ASSESSING THE EVIDENCE:

MIGRATION, ENVIRONMENT AND CLIMATE CHANGE IN

PAPUA NEW GUINEA

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International Organization for Migration (IOM)

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ACRONYMS AND ABBREVIATIONS

ACP	African, Caribbean and Pacific Group of States
AGB	Autonomous Government of Bougainville (also ABG)
AIDP	Atolls Integrated Development Policy
ARB	Autonomous Region of Bougainville
ARC	Atolls Resettlement Committee
ARP	Atolls Resettlement Program
AR5	Fifth Assessment Report
BEC	Bougainville Executive Council
BHP	Broken Hill Proprietary
BPA	Bougainville Peace Agreement
CCA	Climate change adaptation
CCDS	Climate Compatible Development Strategy
CIRP	Carteret Integrated Relocation Project
COE	Council of Elders
COTS	Crown-of-thorns starfish
DMA	Disaster Management Act
DRM	Disaster risk management
DSP	Development Strategic Plan
EHL	Esso Highlands Limited
ENSO	El Niño-Southern Oscillation
Ffa	Disaster Risk Reduction and Disaster Management National Framework for Action
GDACH	Global Disaster Alert and Coordination System
GDP	Gross domestic product
GoPNG	Government of Papua New Guinea
IDMC	Internal Displacement Monitoring Center
IDP	Internally displaced person
IPCC	Intergovernmental Panel on Climate Change
ITCZ	Intertropical Convergence Zone
LLG	Local level government
LNG	Liquefied natural gas

MOA	Memorandum of agreement
MOU	Memorandum of understanding
MSG	Melanesian Spearhead Group
MTDP	Medium Term Development Plan
NDC	National Disaster Centre
NEC	National Executive Council
NGO	Non-governmental organization
NPSF	National Strategic Plan Framework
NRAP	National Response Action Plan
NRC	Norwegian Refugee Council
NRI	National Research Institute
NUP	National Urbanisation Policy
OCCD	Office of Climate Change and Development
OTML	Ok Tedi Mining Limited
PAC	Pacific Access Category
PACER	Pacific Agreement on Closer Economic Relations
PAPs	Project affected peoples
PCCIS	Provincial Climate Change Implementation Strategy
PDL	Petroleum development licence
PGK	Papua New Guinean kina
PICTA	Pacific Island Countries Trade Agreement
PIP	Public Investment Plan
PJV	Porgera Joint Venture
PNG	Papua New Guinea
PRL	Petroleum retention licence
PSWPS	Pacific Seasonal Worker Pilot Scheme
RPF	Resettlement Policy Framework
RSE	Recognised Seasonal Employer
SML	Special Mining Lease
SPCR	Strategic Program for Climate Resilience
TMNP	Temporary Movement of Natural Persons
TWG	Technical working group
UNFCCC	United Nations Framework Convention on Climate Change
UNHCR	United Nations High Commissioner for Refugees
VOP	Village Oil Palm
WRI	World Resources Institute

EXECUTIVE SUMMARY

The national assessment report brings together available evidence on the climate change, environment and migration nexus in the Independent State of Papua New Guinea (hereafter PNG).[1] The aim of the report is twofold, such that: (a) it maps the complex relationship between migration, environment and climate change by looking at human mobility due to environmental change; and (b) it examines the existing policy framework and offers guidance to include environmental migration in PNG's national planning.

PNG is the largest and most populated country in the Pacific, under threat from the impacts of environmental and climatic changes. The volatile environment makes its communities vulnerable to many hazards. For PNG, both slow-onset processes (drought, frost, salinization, coastal erosion, sea-level rise) and rapid-onset events (cyclones, earthquakes, flooding, landslides, tsunamis, storm surges volcanic eruptions) are a reality.

The patterns of migration and displacement in PNG have been primarily internal and caused by environmental change, conflict and development. According to the Internal Displacement Monitoring Center (IDMC), a total of 151,000 people were newly displaced between 2008 and 2013, two thirds of which were due to natural hazards. Around 50,000 people were internally displaced by conflict and violence, which are partly linked to environmental degradation and accelerating climate change (ibid.). In addition, large-scale development projects (mining and oil palm) induced the displacement of more than 30,000 people by the early 2000s despite formal agreements for relocation already generally integrated in the development ventures.

Case studies of Carteret and Manam islanders reflect government responses to human mobility induced by natural disasters, such as sea-level rise and volcanic eruption. The case studies reveal the sociopolitical dynamics of resettlement: (a) the interaction between traditional and formal authorities in preparing for and responding to disasters; (b) the relocation measures initiated by the national and local authorities of PNG and community organizations for protection of people displaced for environmental reasons; and (c) the local undercurrents between resettled and host communities.

1 For the purpose of this report, Papua New Guinea is also referred to as PNG.

PNG's unique land ownership (97% of land customarily owned) is a key impediment in planned relocation. Land planning policies should render the provision of adequate land supply for planned relocation of people likely to be displaced due to environmental reasons, paying special attention to factors that may trigger conflict and disputes, as well as sustainable livelihood options. Thus, policy formulation and implementation should be community-based, reflecting the needs of affected populations and identifying priority adaptation and resilience building.

Relocation and resettlement measures call for coordinated and systematic solutions facilitated by the government, as well as civil society, to avoid trauma, marginalization and upheavals likely to be associated with relocation. The relocation process needs to enhance the ability of settlers to meaningfully participate in the social and economic activities that can improve their living standard. It is essential to develop laws and policies on environmental migration management based on broad stakeholder involvement, human rights, international norms and respect for cultural and socioeconomic issues.

The scope of facilitating migration as an adaptive strategy should be explored to cope with the conditions low-lying island communities are likely to face during displacement. Therefore, policy measures need to be in place to: (a) facilitate voluntary movements out of vulnerable regions by providing microfinance schemes and education; (b) facilitate transfer of remittances, knowledge and skills to vulnerable communities and access to labour markets; and (c) develop international temporary and circular labour migration schemes for environmentally vulnerable communities. A proactive framework for action should be developed with urgency to minimize the impacts of environmental and climate change before they are deeply felt by the communities of PNG.

While PNG experiences a significant number of displacements triggered by the changing environment and climate, there is no existing policy framework that specifically deals with people displaced by environmental conditions. As of 2015, human mobility due to environmental change is only addressed under the disaster risk reduction evacuation schemes.

