (example UNFCCC, Montreal Protocol, Convention on Biological Diversity) (Kaly et al., 2002; UNDESA, 2009).

AOSIS has maintained moral pressure on developing countries to reduce greenhouse emissions through appeals to the UN General Assembly, partnerships with large nongovernmental organizations such as Greenpeace and speeches and lobbying in a broad range of international forums such as Commonwealth Heads of Government Meetings and the World Summit on Sustainable Development (Barnett, 2005).

Although not all MEAs have been able to make an impact, many have been effective in mobilising funding for increasing understanding within SIDS and, internationally (Kaly et al., 2002; UNDESA, 2009).

Approaches to Climate Change and Development

In a previous section both adaptation and vulnerability were discussed as approaches to linking development and climate change. After defining and exploring the approaches, it was determined that vulnerability has the capacity to establish the extent to which a region or country will be affected by climate change. Vulnerability will determine if adaptation is possible and what level of adaptive capacity is needed. This section will look at both the adaptation and the vulnerability approaches within the context of SIDS and how the approaches have been implemented.

Vulnerability

For small island developing states it is the natural environment that is thought to be vulnerable to a range of natural and anthropogenic hazards, which have the capability to damage them at higher rates and intensities than other countries or regions (Kaly et al., 2002). SIDS are vulnerable because of their small size, insularity, and remoteness, environmental factors, limited disaster mitigation capability, and demographic and economic structure (Pelling and Uitto, 2001). "It is expected that because SIDS are small, and/or their human and natural environments have limited capacity to absorb shocks, tend to have few refugia and may be less differentiated, the effects of hazards present in other areas of the world are more pronounced and cause greater damage" (Kaly et al., 2002). Small islands have a disproportionate vulnerability to natural disasters (Pelling and Uitto, 2001). Briguglio (1993) conducted a study using data on export dependence, insularity and remoteness and proneness to natural

disaster, in which he concluded that nine out of the ten most vulnerable countries were small island states (Pelling and Uitto, 2001). Even though this study showed the need for more research on natural disaster vulnerability and SIDS, between 1993 and 2001 the literature was still underdeveloped. Pelling and Uitto's 2001 paper titled 'Small island developing states: natural disaster vulnerability and global change' concluded that "the larger, least globally connected island states are those most severely affected by disaster (Haiti, PNG, Jamaica). Although it is the smaller islands that are most at risk from the 'knock-out' by a single event." This goes back to the fact that although SIDS have much in common they will be affected differently. For the smaller islands one event could change the entire nation's livelihood and future. Pelling and Uitto (2001) say that "perhaps the most critical of all for island states is that a rising focus on building local resiliency does not detract from international efforts to reduce economic and environmental pressures resulting in risk for small island states". Since 2001 there has been more literature on SIDS vulnerability to climate change and natural disasters. Daly et al. (2010) discuss a project that was undertaken by the Government of Samoa in partnership with communities which "sought to assess the vulnerability of the country's infrastructure to climate-related hazards and to develop a land-use and disaster management framework". Other similar projects have been implemented in SIDS, although there are still many frustrations about the way in which the connections between these issues are studied and implemented. Gaillard (2010) concludes that "the root causes of vulnerability in the face of climate-related and other natural hazards are yet intimately embedded in development failure for those who suffer from disasters. In

return, these disasters leave a heavy toll on development". It is evident that SIDS are vulnerable to climate change and there is consensus among academics that SIDS are the most vulnerable group.

Adaptation

Small Island Developing States have ongoing projects and plans for new projects "which will implement adaptation measures to help increase resilience to the impacts of climate change on a global, regional and national level. These projects involve strengthening of institutions, policy and regulations, but also ground-level tasks such as water storage and drought resistant crops" (UNFCCC , 2007). Small island developing nations that are faced with the consequences of climate change must somehow adapt, however some feel that there are only limited options available; islanders can either abandon threatened areas, retreat to higher ground, or build walls to hold back the sea (Schmidt, 2005). This is a very extreme view and there are other options, such as hurricane resistant buildings, provision of water storage, waste management facilities, and green technology (UNFCCC, 2007). The capital of the Maldives, Male built a system of protective walls at a cost of \$4000.00 US per meter. This project was largely financed by Japan and it was these walls which saved the capital from the tsunami that struck the Indian Ocean in December 2004. Unfortunately seawalls are not always as effective (Schmidt, 2005). "Intervention is necessary to enhance adaptive capacity or the ability to adapt to a new or changing conditions without becoming vulnerable or shifting towards maladaptation" since the IPCC recognizes that there is little evidence that

efficient or effective adaptations to climate change risks will be taken autonomously (Adger et al., 2003).

In 2001 the seventh meeting of the Climate Change Convention was held in Marrakech. It was decided that the scope of activities which are eligible for funding needed to be expanded; this included the areas of adaptation and capacity-building. Two new funds were developed under the Convention which were to be managed by the Global Environmental Facility (GEF) (UNFCCC, 2007). “The GEF is charged with implementing the provisions of the Marrakech Accords in a manner that respects both procedural fairness and reflects the priorities of developing countries seeking to adapt to both climate variability and change” (Adger et al., 2003). Out of this came the National Adaptation Programme of Action (NAPA). Many countries have taken part in this and been able to create an extensive plan with the help of the GEF and the UNDP. It has allowed SIDS to identify their most urgent adaptation needs (UNFCCC, 2007). The NAPA allows countries to identify adaptation measures which are said to relatively reduce severity of adverse impacts of climate change. The NAPA builds upon existing environmental information and reports including expert judgements, and understanding gathered through community consultation and climate change awareness (UNFCCC, 2006). NAPAs have been done for many SIDS including Maldives, Samoa, Haiti, and Vanuatu. When reading the literature about the threats and vulnerability of SIDS it can be hard to stay optimistic. However, deep within the threats and vulnerability, hope can be found and there is good reason to think that even the most vulnerable atoll states

will prevail with a high level of adaption, determination and sustainable practices (Barnett, 2001).

2.6 Conclusion of Literature Review

It has been shown that there is a link between climate change and development and that studying the connection between the two is important. The connections can be seen at a broad level in poverty and environmental degradation and in a more focused level by looking at the adaptation and vulnerability approaches. It can be seen in policies and organizations at the national and international scale such as the Rio Earth Summit, UNFCCC and IPCC (Roberts, 2007; UNFCCC, 1992; IPCC, 2001). Climate change has been widely recognized to be a serious risk to development (Yamin et al. 2005; IPCC 2001; Stirling 2003). The question of who should take responsibility for climate change is a central question in the linkage, because it is the reason why international, regional and even national climate change agreements are struggling to hold strong. Each country is trying to look out for themselves and others that are in similar situations. For the purpose of this paper all of these issues were looked at through the lens of small island developing states. By reviewing the literature it is clear that there is a gap. Climate change and development and the reasons there should be linkages between the two disciplines is developed by many academics, but the trade-offs between climate change and development is less developed. ``There is a need to explore the effects of climate change at the local level, as well as to incorporate the culturally-specific adaptive capacity of diverse and potentially resilient atoll societies`` (Barnett and Adger,

2003). How a country balances development and climate change will be central to their survival in the future; this is an area of study that needs to be looked at from a regional and national level.

Chapter 3: Background of Tuvalu

3.1 Background of Tuvalu

Tuvalu is one of the smallest and lowest lying island nations. It consists of nine islands, five of which are considered true atolls (Nanumea, Nui, Nukufetau, Funafuti, and Nukalaelae) and are edged by small motu (islets above sea level). Three are table reef islands (Nanumaga, Niutao and Niulakita), and one (Vaitupu) has composite characters of an atoll and a table reef island. Each island is ecologically and culturally unique. All of the Islands have a combined land area of 25.6 square kilometres. Tuvalu covers an ocean area of 9,000 square kilometres and has distances of 125 to 150 kilometres between each island/atoll. Tuvalu is located approximately 1,000km north of Suva, Fiji and 250km south of Kiribati (Grano, 1995; Lazrus, 2009). The current population is over 11,000 (ADB, 2009). Tuvalu's highest elevation is 5 meters and the average elevation is less than three meters above sea level (CIA, 2010; Lazrus 2009).

History

In the early 16th century, Tuvalu was settled by Polynesians coming from Tonga and Samoa. During this period, Micronesians from Kiribati invaded the island of Nui. The people of Tuvalu are mainly Polynesians with a minority group of Micronesians (UNFCCC, 1999). During this time there were frequent canoe voyages between the nearer islands. Eight of the nine islands of Tuvalu were inhabited; the name Tuvalu means `eight standing together` in the Tuvaluan language (UNFCCC, 1999; Tuvalu Government, 2006a). In the early 1800s whalers were in the Pacific, although due to the

difficulties of landing ships on the atolls they visited infrequently, and no settlements were established by them. Between 1862 and 1864 Tuvalu was hard hit by Peruvian slave raiders (known as blackbirders), and over 400 people were taken from two of Tuvalu's Islands, none of whom ever returned. In 1865 the London Missionary Society (Protestant Congregationalists) arrived in Tuvalu and converted the people to Christianity, which they are said to have completed by the 1920s. In 1892, (what is now) Tuvalu became part of the British protectorate known as the Ellice Islands. The protectorate was incorporated into the Gilbert and Ellice Island Colony in 1916 (UNDP, 2006; Faaniu et al., 1983). In 1942 during World War II the American military landed forces on Funafuti since it was a strategic location for its fight against the Japanese advance in the Pacific region. The military runway was built over pulaka¹⁰ gardens. The deep mud pits that were used to grow pulaka had to be filled; coral and sand was 'borrowed' to do this. They called these 'borrow pits' and there are 10 of them throughout Funafuti (Simms, 2005; Grano, 1995).

In 1974 due to ethnic differences the Polynesians of the Ellice Islands voted to separate from the Micronesians of the Gilbert Islands (later Kiribati). The Ellice Islands became the separate British colony of Tuvalu in 1975, and independence was granted in 1978. The following year Tuvalu signed a treaty of friendship with the United States, which recognised Tuvalu's possession of four small islands formerly claimed by the United States (UNDP, 2006).

¹⁰ Pulaka is root crop grown in Tuvalu. It has large leaves and coarse roots, which need to be cooked for hours to reduce toxicity (Personal Communication 2010).

Political

The Tuvalu political system is a constitutional monarchy with a parliamentary democracy. The head of state is Queen Elizabeth II, represented by a governor general. Tuvalu has an elected fifteen member legislative chamber. Each Member of Parliament (MP) runs for office independently, as there are no formal political parties in Tuvalu. The elected legislature elects a Prime Minister. The Prime Minister then chooses up to ten MPs to join a Cabinet (NZ Govt, 2010; Tuvalu Government, 2010c; Faaniu et al., 1983). The number of members per island is dependent on the number of registered voters per island; currently all islands have two members except for Nukulaelae which has only one (Tuvalu Government, 2010b).

In December 1997 a new form of governance was established for all island communities in Tuvalu. The Falekaupule Act of 1997 (passed by the Parliament of Tuvalu) entrusted local government authority to the Falekaupule¹¹ and Kaupule¹² (two separate bodies) “to work together in addressing community affairs in order to promote decentralization to decrease domestic urban drift” (Tuvalu Government, 2007a). The Falekaupule Act gives island councils (which are comprised of traditional leaders) responsibility for managing their own finances from a budget allocated by the central government (NZ Govt, 2010). Tuvalu’s islands are centred around a single village and have a distinct sense of community and identity. The traditional councils of chiefs

¹¹ The product of the fusion of the traditional leadership and the introduced governing system on each island (Tuvalu Government, 2007b)

¹² The executive arm of the Falekaupule (Tuvalu Government, 2007b)

operate in tandem with the established federal government and are the authorities on matters of custom (Australian Government, 2010). Under the Falekaupule Act 1997, increased autonomy was given to the island councils to determine development priorities. However the island councils had to make sure their development priorities fell in line with the Federal Government's development priorities which included: human resource development, improvement of the country's economic and education infrastructure and the further development of its capacity to manage its narrow resource base (Australian Government, 2010). The Falekaupule Act shows the importance of traditional knowledge and methods currently play in Tuvalu.

Tuvalu experienced a period of "political instability" between 2000 and 2003, with three Prime Ministers resulting in a lack of clear priorities and strategies, and fiscal management problems (Tuvalu Government, 2007b). Unfortunately there has been a lack of constant record keeping and strategy documents are often hard to come by or unavailable. The increasing use of personal computers has begun to help this situation and better manage record keeping, but time and effort needs to be put into this endeavour (Tuvalu Government, 2007b).

An election occurred in September 2010, and the former Prime Minister Apisai Ielemia was re-elected as a member of parliament, but the other members did not vote for him to become Prime Minister again; instead they chose former Prime Minister

Maatia Toafa¹³ (Tuvalu Government, 2010b). Soon after the election Mr. Maatia stated in an interview that climate change is on the radar for his government, and that he would like to focus on a solution to the problem, not on resettlement (Tuvalu Government, 2010d). Three months after the election in December 2010 Mr. Maatia was removed as Prime Minister after a non confidence vote. The vote was initiated due to MPs' concerns over certain aspects of the budget, in particular the prospect that the government may no longer fully fund the medical treatment scheme which covers medical costs for patients that need to go overseas. Mr. Willie Telavi was voted in as Prime Minister on December 24th 2010. Mr. Telavi was formally the Minister of Home Affairs and has held that position since 2006 when he was first elected to government (Tuvalu Government, 2010e).

Economy

Tuvalu was historically based on a subsistence economy. Subsistence agricultural practices were used on all arable land. Of Tuvalu's 6400 acres, 66.67% (4,300 acres) is arable land (CIA, 2010) and of that arable land there is only a thin layer of accumulated vegetable deposits which cover alkaline coral sand soils (Lazrus, 2009). Agricultural production is limited, the main crops being pandanus, breadfruit, coconuts, bananas, and pulaka (Tuvalu Government, 2006a). Coastal flooding in recent years has caused saltwater intrusion into much of the groundwater. This has affected the amount

¹³ Maatia Toafa the current prime minister of Tuvalu was a caretaker prime minister from 2004-2006. (Tuvalu Government, 2010c)

of arable land available and has made rain water the main source of freshwater. During colonial times Tuvalu was heavily deforested for building materials, and space for the increasing population. The deforestation of the islands has increased the chance of flooding due to the fact that there are not enough trees to absorb excess water from storms and floods (Roberts, 2007).

