Climate change-induced migration in the Pacific Region:

sudden crisis and long-term developments[1]

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Abstract

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With so many other social, economic and environmental factors at work establishing linear, causative relationships between anthropogenic climate change and population dynamics it has been difficult to pinpoint the specific human consequences of climate change on respective populations. Through qualitative information based on interviewees testimonies and personal experience as well as a descriptive analysis of (1) population records, (2) climate-change related impacts, and (3) consequences of uneven development in the Republic of Kiribati and Tuvalu, two low-lying atoll nations in the Pacific Region taken as examples to illustrate the issues involved, there is strong evidence that recent influxes in population movements to urban central islands from rural outer-islands experienced in these countries can be attributed to a combination of the adverse impacts of climate change and socio-economic factors inherit in small island developing states. Moreover, internal migrants cannot be accommodated in their states of origin - putting pressure on local infrastructure and services. This, combined with a recent population boom, has led to (1) a decline in human development indicators and (2) a general livelihood decline.

Introduction

The Intergovernmental Panel on Climate Change (IPCC) identifies the most adverse primary impacts of climate change as rising sea levels, influx of drought, greater propensity of flooding and an increased intensity and frequency of violent storms (IPCC 2001). These impacts are well-known, in part, from recent advocacy surrounding the crisis. However, the secondary impacts of climate change, specifically general health decline and more unreliable food and water supplies that influence population movements, may prove to have the most adverse effects on vulnerable populations at risk – for as the IPCC noted as early as 1990, the greatest single impact of climate change on the human population could be on human migration (IPCC 1990).

Growing crisis

The IPCC's 4th Assessment Report (FAR) projected that over the course of the next 100 years global average temperatures will increase to a rate unprecedented in the last 10,000 years (IPCC 2007). By 2099 the world is expected to be on average between 1.8 and 4 – Celsius hotter than it is now. Consequences of this forecast would result in a global mean sea level rise of up to 88 centimetres over the next 80 years, which would displace millions on people around the world and could potentially inundate some countries (IPCC 2007).

Coral reef environments inherit in small island countries are considered the most vulnerable ecosystem to each degree of change in global temperature – Celsius (IPCC 2001). Consequently, rising global temperatures will have a host of adverse impacts in low-lying small island countries. When combined with socio-economic factors these

impacts could have even more of a negative impact. In some island states the secondary impacts of rising global temperatures are forcing residents to migrate from more vulnerable outer islands to capital islands - leading to mutually reinforcing economic and environmental declines. The environmentally-induced internal migration is contributing to high urban growth rates as it combines with other migratory pull-influences and high urban birth rates. This has resulted in sharp increases in population densities in central islands, which can be linked to recent declines in human development indicators. Contributing to the crisis, local policy responses of the respective governments have been short-term in scope and unsustainable both financially and contextually.

This paper focuses on climate change-induced internal migration in the Republic of Kiribati (pronounced *Kiribas*) and Tuvalu – two countries taken as examples to illustrate the issues involved. It also addresses local policy responses by the respective governments to the human development indicator decline associated with current migratory trends as well as planning for population relocation. This paper argues that these problems should be addressed proactively and provides an analysis of current policy responses in order to implement long-term planning and policy responses designed to minimize the costs to future environmental migrants (environmental migrants are persons or group of persons who, for compelling reasons of sudden or progressive changes in the environment that adversely affect their lives or living conditions, are obliged to leave their habitual homes, or choose to do so, either temporarily or permanently, and who move either within their country or abroad) within and from small island states at risk as well as recipient communities (IOM 2007:1).

The first part of this paper explores the link between climate change and migration. The second part explores recent influxes in internal migration, migratory influences and the associated livelihood decline in Kiribati and Tuvalu. It also reviews local policy responses designed to alleviate problems associated with current migratory trends and provides an analysis of each intervention.

Part 3 presents possible future population relocations as a consequence of climate change. It explores the long-term developments that may occur if scenarios presented by climate analysts are realized. Finally, Part 4 provides a brief conclusion and recommended course of action for a proactive solution to this complex and multi-dimensional problem.