There are potential policy tools related to environment, climate change and migration in the area of development, urbanization, environment, climate change and land management. To begin with, poverty reduction strategies address the vulnerability of people due to the change in their physical environment, by setting objectives to reduce disaster risk and adapt to domestic impacts of climate change. Climate change-related policies are echoed in development policies to make PNG's development investments climate resilient and facilitate climate-compatible development. In addition, urbanization policies incorporate climate

change issues in sustainable urban development planning. Furthermore, land management policy currently in development recognizes climate change as threat to biodiversity, environment and sustainable land use and highlights the importance of integrating climate and disaster risk concerns in land use planning. Besides these policies, there are over 45 various legal instruments guiding environment issues; yet compliance, enforcement and adherence to standards remain a key challenge.

Based on the review of current policy framework, disaster-induced displacement should be incorporated into policies on disaster risk management, development and climate change adaptation in a holistic way. As potential environmental migrants will likely put additional pressure on urban services and urban management, a link between internal migration and urbanization should be established to mitigate adverse effects of rural-to-urban migration.

I

INTRODUCTION

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I. INTRODUCTION

The Pacific Ocean is the world's largest ocean, covering an area of approximately 165 million sq km – one third of the Earth's surface. The Pacific region, with its thousands of islands and high concentration of development in coastal areas, faces some significant challenges as a result of anticipated impacts of climate change (ADB, 2009; Mimura et al., 2007). Climate impacts, especially rising sea levels, and extreme events, such as cyclones and droughts, pose substantial challenges to the lives and livelihood of the people living in the Pacific island countries (Mimura et al., 2007:687–716; ADB, 2009; Stern, 2006). The Independent State of Papua New Guinea (PNG),[2] being the largest and the most populated country in the Pacific, is under enormous threat for the impacts of global warming and the effects of changing climate patterns (OCCD, 2014). PNG is located in the so-called Pacific Ring of Fire and has active volcanoes and significant earthquakes and landslides, and its coastal areas are prone to tsunamis and floods (Ramakrishna and Bang, 2015:68).

Thus, PNG's volatile environment makes its citizens vulnerable to many hazards, such as volcanic eruptions, tsunamis, earthquakes, tropical cyclones, floods, landslides, El Niño and droughts (NDC, 2015; Australian Bureau of Meteorology and CSIRO, 2014:220; Government of Papua New Guinea, 2010:13). Several low-lying small islands of PNG are experiencing frequent storm surges due to sea-level rise, and about one fifth of the land in PNG is subject to inundation (Australian Bureau of Meteorology and CSIRO, 2014:220). PNG experiences two to three national-level activations (and numerous smaller local activations) for disaster events per year and in the past 15 years, there have been seven events of significance covering flooding, tsunami, landslide, drought and volcanic eruptions. In addition, there is high risk of technological and human-induced disasters from oil spill, industrial pollution, unregulated and destructive land use practices and infrastructural development, as well as rapid growth in population (NDC, 2005). Indications are that environment and climate change-related impacts are already translating into people movements in a number of different geographic, ethno-cultural, environmental and climatic contexts.

2 For the purpose of this report, Papua New Guinea is also referred to as PNG.

Historically, migration has never been a major concern in PNG. Still, PNG does not experience any substantial international migration in terms of both emigration and immigration. Nevertheless, the concerns of migration, displacement, relocation and resettlement have gradually been taking prominent place in recent years. In this context, this national assessment primarily focuses on migration triggered by environmental and climate change. It outlines the challenges posed by environmental and climate change on the lives and livelihood of people in PNG, the consequences of both the sudden-onset events and slow-onset processes, specifically linked or not to climate change, and also their implications on human migration. It also describes the effects of migration on human life, community and environment. This vulnerability mapping is imperative to understanding the degree of future risks likely to be posed by impacts of environment and climate change-related events on human life and livelihood, and also to determine how to respond to these challenges.

This national assessment included two case studies based on a literature review that reflect the government responses to natural disasters leading to human migration and relocation. The case studies will help in understanding the negative and positive long-term effects of previous efforts to resettle communities to different sites, the interaction between traditional and formal authorities in preparing for and responding to disasters, and the relocation measures initiated by both the Government of Papua New Guinea and non-governmental organizations (NGOs) for protection of people affected by natural disasters.

It analyses relevant existing policy framework for migration, environment and climate change to understand the extent and scope of policies in dealing with the challenges posed by climate and environmental change, as well as consequential population displacement. It also identifies the research gaps and priorities for future research areas.

1.1 Methodology

There was an initial conduct of extensive literature review of relevant books, journal articles, media reporting, policy papers and reports from NGOs, think tanks and donor agencies. Almost 10 experts, practitioners and academics in PNG were contacted as potential interviewees; 6 interviews were held in person and by phone.

The draft of this assessment report had been presented to the Second Technical Working Group (TWG) meeting on 4 February 2015 at Port Moresby, PNG and received feedback from the members of TWG.

A full bibliography is included at the end of the report. However, no new data was collected as the aim was to take stock of existing information to understand the challenges, and also identify the research gaps and priorities.

I.2 Background and context

PNG is one of the largest and most populated countries in the South Pacific region along the tectonic line dividing Oceania and Asia. PNG occupies the eastern half of the island of New Guinea, sharing borders with the Indonesian province of West Papua (formerly Irian Jaya) to the west, Australia to the south, the Solomon Islands to the east and the Federated States of Micronesia to the north. The total land area of PNG is 465,000 sq km and the exclusive economic zone encompasses 17,000 km of coastline. It has 4 large islands (Manus, New Ireland, New Britain and Bougainville) and some 600 smaller islands, most of which are located on the east (GoPNG, 2012). Almost 97 per cent of the country's total land area is held by customary landowners, who enjoy considerable and unique rights governing extraction of resources and compensation claims (GoPNG, 2007). PNG is a unique country in many ways; it has a relatively large land mass with high mountain ranges, islands and atolls, a strikingly diverse population, unique and rich biodiversity, and a range of environments, cultures and languages (Kaluwin, Ashton and Saulei, 2000:1). The third largest area of tropical rainforest in the world is in PNG. It has fertile soils that suit the production of cash crops and vast mineral and fuel reserves (ibid.:5).

I.2.a Climate

The climate of PNG is determined by its near-equatorial setting, and consequently controlled by the presence of warm humid air masses. These are produced by the meridional or north-south movements across the equator of the Hadley circulations, which converge in the Intertropical Convergence Zone (ITCZ), and the zonal east-west moving Walker circulations. Large-scale oceanic events, such as the El Niño-Southern Oscillation (ENSO), influence PNG's environment. PNG has a monsoonal climate characterized by high temperatures and humidity throughout the year. Two monsoonal seasons are recognized: the north-west monsoons, which occur from December to March, and the south-west monsoons, which occur from May to October. Indeed, the country is home to one of the wettest climates of the world, and rainfall in many areas of the country exceeds 2,500 mm, with the heaviest events occurring in the highlands. Temperatures are relatively steady across the country, and mean temperatures in Port Moresby range from 26°C to 28°C.