A substantial amount of Tuvalu's income annually comes from the Tuvalu Trust Fund (TTF). The TTF was established in 1987 by Tuvalu, Australia, New Zealand and the United Kingdom. Its purpose is to assist the Government of Tuvalu to "achieve greater financial autonomy in its recurrent budget, to maintain and perhaps improve social infrastructure and services, to improve absorptive capacity, to enable the Government to meet the maintenance and operating costs for social infrastructure and services, and to assist the development of Tuvalu's economy" (Knapman et al., 2002). The starting amount of the capital fund was 26.4 million Australian dollars (AUD) (Approximately 26.4 million CAD). This money was maintained by reinvestment and continuous contributions. In 2002 the maintained value was 67.1 million AUD (approximately 67.2 million CAD) (Knapman et al., 2002). This money plays an important part in the Tuvaluan economy, and they have become dependent on it. In 1999 the government adopted a similar strategy as the TTF to promote the outer islands¹⁴ development. It is called the Falekaupule Trust Fund (FTF), and was established to help outer islands take an initiative in development (UNFCCC, 1999).

¹⁴ The outer islands refer to all islands except the main island of Funafuti.

Tuvalu is seen as structurally vulnerable due to its small size, remoteness, unpredictable global markets, and dependence on a single export crop (copra, dried coconut kernels). In an average year Tuvalu's imports outnumber exports twenty to one (Roberts, 2007). All of these factors contributed to Tuvalu's continued economic vulnerability and instability. With no mineral resources, the primary economic activities are subsistence farming and fishing (Simms, 2005). The current economy is known as MIRAB¹⁵ economy because it is dominated by migration (MI), remittances (R), aid (A), and bureaucracy (B), but still has been able to be resilient (Lazrus, 2009; Knapman et al., 2002; Bertram, and Watters, 1985; Boland and Dollery, 2005; Goldsmith, 2005). Tuvalu uses the Australian dollar (AUD) as currency, which because of its small open economy eliminates monetary policy as an instrument of macroeconomic management (ADB, 1999). The economy has driven heavy urbanization to the capital on the Funafuti Atoll which has the international airport, wharf, and government buildings (Lazrus, 2009). Tourism provides minimal revenue due to Tuvalu's remote location and limited access. On average, fewer than 1,000 tourists visit annually. The majority of government revenues come from the sale of stamps and coins, and remittances from seamen on merchant ships abroad (UNFCCC, 1999; CIA, 2010).

Starting in the 1990s a flow of money annually comes into the country from the sale of fishing rights within Tuvalu's Exclusive Economic Zone (EEZ) (Ede, 2003). One of Tuvalu's most valuable resources is the fish stocks in the Exclusive Economic Zone (EEZ),

¹⁵ The MIRAB model was put forward as an alternative explanation for the economies of small nations. It attempts to explain the economic development based on a mix of migration (MI), remittances (R), aid (A), and bureaucracy (B) (Boland and Dollery, 2005).

lagoons and inshore waters (Tuvalu Government, 2006a). The EEZ covers approximately 900,000 square kilometres with oceanic fish stocks offering potential for foreign and local based fishing fleets (Tuvalu Government, 2006a). Fishing is important for the citizens of Tuvalu, it is both a commercial and subsistence activity with just over half of outer islands' and Funafuti households being engaged in fishing (Tuvalu Government, 2006a). If changes to the climate affect the fish ecosystems, it will severely impact the Tuvalu economy and the locals' lives.

Another Flow of Money

In 1995 the Government of Tuvalu started receiving letters from international businesses wanting to collaborate on various internet-related operations (Hayward, 2000). The reason for this sudden interest from international business was that Tuvalu in the 1980s had been assigned the internet domain address '.tv' by the international body that allocates countries' domain names (Knapman et al., 2002). The letters 'TV' are universally known and many companies wanted ownership over these letters, the purpose being to sell them to television corporations worldwide. What followed changed Tuvalu forever.

In 1999 the Government of Tuvalu signed a 12 year contract to share revenues from '.tv' registrations with a company from Pasadena California. The original deal was 50 million USD over 12 years (Hrynyshyn, 2008). In mid 2001 the DotTV Corporation ran into financial difficulties and was purchased by VeriSign, Inc. Tuvalu was then given 10 million USD from the sale and a 15 year contract with VeriSign Inc., that guaranteed 2.2

million USD per year plus 5% of all revenue exceeding 20 million USD per year (Knapman et al., 2002). This money doubled Tuvalu's GDP instantly, which has granted the Government of Tuvalu the ability to have a bigger voice on the international stage by joining international organizations, and taking part in different programs.

International Stage

The main focus of Tuvalu's foreign policy is the Pacific region, although in the past decade they have broadened their focus and have signed and joined international organizations and treaties (NZ Govt, 2010). In 2000 the Government of Tuvalu used part of the money from the loan of their internet domain name to join the United Nations. In 2007 in a speech to the UN, Tuvalu's Prime Minister Apisai Ielemia stated that his country "joined the United Nations on 5 September 2000, firmly believing in the Organization's noble pillars of development, security and human rights" (Ielemia, 2007). Since 2000 Tuvalu has been very active within the UN trying to promote awareness of the effects of climate change on small island developing states (SIDS) and encouraging the implementation of regulations that aspire to reduce green house gas (GHG) emissions (Ielemia, 2007).

Tuvalu joined the Pacific Island Climate Change Assistance Program (PICCAP) and established a five-point plan to address the effects of global warming on their country. This plan includes the selection of a climate change research committee, conducting a greenhouse gas inventory, communicating with the UN on climate change and rising sea levels, studying island vulnerability and adaptation strategies, and then developing a

national implementation strategy for climate change. Tuvalu has already completed the first four tasks and is still in the process of completing an implementation strategy for climate change (Asian Development Bank, 2005). The money received from Tuvalu's domain name was an incredible and much needed 'godsend', that has allowed Tuvalu to have a much louder voice on the international stage and the opportunity to have a significant impact on global matters.

Tuvalu is a member of the British Commonwealth, the Pacific Islands Forum, the Forum Fisheries Agency, the South Pacific Regional Environment Programme (SPREP), the South Pacific Applied Geosciences Commission (SOPAC), and the Secretariat of the Pacific Community (SPC), to name a few. Tuvalu is also party to a number of international environmental agreements including those related to the Kyoto Protocol, Desertification, Endangered Species, Marine Dumping, Ozone Layer Protection, Shipping Pollution, Biodiversity and the Law of the Sea (NZ Govt, 2010).

Culture

The traditions of Tuvalu are very important to everyday life and to the Tuvaluan society overall. This can be seen in the way traditional and local governments have been integrated into the formal political system. How Tuvalu was created is an important part of the culture. In some places people believe that the spirits of their great grandfathers were the creators of their islands; in other islands they believe that a woman who once lived in the moon is the creator. The most common belief of the

formation of Tuvalu's islands and atolls is that *te Pusi mo te Ali* (the Eel and the Flounder) were the first creators. This belief is so strong that nearly all the islands regard *te Pusi* (the Eel) as a *tapu*¹⁶ among the many fish that are edible (Faaniu et al., 1983). An overview of the story is

Long ago Eel and Flounder were great friends. One day they decided to find out which one of them was stronger by seeing who could carry the larger stone. As they competed, an argument broke out between them. Flounder became caught under the stone and his body became flat like the islands of Tuvalu. Eel was also wounded where Flounder hit him in the stomach and he vomited until his round body became long and thin like the coconut trees that are ubiquitous in Tuvalu. After this happened, the rock, which was coloured black, white, and blue, broke into pieces that formed the dark night sky, the light sky of day, and the blue ocean that extends in every direction around the islands now known as Tuvalu.

-Tuvalu Origin Story
(Lazrus, 2009)

This story is an important part of the history of Tuvalu and the traditional culture.

Traditional knowledge is an important part of Tuvalu today, and can be seen in the political system, the agricultural practices, and the views of the locals on how the environment is changing. This will be discussed further in Chapter 5.

3.2 Environmental Change in Tuvalu

In recent years Tuvalu's environment has been seen to be very unstable. Issues range from its eroding coastlines, to its bleached coral. Problems such as the saltwater intruded farm land and limited waste management programs exemplify only a few

¹⁶ Seen as 'Holy' and/or 'sacred' (Lazrus, 2009)

aspects of Tuvalu's troubled environment (Roberts, 2007). Six factors will be discussed in further detail in this section. Each of these factors has direct and/or indirect impacts upon Tuvalu's environment. The factors are: population density, ratio of coastline to land area, manmade impacts on Tuvalu before independence, access to freshwater, waste management, and health.

Urban Population Density

The first factor is the high urban population density. In recent years Tuvalu has experienced more rapid migration and urbanization of population than any other country in the Pacific region (Simms, 2005). This is due to people migrating to Funafuti after Banaba Island closed its phosphate mines, in addition to people from the smaller Islands in Tuvalu migrating to the main island due to the decline in copra production and the fact that Funafuti has better access to the global economy since the construction of the airfield in 1942. The main islet of the Funafuti atoll, is Fogafale which is only 2.8 square kilometres, one third of which is uninhabitable because it is used as the airfield, or contains excavated borrow pits¹⁷ (Grano, 1995). Appendix B shows the population of each island and the change of population of each island from 1992-2002. The outer islands of Tuvalu are much more remote and can only be accessed by sea, which is expensive and timely (Yamano et al., 2007). Funafuti has experienced urban development at such a rapid rate, that development has occurred in areas that had originally been predominantly swampland. This swampland was lower than historic

¹⁷ A pit excavated during World War II to provide landfill for the airstrip (Grano, 1995)

tides and therefore it is not surprising that this is the main area that is commonly flooded by tides that are said to be higher than normal (Yamano et al., 2007). The population increase in Funafuti has placed heavy stress on the limited resources available.

Ratio of Coastline to Land Area

The second factor is the high ratio of coastline to land area. Tuvalu's total land area is 26 square kilometres divided over many small islands, of which there is 24 kilometres of coastline (Howarth, 2001; CIA, 2010). This leaves a very high proportion of the land of Tuvalu susceptible to tropical storms and cyclones. The fact that the atolls tend to be narrow landforms also adds to the susceptibility. It is probable that the increasing number and intensity of storms and cyclones will be the first thing that causes Tuvalu to become uninhabitable. The flooding caused by storm driven high tides is saturating the fertile land with salt water (Roberts, 2007). As less land is available, traditional crops, such as pulaka or taro, are being marginalized. Pulaka is particularly affected as it traditionally grown in fertile soil pits which are dug down into the top layers of the freshwater lens. With environmental adaptation the local farmers have been forced to adapt. Different methods have been discovered in an attempt to continue cultivating their crops in salinated soil. Several farmers dig tin cans into the soil and then plant the seeds in clean soil in the can, to prevent the contaminated soil from interacting with the seeds. Others use similar methods such as cementing the

bottom and sides of the pits (Johansen, 2003). These methods of adaption call for an increasing amount of freshwater and attention to allow the crops to grow.

Manmade Impacts before Independence

The third factor that is creating vulnerability for Tuvalu's environment is ecological impacts caused by humans before Tuvalu's independence in 1978. In 1942 the American military landed forces on Funafuti because it was a strategic location for its fight against the Japanese advance in the Pacific region. The Americans and Europeans were unable to understand the importance of subsistence crops to the people of Tuvalu (Simms, 2005). The military runway was built over pulaka gardens. The deep mud pits that were used to grow pulaka had to be filled; coral and sand was 'borrowed' to do this (Simms, 2005). Ten borrow pits were created on the on the Fogafale Islet (Funafuti) (Grano, 1995), which destroyed the local farmers' ability to practice sustainable agriculture. Blasting was done around the islands to create deeper shipping channels. Wharves and piers were built that interrupted the sand-bearing currents in Te Namo (the lagoon) which historically replenished the beaches. The American military left without restoring any part of the island (Hayes, 2006). Deforestation occurred in the mid part of the 20th century due to the pressing need for fuel and limited natural resources (Roberts, 2007). Due to the colonial ties to England, Tuvalu's land and resources were cultivated primarily to provide reliable sources of tropical crops to consumers in the mother country (Roberts, 2007). Colonialism has had a strong influence on much of the South Pacific. Tuvalu is no exception and thus colonial

influence cannot be overlooked when attempting a complete understanding Tuvalu's current situation.

Freshwater Access

The fourth factor is the decreasing amount of freshwater available in Tuvalu. Traditionally freshwater was obtained from the ground and the island's subsurface lens. In recent years the subsurface freshwater lens has been depleted and contaminated (Barnett, 2001) and has been intruded by saltwater. Currently the main source of freshwater is rain, which raises a new set of issues connected with seasonal variations in precipitation. Recently, annual precipitation seems to be decreasing, but surprisingly there is also a decrease in drought events (Simms, 2005). If fluctuations in precipitation patterns continue, Tuvalu will need to rely on imported water or use the expensive desalination plant that was built by donor money, in order to let their citizens continue on with their everyday lives. Not having a natural source of water is going to create more problems for Tuvalu in future. If water has to be imported then citizens will have to ration water. This could also create a gap between rich and poor, if the water gets expensive.