Part 1: Climate change and migration link

Today, more than ever, technology-reliant optimists assume that mankind is immune to the impacts of rapid climatic shifts. They claim that advances in technology-driven coping mechanisms will overcome the adverse effects of a rapidly changing environment. However, this claim only pertains to advanced economies of developed countries that have the resources to utilize technology as a form of adaptation. Developing countries also have largely urbanized populations and are, therefore, removed from agricultural activities most directly impacted by rapid climate change. Developing states, on the other hand, do not have the financial or logistical capacity to cope with rapid climate change. Not to mention, a majority of populations in developing countries are actively engaged in agricultural and subsidence-related activities making them more vulnerable to climate-related changes - putting pressure on their populations to use more traditional adaptation strategies, like migration.

Pacific Region

The adverse effects of a warming world can be felt most in the Pacific Region. According to the International Red Cross and Red Crescent's World Disasters Report of 2005, the number of persons killed by weather related disasters in the Pacific Region rose by over 21 percent over the last 20 years (Below, Hoyios and Guha-Sapir 2005:Annex 1). The number of people's lives affected by weather related disasters rose by 65 fold, an increase from 270000 during the 1980's to 1.2 million in the 1990's (Below, et. al. 2005:Annex 1). This phenomenon has led to a decline in economic growth and livelihood, which collectively contributes to population movements both within and out of small island states.

The customary lifestyle of most Pacific islanders has changed little over the last 2000 years. Although pacific islanders have learned to adapt to their ever-changing environment over the centuries, recent climatic shifts may exceed their ability to adapt within local resilience capacity. Recent disruptions in weather patterns have made outer-island populations in low-lying island countries particularly vulnerable resulting in increased inter-island migration – a traditional adaptation method used by their ancestors.

There are several documented cases of relocations of small island populations in the Pacific to nearby islands spurred by environmental causes. In the 1970's, a majority of the population of Banaba, a once phosphate-rich island under Kiribati authority, was relocated to Rabi Island in Fiji. Mined to inhabitability for its phosphate by the British, the I-Kiribati (people of Kiribati.) that once worked the phosphate mines of Banaba were relocated as part of a bi-lateral agreement facilitated by the British. A few years earlier, Cyclone Heta destroyed most of the agricultural system in Niue, a small island nation east of New Zealand, which led to severe food shortages. Under a New Zealand initiated relocation program most of the population was relocated to New Zealand, where a majority of the Niuean population now lives (Moore and Smith 1995:115).

Part 2: Sudden crisis

The cases of Tuvalu and the Republic of Kiribati share a number of commonalities, including: geography; homogeneous populations; high urban growth rates; subsistent-based economies; and environmental degradation. Also, it is increasingly evident that both are experiencing secondary impacts of climate change – exacerbating existing problems associated with degradation and pollution, which are threatening renewable resources, including: fresh water sources; in-land tree crops; garden crops; and near shore fishing stocks. This is directly leading to health problems and other declines as well as putting into question the source of livelihoods for future generations.

Economic migratory pull factors associated with uneven development are combining with environmental push factors, forcing citizens to migrate from outer islands to central islands. Motivations that led to current migratory patterns were most likely multiple at first, and distinguishing between economic pull and environmental push factors is very difficult. Migration from outer islands to capital islands is in constant flux and current data on the stock and flow of inter-island migration is unreliable. For example, it is not uncommon for migration flows to capital islands to swell during national holidays and national sporting events like Independence Day and inter-island soccer championships. This interaction of individual desires and government sponsored events makes is difficult to collect accurate migration estimates based on administrative records, censuses and surveys.

The current internal migration is resulting in high population densities, straining the provision of services such as sewerage and water supplies, which has overwhelmed local

mechanisms and capacities to cope. However, in each case, inherit socio-economic and cultural differences have had specific consequences on the human development context.