I.2.b Politics and governance

PNG is a constitutional monarchy that received independence from Australia in 1975. However, it maintains a parliamentary democracy governed by a single parliamentary body in Port Moresby. It has three arms of government: (a) the legislative arm (National Parliament headed by the Speaker); (b) the executive arm (the National Executive Council (NEC), headed by the Prime Minister, who is also the Chief Executive of the National Government); and (c) the judiciary arm (headed by the Chief Justice). The National Parliament is a 111-member unicameral legislature elected for five-year terms by universal suffrage. The Prime Minister is appointed and dismissed by the Governor-General on the proposal of Parliament. The Cabinet – known as the NEC – is appointed by the Governor-General on the recommendation of the Prime Minister. PNG has a very complex and costly decentralized system of government. At the subnational level, there are three levels of administration: the province, district and local level government (LLG). There are a total of 89 districts and 319 LLGs.

I.2.c Population

PNG's population is among the most diverse on Earth. PNG has a unique population having ethnic, social, cultural and linguistic diversity, and is organized in small fragmented social groups that speak over 800 distinct languages (Kaluwin, Ashton and Saulei, 2000:6). PNG's population was estimated at 7.32 million in 2013, with a population growth rate of 2.1 per cent, and an estimated density of 16 persons per sq km of land area (World Bank, 2014). The total population of PNG accounts for more than the other 21 Pacific countries and territories combined. The majority of the total population (87%) live in rural areas where access to markets, services and income-generating opportunities is limited. However, there is a growing trend of an increasing urban population, with growth rate at an average of 2.7 in the period of 2010 to 2015 (United Nations, 2014:152). Around 12.6 per cent of the total population live in urban areas (ibid.; UNDP, 2014).

I.2.d Economy

PNG is endowed with vast natural resources in terms of availability of agricultural land, mineral deposits, extensive forests, fisheries resources and hydroelectricity potential (World Bank, 2012:1). The economy of PNG relies heavily on exports and income from mining and petroleum, agriculture, forestry, fishing and, to a lesser extent, construction and transport sectors (World Bank, 2012:1; Cifuentes and Au, 2013:1). Since the early 1990s, PNG has embarked on major gas and oil production, which has accelerated significant economic growth (ibid.). However, strong global demand – coupled with rising prices for fuel, mineral and agriculture export products in the mid-2000s – has enabled PNG to experience sustained and

strong economic growth, and become one of the fastest-growing economies in the South Pacific region (ibid.). Since 2005, economic growth averaged 5 per cent between 2005 and 2009 despite the global financial crisis (DNPM-PNG, 2010:7). Notwithstanding this astonishing economic growth, however, the poverty level in the country is considerably higher compared to the neighbouring Pacific countries, with 39.9 per cent of the population falling below the poverty line (in 2009), while 88 per cent of the poor are rural based (DNPM-PNG, PNG, 2010:7; World Bank, 2014). According to the World Bank estimates, life expectancy is 62 years (in 2012), infant mortality is 47 per 1,000 live births (in 2013), with an adult literacy rate of 63 per cent of people ages 15 and above (in 2012) (World Bank, 2014). PNG is ranked 156 out of 187 countries in the UN's Human Development Index (UNDP, 2014).

Table 1: Summary information of Papua New Guinea's national circumstances

Independence	16 September 1975
Capital	Port Moresby
Population	approximately 7.32 million (2013)
Land area	465,000 sq km
Religion	predominantly Christian
National parliament	Unicameral chamber with 111 elected seats
Government structure	Westminster system; one central government; 22 provinces
Population growth	2.1% (2013)
Urban population growth	2.7% (2010–15)
Urban population	12.6% of total population (2013)
Poverty rate	39.9% (2009)
Life expectancy	62 years old (2012)
Infant mortality	47 per 1,000 live births (2013)
Adult literacy rate	63% (2012)
Completion rate of primary school	63% (2012)
Human development ranking	156th out of 187 countries

Sources: Vision 2050; World Bank, 2013, 2014; UNDP, 2014.