Waste Management

The fifth factor is again human induced; the lack of waste management and continued dumping of waste on land and in the sea. Prior to 1999 there were no waste management programs in Tuvalu. Even with the obviously harmful effects of pollution

on the fishing industry, the farmers, and the general population, waste was still placed in people's yards or dumped into the ocean. In 1999 the Ministry of Natural Resources, Environment and Energy (MNREE) with the help of the Australian Government's Overseas Aid Program (AusAID) began the Tuvalu Waste Management Project (Knapman et al., 2002). The Waste Management Project has a dedicated waste depository at the northern end of the island of Funafuti. At this location, household green waste that is collected from each household is composted. By 2002 over 250 households in Funafuti (the largest atoll) were participating in the project, more than half of the households on this island. The composted material, is turned into mulch and soil and is then sold to citizens who are still practicing subsistence agriculture for 2.00AUD (Approximately 2.00CAD) for a one litre bin. In 2007 a biogas digester was completed on the main island of Funafuti (Knapman et al., 2002, Personal Communication, 2010). The biogas digester uses manure from about 60 pigs to produce gas for cooking stoves, which helps decrease GHG that accelerate climate change. There are plans to construct another biogas digester, which will use human waste (Leahy, 2007). Unfortunately this program is only happening on the main island of Funafuti; however it is a good beginning in the attempt decrease the amount of waste being dumped onto the land and into the sea. Although the composting program has become somewhat of a success, there is still a major problem with the amount of plastic and tin on the main island of Funafuti. They have no way of getting rid of the plastic and tin, and more and more are imported on to the island every month. This is a result of the switch to more of a western diet. In the past Tuvalu's waste was largely biodegradable,

and in recent years the large amounts of non-biodegradable waste is dumped in borrow pits and rubbish dumps (Corlett, 2008). The rubbish dumps are becoming bigger, and people have waste piles on their own properties, but the government has yet to come up with a solution to this problem.

Health

There is an interaction between health and environment in Tuvalu. In 1999 the UNFCCC identified that the climate conditions in Tuvalu were the ideal conditions for dengue fever, cholera and the breeding of the mosquito vector. They identified the potential for epidemics (UNFCCC, 1999).

The lack of waste management in Tuvalu is affecting the health of the citizens and the Tuvalu's environment. Borrow pits are aesthetically undesirable but also allow for health problems and diseases. Many people live around the borrow pits and even over them. There are houses built on stilts over the ten borrow pits located on the Fongafale Islet (of Funafuti). There are cases of people getting scabies from swimming in the borrow pit. Houses that straddle the borrow pits are flooded with rubbish infested water, when the water rises and/or waves increase, which can cause health problems. Thus Tuvalu's environment is linked to the health of its people (Personal Communication, 2010).

3.3 Current aspects of development in Tuvalu in an era of climate change

Tuvalu is classified as “extremely vulnerable” by the United Nations Environmental Program’s (UNEP) Environmental Vulnerability Index (EVI) according to an assessment conducted in 2005 (Appendix C). The EVI is based on 50 indicators for estimating the vulnerability of the environment of a country to future shocks (UNEP, 2005). The test results show that the issues of greatest environmental vulnerability for Tuvalu are wet periods, isolation, migrations, coastal settlements, lowlands, waste treatment and population (UNEP, 2005). All six of the factors that were addressed above have increased Tuvalu’s environmental vulnerability to changes in sea level.

Studies have shown that a mean sea-level rise in Tuvalu of 20 to 40 cm in the next hundred years would significantly increase the frequency and depth of saltwater flooding and accelerate coastal erosion (Patel, 2006). It makes sense that if sea-level rises, Tuvalu will become uninhabitable due to the fact that the highest point is a mere 5 meters above sea level and the average is 1 meter (Grano, 1994). For most coastal dwellers a response to sea-level rise is to move inland to higher ground, but for Tuvalu that is not an option since high land does not exist (Connell and Lea, 1993). John Connell a professor in geography at the University of Sydney uses the term ‘greenhouse-induced sea-level rise’. This is a relevant term when speaking about sea levels around Tuvalu because sea levels naturally fluctuate, but what Tuvalu needs to be prepared for is sea-level rise that is a result of greenhouse gases and climate change (Connell, 2003).

Precautions

The Tuvalu government is continually working on a long-term safety measure, resettlement. In the late 1990s and early 2000s Tuvalu was in talks with Fiji to buy 14,000 acres of land. The idea was that if Tuvalu became uninhabitable, they could move their entire population to this area in Fiji and try to maintain a somewhat normal existence as a nation in another country. The government felt that the best way to keep their culture intact was to move as an entire nation to a somewhat comparable climate. Unfortunately the negotiations were put on hold in 2001 after a nationalist coup in Fiji (Dutter, 2001).

Tuvalu then turned to Australia and New Zealand in 2001 for help. They asked about a possible resettlement program, refugee status and/or land. Australia denied this request on the ground that “international law does not recognize environmental refugees” (Rinnerberger, 2006). The issue of an environmental refugee is a controversial one. For the people of Tuvalu, this means that if they flee to another country such as Australia because their homeland becomes uninhabitable, they are denied the rights of a refugee which are “the right to food and shelter through government and aid groups” (Rinnerberger, 2006). The issue of an ‘environmental refugee’ is one that Tuvalu is trying to bring to light with their voice at the United Nations. Tuvalu has continually reminded the international community about the lack of kindness that Australia has shown to their situation.

In 1986 New Zealand and Tuvalu implemented a guest-worker scheme. It “provides work permits for up to 80 workers from Tuvalu to be employed in New Zealand at any one time, for a maximum period of three years” (Simati and Gibson, 2001). Regardless of the requirement to return to Tuvalu, many workers either renewed their visas, overstayed or married New Zealand residents in order to stay in New Zealand (Simati and Gibson, 2001). In 2002 New Zealand agreed to help Tuvalu further by introducing the Pacific Access Category (PAC) which allows up to 75 Tuvaluans a year to migrate to New Zealand. This 75 includes the dependents of the principal applicant. The applicant must meet a number of conditions, including an offer of employment (Boland and Dollery, 2005; Patel, 2006). The resettlement solution is an irreversible one that not only affects the development of the country but the culture as well. Even if Tuvaluans that have moved to New Zealand decide to return home, they will no longer be using the same cultural traditions and values and will have to relearn them (Pearce, 2007). With each year that passes, and the more people move to New Zealand, the fewer people there will be in Tuvalu to support the economy and sustain cultural traditions. This being said, the government still views the PAC program as an important precaution because if the islanders do not gradually resettle, the possibility of an immediate migration of the entire population toward one country in the event of an emergency is slim. Such a mass migration would also leave Tuvaluans at the mercy of the international community. This is not a preferred situation of the Tuvalu government because of the uncertain status of ‘environmental refugees’ (Roberts, 2007).

Niue, another microstate in the South Pacific has offered itself as a destination for the people of Tuvalu. Unfortunately, Niue has problems of its own, since many residents left after a cyclone devastated the nation state in 2004 (Roberts, 2007). The fact that a country that has so little would offer Tuvalu support is inspiring, and it is likely that Niue is able to relate to Tuvalu's situation more easily than a larger nation such as Australia.

Chapter 4: Methodology

This thesis attempts to analyze the following question: In an era of climate change, are Small Island Developing States, such as Tuvalu, optimally balancing development initiatives and climate change adaptation? The overall method to approach this question was through an extensive review of the literature, augmented by field research.

There was an extensive review of the literature over the past three years. Three main areas were identified: the linkages between climate change and development, climate change and development linkages in relation to SIDS, and a background of Tuvalu including how development and climate change interact. The first area that needed to be addressed was the term climate change. For the purpose of this paper the UNFCCC definition of climate change was used. The linkages between climate change and development came from the environment and development field and the creation of environmental policies, therefore this became an important starting point for the understanding of the literature. Another key part is an understanding of the debates happening in the literature such as the North-South debate, and the debate of responsibility. These debates were looked at in-depth using various academic and NGO documentation.

The three approaches to climate change and development that were reviewed in the literature were: vulnerability, adaptation, and adaptive capacity. There are many authors in the literature that discuss these approaches and extensive research was completed to develop an overall understanding. When linking climate change and

development as a discipline it became clear that it is important to understand how environmental and climate change policies have evolved over the years. These policies ranged from the Brundtland Commission, to the Rio Earth Summit, to the Kyoto Protocol.

The second key part of the literature discusses the connections between conditions in small island developing states, and the linkages of climate change and development. Many SIDS are dealing with similar physical and socioeconomic issues, which causes them to have similar vulnerabilities to climate change. They therefore may be able to pursue similar adaptation strategies. In any case, they have been able to band together by creating networks and alliances for small island developing states.

The third key part of the literature that was needed to answer the thesis question concerned the interactions Tuvalu has had with climate change. This was explored by seeking to understand Tuvalu's history, economy, politics, and cultural beliefs. Then six factors that have had indirect and/or direct impacts on Tuvalu's environment were identified, which allows us to have a better grasp of the current environmental situation in Tuvalu. Overall, the literature review was extensive and allowed for understanding how climate change and development interact, and how these interactions have affected SIDS, as represented by the country of Tuvalu.

The primary data for this thesis was collected in Funafuti, Tuvalu over three weeks in July 2010, and supported by observations made during this time as well as the above-noted research of the literature over the past 3 years. Funafuti is the main island of Tuvalu, and was chosen as the destination for field research because it is the most

accessible of the nine islands, and is where the federal government and the majority of NGOs are located. A total of 24 semi-structured interviews were conducted. Semi-structured interviews are not highly structured as in the case of an interview that consists of close ended questions, nor are they unstructured such as interviews that allow the interviewer to ask questions freely, instead they are a combination of both. Semi-structured interviews are carefully designed to draw out ideas and opinions without imposing meanings and bias. This method was chosen because it allowed for certain relevant questions to be asked, but also allowed for follow up questions if there was need for more clarification and/or understanding. It also allowed for the same interview questions to be asked to all interviewees, but when key people were interviewed, specific questions could be asked as follow up questions to allow me to draw on my insight on the topic (Mikkelsen, 2005). There were 16 interviews with local citizens, and 8 interviews with people working in a professional capacity in government departments, donor agencies, and the non-profit sector. The decision to conduct 24 interviews was based on time, and the ability to create trust and make connections to be able to conduct the interviews. After deciding to have 24 interviews, it was decided that 2/3 of the interviews would be done with local citizens and the remaining 1/3 would be conducted with people from government, donor agencies, and NGOs (people working in a professional capacity). This decision was based on the fact that there is only a small portion of the population working in a professional capacity, therefore only a small portion of the interviews should be conducted with them, but still a number significant enough to allow for relevant results. Twenty four interviews allowed for an

understanding of the situation, although if more time was allocated for research, more interviews would have increased the accuracy of the results.

Interviews were not introduced as themed around climate change but as discussions about the interaction between the environment and development in Tuvalu. This was done to allow for questions of environmental changes at the beginning without bringing in the bias of climate change, and to see if people identified climate change as part of environmental change. All respondents were between the ages of 25-60. The sixteen local citizens interviewed were selected in an 'ad hoc' manner by interactions and connections made by the researcher during the fieldwork. The eight interviews with people working in a professional capacity (those working for the government, donor agencies, and NGOs) were purposively sampled. They were key people in their area of expertise and employment.

Respondents were asked about the types of environmental changes they have seen in their lifetime in Tuvalu. This discussion then led into climate change – whether they have heard the term used; if so, how it was first used and how they have heard it being used presently. Appendix D is a list of all interview questions. Slight changes in the wording of the interview questions were made along the way; an example of this will be discussed in greater detail when discussing limitations.

There were eight questions asked (Appendix D, Questions 14-21), which the interviewee had to answer based on a scale from 1-5 (1 = poor, 5 = excellent). This can

be seen as a self anchoring ladder survey, although it is has been done by other authors using 10-15 steps (Pomeroy et al., 1997).

A few of the people interviewed asked not to be named, while others asked that their profession not be stated. This will be reflected in chapter 5 when direct quotes are used; if no name is stated they have asked to remain anonymous. All twenty four people interviewed are local citizens of Tuvalu, although eight of these people will be referred to as 'people working in a professional capacity' due to the type of work they are involved in currently.

The interview questions concerned four development indicators: health, education, waste treatment, and access to freshwater. These indicators are important to this research because each indicator is looked at from the respondents' perspective over a 20 year period. The answers are then compared with statistics from these years using the same indicators, to see if development has improved over the last 20 years, statistically and from the perspective of locals, governments and donors.

When the fieldwork for this thesis was undertaken, there were other researchers and journalists interested in climate change in Funafuti. The population of Funafuti is 4492 (Tuvalu Census, 2002), and therefore some of the people approached had been interviewed before. As has been stated in other researchers' work in Funafuti, researcher fatigue is a problem in Tuvalu and may have affected responses to this research (Mortreux and Barnett, 2009).

When choosing the appropriate people to interview, it was assumed that 4 interviews would be done with government officials and four would be done with people working for donor agencies. While in the field I learned that many of the donor agency projects are attached to the Tuvalu government. This meant that these people interviewed are working on a donor agency project with donor funds, while at the same time they are employees of the government. It was then decided that the eight interviews would be grouped together and described as people working in a professional capacity working in Tuvalu.

Of the 8 interviews that were conducted with people working in a professional capacity, one was involved in the non-profit sector, one was an employee of the government, two were employed by donor agencies, and four were working under a government department on a project funded by a donor agency. These people were asked the same questions that the local citizens were asked, along with two extra questions on how they have seen funding change for their department/project(s) over the past 20 years and the purpose and/or objective of their department/project(s) for Tuvalu.

Limitations of Methodology

There were unexpected problems during field research that created limitations to the research. The first was that I planned on focusing on Funafuti, Tuvalu, and not the other islands. I did not realize how much the other islands would come up in

interviews until I started interviewing both the locals and the people working in a professional capacity. This brought in a different perspective and changed the results of the research. When interacting with people in Tuvalu I learned that many people now living in Funafuti were still very connected to their home island elsewhere in Tuvalu, and that the way in which they view changes to the environment is based on their respective home islands. Therefore the interview answers, although focused on Funafuti, have relevance to the outer islands as well.

A second limitation was a language barrier. The people of Tuvalu are fluent in English, since English is taught in all schools, but English is not their native language, Tuvaluan is. Before travelling to Tuvalu I was assured that interviews could take place in English and translation would not be an issue on the main island. However, even though English is taught in schools, many locals do not speak it often and therefore some of the people that were interviewed have broken English and/or it could be misinterpreted. When interviewing I did my best to make sure that the interviewee understood the question I asked, and that I interpreted their answer correctly. Of the 24 interviews, 6 had this identifiable concern.