Republic of Kiribati

The small island nation of the Republic of Kiribati consists of 33 atolls and reef islands spanning some 5000 kilometres across the central-western Pacific Ocean (Asian Development Bank 2007:1). Straddling the Equator and bordering the International Date Line, these tiny islands make up a total land area of only 726 square kilometres spread over three exclusive economic zones, together covering 3.5 million square kilometres – the second largest in the world (Asian Development Bank 2007:1).

There is strong evidence that Kiribati is experiencing direct and serious effects from climate change that have widespread and far-reaching environmental, social and economic implications. Humanitarian-based organizations claim that the country is experiencing climate processes characterized by sea level rise, leading to coastal erosion and a gradual salinization of potable water supplies and agricultural land. With few island points that measure over 2 meters above sea level and an average island-width of less than 1000 meters, Kiribati was identified as one of the top 10 most vulnerable countries in the world to climate change by the International Institute for Environment and Development (World Bank 2006:2; Ayers and Huq 2007:2).

Nationwide, Kiribati has a population density of 127 people per square kilometre, but this varies widely from 13 people per square kilometre in Kiritimati Island to 2558 in South Tarawa, the capital and urban centre of the country (World Bank 2006:2). Between

1995 and 2000, there was significant in-migration of people from outer islands to South Tarawa due to a combination of economic and environmental factors, resulting in a sharp increase in the urban growth rate (World Bank 2006:2). During that time the population declined on most outer islands while South Tarawa's urban growth rate increased to 5.2 percent per annum - the highest annual urban growth rate in the Pacific by almost a percent (Asian Development Bank 2007:1). Population records dating back to the 1940's put this demographic trend into perspective. In 1947 only 1671 people lived on South Tarawa, but by 2005 the official figure had risen to 40311, and by early 2008 the unofficial figure was almost 65000 (Kiribati National Statistics Office 2005; Coordinator, Kiribati Adaptation Project II 2008). South Tarawa now holds more than half of the total population of Kiribati, all concentrated on less than 16 square kilometres of land (South Pacific Commission 2001).

The highest urban growth rate is occurring in Betio (pronounced 'Bes-she-o'), a small islet with a total land area of only 1.75 square kilometres located at the south-western end of South Tarawa (Asian Development Bank 2007:1) According to recent estimates, approximately 14000 people now live in Betio (World Bank 2006). The islet has a population density of nearly 8000 persons per square kilometre, giving it a population density similar to Hong Kong, but with everyone living on the ground floor instead.

The spike in population density on South Tarawa during a relatively short period of time has overwhelmed local capacities, putting stress on the already fragile environment and creating an imbalance between population and resources. Informal housing or squatter settlements have mushroomed, and now make up 25 percent of all dwellings on South Tarawa (Asian Development Bank 2006:1). Overcrowding has led to unsanitary

conditions associated with inadequate sewerage and lack of garbage disposal systems, which can be attributed to overwhelming local health facilities and resulting in the highest human poverty index in the Pacific Islands (United Nations Development Programme 2006:18). The under 5 mortality rate in Kiribati, the most widely used general health indicator, is 69 deaths per 1000 live births (compared to the U.S. rate of 7 deaths per 1,000 live births) and is most likely much higher on South Tarawa (Kiribati National Statistics Office 2006). High rates of malnutrition, iron, vitamin A and protein deficiencies and worm infestations among children under age 5 are contributing factors (United Nations Development Programme 2006:18).

There is evidence that some health indicators have steadily improved over the last decade due to government-led health initiatives, but overall people in Kiribati have a shorter life span than those in other Pacific islands. In 2005, life expectancy at birth was estimated at 58.9 for males and 63.1 for females (Kiribati National Statistics Office 2006). Although no studies currently exist, these figures are considered to be much lower for males and females living on South Tarawa. This can be linked to lifestyle diseases associated with urbanization - notably reliance on nutritionally inferior processed foods, such as refined sugar, tinned meats, soft drinks and low-fibre bread and rice (Thomas 2003: 8). Since the end of World War II, the I-Kiribati diet has changed from a fish and coconut dominated-diet to a diet that is high in fat and sugar while low in fibre (Thomas 2002:166). The scarcity of vacant land and non-agreeable conditions for agricultural production and a growing population combined with an increase in remittances and foreign aid have contributed to Kiribati's reliance on import foods that are now considered staples of the I-Kiribati diet (Thomas 2002:166). This attributes to an over 50 percent incidence of

diabetes among adults, and increased rates of gout, hypertension, coronary heart disease, specific cancers and stroke (United Nations Development Programme 2006:18).