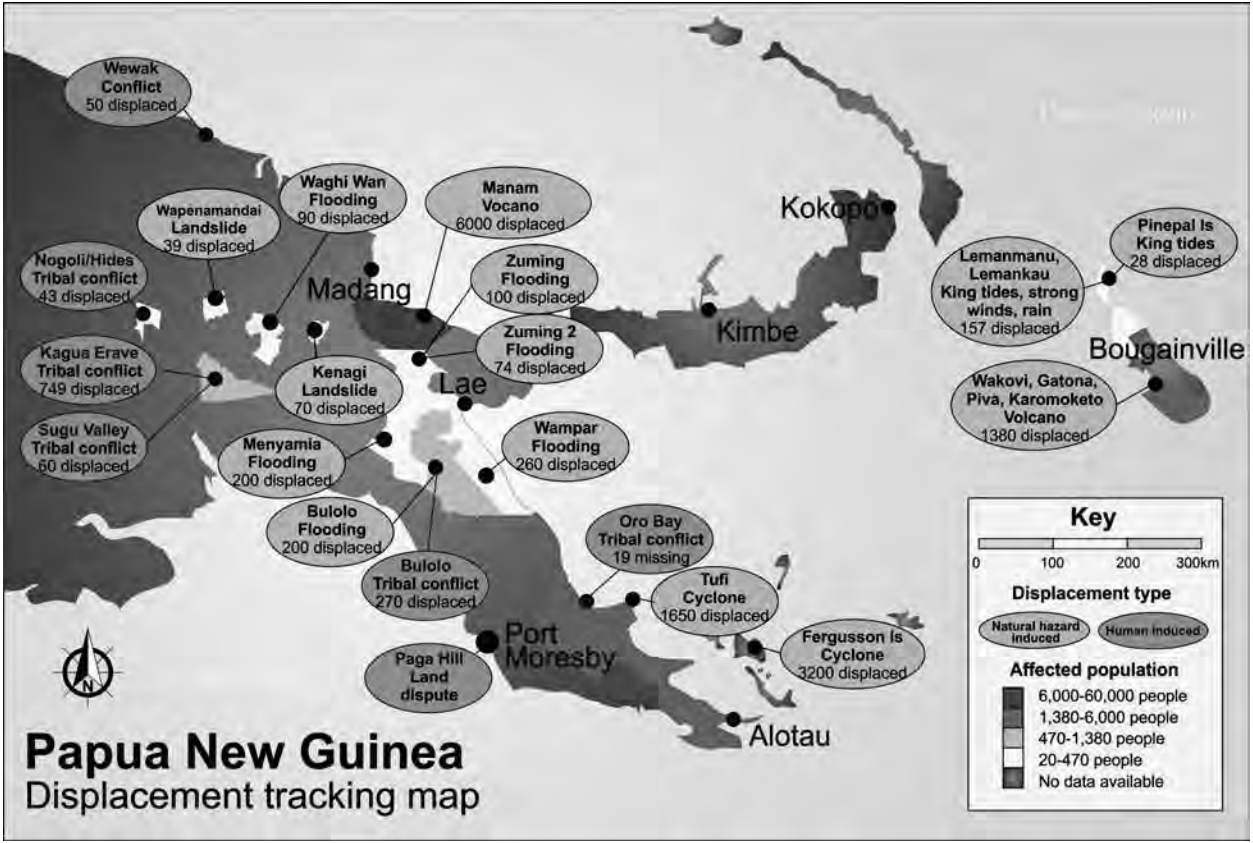
I.3 Migration – Evidences from the past

Migration has never been a major concern in PNG and approached as a research topic until recently (ACP, 2010:5). Traditional migration exists from one village to the other, but is limited by historical land divisions. Historically, PNG did not experience any substantial international migration in terms of both emigration and immigration. Whereas international migration is still considerably low, internal displacement has been increasing in recent years due to multiple independent and interrelated triggering factors. Thus, presently, various categories comprise internal displacement in PNG, such as labour migration, environmental migration, development-induced displacement and displacement caused by conflict. According to an IDMC Report, between 2008 and 2013, a total of 151,000 people were newly displaced in PNG (cited in IDMC and NRC, 2014:5). According to a report published in December 2014 by the Internal Displacement Monitoring Centre (IDMC) and Norwegian Refugee Council (NRC), as of November 2014, at least 22,500 people were displaced in PNG as a result of conflict or natural hazard-induced disasters (IDMC and NRC, 2014:1). While two thirds of internally displaced persons (IDP) have been displaced by natural hazards, the rest were displaced by conflict (ibid.). However, it is not very easy to segregate the reason for displacement, rather in most of the cases, "natural disasters, conflict, violence and development projects often coincide to create an environment conducive to displacement" (ibid.).

Moreover, the civil war in Bougainville that lasted for almost a decade (1989–1998) caused displacement of up to 80,000 (Wallis, 2012). The operation of the Panguna copper mine is the most commonly identified catalyst of the Bougainville war (USAID, 2013:4). Moreover, frequent natural disasters, such as cyclones, flooding and earthquakes, regularly cause extensive internal human movement in PNG (IOM PNG Displacement Tracking Map, 2014).

This section briefly analyses various typologies and categories of migration and displacement in the context of PNG.

Map 1: IOM's Papua New Guinea Displacement Tracking Map (2014)



I.3.a Immigration and emigration

In PNG, the numbers for both emigrants and immigrants are significantly lower than the world average. The main factors contributing to this lower percentage of both immigration and emigration in PNG include cultural ties with land, strong societal bonds, lack of resources for education, finance and network, and customary land ownership system.

Until the early 1990s, PNG had experienced relatively low growth and high unemployment rates over long periods (Browne and Mineshima, 2007:11). Nevertheless, no significant emigration trend from PNG has been observed (ibid.). The traditional *wantok* system has a significant motivating effect on migration trends and patterns in PNG (ACP, 2010:5). The *wantok* system provides strong support both socially and in terms of livelihoods. The system provides social insurance to the members and sharing of responsibilities for the care of the needy. A researcher from PNG also corroborated this concept in that the emigrants often maintain their *wantok* relationships by sending money back, enabling them to resume their former positions within the community whenever they return.

Wantok

The word *wantok* – the generic local term for "tribe" or "clan" – is derived from "one-talk", which refers to a similar linguistic background or ethnic origin. The *wantok* system has its philosophical grounding in the traditional notions of taking care of one's own group because they, in turn, are the ones who will help you out when you are in need. It is a debt that has to be paid off sometime in the future. It is these foreseeable tangible benefits that make this practice so pervasive. It is indeed an indirect form of future investment. The positive aspect of this arrangement is that it provides a cultural and linguistic identity and a support network in times of difficulty. On the other hand, obligations to one's *wantok* follow a person into public life. The instinct to "look after one's own" is not easily set aside and the result is a tendency towards patronage that many Papua New Guineans would not regard as improper.

Source: UN-Habitat, 2004.

However, the report by ACP Observatory on Migration identifies more practical aspects for relatively low percentage of emigration. In PNG, a high percentage of the population who lives in rural areas lacks access to higher education and other resources necessary for emigration. These people cannot fulfil the requirements for skilled migration set by immigration policies of developed countries, such as neighbouring Australia and New Zealand. However, international migration to Australia and other neighbouring countries has been increasing in recent years. According to the World Bank's Bilateral Migration Matrix, more than 90 per cent of migrants originating from PNG move within the continent of Oceania (2010).

Table 2: Immigrants from Papua New Guinea by region of destination, 2010

	Stock	Share of stock
Oceania	55,261	90.30%
Europe	2,181	3.56%
North America	2,778	4.53%
South America	22	0.03%
Asia	540	0.88%
Other South	413	0.67%

Source: World Bank, 2010b.

Since 2005, PNG has started attaining economic growth by major gas and oil production. Alongside this economic growth, the formal employment sector has increased significantly due to the commodity boom (Duncan and Voigt-Graf, 2010:14). These new employment opportunities have exposed the shortage of people with the necessary professional, technical and managerial skills to meet the needs of private sector employers. As a result, a substantial number of foreign labour, including skilled, semi- and low-skilled, are attracted to PNG due to high salaries and economic opportunities (Cifuentes and Au, 2013:1). The stock of immigrants as percentage of the population as of 2013 is 0.3 per cent (UN DESA, 2014).

In this trend, many labour migrants from Asia moved to PNG because of Asians' long history of labour migration to this region, well-developed networks and their high productivity and low labour costs. However, neighbouring Melanesian countries, such as Fiji and Solomon Islands, have very little share to this movement of labour migration due to Melanesian topography, historical factors and institutional structures (Cifuentes and Au, 2013). Historical evidence confirms that the colonial powers, such as Australia and the United Kingdom, who ruled over the Melanesian countries, carefully regulated Melanesian mobility for their vested interests (ibid.).