A third limitation was cultural/language understanding. Within the first few interviews I learned that my interpretation of the word “waste” and the interviewees’ understanding were different. When I asked about “waste” I was asking about garbage and other types of waste products. The interviewees’ interpretation of the word “waste” tended to be household, and yard waste, such as compostable food items,

grass, and leaves. The word that describes garbage is “rubbish”. As soon as I learned about this misinterpretation I made sure to adjust my questions to account for it.

A fourth limitation is the scale used for questions 14-21 was only five steps. This can be seen as a limitation since making the scale 10-15 steps would have allowed for better distinction between interviewees answers and the ability for better interpretation (Pomeroy et al., 1997).

A fifth limitation was time and resources, which limited the amount of interviews that could be conducted, and limited the location. I was unable to travel to the outer islands because of only having three weeks to conduct field research and the outer islands can only be reached by boat, which is time consuming and expensive. The time limitation also made it difficult to interview key people, since a few of the government officials were travelling abroad during my stay in Tuvalu. An example of this was the Minister of Natural Resources, Energy and Environment who was out of the country. I was unable to conduct an interview with him, although I was able to speak to a person in his office.

Chapter 5: Case Study: Tuvalu

5.1 Introduction

Tuvalu is currently dealing with the impacts and effects of climate change, which has the ability to exhaust their economic system. The effects of climate change have the capability of affecting all countries, and therefore small island developing states such as Tuvalu need to be prepared. The balance between development initiatives and climate change adaptation is important. This thesis asks the question: In an era of climate change, are Small Island Developing States such as Tuvalu optimally balancing development initiatives and climate change adaptation? The thesis will attempt to answer this question by using four indicators: Health, Education, Waste Management, and Access to Freshwater.

The Government of Tuvalu has spent time, effort, and money attending conferences and joining multilateral organizations, in trying to educate the world about the possible effects that climate change will have on Tuvalu in the future. When looking at the balance of climate change and development in Tuvalu, the first area to look at is the people's knowledge of climate change. If money is being spent on educating the world about climate change, is it being spent on educating the local citizens of Tuvalu about climate change as well? The first few questions when interviewing the people of Tuvalu were questions about changes to the environment, and the term 'climate change'. A few of the people interviewed asked not to be named, while others asked

that their profession was not stated. This will be reflected throughout this chapter when using direct quotes; if no name is stated they have asked to remain anonymous. All twenty four people interviewed are local citizens of Tuvalu, although eight of these people will be referred to as 'people working in a professional capacity' due to the type of work they are involved in currently.

5.2 Environmental and Climate Changes

Participants were asked "what types of environmental changes in the world around you have you seen in your lifetime?" Answers varied, however over half discussed the rising of the sea, and how the sea is higher than it was in the past, and that the tides have been rising as well. Nia, a male in his late twenties, says "the sea has come up, when I was a kid the sea was further out and you could drive a truck on the stones on the beaches around the island, now look at the beach, a truck could not fit on there or drive down there". This comment is compatible with my professional observation of the beach presently. One local, who calls himself Luckyone, says "the rains have changed; we are getting our seasons at different times, and the storms have changed too, it is not the same as it used to be". Others expressed this concern in terms of a lengthening of the dry season, which will affect the amount of water available because of the dependency on rainwater. Another concern that was continually brought up was erosion, and that the sands from the beaches are being removed. Alemia, a local fisherman, says the fish have changed, you can't catch the ones you used

too, but the fisherman adapt to the ways of the sea, that's what fisherman do and will continue to do in the future.

These are very personal views of the changes people have seen but the common themes show that the locals are concerned about the environmental changes, and they have recognized the changes over the years.

Discussion of Climate Change

To bring the term climate change into the discussion of the interviews I asked if the interviewees had heard of climate change and all responded 'yes'. I then asked approximately when was the first time they heard the term climate change used. For the people working in a professional capacity the answers all revolved around when they started working for the government and/or donor agency. This ranged from a few years ago to the mid 1990s, depending on when they started working in a professional capacity. For the locals, all answers were that of the last few years. One said "I heard of climate change when you researchers started coming to talk about it". This shows that the people working in a professional capacity had the term climate change in their vocabulary before the locals.

I then asked "when you first heard about climate change, how was it first discussed?" For the people working in a professional capacity it was again linked to their job but many said at first they did not believe it, but it was explained in detail to them to make sure they understood the concept and what effects it could have on Tuvalu.

Pasemeta, from NZaid (New Zealand Aid), said that “I heard people from the science talk of the greenhouse effect, but I didn’t take it seriously, but then NZaid really explained it and I began to take it seriously and became concerned”. Solo, from the Environment Office, said “Working with the government it was explained to us, but it was difficult to deliver the message to the communities, many people think of it [climate change] as sea-level rise, they don’t think about all the other factors that make up climate change”. This is important as we begin to dive deeper into how the locals feel about climate change, and the connections they make with other environmental factors.

The locals had similar answers about how they first heard climate change discussed. Many said that the government started talking about it and sending government people overseas to deal with it. Luckyone, said “I heard people say Tuvalu is different now, that our climate is changing but I didn’t understand”. A local fisherman said that he heard people say that Tuvalu is in trouble and he needs to be careful, but he didn’t know how he was supposed to be careful or why. These answers show that government did start talking about it, but there didn’t seem to be enough discussion and education with the locals about the term, and the effects of climate change.

Discussing the term climate change brought up similar answers and also began to bring up concerns; I then asked “what does the term climate change mean to you”? Answers ranged from one word, to personal fears and concerns. A local fisherman brought up an issue I had read about in my research of the literature, he said “Biblically I cannot believe in climate change, I understand that changes have and are happening

but I have faith and that is what comes first". Religion was brought up by 6 of the 16 local interviewees. One man talked about the Lord and how the lord promised he would not flood the earth again after Noah, and that he will believe the Lord, not the government and their science. A local lady said "it mean nothing, cause I have faith". This raises an issue that needs to be addressed, but it is a sensitive issue and needs to be tackled with education and understanding of both science and religious beliefs.

Other locals talked about climate change meaning water rising, temperature, and their surroundings. Nia, a young man, had an interesting comment by saying "I don't know if climate change is the pulange's [white people] or if it is god, but things are changing. Pulanges are putting stuff into the air, and into our world and it's not going [to] be able to stay this way, we need to decide if we want to live this way, the fast way of life even though it is not good for the world. Or do we go back to the way it was; a slow way of life but the world was good and healthy". His comments show an understanding of what is happening to the world, and that we are not going to be able to continue to live this 'fast' way of life.

The people working in a professional capacity talked about climate change being "a buzz word" and that climate change is not only sea-level rise but it is rainfall patterns, crops, temperature, hot weather, water temperature and much more. One person talked about climate change being a headache to them, a lot of extra work, and more meetings. None of the people working in a professional capacity brought up religion and/or faith in their interviews. They brought up what they have learned about climate

change, since many of them deal with it on a daily basis in their jobs, and two people (working in a professional capacity) said they sometimes get exhausted from discussing it.

Government and Climate Change

Four questions were asked about the government and climate change, and how the people feel the government is dealing with climate change. This was an important part of the interview because it brought up the discussion around time, money, and effort being put into climate change, and if locals feel these efforts should be spent on climate change.

All people interviewed were asked if they feel the government should be spending time, effort and/or money on educating the world on Tuvalu and how climate change could affect them. The overwhelming response from the locals was that the government should be educating them, the people of Tuvalu, first, and then the world. One local answered this question by saying “they need to educate us, the people of Tuvalu”. This will be discussed again in the education section, since it is an issue that the people continually bring forth. Others expressed the concern about the money the Tuvaluan Government is spending and if it is not helping other countries send money to Tuvalu, then Tuvaluan money should be spent on the other issues. Luckyone, said “I am not sure if the government is educating the world, or just spending money on travelling,

but we don't see any benefit from it, they [the government] could at least help us understand why they keep traveling overseas".

I assumed the people working in a professional capacity would have the opposite view, that money needs to be spent on climate change and educating the world. A few people did say that money needs to be spent on educating the world because it helps bring more funding to Tuvalu, and gives Tuvalu a voice in the international community. Many of the respondents said, yes some money should be spent, but more needs to be spent on educating the community. Annie, who is the director of an umbrella organization for NGOs in Tuvalu, said "Everything is happening outside, not enough [is] happening inside the country, and what does that mean if we are only educating the outsiders, and not our own people; we need more in-depth awareness given to the general public about the climate effects". This is a common concern, that the local people are not being educated about climate change. Pasemeta, the in-country NZaid worker, is upset about the way the government is educating the world and feels they are exaggerating the situation in Tuvalu, that the government sells Tuvalu as a sinking island which is not right. Pasemeta, says "I don't want to be identified as a sinking lady, or be identified as from a sinking island but because the government needs money, they will do it". Pasemeta is upset about the way she is being identified to the world, and she hopes the government will see the error of their ways and let people know that Tuvalu is not sinking, but it does need help.

When interviewees were asked if they felt the government was worried about climate change many said yes, both locals and people working in a professional capacity. Solo, from the environment office, said “climate change is #1 on the agenda, money and resources are going towards it”. Nakala, a government employee working on a UN funded project said, the government is worried and needs to be worried, since this is a concern for Tuvalu’s sovereignty and the lives of their people. A few people did say that the government was not worried about climate change, but if it is a way to get more money into the country, then they will act as if they are worried.

Overall there seems to be a disconnect between what the government is worried about, and what the people feel the government should be worried about, when it comes to the issue of climate change. This disconnect is causing problems within the country, in that the people feel that money, time, and effort is being spent on educating the world, and not on what is happening in Tuvalu. This may have caused the change in government during the September 2010 election - although it is not clear what sparked the change, it does show that people need to have faith in their government, and pride in their country.

5.3 Development Indicators

After discussing climate change in the interviews, four development indicators were asked about, in order to bring forth the development side of the argument. The four indicators were health, access to freshwater, education, and waste management,

which were used to understand if people feel that their basic needs and services are being met. A reference point of 20 years ago was used because it was a time before climate change had become a topic in Tuvalu and before the government was spending resources on climate change.

5.3a Health

In Tuvalu there is a National Health Plan which covers all of the Islands and there is a Minister of Health. According to government documents Tuvalu has made significant progress in reducing morbidity and mortality since 1990 (Tuvalu Government, 2006a). The financial and human resources for the health sector are scarce. Although they are able to provide most of the basic services, they must rely on an overseas medical referral scheme known as the Medical Treatment Scheme. This scheme sends Tuvaluans who need medical care which cannot be provided in the country, overseas. It is expensive, and waiting lists occur, but the expenses are covered by the Tuvaluan Government. Currently there are only doctors on the main island; nurses and midwives are relied on for health care on the outer islands¹⁸.

The 2006 Tuvalu Millennium Development Goals (MDG) Report explains that the current national health policy priorities and major activities of the Ministry of Health are orientated towards strengthening current programmes. This includes the communicable diseases program with special attention given to tuberculosis, filariasis, skin infections and primary eye care (Tuvalu Government 2006a). The Tuvalu National

¹⁸ 2006 statistics state there are 4 physicians, 10 midwives, and 30 nurses (Tuvalu Government, 2006b)

Health plan addresses the major causes of morbidity as communicable diseases and lifestyle diseases (Tuvalu Government, 2006b). Appendix E shows a causes of morbidity in Tuvalu from 1997 – 2003. Many of the major causes have fluctuated during these years, reaching the highest numbers between 2002 and 2003 (Tuvalu Government, 2006c). The key health challenge facing Tuvalu is the increasing rise of life-style diseases, which need to be tackled by health education and nutrition awareness for healthy lifestyles (Tuvalu Government, 2005). In the past 20 years the people of Tuvalu have changed their diets and now consume less traditional foods and more imported products, such as pop, rice, cookies, and many other products containing high amounts of sugar. This will be discussed further since many interviewees expressed a concern over this issue.

The main source of information on health in Tuvalu comes from government documents. The information in these documents suggests that the health sector in Tuvalu is improving, and that many of the main health development indicators have improved over the past 20 years (Tuvalu Government, 2006a; 2006b; 2006c).

The locals' views

When health care was discussed with local citizens in Tuvalu, they were very opinionated since it is a service that all of them have used in the past, and will use in the future. They were asked to rate the health care system presently and 20 years ago on a scale of 1-5 (1 equalling poor and 5 equalling excellent). Sixteen local citizens were

interviewed and the majority felt health care had improved significantly over the past 20 years. The average answer was 2.5 for the past (20 yrs ago) and 3.19 for the present. Appendix F is a table of all of the averages for the development indicator questions. The answers from locals for healthcare show that healthcare still has a way to go in Tuvalu, but it has improved over the past 20 years. In the past “the health care facilities were not as good”, but the lifestyle was different. Currently the health care system “is better than it used to be, but it is still not great”. There “needs to be better health care on the outer islands, there are not enough doctors or equipment, and so much is dependent on donor funding”. The locals understand that Tuvalu has a dependency on donor funding and that their health care system must rely on others to function properly. One local, who works at the medical lab, discussed the fact that the current doctors are from Cuba and are paid by the Cuban government. There are only four doctors on the main island, therefore many procedures are not able to be done in Tuvalu and people must fly to Fiji for these procedures and surgeries. The fortunate part is that the government pays for patients’ travel, accommodation, and medical costs while in Fiji. The Health Department had the third highest budget in 2010 (after Communications, Transport and Tourism, and Education, Youth and Sports), which equals 13.9% of the entire national budget (Tuvalu Government, 2010a). Another major concern that was expressed in many interviews with locals was the change in diet, and how this has affected the health of many and why there has been an increase of diseases such as diabetes. Tuvaluans expressed that the change in diet has occurred in the past 20 years because more and

more imported high sugar foods have come into the country, and there is less reliance on local foods and fruit.