In the past, migratory influences were attributed solely to development-induced economic pull factors associated with an uneven distribution of development between rural and urban areas. Other than the production of *copra*, which accounts for about two-thirds of export revenue, South Tarawa is the economic centre of every aspect of the small country's economy. The monetary economy on South Tarawa provides 2 out of every 3 formal jobs and 4 out of every 5 payroll dollars (Asian Development Bank 2006:2). South Tarawa is also the centre of almost all higher educational facilities. However, inferences from recent environmental studies conclude that environmental push factors may be aggravating an already high rate of migration from outer islands to South Tarawa. From 1985 through 1990 Kiribati's annual urban growth rate averaged 3.1 percent, an increase of roughly 1 percent from the previous decade (South Pacific Commission 1995:40). This figure boosted to 5.2 percent after 1995, compared with a national growth rate of 1.7 percent - at the same time the adverse impacts of global warming intensified (Kiribati National Statistics Office 1985-2005). Other than personal testimonies, migratory studies that disaggregate migratory influences are non-existent; however, there appears to be correlations between influxes in urban migration and increased potable water scarcity, coral reef depletion and coastal erosion on outer islands.

Consequences from drought in the southern Gilbert Islands and storm surges throughout Kiribati associated with the impacts of climate change are increasingly evident as well. The southern Gilberts, consisting of 8 atolls, have on average less rainfall per year than the other islands of Kiribati. Located on the western extension of the dry equatorial

tongue, recorded ranges of annual rainfall in the southern Gilberts can be as low as 15 inches per year compared to the 100 inch per annum average in the northern Gilberts (Lundsgaarde 1968:86-93). In recent years these islands have experienced longer periods of drought than normal followed by shorter periods of rainfall (Kiribati National Statistics Office 1998-2003). This has negatively affected copra production – the primary source of income in the southern Gilberts (Asian Development Bank 2006:2). Moreover, on all outer islands there is evidence of coastal erosion, which has attributed to both coastal and inland flora decline. In the past, Kiribati would experience 1 to 2 "King Tides" or storm surges per year. Today it is not uncommon for 5, 6 or even 8 king tides to pound the shores of Kiribati every year (World Bank 2006:3).

Arguably, the greatest climate change-related threat to Kiribati is the breaching of its' underground fresh water table by rising seas (Hunt 1996:224). Fresh water that the I-Kiribati depend on for almost all their potable water, in the form of rain, is held within a shallow underground slightly brackish freshwater lens by the porous coral that forms the island, hydrostatically floating above the more dense salt water (Thomas 2002:164). As ocean temperatures increase, water expands causing sea levels to rise. Sea levels also raise as global warming melts land-based glaciers, because of the direct transfer of newly thawed water into the sea. As sea levels rise, by combination of water expansion and land-based glacier depletion, the porous underground water table is breached by the encroaching sea - causing higher levels of salinity. In turn, aquifers become contaminated and people must find new sources of fresh water.

Over the last 20 years, in an attempt to meet the needs of South Tarawa's growing population, a concentration of fresh water infrastructure investments were isolated to high

population density areas on the capital island (UNESCO 1999:12). In the process, improved water supply systems on outer islands were ignored – now understood to be a significant influence in migratory influences.