However, according to World Bank's estimates of migrant stocks, more than half of all migrants residing in PNG come from Australia (63%) and other developed countries (2010). Many of these nationals from developed countries (largely Australian) deliver services in the private, public and humanitarian sector and stay in PNG for a certain number of years.

Although the first presence of Chinese people in PNG dates back to the late nineteenth century, a significant trend of migrants of Chinese origin settling in PNG has started since the expansion of the mining industry in 2005 (ACP, 2010:9; Ichikawa, 2006). In 2009, however, three ethnic Chinese were killed in an anti-Chinese riot that lasted for one week. The riots were triggered by widespread resentment over the arrival of new Chinese migrants from Mainland China who operate small businesses displacing local business (Chin, 2010). It was also revealed that work permits were issued to Chinese workers at the Chinese state-owned mine Ramu Nickel, violating labour laws for non-citizens (ibid.).

Table 3: Number and origin of migrants in Papua New Guinea

Australia	15,531
China	368
Germany	672
India	268
Indonesia	398
Japan	176
Netherlands	381
New Zealand	1,008
United Kingdom	2,553
United States	792
Other North	2,286
Other South	112
Total	**24,545**

Source: World Bank, 2010a.

I.3.b Role of remittances

Since there is no significant tradition of emigration from PNG and only a minor percentage of the population lives abroad (mainly in Australia), the contribution of personal remittances inflows in 2012 was around 0.1 per cent of PNG's GDP (World Bank, 2014). As for immigration, although the estimated number of

immigrants represents only 0.4 per cent of the population (World Bank, 2011b), the outward remittances reached USD 512 million in 2012, or around 3 per cent of the GDP (World Bank, 2014). According to the World Bank, until 2012, the value of remittances being sent from PNG was 40 times the value of the remittances being received (USD 14 million of inflow remittance compared to USD 512 million outflow). A comprehensive survey on nationals from PNG living abroad has never been undertaken, so remittances are only recorded in the balance accounted by PNG national banks, which does not account for informal and small-scale transfers (ACP, 2010:14).

I.3.c Internal and international labour migration

Historically, there is little labour mobility in the Melanesian region, and PNG is not an exception. The number of labour migration, both internal and international, is not very significant in PNG. Most of the labour force is employed in the informal economy and have close attachments to land, which in turn makes emigration less likely. The agricultural sector employs 85 per cent of PNG's population (GEF, UNDP and SPREP, n.d.). It is interesting to note that although the number of immigrants and temporary workers has increased in recent years, especially because of mining and liquefied natural gas (LNG) projects, no significant outward labour mobility is observed to date. For instance, Ok Tedi Mining Limited (OTML) – the largest enterprise in PNG – contributed about 20 per cent to the country's export income and provided employment for thousands of local people. The PNG LNG project attracted both foreign and local workers to fill up the necessary workforce. As of August 2012, PNG LNG workforce comprises some 17,600 people, and of those, over 8,600 are Papua New Guineans (PNG LNG, 2012).

However, the Government of Papua New Guinea is actively participating in a wide range of international labour mobility schemes to facilitate future employment opportunities abroad for PNG nationals (GoPNG, 2010c). Among these efforts, the most noteworthy is seasonal working schemes that allow short-term entry to low- and semi-skilled workers from PNG.

On 8 July 2010, the Australian Government signed a memorandum of understanding (MOU) with the Government of Papua New Guinea establishing arrangements under the Pacific Seasonal Worker Pilot Scheme (PSWPS) (TNS Social Research, 2011). Under this scheme, 650 visas would be issued for PNG nationals as seasonal workers to spend up to seven months in any 12-month period in Australia. As of 30 September 2012, only 82 PNG nationals availed of this opportunity (DIAC, 2012). In August 2013, PNG signed a Recognised Seasonal Employer (RSE) Policy: Inter-Agency Understanding Papua New Guinea with New Zealand to facilitate access of PNG nationals to seasonal work in the horticulture and viticulture industries

under New Zealand's RSE policy (GoPNG, 2013). However, the preferred skilled migration scheme for selected Pacific countries under the Pacific Access Category (PAC), which was introduced by New Zealand, does not include PNG (Immigration New Zealand, 2014).

Moreover, there are some other regional initiatives in the Pacific, particularly among Melanesian countries, that allow labour exchanges among countries and thus facilitate short-term mobility of semi- and skilled workers, which include the Temporary Movement of Natural Persons (TMNP) scheme under the Pacific Island Countries Trade Agreement (PICTA), the Pacific Agreement on Closer Economic Relations (PACER) and the African, Caribbean and Pacific Group of States' (ACP) Temporary Movement of Natural Persons scheme. Among the most advanced schemes is the Melanesian Spearhead Group (MSG) Skills Movement agreement. In 2005, the MSG Skills Movement Scheme was endorsed at the Leaders' Summit as a scheme for the movement of professionals for each member country. This scheme is framed on an MOU between the MSG countries of Fiji, PNG, Solomon Islands and Vanuatu and based on an agreed list of specific skilled professions, such as engineers, accountants, pilots, doctors and nurses, as well as trade skills and vocational teachers. Each country member has its own list of occupations based on its identified shortages, and the scheme is capped at a quota of 400 professionals each year. The fieldwork conducted by ACP Observatory in Melanesian countries, such as PNG, found that despite recent initiatives, there is limited migration among Melanesian countries, mainly due to strong links and attachments to land and communities being the basis of Melanesian society (Cifuentes and Au, 2013:viii).

The ACP Report in 2013 observed that PNG workers lack formal education skills to take advantage of international labour opportunities, since migration policies of larger economies – such as Australia, New Zealand and the United States – set high standard of skills as a precondition for emigration (ACP, 2013:viii). Browne and Mineshima identified several reasons for this limited number of labour migration that include: (a) small number of skilled citizens; (b) absence of established links and networks with developed countries, such as Australia and New Zealand; (c) large rural communities with limited knowledge and skills for securing jobs abroad; and (d) "the continued importance of the wantok system whereby a relatively high percentage of earnings would need to be widely shared with neighbours" (2007:11).

I.3.d Development-induced displacement

Development in PNG has been increasingly dependent on large-scale projects involving the exploitation of natural resources, principally minerals, petroleum and forests. These mega projects have been enormously contributing to the desired economic growth, as well as employment generation. Simultaneously, these large-scale development projects potentially affect the livelihoods, living conditions and human rights of people living in and surrounding project areas (Jackson, 1991). The customary ownership of land prevalent in PNG somehow creates adversity on the large-scale extraction of natural resources. Nearly all land available for resource exploitation in PNG belongs to customary owners, and there is no constitutional basis for compulsory acquisition of such land. Therefore, any conversion of use has to be negotiated between the interested parties with compensation determined by the negotiating process.