Views of people working in a professional capacity

The interviews with people working in a professional capacity in Tuvalu had a similar outcome to those with locals, concerning the health care system. The same questions were asked. Health care was given an average score of 3.2 for the present day and for 20 years ago the average was 2.8 (Appendix F). When asked about the past Pasemeta, a worker with NZAid (New Zealand Aid), said health care “was better, the service itself was better, but the outer islands were worse, even though they are still not good”. Annie, a worker for a Non-Profit umbrella group that used to work at the hospital, said that “drugs were not always available and the resources were not there, it was less than basic health care” and now she feels that the system is much more advanced, and there are more human resources than there used to be. Pasemeta, NZAid worker, has mixed feelings about health care presently, and says “we are lucky that health care is free, we don’t pay for medication, and when we need to go away for surgery, the government will pay, but the cases are screened and there are many delays”. She discusses the shortage of medicine and that they have to wait for shipments when running low. A local UN worker, feels that health care is currently better than 20 years ago, but still there are a lot of faults such as “when it comes to medical equipment, the staff is not always trained to be able to sustain the equipment” and “there are doctors on the main island, but no specialists”. “The facilities are not

adequate and running out of medicine is very common". After interviews with people working in a professional capacity in Tuvalu it was clear that even though the health care system in Tuvalu has improved from 20 years ago it still has many weaknesses, and areas to improve.

Analysis of Health care

Overall the interviews have shown that people working in a professional capacity in Tuvalu and the local citizens both feel that the health care system has improved from 20 years ago, but it is far from meeting the needs of the citizens. The major concerns included the need for doctors on the outer islands, education and understanding of how the changes in diets are affecting the people, upgrades in facilities, more training of staff, more equipment that would allow more procedures and tests done in the country, and more specialists which would again reduce spending money on the medical scheme (transporting patients overseas). Another important need is better management of the current resources, such as the timely ordering of health supplies which would allow for better availability of medication and therefore benefit citizens.

Since 2006 the amount spent on Health in the National budget has increased from 9.8% to 13.9% (Tuvalu Government, 2010a). Health care is important to any country, but the fact that there has been an increase shows a government commitment to the standard of the health care. This can be seen not only through an increase of budget but also through health statistics, such as a decrease in infant mortality, a decrease in child mortality, and an increase in maternal health (Tuvalu Government,

2010a). After an overview of health statistics, the national budget, and interviews, it can be seen that there has been positive headway made in the health care system in Tuvalu. The government has been able to maintain and increase services for this key area of development over the past 20 years. In this area, Tuvalu has been able to balance climate change and development, and there is hope that the health care system will continue to improve in the near future through different means such as the millennium development goals, the priorities set in the National Health Plan, and continued effort from the government and donor agencies.

5.3b Access to Freshwater

Tuvalu relies on rainwater as its main source of drinking water. It is collected from the iron roofs of houses, and is stored in concrete cisterns or plastic tanks (Tuvalu-European Union Cooperation, 2009). There is no surface water (freshwater lakes, ponds, or streams) in Tuvalu, and the groundwater resources are no longer usable for household use. This is due to saltwater intrusion and pollution from both solid and liquid wastes (Tuvalu Government, 1999; Tuvalu-European Union Cooperation, 2009). Climate change in the form of changed precipitation patterns has created a challenge for water resources in Tuvalu due to frequent water shortages. In 1999 a desalination plant was introduced into the country, which was provided by a donor country (unaware of which country). Unfortunately for the locals the water produced by the desalination plant is expensive. In 2006 a survey conducted in Funafuti concluded that household water storage facilities are insufficient for meeting household water demands and

needs (Tuvalu Government, 2007). Reports from the Tuvaluan Government reassure residents that major water reserves are attached to the Hospital and Government Central Office in case of an emergency, but after interviews with the locals it was clear that people are still having a hard time with water shortages on an everyday basis (Tuvalu Government, 2007).

Locals' Views

Access to freshwater and how their access has changed from 20 years ago till now was discussed with local citizens in Tuvalu. They were asked to rate access to water presently and 20 years ago on a scale of 1-5 (1 equalling poor and 5 equalling excellent) and then to elaborate on why they feel that way. Sixteen local citizens were interviewed and all sixteen felt that their access to freshwater had improved over the past 20 years. The average answer was 2.44 for the past (20 yrs ago) and 3.75 for the present (Appendix F). The fact that all sixteen local citizens felt that their access to freshwater has improved is a good sign, although after each person elaborated, it was clear that in the past the access to water was extremely poor, and therefore an increase to present day does not mean that the situation is currently ideal; there is still much improvement that can be made. Many people expressed the concern that the one tank that is provided for each residence is not enough water for the numbers of people living in one house. Many residences have extended families living together, which can mean 10-20 people living under one roof and all using the provided rain water tank. More tanks can be bought but they are very expensive. It is very common for families from

the outer islands to stay with family on Funafuti for extended periods of time, which can put extra stress on the one provided tank.

Over the past 20 years there have been upgrades to rain tanks and to the water catchment system, to make them more efficient and accessible. In speaking of the past locals talk about their thatch roofs and how the catchment was not as good since it was harder to collect water. People used to build their own tanks, and many of them leaked. Locals talked about how much their water needs have changed. One person said “It was harder to get tanks in the past, but we didn’t need as much water; we just didn’t use the amount we do today”. Another local felt that people today do not appreciate the water like they did in the past, and that people abuse the water until there is a water shortage. This identifies a need for educating the locals about water use, and different types of water saving techniques.

Views of people working in a professional capacity

The views of people working in a professional capacity in Tuvalu are very similar to those of the locals. Of the eight people interviewed the average answer for the past (20 years ago) was 2.29 (locals = 2.44) and the present was 4 (locals = 3.75) (Appendix F). All except one felt that the access to freshwater in Tuvalu has improved over the past 20 years. Nakala, who works for the government on a UN funded project, felt that access to water has not improved or may have even worsened over the past 20 years, and answered ‘3’ for both questions. He felt that access is “better, but it is not adequate and there did not used to be as much wasted water as there is currently”.

Even though he does feel access is better overall, that does not mean improvement if people are wasting the water that they now have better access too.

The other people interviewed of a professional capacity had a lot to say when asked to elaborate on their numerical answers. A government worker in the waste department, said “ In the past there was not storage, now we have better storage, but we are still having problems due to the amount of people living in one household, since extended families can be 16-17 people. Even though the average is 8, relatives come to stay from the outer islands”. This reiterates the concern of having large numbers of people living in one household and the strain this places on one water tank. Solo, who works in the government environment office, discussed how things are better than they were in the past, and stated that they will continue to get better. He talked about a new project that is being worked on with the Tuvalu Public Works Department, funded by the UN, which will focus on improved access to water catchment. Solo feels this is a good step for the future, although “it is hard that we depend on rain water.”

Many of these interviews brought up how the access is better since the European Union (EU) funded a project in 2005 and 2006 in conjunction with the Tuvalu Public Works Department, which provided every household in Funafuti with a rain barrel/tank. This EU project was only on Funafuti, but there are plans to expand the project to the outer islands. The need for better catchment was discussed in length in many of these interviews, but most interviewees were unaware of the catchment improvement project that is being put in place currently (Solo from the Environment Office informed me of this project during his interview). Another concern was the

quality of the rain water because of dirty roofs. This could be tackled by educating the local citizens on the need to clean their roofs to improve the water quality and lessen the chance for sickness and disease.

Analysis of Access to Freshwater

The literature and field research show that access to freshwater has improved from 20 years ago in Funafuti. Both the people working in a professional capacity and the local citizens share this view, and feel that they have good access now, although it could be better and more dependable. There is a need for people to be educated about water use and how to use it responsibly in each of their households. As well education is needed about the roofing and the benefits to their water if the roof is cleaned on a regular basis. A second major need is the availability of tanks for large households at a reasonable price, which will allow larger families to have better water security, especially during drier seasons. I did not travel to the outer islands, but after interviews with people living in Funafuti, it is clear that better access to freshwater is needed on the outer islands and this needs to be a priority for the government. Another important need is education about water management and conservation. Water education programs could help to increase awareness about the current water situation, and help the amount of water shortages.

Access to clean freshwater needs to be a major national priority for the government, since it is a necessity for the people. The more money put into cleaner water, the less that will need to be spent on sickness related, to consumption of dirty or

contaminated water. After literature and field research I feel that Tuvalu is not truly meeting all needs for freshwater access and although they have come a long way from 20 years ago, they still have a long way to go. Climate change has the ability to exacerbate water shortages, and therefore Tuvalu must make bigger strides in meeting water storage needs and concerns. Therefore Tuvalu is not balancing their efforts on access to freshwater with efforts on climate change, and must put more money and effort into making sure that access to freshwater and water education is prioritized as a key development need.

5.3c Education

The education system in Tuvalu is comprised of pre-primary, primary, secondary and tertiary levels (Tuvalu Government, 1999). Education is free at the primary and secondary levels in government-run schools. There is one government funded primary school on each of the 9 islands. There is another primary school on Funafuti which is funded by the Seventh Day Adventist Church, but receives some financial support from the government (\$30,000 in 2002) and also collects school fees (Knapman et al., 2002). Motufoa is a secondary school which is a boarding school on the island of Vaitupu and until the mid 1990s, was the only secondary school in Tuvalu. In the 90s a secondary school called Fetuvalu was built by the Tuvalu Christian Church on the main Island of Funafuti. The literacy level is approximately 98% in Tuvalu, but with only 3-5% of the population reaching the tertiary level (UNICEF, 2010; Tuvalu Government, 1999).

Government documents in 1999 discussed the lack of technical expertise in the area of

climate change because of a shortage of trained scientists in Tuvalu, and the concept of climate change in the Pacific Region. My field research was done more than 10 years after that document was created and it is clear that this is still an underlying issue when it comes to education and climate change in Tuvalu.

Education in Tuvalu currently falls under the Ministry of Education, Sports and Culture (MESC). Between 1996 and 2001 the Ministry budget fluctuated between 13 and 35% of the national budget. Under the Ministry of Education, Sports and Culture is the Department of Education (Knapman et al., 2002). In 2006, MESC was allocated 21% of the national budget, which is the largest of any of the ministries and departments in Tuvalu. In 2010, MESC's budget was still 21% and therefore had increased at the same rate as the overall national budget (Tuvalu Government, 2010).

Locals' Views

After interviewing local citizens on the education system in Tuvalu, using the same scale and questions as for the other previous development indicators, it was found that local citizens feel that the education system has improved over the past twenty years, but with those improvements it is still only mediocre. When asked how the education system was 20 years ago, the average rating by local citizens was 2.75, and when asked how it is currently, the average answer only increased by 0.5 (3.25) (Appendix F). The numerical answers ranged quite a bit, and although the average answer shows an increase from past to present, not all locals citizens felt that there had been an increase. One citizen felt there has been a decrease, answering with a '4' for

the past and a '2' for the present. They explained this by discussing how the level of education does not seem to have increased, and that students are not learning the appropriate materials. She felt that students are getting away with more free rides and have lost the drive to continue on with education.

Six out of twenty four of the interviewees felt that education did not increase or decrease from past to present. Five of these people were locals (as designated in this thesis) and all six of these people gave a '3' for education in the past and in the present. They expressed similar concerns about the level of education, and the need for higher standards for the students when it comes to their education and need for learning. The reason these citizens did not give a lower number to the present day, is due to the fact that the educational facilities and infrastructure of the schools has improved. One citizen stated that "the facilities are better, but I'm not sure that the education is better". Another raised concerns about finding jobs given their limited education. "The facilities are better, but many people come out of school and do not have a job. It is not good and they won't find jobs because they are not well educated". This raises a major concern. If citizens cannot find jobs in Tuvalu, they most likely will not have the financial ability to move to another country to find a job, and therefore will become dependent on other family members.

Citizens that felt there had been an increase from 20 years ago to present day had a variety of answers ranging from "free and good" to "the education system is better now that there is more than one high school". Although these people felt that

overall, the quality of education had increased, they still brought up similar concerns to those that felt there had been no change, including “the students were better prepared and educated” in the past, and “facilities are better, but I cannot say if the education is”. The views of the citizens are clear that facilities have been upgraded and improved, and they are happy to see that this has happened, but there is a major concern among citizens that the quality of education has not increased, and may have decreased from twenty years ago. This will be expanded on once the views of people working in a professional capacity have been outlined.

Views from people working in a professional capacity

People working in a professional capacity, on average, feel very similar to the local citizens concerning how the education system has changed from 20 years ago to the present day. The people working in a professional capacity from Tuvalu feel that the education system has improved marginally from an average of 2.86 in the past (2.75 local average) to 3.14 in the present day (3.25 local average) (Appendix F). Three of the people interviewed felt that education has declined from 20 years ago, expressing similar concerns to those of the locals. Pasemeta, a Tuvaluan working for NZaid and a former teacher, stated “based on the academics the education system is not improving, although the infrastructure is, but that is because of donor help and the training of teachers, but I do not feel this training is showing improvements”. She says that “discipline is down, and kids don’t have the same respect, though this might be because of new policies such as right of the child”. The concern that many children are seen

running around the streets during school hours was brought up by Pasemeta and a few others. I also noticed this when I stayed in Tuvalu. Nakala, mentioned that in the past, they used to go around to the houses to make sure that all kids were going to school, but they no longer do so. Those that do feel education has improved had similar concerns to those of the local citizens, that the increase has been in infrastructure and facilities, and does not appear to be in the academics. Solo, from the environment office, talked about the lack of environmental education in the curriculum and that there are no current plans in their office to work on it. He did say that last year they went into the government-run primary school in Funafuti on Earth Day to talk to the children about biological diversity and the importance of it.

Analysis of the Education System

In Tuvalu there is a concern about the quality of education that is being offered in the classrooms and that this has decreased over the past 20 years. This concern comes from both local citizens and people working in a professional capacity such as donor agency and the government staff (not from the department of education). There has been an increase in the education budget over the past 20 years, and is reflected in the upgrading of the educational facilities, which the local people have noticed and appreciated. Unfortunately more resources need to be spent on the curriculum for the government run schools. As well there needs to be a better way to monitor that children are going to school, and not staying at home. After carefully looking at statistics, there are numbers for enrolment but there is nothing indicating the number

of children that are of age to go to school compared to the number enrolled in school. This is a concern of the local people and should be addressed by the government.