Policy response In order to alleviate the human health problems associated with over-population on South Tarawa, the Kiribati Government has proposed the "Integrated Land and Population Development Programme" as defined under the National Republic of Kiribati Climate Change Adaptation (CCA) Strategy, which was approved in August of 2005 (World Bank 2006:1). As part of the CCA strategy, the Kiribati Government aims to stabilize the population at 125000 persons by 2025 through government-sponsored family planning programs and large scale inter-island relocation. Betio was identified as the key focus of adaptation plans. The Kiribati Government intends to relieve population pressures by relocating many of Betio's more than 14000 residents and other population dense areas on South Tarawa to other islands in Kiribati and overseas. The proposed population distribution is 50000 in South Tarawa, 45000 spread over the other islands in the Gilberts, and the resettlement of roughly 30000 I-Kiribati to Kiritimati (pronounced *Christmas*) (Asian Development Bank 2006:2). Needless to say, a significant amount of resources will be required for such an intervention.

Stabilization of the population growth on South Tarawa will ensure balance between population and resources, which will ultimately lead to improved living standards and well-being for the local population (Asian Development Bank 2006:3). The programme will tackle the issue of squatters through a well conceived plan to offer incentives to voluntarily resettle Kiritimati over 2000 kilometres east of South Tarawa.

Kiritimati is the largest of all Kiribati's 33 coral atolls and comprises over 70 percent of the total land area of Kiribati – although a third of the island is uninhabitable salt flats (World Bank 2006:5). It is located a few hundred miles south of Hawaii and is on the route of a number of American cruise line ships. As a result the island is regularly visited by tourists, which has drastically boosted the local economy (World Bank 2006:3). In addition, there is a government outpost located on the island, which has the potential to employ a number of people.

Unfortunately, the "Integrated Land and Population Development Programme" as an option for adaptation proposed by the Kiribati Government is only a short-term solution to a larger problem. It will require a great amount of resources to permanently relocate citizens of South Tarawa to Kiritimati Island. Additionally, Kiritimati measures less than 4 meters above sea level at it highest point (Asian Development Bank 2006:2). As forecasted by the IPCC, global mean sea levels will continue to rise in the future – eventually forcing Kiritimati's present and future residents to migrate inward until they are eventually forced to abandon the island.

In the short-term, however, the relocation programme may prove to slow and eventually reverse the decline in human health problems associated with over-population. As families are relocated, infrastructure pressure caused by high population density will be mitigated, which may improve the government's capacity to cope in the short-term.

Tuvalu

The case of Tuvalu has been well documented in recent years. The small island nation, the fourth smallest country in the world, consists of a string of 9 small islands (5 are coral

atolls and the other 4 are independent islands) with an estimated population of 9561 (Government of Tuvalu 2006). Tuvalu's islands are small, isolated, fragmented and maintain a land elevation average of around 1 meter above sea level (Parks and Timmons 2006:13).

People of Polynesian decent who first inhabited the islands some 2000 years ago (radiocarbon dates are somewhat unclear, carbon-dating evidence only goes as far back as AD 1000) have become accustom to living in Tuvalu's fragile and ever-changing environment, but recent climate changes may overwhelm their ability to adapt. It is believed that in the next few decades the small island state will be rendered uninhabitable due to rising sea levels, and evidence of future inundation is increasingly evident (Parks and Timmons 2006:14). Just last year, one of Tuvalu's small islets, where plant and animal life once thrived, disappeared beneath the sea. In 2000, Tuvalu experienced an unusually long flood season that, on average, lasts for only a few months. However, during this period the floods lasted for over five consecutive months. The flooding percolated up through the porous limestone soil, soaking many of Tuvalu's islands from the inside out. Climate change forecasts indicate that this occurrence may become the norm in the near future.

Over the past few decades, the capital island of Funafuti has seen an influx of migrants from outer islands. With a land area of 2.79 square kilometres, Funafuti supports a population of approximately 5000 people, and like in the case of Kiribati, most migrants are isolated in a central area (Government of Tuvalu 2006). In Funafuti, squatters have taken sanctuary in Fongafale, a make-shift village in the centre of Funafuti – of which 35 percent of the village is built on water and garbage-filled borrow pits, a legacy of the

Second World War (Hunt 1996: 225). Due to overpopulation, deforestation, lack of potable water and an eroding shoreline, the Tuvaluan Government's capacity to cope with a growing urban population has been severely hindered. However, the associated impacts experienced in Tuvalu differ from Kiribati.