There had been some resettlement processes associated with the establishment of oil palm estates under the World Bank project, "The Resettlement Policy Framework for the Smallholder Agriculture Development Project Papua New Guinea". Three oil palm schemes are included in the project; these are located at Hoskins, Bialla and Oro. The aim of the project is to manage and resettle the people who may experience negative economic and social impacts caused by the oil palm project due to involuntary relocation, loss of shelter, loss of garden crops, non-timber forest products (NTFP) economic forest trees[3] and other assets, and loss of income or livelihoods resulting from the involuntary acquisition of land for Village Oil Palm (VOP) infill. In line with the World Bank's operation policy on resettlement, codes of practice and policies, the Resettlement Plan has the following principles and objectives: (a) avoid and minimize involuntary resettlement and land acquisition associated with infill or road upgrading construction; (b) land acquisition or resettlement will be entirely voluntary and limited to situation; (c) project affected peoples (PAPs) will be the beneficiaries of services and facilities offered by the project; (d) provide assistance to PAPs to re-establish their livelihoods so that their income levels and living standards are equal to or greater than predisplaced levels; (e) if resettlement or land acquisition cannot be avoided, a resettlement plan will be prepared in consultation with affected landowners; (f) allow culturally appropriate and accepted procedures to take place among landowners and PAPs, where PAPs will be resettled within village territories; and (g) encourage and ensure clan leaders that chosen relocation sites cause minimal disturbance to the livelihood and living standards of PAPs, particularly vulnerable groups among those relocated, such as the elderly, women and children, or that marginal clan members are not disadvantaged by the relocation (Koczberski and Cury, 2011).

3 Economic forests are those where the main management emphasis is on forest products rather than timber, such as fruit, bark, leaves, branches, tree sap, flower buds and tender sprouts.

However, this approach has been lacking in the case of the expansion of one of the largest open-pit mines, Ok Tedi Mine. In this case, land was acquired for this development project, and compensation was paid to local people without any relocation agreement with the local community. However, displacement has occurred because of the absence of any such formal relocation agreement, as well as the lack of defined rules and regulations on land acquisition.

The impacts of the mine had been catastrophic along the 100 km of Ok Tedi Mine. Mine tailings have robbed the river of life. After a heavy rainfall, the tailings are swept into the surrounding rainforest, swamps and creeks, and have left behind 30 sq km of dead forest. The expansion of Ok Tedi Mine, together with environmental devastation in surrounding areas, created serious concerns of human rights violations and resettlement of people; particularly, it affected remote indigenous communities living near potential mine sites, causing emotional distress and loss of livelihood (Kirsch, 1996). More than 30,000 people have been displaced by pollution associated with the development of Ok Tedi Mine. According to some sources (Higgins, 1999), environmental damages have forced 4,000 people to relocate (Teminski, 2012).

However, on 12 June 1996, Broken Hill Proprietary (BHP) and leaders of a group of 30,000 indigenous plaintiffs from Ok Tedi Mine and Fly River reached an out-of-court settlement. The key component of that agreement is a binding commitment that BHP and their subsidiary, OTML, will construct appropriate tailings containment facilities, which was expected to cost approximately USD 350 million. Finally, the Ok Tedi Mine settlement package established a USD 90 million trust fund for the people of Fly River and another USD 35 million for the communities in the most heavily impacted areas of the lower Ok Tedi River. The benefits from a 10 per cent equity share in the mines would be given to the province where the mine operates. Notwithstanding the settlement, Ok Tedi Mine has adversely changed the lives of indigenous Yonggom people. They have not only lost the fertility of land, but also the connection with the land (Kirsch, 1996).

However, formal agreements for relocation are found in three mining projects: Porgera, Tolukuma and Lihir. Resettlement principles were identified in the Porgera Relocation Agreement (September 1988), the Tolukuma Compensation Agreement (November 1993) and the Lihir Integrated Benefits Package (April 1995) (ADB, n.d.:57). During the development of the Porgera gold and silver mining operation, the Porgera Joint Venture (PJV) agreed to relocate 263 families resident within the boundaries of the Special Mining Lease (SML) under the Porgera Relocation Agreement (ADB, n.d.:57).

During the development of the Lihir mine in the New Ireland Province of PNG in 1995, the concerned company formally negotiated development agreements with landowner residents, including two sub-agreements for the relocation of Put Put/ Ladolam and Kapit villagers who were residing on the mining lease area (Filer, 2000). One village community, Putput, was relocated off the mining lease to a nearby customary land where residents had clan affiliations in the hope that they could "retain a semblance of village unity" (Bainton, 2010:32).

PNG LNG

PNG LNG is an integrated development project that commercializes the gas resources of PNG. Natural gas is produced from gas fields at Hides, Angore and Juha and from existing oil field feeding production facilities at Kutubu, Agogo and Gobe. It will be processed and then transported via pipeline from these provinces through the Gulf Province and the Gulf of Papua to LNG producing and transporting facilities in Central Province.

Access to land required for petroleum development is granted under the terms and conditions of the PNG Oil and Gas Act 1998 (OandGA), by the award of a petroleum tenement (petroleum retention licence (PRL), petroleum development licence (PDL), pipeline licence or petroleum processing facility licence. Such rights of access are conditional upon providing appropriate compensation to the lawful owners and rightful occupants of the land. Thus, land for project use can be accessed through negotiation (project's preferred method) or acquired by the Government. The developer cannot purchase any land outright. Land that is accessed will revert to the owner clan after the project's activities are completed. The Government may acquire land through outright purchase and may lease the land to the project.

Sections 110 to 120 of the OandGA describe the rights and obligations of the licencees. With respect to compensation for land acquisition, OandGA Section 118 (2) states that compensation shall be paid for the deprivation of the use and enjoyment of the surface of the land or any part of it or of any rights customarily associated with it, except where there has been a reservation in favour of the State of the right to such use and enjoyment; damage to the surface of the land or any part of it, or any improvements on it; or to any trees, fish or animals, caused by the carrying on of operations by the licencee. The projects are supposed to conform to the requirements of Performance Standard 5 (PS5 Land Acquisition and Involuntary Displacement) of the International Finance Corporation.