After interviews and observations there seems to be a lack of environmental education in the classrooms. Children are not being taught about the environmental changes in Tuvalu and climate change. If climate change education was brought in at an early age, children would be able to understand their surroundings and their environment and hopefully have a better respect for it as they grow up. I am not suggesting that the children learn about the scientific predictions of climate change for Tuvalu, but instead have a basic understanding of how the climate works, what has happened in the past and what is happening currently, and learn about what each person can do to help protect their local environment.

Over the past 20 years, the budget for MESC has increased and the government has been able to upgrade the school facilities, which was greatly needed. The majority of people interviewed feel that the government has not improved the quality of education. Because of the concerns expressed in the majority of interviews it is clear that Tuvalu needs to make much bigger strides to improve the education system and the curriculum in particular. Therefore I conclude that Tuvalu is not currently balancing climate change and the education system. To work towards this balance Tuvalu needs to create an appropriate monitoring system to make certain all children are registered and attending school. Tuvalu needs to allocate the appropriate resources to the

strengthening and improving the curriculum in order to continue on the path of development.

5.3d Waste Management

The Tuvalu National Strategy for Sustainable Development 2005-2015 addresses waste management as one of the most pressing problems, which has direct implications for human and ecosystem health, particularly in Funafuti (Tuvalu Government, 2005). The garbage on the islands needs to be collected and disposed of properly, which “will lead to less potential pollution of lagoon waters and less accumulation of waste that is a latent source of disease and other public health issues” (Tuvalu Government, 2005: p43).

As mentioned in a previous chapter there is a waste management program set up in Tuvalu, but it is only for household waste such as compostable materials, leaves, and branches. That waste management program is funded by a United Nations project and is under the Ministry of Home Affairs. I asked many questions when researching, trying to find out who was in charge of the other waste (known as rubbish). The environment office told me that they do not look after it because it falls under the jurisdiction of the town councils (there is a town council on each of the 9 islands of Tuvalu). When I spoke to the town council in Funafuti they said they did not look after it, and that it is the government’s responsibility. This raised a warning sign.

Currently in Tuvalu there is a great deal of waste such as plastic containers and tin. This is the result of a dependence on imported packaged goods. There are two

rubbish pits (garbage dumps) on the island. They are both very large and piled high; they are burned as often as possible to make room for the continuous flow of rubbish that is being thrown away daily. On the beaches in Tuvalu there is a lot of rubbish as well, that has been washed in from the sea and/or been thrown onto the beaches by the locals. The beaches are scattered with metal, ropes, old buoys, and much more. As well, the borrow pits¹⁹ are filled with rubbish and can be mistaken for rubbish pits (garbage dumps) since they are so full.

Locals' Views

The numerical ratings for waste management are much different than those for the other indicators. The numerical answers and the responses show a clear view that waste is worse in Tuvalu in the present day than it was in the past. Locals were asked how “would you rate waste treatment (garbage disposal, sewage, rubbish) in Tuvalu presently on a scale of 1-5” (1 equalling poor and 5 equalling excellent) and “can you elaborate why you chose that number”. This question was then asked pertaining to the past (20 years ago). The average answer for the past (20 years ago) is 3.81, and the present is 1.88 (Appendix F). All locals interviewed felt that waste treatment was significantly better in the past compared to the present day. When asked to elaborate why each person chose the number they did for the present day, many had similar answers, and provided an example of how they have been affected. A local fisherman,

¹⁹ A pit excavated during World War II to provide landfill for the airstrip (Grano, 1995).

said, “there is rubbish everywhere, here and the outer islands”. One person talked about how horrible it is to see the waste everywhere and gave a personal story by saying “I live in the government houses, so they came to fix my pump for the water barrels, the other one was broken; they installed the new one, and then just left the old one beside the barrel, and never came back to get it, it just sits there rotting”. If government workers are not trained to clean up the waste they create, then others may not feel the need to either. A major concern that came up in the interviews was the overwhelming amount of plastic and tin, and that there is no way of properly disposing of it on the islands. One of the locals was concerned about the waste, and also concerned because there are more people now than in the past, and the more citizens that migrate to Funafuti, the worse the waste situation is going to get. The locals are worried about the waste situation, and how much it has changed over the years, although none of the locals I talked to mentioned anything about going out and cleaning it up themselves.

From the locals’ perspective the waste situation twenty years ago was better than it is currently. One local sums it up clearly when he states “there wasn’t as much rubbish, and people seemed to care more”. Another local says “it was much better then, there was not as much waste, no plastic and tin”. The overall view of the locals was that in the past there was less waste, but there were not as many people on the main island, so that could be the reason. People are not happy with the waste, and seem very upset with the severity of the situation. The amount of plastic and tin continued to be brought up in the interviews, and the fact that it piles up in the landfills.

In the past there wasn't very much plastic and tin on the islands and therefore it did not create the amount of waste it does now.

Views of people working in a professional capacity

When it comes to waste management the view of the people working in a professional capacity is similar to that of the locals in that they think the situation in the past was better than it is in the present day. Their numerical answers for the present day show that they feel the current situation is better than the locals feel it is. The average answer from the people working in a professional capacity for waste treatment 20 years ago is 3.57 (locals average 3.81), and for the present day is 2.57 (the locals average is 1.88) (Appendix F). Susan, who works with the Waste Management program (focusing on household waste only), was the only one interviewed who felt that waste treatment has improved over the past 20 years. She feels that it is improving but not excellent yet and that it is an important issue that they still need to provide more education about, because it is hard to change the behaviour and attitudes of people. Education, awareness and understanding are needed to get the local citizens on board, and to be able to see concrete changes in Tuvalu. The people working in a professional capacity had similar answers and concerns to those of the locals. The major concern was the amount of plastic, tin, and metal. In the past, plastic bottles were precious because there were not many of them, so they were used for storage of petrol and kerosene, but today there is plastic and tin littered all over the island and the environment looks ugly.

Solo, from the environment office, talked about a project they tried to run in Tuvalu, which was to clean up the borrow pits. He said they were going to clean up a small one as a demonstration that they hoped would get people to go back and clean up the bigger ones on their own. Unfortunately the borrow pit was so badly contaminated with rubbish that they were not able to get the right equipment and materials. He also stated that rubbish is a town council issue and not an environment office responsibility. Melton, who is a government employee working on a UN funded project, feels that the concern with waste began when more products were imported into Tuvalu, such as nappies (disposable diapers). Melton states “People [are] turning to globalization but we don’t have the capacity and money to cater to this type of living”. Tuvalu has been living a more westernized lifestyle in recent years and they do not have the infrastructure and programs set up to deal with this lifestyle, therefore waste management issues are getting out of control and the country is being greatly affected. In the past the waste found in Tuvalu was mainly perishable items. Pasemeta, from NZaid, says that “nothing went into the sea in the past, and we didn’t have plastics, there just wasn’t as much garbage, or motorbikes.” This is the concern that many of the interviewees expressed.

Analysis of Waste Management

The overall theme from both the people working in a professional capacity and local interviewees is that there is much more waste in Tuvalu currently than there was 20 years ago. The country has become more dependent on imported goods, and is

unable to dispose of them. More people use motorbikes than they did in the past and this has created the need for more petrol (gasoline), and more bike parts, but it has also created more waste. When a motorbike is at the end of its life it gets stripped of any useable parts then left on the shoreline to rust. It is clear that the locals need to be educated about waste issues, and how they are able to all help to solve the problem. The dependence on imported goods will likely not change, but if people learn how to properly dispose of their garbage, instead of letting it rot in their own yards or throwing it into the sea, a lot could change. This needs to start by educating the local people about proper disposal and other ways they can reuse their wasted items. The government needs to put workshops and awareness programs in place, and not put the blame onto a different governing body such as the town council. It is clear that waste is not being dealt with in Tuvalu and therefore the government must step in (even if they feel it should be a town council issue). The other issue is there are many donor funded programs currently happening in Tuvalu, but none of them are focusing on the issue of waste, or cleaning up the islands. Anyone who has ever been to Tuvalu would be able to see the need for a waste/rubbish cleanup within the first few moments of experiencing the country. When walking around Tuvalu it is clear that there is a lack of waste management, and that this problem is a health and safety issue, as well as a major environmental concern.

The issue of waste management and cleaning up the current waste is a very big concern for the people of Tuvalu and on paper it is a priority for government, but there is no implementation that shows that the government is striving to meet this priority

challenge. Tuvalu is not a large country and therefore the little amount of land and resources they have, needs to be treated with care and respect. Currently, the country is very dependent on the ocean and if it continues to be polluted this could affect the ecosystem, which in turn would affect the country. Tuvalu is not properly dealing with the waste in their country and therefore they are not balancing this issue with the concerns for climate change. Resources need to be shifted from climate change to waste management. If the government is unable to shift resources, they need to be making a conscious effort to ask donor agencies and other countries to help fund a solution to the waste problem in Tuvalu.

5.4 Discussion

Climate change is currently a major concern for the Government of Tuvalu and has become a priority in government documents and donor funded projects. Field research was done to find out if the local citizens feel that climate change is and should be a priority, and to relate that to how they feel about how four different services (health, water, education, waste management) have changed since climate change became a priority for the government. After analysing the results it is clear that the government and the locals are not on the same page, although they are not on opposite sides either, but there is a great amount of disconnect between the two groups. The people feel that the government is worried about climate change, and in many cases, more worried about climate change at the global level than at the local level. The government needs to spend more time on building awareness and understanding of

climate change by educating the local citizens. As well, the government needs to help the locals understand why it is important for the government to spend resources on educating and increasing awareness about Tuvalu around the world. There needs to be more transparency and education about why the government has set their current priorities, and this needs to be expressed in a way that the locals can begin to understand and respect why these decisions are being made.

In the interviews each person was asked what the term climate change means to them. This was important to understand if it is a concern for the locals and the people working in a professional capacity. After asking this question I feel that climate change is a bigger concern for the government and donor agencies, and that the local people are being left out of the loop. Their understanding comes from hearsay, religious beliefs, and what environmental changes they have seen, but they need more information about the situation, because there is fear and concern, which might be alleviated or put into perspective with better understanding and awareness of the issues.

My analysis determined that of the four development indicators reviewed, only one (health) is currently being optimally balanced from the perspectives of both the local citizens and the people working in a professional capacity. This is not to say that the health system is perfect in Tuvalu. There is still a long way to go, but many strides have been made over the past 20 years, and overall the health system is getting a reasonable proportion of government attention and financial investment.

Education, waste management, and access to freshwater are three indicators that are not being optimally balanced with climate change in Tuvalu. Education and access to freshwater are two indicators that I feel are close to being balanced, but the government needs to treat these issues as more important. If climate change becomes a bigger threat these two indicators will suffer more, because resources from both government and donor agencies will be diverted away from these issues. Therefore, if resources are spent on education and access to freshwater now, then this will strengthen these systems, and in the event of more resources needing to go to climate change, these sectors will be strong enough to handle a period of relative neglect. Currently, both the education system and the water access system would not be able to function properly in a crisis situation, and most likely they would begin to fall apart. Therefore the government needs to understand the needs of these systems and the benefits of making them stronger.

The waste situation in Tuvalu is extreme and is deteriorating by the day. This is an issue that needs to be addressed immediately and must become an implemented priority for the government (not just one among others in the National Strategy). Both professional and local people of Tuvalu raised this as the issue of greatest concern. This is the issue that strengthens the conclusion that Tuvalu is currently not balancing climate change and development initiatives. The health of Tuvalu's ecosystem is important and necessary for development and climate change adaptation to occur. Human health can be affected by the pollution of an ecosystem. Human health also can

be acted upon by contaminated water, which in Tuvalu could be caused by the rain water catchment system, and/or from the pollution of the oceans, and borrow pits. The government needs to understand the severity of this situation or there will be dire consequences. Not only is it physically damaging Tuvalu, but it is also affecting the locals' views of their country, and government. If Tuvalu is able to tackle their waste situation, they would begin down the path of optimally balancing climate change and development.

Chapter 6: Discussion and Conclusions

6.1 Summary of Thesis

Climate change has become an important issue in the field of development. It has the potential to change the way a country deals with their own internal resources, and affect their development needs and priorities. Each country will experience climate change differently and in addition, developing countries will be heavily influenced by other socioeconomic, geographic, and political factors. Therefore, balancing development efforts and climate change efforts is crucial. Small Island Developing States are a category of countries that must deal with the effects of climate change now, and plan for the future effects that scientists are predicting. The issues that are of major concern for SIDS include (but are not limited to): sea-level rise, access to clean freshwater, tropical storms, saltwater intrusion, and health issues. These climate change issues are putting heavy strains on many SIDS which are already struggling to make ends meet. Small Island Developing States must tackle similar barriers when dealing with development challenges – in fields such as education, health and environmental quality. These barriers may be expanded and resources exhausted due to the effects of climate change, given that Small Islands are particularly vulnerable to climate change.

This thesis has explored several different perspectives of what constitutes an optimal balance of attention to climate change versus development. First, a review of the literature found that studying the linkages between climate change and

development is important and that these linkages can be seen at a broad level in poverty and environmental degradation and in a more focused level by looking at adaptation and vulnerability approaches. The way in which a country balances climate change and development will be central to their survival in the future. Second specifically in the country of Tuvalu, the research has involved analyzing and comparing (1) the priorities set by the government and donor agencies for the allocation of time, effort, and money, in relation to the priorities of local citizens, and (2) how the state of development indicators today compares with the situation twenty years ago, prior to the emergence of concern about climate change. Within Tuvalu, different perspectives on what the optimal balance between climate change and development should be are evident. In particular, priorities set by the government for the allocation of time, effort, and money do not always match those of the people of Tuvalu. The people of Tuvalu interviewed in this study feel that there is a lack of attention to waste management, and that more resources need to be spent on aspects of education and access to freshwater. The local people also feel that more government resources need to be focused on creating awareness of climate change issues in local Tuvaluan communities.