According to a current study, Tuvalu's infant mortality rate is fairly low at 20 deaths per 1000 live births (Government of Tuvalu 2006). However, it is common practice for pregnant Tuvaluan women to travel to New Zealand, Fiji or other Polynesian countries to give birth. Pre-existing social networks allow for this phenomenon to occur.

Sharp increases in population density on Funafuti over the lass 30 years have had other effects on human development indicators. Funafuti has a relatively high annual death rate in comparison with the next most populated island of Tuvalu, Nukufetau. Although Nukufetau's population is nearly half that of Funafuti, Nukufetau's annual death rate is over 100 times less per year than that of Funafuti (Government of Tuvalu 2006). Health workers attribute the higher death rate on Funafuti to a poor diet rooted in a dependency on imported goods, which are high in fat and low in fibre. While Tuvaluans on outer islands maintain a more traditional diet of taro root, fish, breadfruit, papaya and coconut.

Barring the brunt of changes in climate and, in effect, the customary lifestyles of Tuvaluans' are young women. Recent reports from the Women's Environment Development Organization and the World Conservation Union show that the adverse affects of climate change are affecting women most in places like Tuvalu (Kallmeyer 2008:1). According to studies, young women in Tuvalu are spending an increased amount

of time securing water and fuel due to the scarcity of potable water and resources (Kallmeyer 2008:1). Increased time spent working to ensure the basic needs of the family can be linked to decreased girls' attendance in school and lower literacy rates particularly among young girls.

Similar to the case of Kiribati, a combination of economic and environmental factors have contributed to the influx in movement from outer islands to Funafuti. Economic opportunity in addition to an increasingly volatile environment has both pulled and forced people to migrate from outer islands.

In comparison to Kiribati, the average population density of the islands of Tuvalu is relatively high – in fact, the average population density in Tuvalu is over four times higher than in Kiribati. As a consequence there is greater stress on potable water supplies and agricultural yields, which may be a major factor in recent migratory trends. Tuvalu has no streams or rivers and, therefore, almost no potable water. Fresh water infrastructure in Tuvalu, in the form of large communal rain tanks, is relatively isolated to Funafuti (Hunt 1996:224). Rising seas have adversely impacted traditional fresh water sources and crops like *taro* on outer islands leading to a livelihood decline. There are reports that on some outer islands, islanders must grow crops in tins because the soil has become too salty (Patel 2006:736). These factors have influenced people to migrate to Funafuti, which have combined with migratory pull influences. Consequently, the population of Funafuti grew at 4.8 percent after 1995 – and while this is not a high urban growth rate by developing country standards, such uneven distribution rates of growth for small island countries has had severe consequences on the capacity of the small island environment (Hunt 1996:225).

Policy response Due to Tuvalu's extremely low elevation, land degradation and high population density, sea level rise is a more urgent issue than it is in Kiribati. These tiny islands face a morbid future from a host of threats caused by global warming. For that reason, in 2001, Tuvalu targeted Australia and New Zealand to relocate its population. Australia, who was first identified as a possible destination, refused to discuss relocation agreements with Tuvalu in accordance with their strict immigration policies (Whitty 2003:50). While New Zealand, who in the past has openly criticized Australia's immigration policies, offered to accept as many as 75 Tuvaluans per year as part of a labour programme (New Zealand Office for Immigration 2007).

The New Zealand seasonal labour scheme serves two purposes – alleviate labour shortages in the agricultural sector during peak times and to better manage "inevitable" migration flows. Tuvalu is 1 of 5 Pacific island states recruited to kick start the seasonal labour scheme. Based on a competitive recruitment process, 5000 seasonal workers will be selected each year from the identified countries (New Zealand Office for Immigration 2007). According to New Zealand officials, workers from Tuvalu are given some special benefits due to their country's extreme circumstances. Tuvaluan workers receive a 9 month work visa instead of a 7 month visa given to workers from other countries. At the end of that period, most Tuvaluan workers will return to their home islands while some may be able to stay permanently.