The PNG LNG Project intends to avoid resettlement where possible, but where unavoidable, to design and implement resettlement in a manner that compensates

and/or assists people who will be affected by resettlement and provides them the opportunity to at least restore their livelihoods and standards of living (PNG LNG, n.d.). The Esso Highlands Limited (EHL), the operator of PNG LNG Project that is responsible for the management of programmes for displaced people in all project areas, made a plan called "resettlement policy framework" (RPF) to be followed in its operations. This RPF establishes the goals, principles, structures and procedures that will be employed for all physical and economic displacements required for the project.

For the implementation of the project, there is loss of communal forest resources on clan land and 17 gardens, some of which are abandoned and some containing mixed crops and trees. According to an EHL report, however, no physical resettlement was required for the implementation of the project (2011:4).

I.3.e Internal displacement due to conflict

In PNG, a substantial number of people are internally displaced by conflict and violence (IDMC and NRC, 2014:2). According to the IDMC and NRC Report published in 2014, about one third of the IDPs in PNG are displaced by conflict. The number of newly displaced by conflict in 2014 is around 1,200 as per conservative estimates (ibid.:1). Moreover, the diverse patterns of migration previously illustrated contribute to aggravating pre-existing conflict and violence triggered by land disputes or political rivalries (IDMC and NRC, 2014:2). In particular, heightened tensions have been observed due to migration concerning mines and oil palm plantations. PNG has experienced a civil war for a decade because of disputes brought by pollution management of the Pangua mine in Bougainville and sharing of royalties with the community. Indeed, some of the conflicts and violence are linked to environmental degradations escalated by climate change. The relocation of large number of people displaced due to environmental degradations caused by environmental change have been triggering tension and conflict between migrants and customary landowners (Cinner, 2009:411).

I.3.f Environmental migration

PNG's volatile environment makes its citizens vulnerable to many hazards, such as droughts, earthquakes, floods, tsunamis, landslides, El Niño, tropical cyclones and volcanic eruptions (NDC, 2015; Australian Bureau of Meteorology and CSIRO, 2014:220; Government of Papua New Guinea, 2010:13). Several low-lying small islands of PNG are experiencing frequent storm surges due to sea-level rise, and about one fifth of the land in PNG is subject to inundation (Australian Bureau of Meteorology and CSIRO, 2014:220). PNG experiences two to three national-level activations (and numerous smaller local activations) for disaster events per year,

and in the past 15 years, there have been seven events of significance, involving drought, flooding, landslide, tsunami and volcanic eruption.

In 2012, at least 75,000 people have been displaced by natural disasters (IDMC and NRC, 2013:45). Thus, every year, PNG needs to manage resettlement of a substantial number of people displaced by natural disasters and slow-onset changes, such as salinization, coastal erosion and sea-level rise. PNG already had to relocate around 10,000–15,000 people displaced due to volcanic eruptions in Manam Island. Also, many people threatened by inundations and sea surges due to sea-level rise from Carteret Islands are in the process of relocation to the Autonomous Region of Bougainville (ARB). (The challenges posed by environment and climate change to internal migration in PNG are illustrated in detail in the next section.)

Table 4: Key recent environmental events in Papua New Guinea

Event	Year	Number of deaths	Number of injuries	Number of displacement	Number of affected people
Tropical Cyclone Guba	2007	149		9,500	162,000
Flood	2008				
Flood	1998	2,182			20,000
Landslide	2012	60			10,000
Earthquake and tsunami	1998	2,200 (500 missing)	700	10,000	35,000
Volcanic eruption	2004			10,000	10,000

Sources: IFRC, 2009; IRIN, 2009, 2010; UNHCR, 2010; The Guardian, 2012; US Geological Survey, n.d.; Barr, n.d.; World Bank, 2011c.

I.3.g Relocation

In Pacific countries, resettlement of at-risk communities is widely considered as an adaptive measure in the past on many occasions (Edwards, 2013:53). PNG has experience on resettling two distinct categories of involuntary displacement: people displaced by development projects and people displaced by natural disasters. It is observed that certain norms, guidelines and practices have already been developed and implemented on some necessary resettlements due to implementation of development projects. The main reason for such positive development may be due to strict regulatory frameworks in preserving traditional customary ownership of land. The developer company cannot purchase any land

outright; land for development project use can be accessed through negotiation (development projects' preferred method) or acquired by the government. The Government may acquire land through outright purchase and lease the land to projects. Such rights of access are conditional upon providing appropriate compensation to the lawful owners and rightful occupants of the land. Land that is accessed will revert to the owner clan after project activities are completed.

On the contrary, the Government needs to negotiate with other local communities for resettlement of the people who are compelled to leave their land for environmental reasons. PNG has had significant experience of resettlement following natural disasters, particularly volcanic eruptions and landslides. Resettlement of people displaced by natural hazard-induced disasters in many cases was difficult because of land tenure and customary land ownership problems. This national assessment includes two case studies that reflect the responses by the Government of Papua New Guinea to natural disasters leading to human migration and relocation. The case studies will help understand the positive and negative long-term effects of previous efforts to resettle communities to different sites, the interaction between traditional and formal authorities in preparing for and responding to disasters and the relocation measures initiated by the Government of Papua New Guinea and community organizations for protection of people displaced for environmental reasons.

Carteret Islands

Geography, location and tradition

The Carteret Islands – also known as the Carteret Atoll – is located approximately 86 km north-east of Bougainville, and consists of six islands (Han, Huene, Iangain, Iesila, Iolasa and Piul). Five of these islands are inhabited. Formed on a raised coral reef, the combined land area of the islands is 0.6 sq km, and the maximum elevation of the islands is 1.2 m above sea level (Edwards, 2013:59). The islands are composed mainly of soil and sand, and there is virtually no arable land suitable for agricultural purposes (Rakova, 2007).

The Carteret Islands are part of the Atolls District of the Autonomous Region of Bougainville (ARB), a semi-autonomous region composed of several islands located off the east coast of PNG. The Atolls have been inhabited for about 1,000 years before European contact in about 1880. Today, the population are Melanesians, but oral tradition states that the Carteret Islands were originally inhabited by a Polynesian group. The islanders call themselves the "Tuluun" and constitute a Halia-speaking community closely related to the population of Hanhan Bay on Buka Island, Bougainville. Their customs are very similar to those of the Buka people, although with some important adaptations to the atoll environment over hundreds of years.