6.2 Limitations

The limitations in the field work of this thesis range from the amount of interviews, to the interpretation of interviews, and the limited amount of government statistics available. Twenty four interviews were completed, which allow the research to gain some understanding of both the local and professional perspective. All of the

people interviewed are citizens of Tuvalu who all live in Tuvalu currently. Data from the people working in a professional capacity were treated separately in this thesis because of the role these interviews play in their job either working for the government, donor agency, or NGO. The first limitation of the field work and this thesis was that it was difficult to find people that worked in-country for only a donor agency, and/or only the government. The overlap between these two fields was a surprise when I stepped into the field, and therefore changed the way I was attempting to look at the different perspectives. I was unable to separate the government and donor agency views.

A second limitation is the way in which I interpreted the answers provided by the people interviewed. I interpreted them the best way I was able to without biases, but there is the possibility of bias in semi-structured interviews. Therefore the thesis is limited by my interpretation of the results. I feel that my bias could come in different forms. One would be my in-depth knowledge and understanding of climate change, and therefore I may not recognize their limited understanding as vast for that area.

A third limitation is the amount of statistics available for Tuvalu. I spent a significant amount of time in the National Library of Tuvalu, but they had limited information on their own country. I assumed I would be able to find more concrete information and statistics when I was in the country, but this did not happen. Not being able to find the statistics for the development indicators for the year 1990 (the year used as a measuring point before climate change became an issue in Tuvalu) limited the

depth I was able to get into in my research. I had hoped to find concrete statistics for 1990 and 2010 and to be able to compare them to the field data.

A fourth limitation was the influence the outer islands have on the main island of Funafuti, in that it influenced the answers given by many interviewees. This brought in a different perspective and changed the results of the research. Since I did not expect this, my background research focused on Funafuti and not the outer islands, which created a limitation. When interacting with people in Tuvalu I learned that many people now living in Funafuti were still very connected to their home island elsewhere in Tuvalu, and that the way in which they view changes to the environment is based on conditions in their respective home islands. Therefore the interview answers, although focused on Funafuti, have relevance to the outer islands as well. This can also be seen as an opportunity to learn about more of Tuvalu than just Funafuti.

A fifth limitation concerned the understanding of culture/language. Within the first few interviews I learned that my interpretation of the word “waste” and the interviewees’ understanding were different. When I asked about “waste” I was asking about garbage and other types of waste products. The interviewees’ interpretation of the word “waste” tended to be household and yard waste, such as compostable food items, grass, and leaves. The word that describes garbage is “rubbish”. As soon as I learned about this misinterpretation, I made sure to adjust my questions to account for it.

A sixth limitation was time and resources, which limited the number of interviews that could be conducted, and limited the location. I was unable to travel to the outer islands because of having only three weeks to conduct field research. The outer islands can only be reached by boat, which is time consuming and expensive. The time limitation also made it difficult to interview key people, since a few of the government officials were travelling abroad during my stay in Tuvalu.

All of the above limitations created barriers in my thesis, and though they may have changed some of the results and ways of looking at the issues, nevertheless the field work and review of the literature together provide suitable means to analyze the balance between climate change and development in Tuvalu. The secondary data from the literature review was used to mitigate the weaknesses by creating a greater understanding of the issues brought up in the interviews and being able to back them up.

6.3 Recommendations

I have two types of recommendations: what could have been done, and what can be done in the future. If I had more time and resources I would have liked to spend more time in Tuvalu and interview more people. In my opinion doubling the amount of interviews would have helped to strengthen this thesis and the results. Another suggestion would be to interview at least one person from each ministry in Tuvalu.

A recommendation for future research is to see this study done in the outer islands of Tuvalu; ideally in all eight of the outer islands. This would allow for an understanding of the other islands, as well as a deeper understanding of Tuvalu as a whole. A second recommendation for future research would be a comparative study with another SIDS. If this study was replicated in a similar SIDS such as Kiribati, the research could be compared which would result in a deeper understanding of SIDS and their interactions with climate change and development.

6.4 Conclusion

The literature review identified that there are linkages between climate change and development, although the literature on these linkages is weak, and needs to be developed further. This thesis attempted to add to the literature linking climate change and development. This was done by connecting literature in the climate change field with that in the development field, with a focus on SIDS. The literature review added to the need for more theoretical links, while the field work for this thesis added a practical contribution.

When climate change emerged as a global issue, developing countries were seen as the most vulnerable, because of the already established link between poverty and environmental degradation and the North-South debate. The North-South debate is essentially a debate about who should be held responsible for of climate change. Many countries have been debating this since climate change has become such a prominent issue. It is difficult to place responsibility for the current climate situation, when

countries continue to point their fingers at others. Countries of the North want the countries of the south to put environmental restrictions on their current and future industry. The countries of the South would like the opportunity to develop as the North was able to, without restrictions. Since the North has more power on the international stage, the countries of the South have had to band together to create alliances and organizations to get their point across, spending their limited resources educating the world such as in the case of Tuvalu. When these limited resources are allocated for climate change awareness, and other climate related issues, they are taken from another sector (e.g. that could meet development needs). This starts a country down the path of not being able to balance their climate change issues and their development needs.

The countries of the south are more vulnerable to climate change because of geographic, socioeconomic, and political factors. The way in which a country is vulnerable affects its capacity to adapt. A country's vulnerability is key to understanding the dynamics that affect the processes of adaptation and adaptive capacity. Vulnerability is a central concept in the development and climate change disciplines and the linkages between them. In many developing countries, previously successful traditional knowledge is no longer relied on and implemented, and societally organized adjustments are not yet available, which causes these areas to be susceptible to extreme events. This causes stress to social services (and thus to meeting development needs). These resources tend to be diverted to climate issues, and other environmental problems.

It has been shown that small island developing states are vulnerable to the effects of climate change. SIDS have banded together to promote climate change adaptation, and to promote awareness of their vulnerabilities. It is recognized that SIDS are developing countries, but instead of focusing on their development needs and implementing climate change strategies into these needs, they have been focusing on climate change and how it will affect their development. When attempting to balance climate change and development this becomes a problem, when more effort is spent on climate change than development. Climate change has the ability to exacerbate the current development needs and therefore these needs must be strengthened to allow them to hold strong if a climate disaster occurs.

Tuvalu is trying to adapt to climate change, but is heavily dependent on foreign funding, which dictates how the funding is allocated. This is not an ideal way to deal with adapting to climate change, and therefore affects the country's vulnerability. Tuvalu is a country that is vulnerable because of geographic reasons which it cannot control. Tuvalu needs to control the other factors that contribute to its vulnerability, to control as much of the adaptation plan as possible, and use traditional knowledge to help this process. Tuvalu has the ability to use local man power and knowledge to help with the adaptation process. To do so, it needs the local population to buy into the idea. This can be done using education and awareness programs.

Tuvalu has been able to be an active member on the international stage by joining and participating in many organizations, groups and networks that SIDS have formed. The government needs to bring these programs closer to home, by

implementing strategies and adaptation methods that these international groups have come up with. When implementing these programs, they need to let the locals know that these programs are a result of the organizations Tuvalu belongs to, so the locals see the value in these organizations.

Tuvalu is a country that is currently being affected by climate change and predictions state that it will continue to be affected in the future. The way in which Tuvalu is dealing with climate change is affecting how it meets its development needs. After an extensive review of the literature and field research it has been shown that Tuvalu is not optimally balancing climate change and development initiatives. The area that is of most concern for Tuvalu and must be worked on is waste management. It must become an active priority for the Government of Tuvalu because if this is not addressed immediately it will affect other areas of development in Tuvalu such as health and the environment.

Another area of concern that this thesis brings forward is the way in which the government is spending time, effort, money and other resources educating and creating awareness about Tuvalu and climate change around the world. Currently, some of the people of Tuvalu feel that the government is using their resources to educate the world about climate change, instead of educating their own people. The government needs to address this issue while also continuing to strengthen their other development indicators (and other social services). By shifting resources from creating awareness around the world, to creating awareness within Tuvalu, different benefits may occur such as: local people wanting to band together to create awareness worldwide, local

people changing their behaviours to benefit the environment, locals understanding the connections between the different sectors (development indicators) and therefore changing habits to benefit these sectors.

The disconnect between government and citizens in Tuvalu has been shown throughout this thesis and needs to be addressed by the government. Such a shift in priorities will allow the people to feel they have more input into the current system. The people of Tuvalu are passionate about their homeland and they deserve to have a better understanding of what is happening and how they are being affected. If the government continues on its current path, they will need to justify this to the citizens of Tuvalu, since it has become clear that the citizens are concerned that local needs are not being met. Tuvalu has shown a lack of collective capacity to respond to the problems happening on the islands, such as the waste issue. This identifies a need for both the people and government to work together to understand why people are not wanting to clean up and take care of their own islands. How will the nation be able to deal with global problems such as climate change if they are unable to deal with a local waste problem currently? This needs to be addressed through individual accountability.

The current state of balance between climate change and development in Tuvalu suggests that other small island developing states may be having similar issues. When a country has limited resources and is dependent on foreign aid, it is difficult to make sure that all development needs are met. I conclude that Tuvalu is spending too many resources on creating awareness of their situation around the world and not enough

resources on creating awareness and understanding of climate change issues with their own society. This can be shown through their weaknesses in balancing waste management and climate change in Tuvalu. Although I recognize that it is important to let the world know what is happening to Tuvalu so they can receive more support, I believe they need to cut back, or the current weaknesses in Tuvalu will increase.

Currently Tuvalu is not balancing climate change and development, because it is spending too many resources on climate change and not enough on meeting its development needs, which is weakening their economy. If this imbalance continues it will decrease Tuvalu's resilience to change, which will in turn affect its adaptive capacity. Tuvalu must continue to understand the impacts of climate change and its ability to adapt, while not forgetting about its development needs. The weight of climate change is putting pressure on its development needs; therefore it needs to allocate more resources to development to continue to strengthen these sectors. Climate change has the ability to exhaust a country's resources, and therefore Tuvalu must be aware of this by continuing to monitor the way in which it is balancing its climate change adaptation and development needs. Since the emergence of climate change Tuvalu has not just added climate change as a part of its national priorities, it has changed its focus to be climate change centred. Given that climate change has the ability to destroy the current lifestyle in Tuvalu, it is understandable that they would take such a strong approach. Unfortunately for Tuvalu it has done this at the expense of development. The Government of Tuvalu must shift its focus to the development needs of its citizens and

then implement climate change adaptation into these needs. Tuvalu is a country that many feel will be among the first victims of climate change, and therefore by mainstreaming climate change adaptation into development Tuvalu can lead by example and become the first developing country that made it through climate change, and against the odds.

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Appendix A

B. Opportunities for cooperation

1. Regional organizations, groups and networks

119. The examples of regional organizations contained in this section aim to highlight how past efforts to mainstream climate change have succeeded as organizations have incorporated climate change into their strategies and activities. However, opportunities remain to be exploited and networks and organizations that could be co-opted for the achievement of adaptation goals are also mentioned below. Finally, this section broaches some of the research centres and think tanks carrying out pertinent research of which advantage should be taken.

120. Highlighted below are some examples of the range of regional organizations, groups and networks which are already taking an active role in increasing adaptation to climate change or which could be used as an effective way of cooperating on adaptation.

(a) **Alliance of Small Island States**

The Alliance of Small Island States (AOSIS) is a coalition of Small Island and low-lying coastal countries that share similar development challenges and concerns about the environment, especially their vulnerability to the adverse effects of global climate change. It functions primarily as an ad hoc lobby and negotiating voice for SIDS within the United Nations system. AOSIS has a membership of 43 States and observers, drawn from all regions of the world: Africa, Caribbean, Indian Ocean, Mediterranean, Pacific and South China Sea. Thirty-seven are members of the United Nations, close to 28 per cent of developing countries, and 20 per cent of the total membership of the United Nations. Together, SIDS communities constitute some 5 per cent of the global population <www.sidsnet.org/aosis>.

(b) **Association of Caribbean States**

The objectives of the Association of Caribbean States, formed in 1994, are to strengthen regional cooperation and the integration process in order to enhance economic capacity, preserve environmental integrity and promote sustainable development among its members. Of relevance to adaptation to climate change are the special committees on sustainable tourism and natural disasters <www.acs-aec.org>.

(c) **CARICOM**

All of the objectives of CARICOM,³⁸ established in 1972, are threatened by the impacts of climate change. It provides an important framework through which adaptation to climate

³⁸ To improve standards of living and work; the full employment of labour and other factors of production; accelerated, coordinated and sustained economic development and convergence; expansion of trade and economic relations with third States; enhanced levels of international competitiveness; organization for increased production and productivity; achievement of a greater measure of economic leverage and effectiveness of Member States in dealing with third States, groups of States and entities of any description and the enhanced coordination of Member States' foreign and foreign economic policies and enhanced functional cooperation.

change can take place <www.caricom.org>. In 2000, CARICOM established the Caribbean Community Climate Change Centre, which aims to protect the climate system in the region, enhance capacity of member governments to coordinate national responses to climate change, provide policy and technical support on climate change issues and act as an executing agency for regional projects relating to climate change. In December 2006, the Caribbean Community Climate Change Centre hosted a workshop on regional downscaling in Havana, Cuba <www.caricom.org/jsp/community/ccccc.jsp>.

(d) **Global Islands Network**

The GIN aims to serve as a hub that connects and coordinates efforts to help ensure a healthy and productive future for islanders. GIN brings together islanders and partner organizations, borrowing as well as replicating best practices to tackle sustainable development problems, and problems such as sea-level rise, the cause of which is beyond the control of small island states <www.globalislands.net>.

(e) **Indian Ocean Commission (Commission de l'Océan Indien)**

The IOC is an inter-governmental organization that brings together the Comoros, France (Réunion Island), Madagascar, Mauritius and Seychelles, with the objective of promoting sustainable development in the Western Indian Ocean Islands. The IOC also represents the island states in international forums and defends their interest with regard to specific environmental and economic issues. It also facilitates regional cooperation and integration (<<http://www.coi-info.org>>; World Bank Regional Institutions website).