Beside the current seasonal employment scheme, New Zealand welcomes about 70 Tuvaluans to live and work in the country under its Pacific Access Category (PAC), introduced in 2003 (New Zealand Office for Immigration 2007). Holding similar requirements to the seasonal employment scheme, an employer can make a job offer to a

worker and then sign an employment agreement with them, which must be for no more than 9 months. After that time period a few select workers are asked to stay and work permanently under their current employer (New Zealand Office for Immigration 2007).

In addition to the labour agreement with New Zealand, the Tuvaluan Prime Minister is in the process of persuading a nation to resettle the entire population of Tuvalu before rising tides inundate the small island state. New Zealand is a likely candidate for the permanent resettlement of the entire population as an extension of their labour program, which may be increased to up to 500 Tuvaluans per year. It is also expected that some residents may be relocated to the island state of Niue, which is in free-association with New Zealand and was largely abandoned after Cyclone Heta struck its' shores in 2004.

Given the current quota of 75 persons per year, the labour program is not a viable long-term solution – for at the proposed rate Tuvalu will not be emptied for over 100 years. However, if negotiations prove successful with New Zealand, the people of Tuvalu will be permanently relocated before the most adverse effects of their inevitable fate unfold.

During and after relocation, psychological trauma will no doubt be severe. Relocation methods must take this into account. In addition, it is in the best interest of the recipient state to prepare for such a migration years in advance. Recent declines in educational enrolment and literacy rates of Tuvaluans' will most certainly effect their productivity post-relocation and exacerbate the difficulty in adapting to modern western market-based culture. Such inefficiencies could possibly be mitigated with proper educational investment by the recipient state if proper long-term planning is implemented.

Part 3: Long-term developments

Climate change analysts predict that within the coming decades, atoll nations, like the two presented in this paper, will almost certainly revert to sandbars and then to nothing. In the meantime, as global mean sea levels gradually rise, climate change-induced migrations in the two countries will continue to occur at an increasing rate.

Regional response

Nations states identified as probable destinations for I-Kiribati and Tuvaluans may have begun to identify the multi-dimensional effects of climate change, but only as it affects their own interests. Recently, an article published in the Australian magazine Security Solutions argued that forced migration due to climate change is a national security threat to receiving nations. The article *Climate Change: Is it the Greatest Security Threat of the 21st Century?*, used Tuvalu as a case study to prove the link between forced migration and terrorism. The article claims that if migrants like Tuvalu's 10000 people migrate to Australia, "then millions of poor and unskilled regional neighbours will come begging for a new life" (Soderblom 2008:3). The article continues, "Unskilled workers seeking a new life, coupled with high-demand migration conditions, also raise the risk of people-smuggling syndicates targeting Australia" (Soderblom 2008:3).

As a consequence of such articles, the effort to address the issues presented in this paper has been lagging – reflected in the policy responses of the former John Howard administration. However, with proper leadership and a well-conceived plan for orderly relocation the security risks could be minimised; for it is in the best interest of neighbouring countries to identify countries that vulnerable to future climate change-

induced migrations in order to implement interventions designed to alleviate the consequential tensions sparked by future migrations. Nevertheless, there may be considerable costs for the recipient nations.

Costs and benefits of relocation As small islands states at risk attempt to adapt to the adverse effects of climate change there are likely to be costs as well as benefits. Costs will be considerable for vulnerable populations. Today, roughly 1 million people live on coral islands worldwide, and many more millions live on low-lying land vulnerable to rising sea levels (Myers 1993:11). At risk, are not just people, but unique human cultures. As Pernetta & Hughes predict, "Resettlement and out-migration can be expected to have major social and economic costs for both within island states and regionally. For some of the smaller island atoll based nations, out-migration may mean resettlement in another country with consequent costs both to original and recipient state" (Moore and Smith 1995:108).