(f) **Organization of Eastern Caribbean States**

The Environment and Sustainable Development Unit of the OECS, has brought the member governments together to create the St. Georges' Declaration Of Principles for Environmental Sustainability in the OECS. The Declaration contains 21 principles that were formed by peoples and governments of member states as a guide for environment management within their countries. Importantly, principle eight is called *Preparation for Climate Change* and states that: "Governments will enact laws, create organizations and institutions and provide money to assist people and communities to adapt to the impact of climate change" <www.oecs.org/ESDU>.

(g) **Pacific Islands Forum**

The Pacific Islands Forum, founded in August 1971, comprises 16 independent and self-governing states in the Pacific. The Forum is the region's premier political and economic policy organization. Forum Leaders meet annually to develop collective responses to regional issues <www.forumsec.org.fj>.

(h) **Pacific Regional Environment Programme**

The mandate of SPREP is to promote cooperation in the Pacific Islands region and to provide assistance to protect and preserve the environment while ensuring sustainable development. SPREP is highly active in terms of climate change, for example through initiatives such as the Pacific Islands Framework for Action on Climate Change 2006–2015 and Capacity Building for the Development of Adaptation Measures in Pacific island countries (CBDAMPIC) <www.sprep.org/climate_change>.

(i) **Secretariat of the Pacific Community**

The SPC cooperates with member countries, donors and other organizations to deliver work programmes to members that aim to develop technical assistance, professional, scientific and research support, and planning and management capability. At the recent thirty-sixth Meeting of the Committee of Representatives of Governments and Administrations (CRGA) (13 to 17 November, 2006), policy agenda item 3.1 addressed *Key issues affecting Pacific Island countries and territories* under which the issue of climate change was highlighted. Specific problems highlighted were alteration and possible irreversible damage to biodiversity, changed and unpredictable weather patterns, sea-level rise and reduced food security <www.spc.org.nc>.

- (j) **SIDSnet**
SIDSnet was created in 1998 as a way of facilitating communication among SIDS to assist them in the implementation of the sustainable development goals embedded in the Barbados Programme of Action. It aims to form partnerships through the internet and other information and communication technologies <www.sidsnet.org>.
- (k) **South Pacific Applied Geoscience Commission (SOPAC)**
SOPAC is an intergovernmental regional organization which provides services to aid sustainable development in the Pacific countries it serves. It is introducing adaptation mechanisms to climate change, climate variability and sea-level rise as part of its Oceans and Islands programme <www.sopac.org/tiki/tiki-index.php>.

2. Programmes for SIDS within inter- and non-governmental organizations

121. Many organizations have environmental programmes specifically for SIDS.

- (a) **Caribbean Environment Programme (UNEP)**
The CEP is a conglomerate of legislative, programmatic and institutional frameworks and entities working together to assist the nations and territories of the Wider Caribbean Region to protect their marine and coastal environment and promote sustainable development. The work of the CEP is based around the Caribbean Action Plan and is funded through the Caribbean Trust Fund. Although none of the CEP sub-programmes specifically target climate change, the work of the CEP will be threatened by climate change, and adaptation should be a key concern <www.cep.unep.org>.
- (b) **Coastal Regions and Small Islands platform of UNESCO**
Concentrating on the mitigation and management of conflicts over coastal resources and values, the Coastal Regions and Small Islands platform works through field based projects, UNESCO Chairs and university twinning and a multi-lingual internet-based forum. With regard to small island states, it focuses mainly on helping implementation of the Barbados Programme of Action. Climate change and sea-level rise is one of the domains of the 1994 Barbados Programme of Action, the implementation of which has now been reinforced through the Mauritius Strategy <www.unesco.org/csi>.
- (c) **Regional Offices (UNEP)**
UNEP has a regional office for Latin America and the Caribbean (ROLAC), for Africa (ROA) and for Asia and the Pacific (ROAP). These offices are carrying out many initiatives which contribute towards sustainable development of the region <www.rolac.unep.mx; www.roap.unep.org>.
- (d) **Small States Forum (World Bank)**
At the Small States Forum of the World Bank, representatives of the 45 small developing countries that are members of the World Bank meet to discuss issues of particular interest them.

(UNFCCC, 2007)

Appendix B

Table 1. Total population size, change, distribution and density, by island, 1991–2002								
Island	Area (km ²)	Total population		Population change (1991–2002)			Population distribution (%)	Density (persons per km ²)
		1991	2002	Total	%	r ²	2002	
Funafuti	2.79	3,839	4,492	653	17.0	1.4	47.0	1,610
Outer Islands	22.84	5,204	5,069	–135	–2.6	–0.2	53.0	222
Nanumea	3.87	824	664	–160	–19.4	–2.0	6.9	172
Nanumaga	2.78	644	589	–55	–8.5	–0.8	6.2	212
Niutao	2.53	749	663	–86	–11.5	–1.1	6.9	262
Nui	2.83	606	548	–58	–9.6	–0.9	5.7	194
Vaitupu	5.60	1,202	1,591	389	32.4	2.5	16.6	284
Nukufetau	2.99	751	586	–165	–22.0	–2.3	6.1	196
Nukulaelae	1.82	353	393	40	11.3	1.0	4.1	216
Niulakita	0.42	75	35	–40	–53.3	–6.9	0.4	83
Tuvalu	25.6	9,043	9,561	518	5.7	0.5	100.0	373

Average annual rate of growth (%).

Source: Tuvalu 2002 Population and Housing Census Volume 1 Analytical Report, Table 1, p 15

Appendix C



Environment
Vulnerability Index

Tuvalu

SCORE DATA%

EVI

367 78

CLASSIFICATION:

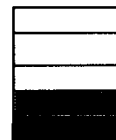
Extremely vulnerable

ASPECTS OF VULNERABILITY:

Hazards	2.74	72
Resistance	5.63	100
Damage	4.38	80

LEGEND FOR INDICATOR TYPES:

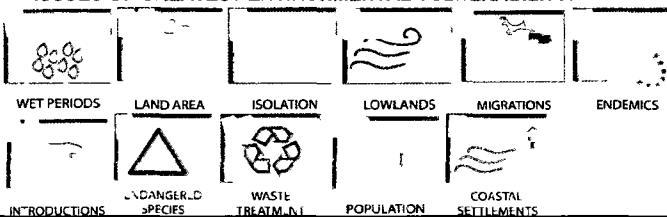
Weather & Climate
Geology
Geography
Resources & Services
Human Populations



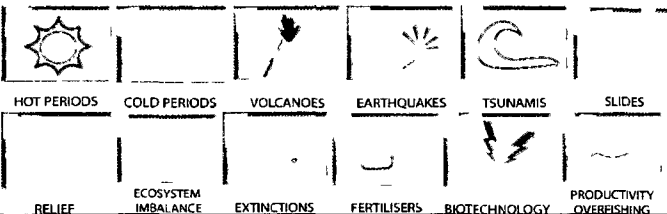
POLICY-RELEVANT SUB-INDICES:

Climate Change	4.75	92
Exposure to Natural Disasters	3.09	100
Biodiversity	4.81	84
Desertification	3.50	73
Water	5.00	62
Agriculture / Fisheries	3.64	58
Human Health Aspects	3.33	50

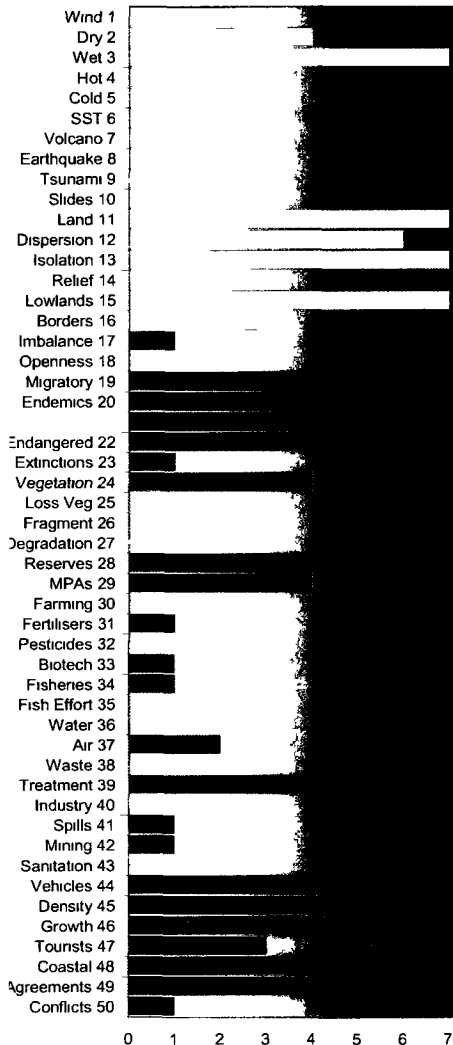
ISSUES OF GREATEST ENVIRONMENTAL VULNERABILITY:



ISSUES OF LEAST VULNERABILITY OR GREATEST RESILIENCE:



CHANGES SINCE LAST EVALUATION None, this is first assessment



Resilient ← Vulnerable
Blanks = No data or Not applicable
EVI scores are 1-7

22/02/2005

(UNEP, 2005)

Appendix D

INTERVIEW QUESTIONS

Field Research in Funafuti, Tuvalu

July 2010

Researcher: Caitlin Dix

A Balancing Act: How Small Island Developing States are balancing climate change and development

Name:

1. What category do you fit in:

- ☐ Government Employee
- ☐ Donor Agency Employee
- ☐ Local Citizen
- ☐ Other (Please Specify) _____

What is the title of your working position? *(eg Fisherman/which donor agency/which sector of the government)*

2. Were you born in Tuvalu?

- ☐ Yes
- ☐ No
 - Where were you born? _____

3. What is your age?

(If they would prefer not to say age, ask category)

Under 18	18-25	26-30	31-35	36-40
41-45	46-50	51-55	56-60	61-65
71-75	75+			

4. How long have you lived in Tuvalu? *(For non citizens working for donor agencies ask how long they have been working on projects involving Tuvalu)*

5. What sort of changes in the world around you have you seen in your lifetime?
(Have you seen any changes to the natural environment?)

6. Have you heard of climate change?

- If yes, approximately when did you first hear the term climate change used ?

7. When you first heard about climate change, how was it first discussed?"?
8. What does the term climate change mean to you?
9. Have you seen or experienced changes to the climate, sea level? (this is not just daily weather changes)
10. Do you feel the government should be spending time, effort, and/or money on making the world aware about Tuvalu and how climate change could affect them?
11. Do you feel the government should be spending time, effort, and/or money on climate change mitigation? (Mitigation meaning that effort and money is put in to offsetting climate change.
12. Do you think the government is worried about climate change?
13. Do think the government is currently spending money on climate change?
14. How would you rate the health care system in Tuvalu presently, on a scale of 1-5?
(1 = poor, 5 = excellent)

Can you elaborate why you chose that number?
15. How would rate the health care system in Tuvalu 15 years ago, on a scale of 1-5?
(1 = poor, 5 = excellent)

Can you elaborate why you chose that number?
16. How would you rate the education system in Tuvalu presently, on a scale of 1-5?
(1 = poor, 5 = excellent)

Can you elaborate why you chose that number?

17. How would rate the education system in Tuvalu 15 years ago, on a scale of 1-5?
(1 = poor, 5 = excellent)

Can you elaborate why you chose that number?

18. How would you rate waste treatment (garbage disposal, sewage) in Tuvalu presently, on a scale of 1-5?
(1 = poor, 5 = excellent)

Can you elaborate why you chose that number?

19. How would you rate waste treatment in Tuvalu 15 years ago, on a scale of 1-5?
(1 = poor, 5 = excellent)

Can you elaborate why you chose that number?

20. How would you rate your access to freshwater in Tuvalu presently, on a scale of 1-5?

(1 = poor, 5 = excellent)

Can you elaborate why you chose that number?

Do you have access to freshwater?

21. How would you rate your access to freshwater in Tuvalu 15 years ago, on a scale of 1-5?
(1 = poor, 5 = excellent)

Can you elaborate why you chose that number?

22. If the government had an extra million dollars should they spend it on climate change responses, on social services, or on something else?

23. If you could change how the government spends money, would you spend more on climate change response or more on social services?

What % of the budget would you shift from one to the other?

Questions 24 & 25 for donor agencies and government

24. How have you seen funding change for your department/project(s) over the past 20 yrs and the purpose

25. What is the objective of the department/project(s) for Tuvalu?

26. What other changes have you seen in Tuvalu over the past 20 years?

27. Is there anything else you would like to add?

Appendix E

Figure 2

Common Leading causes of Morbidity

1,349

Year	1997	1998	1999	2000	2001	2002	2003	2007
Headache	2,220	1,866	2,178	2,226	1,997	2012	2303	1504
Septic sores	1,967	1,548	1,774	1,510	1,710	2637	4758	1667
Diarrhoea	1,314	1,389	1,246	1,307	1,590	967	1262	
Body ache	3,275	2,936	3,388	2,435	1,190			1186
Wounds	2,781		1,752	1,672	1,051			
Cough	1,465	852	988	1,041	989	1224	1890	1067
Acute Respiratory Infection	1,756	1,383	1,243	1,909	971	2029	2950	1298
Abdominal pain	572	656	865	827	627	579		992
Backache		784		622			457	
Ringworm	778	691		619	553		651	732
Tooth decay			771	685		559		536
Measles		431						
Conjunctivitis	756					898		553

source: Department of Health

Copy right © Tuvalu Central Statistics Division – 2006

(Tuvalu Government, 2006d)

	Locals		Professional Capacity	
	20 Years Ago	Present Day	20 Years Ago	Present Day
Healthcare	2.5	3.19	2.8	3.2
Access to Freshwater	2.44	3.75	2.29	4
Education	2.75	3.25	2.86	3.14
Waste Management	3.81	1.88	3.57	2.57

Appendix F

Table of Averages for Interview Questions 14-21

Research Conducted July 2010 by Caitlin V. Dix



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