Some argue that there may be some benefits to permanent relocation while others will pay the cost. Young unemployed islanders with few educational or economic opportunities at home may benefit from access to educational facilities, the job market and perhaps the greater freedom available in developed countries. That is if industrialised countries identified as probable destinations move to accept such populations or if migrants simply move to the closest neighbouring country. On the other hand, older Pacific islanders and those who unwillingly relocate may be the losers if forced to migrate. Many in this category may experience psychological trauma and perhaps suffer from a sense of cultural crisis. They may have difficulty adapting to modern western

market-based culture. This is a small cost as an alternative to drowning or dying from dehydration; however, there are other larger costs.

The possibility of the loss of Pacific island cultures, should climatic shifts continue and out-migrations occur as a means of survival, is also a major concern. It is highly unlikely one recipient nation will grant asylum to an entire country. In reality, asylum seekers from countries like Kiribati and Tuvalu will be divided up by host of nations, most likely by families. If this context becomes a reality, the social and cultural costs of the disappearance of countries must be taken into account.

Global impacts Globally, the consequences of a warming world exemplified by the cases addressed in this paper will be replicated globally in the years to come. As climate change intensifies and food and water supplies become more unreliable populations will undoubtedly respond by migrating to places that offer better livelihoods. Unfortunately, despite sea level rise predictions there has been no official global assessment of the likely number of people to be displaced by an 88 centimetre global mean sea level rise. Nevertheless, the number of people to be affected and/or permanently displaced will be enormous. Currently, 16 of the world's mega-cities are located on coastlines, and 12 of those are in developing countries. Needless to say, the populations that will bare the brunt will be those with the fewest resources and where effected populations have nowhere else to relocate to.

The larger impact of climate change will challenge the capacity of every country, and eventually inundate some. The secondary impacts of this change will exacerbate existing

problems of water scarcity, access to health services, land scarcity, food security and marginalise vulnerable communities as impacts intensify. At some point many land areas will become incapable of sustaining life and people will be forced to migrate. However, before forced migration sparked by global mean sea level rise occurs, there are hosts of existing environmental and health-related crisis that will overwhelm local capacities to cope. Cases of malaria and dengue fever have already shown a sharp increase, which is influenced by rising global temperatures, stagnating water, increased humidity and solar radiation (Lutz, MacKellar and O'Neill 2006:22). Drought, water scarcity and land degradation will also have serious costs. As resources become increasingly scarce vulnerable populations, including children and the elderly, will become increasingly at risk to disease. The proportion of the population over the age of 60 in developing countries is expected to rise from 7.2 percent to 17.4 percent by 2050 (Lutz et. al. 2006:35). Ultimately, these consequences will most likely correlate to an increase in insecurity; for as resources become increasingly scarce, land-use conflicts will certainly intensify.

Part 4: The way forward

Through an analysis of 2 independent cases in the Pacific Region, it is evident that there is a strong association between an increase in population density sparked by climate change-induced migration and a decline in human development indicators. It is important to emphasize this correlation in order to design policy responses that address the root causes of the livelihood decline.

The anticipated rise in global mean sea levels in the near future will gradually lead to increased out-migrations as a method of survival from low-lying countries in the Pacific Region as characterized by the Republic of Kiribati and Tuvalu. As critics may argue, motivations for migration could be multiple at first, and distinguishing between economic pull and environmental push factors is very difficult. This is true, for the migration scenarios predicted in this paper are assured to be multi-causal. Nevertheless, the scenarios presented in this paper will, in all likelihood, increase gradually over the course of many decades, allowing effected countries to negotiate and plan for migrations that will occur.

The case studies presented in this paper may seem daunting; however, with proper planning and specific policy implementation the costs of relocation for displaced persons and recipient states can be minimised. To date, policy responses have been designed and implemented at the local level in a reactionary nature. In order for counter-measures to be sustainable the international community must take responsibility in an effort for a macro-level, multi-dimensional approach. This approach cannot be accomplished by offering a laundry list of recommendations, rather the international community must change the

way they define the problem in order to holistically approach root causes and not only the associated impacts. If countermeasures are appropriately implemented, the secondary impacts of climate change may be mitigated to a degree; however, this entails the international community will forgo investment in another sector.

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