Causes of displacement and resettlement

Resettlement of people from the Atolls is significant in the history of Bougainville and the lives of people affected, including future generations. Although the need for resettlement of people from the Bougainville Atolls has been recognized for over 40 years (ABG, 2014), in recent years since 2007, the resettled Carterets are often characterized in academic articles, reports of international and intergovernmental organizations and especially in media, as the "world's first climate refugee" (Island Business, 2008; IRIN, 2008). However, serious reservations are expressed by both islanders and the academic community against using the term "climate refugee" to identify the people displaced by natural disasters (McAdam, 2011; Naser, 2011–12). The islanders do not want to be characterized as refugees as it portrays distress and helplessness of Pacific islanders, whereas many of them possess strong adaptive capacity and power of resilience to adverse environmental change. Moreover, many academics, as well as intergovernmental organizations, such as IOM and UNHCR, have serious reservations against using this terminology as it has specific meaning in the Refugee Convention, which does not cover the environment or natural disasters as grounds for protection, and so such use may create confusion as there is no legal basis for it, and hence endorse using the term "environmental migration" (IOM, 2014a:12). In many literatures, it is mentioned that the Carteret Islands are being submerged due to global warming-induced sea-level rise (Kenneth, 2009). However, the review of literatures and interviews conducted during field visit in September 2014 revealed different perspectives on the causes of displacement in Carteret Islands.

(a) Losses of sandbanks and shorelines have been reported since the 1960s. John Connell asserts that the first concerns in the habitability of Carteret Islands came into light in the late 1960s when the islanders expressed their concern that they were no longer able to support themselves from their own resources, as occasional severe storms periodically erode the coastline and destroy the agricultural system (Connell, 1990:152). Moreover, the atolls in Carteret Islands were less economically developed with very few resources and no steady cash income. These problems, compounded by rapid population growth and land erosion, have contributed to a shortage of land for food, causing malnutrition, particularly among the children (O'Collins, 1990; Kukang et al., n.d.). Ursula Rakova, a community leader from the Carterets and chief executive officer of local NGO Tulele Peisa, very aptly depicted the situation of Carteret Islands during the 1960s: "The people in Carterets were vulnerable to the effects of land shortage, land degradation, declining crop yields and food shortage, very low income and even rising sea level" (2013). The island of Huene was cut in two by the sea in the 1980s, and its twin, Iolasa, is quickly going the same way. Kilvert affirms that in the 1980s, Carteret and Nissan Islanders were resettled to Kuberia, not because of rising oceans but because of rising populations

(Kilvert, 2010). At that time, there were no issues of climate change and sea-level rise.

(b) The Carteret Islands likely consist of a base of coral that sits atop an extinct volcanic mount. In the usual geological course of events first proposed by Charles Darwin, such islands eventually subside due to weathering and erosion, as well as isostatic adjustments of the sea floor (Box, 2009).

(c) Tectonic movement may be causing the gradual subsidence of the atoll (ibid.).

(d) In recent years, it is claimed that sea levels around the atolls have risen 10 cm in the past 20 years, inundating lands and plantations. It is often suggested that the number and power of storms in the region has increased dramatically, with seasonal floods frequently hitting the islands, and storm surges and king tides ripping away the sand, eating away the land itself. All these events are the results of sea-level rise associated with global warming, and forcing the islanders to leave their original place in search of alternative shelter (ibid.). For instance, in 2008, Ursula Rakova claimed that 60 per cent of the six tiny atolls in the North Bougainville have been submerged into water (ABC Radio, 2008). The process is progressively deteriorating. She said that Carteret residents worry that an enormous wave could wipe them out, "People see with their naked eyes the impact of the rising sea levels" (IRIN, 2008).

In reality, a combination of a number of complex and interrelated factors – environmental, climatic, geological and demographic – is involved in creating a situation that people cannot remain in their traditional homelands (Farrell, 2009). The Carteret Islands are in all likelihood sinking for geological reasons associated with their volcanic origins. In addition, the effects of sea-level rise, higher tides, and more frequent and severe storms and storm surges, which are considered deleterious consequences of global climate change, are constantly occurring.

In 2007, the Autonomous Government of Bougainville (AGB) identified a number of factors for urgent resettlement of Carterets:

- Population is growing too large for the islands to sustain
- Limited income-generating sources to sustain a viable economic livelihood for the island communities
- Critical shortage of arable land for food crops
- Shortage of trees for traditional building materials for new homes and other buildings
- Rising sea levels causing salinization of the soil
- Lack of development on the islands due to limited financial resources of the ABG and National Government (GoPNG)

Resettlement before the Bougainville Crisis

A number of initiatives have been undertaken to relocate the Carteret islanders. In 1967, the Assistant District Officer reported an increase in population and decrease in economic opportunities and discussed the possibility of resettlement with elders in the community. Consequently, in 1968, the Director of Native Affairs wrote a resettlement programme in support (O'Collins, 1990). In 1979, the Provincial Land Policy Committee, which was responsible for identifying the amount of land needed per family and the vacant land for resettlement, initiated a survey to determine the number of people who wish to settle on the mainland (ibid.).

In 1982, the Provincial Government formed an Atolls Resettlement Committee (ARC) to establish a resettlement site. The committee decided that 40 families from the Carterets would be resettled – 20 from the Mortlocks, 10 from Fead and 10 from the Tasmans – and in over 15 years, 120 families will be resettled. The Atolls Resettlement Scheme was located on land near the Kuveria Corrective Institution along the Kieta-Buka Highway and planned as an initial resettlement area to accommodate settlers from Mortlock, Tasman, Carteret, Fead and Nissan Islands (Kukang et al.). It was surveyed and divided into five blocks for the different atoll islands. The area was cleared, transit houses were built and food gardens were set up. In August 1984, 10 families, the first group of settlers from the Carteret Islands, arrived at the resettlement village of Kuveria to begin a new life under the Atolls Resettlement Scheme (Connell, 1990:153). The Carteret settlers had to adjust to a new environment and community, including new surroundings, new food crops, new building materials and different techniques. Kilvert found that Kuberia was a comparatively good site for settlement; however, with the outbreak of the Bougainville Civil War in the late 1980s, most of the families returned to the Carteret Islands (2010). The conflict was initially started by the Bougainvilleans against the Government of Papua New Guinea concerning the due compensation and disagreements over the Pangua mine, which opened in 1972, and its consequent adverse effects on the environment and displacement (USAID, 2013:2). Eventually, the conflict devolved into a civil war within Bougainville that killed up to 20,000 citizens and displaced up to 80,000 between 1989 and 1998 (Wallis, 2012:29). Finally, the Bougainville Peace Agreement (BPA), which was signed in 2001, paved the way for the end of the conflict, and the ARB was formed after elections in 2005 (USAID, 2013:2).

Government-led resettlement programme

In 2007, the ABG recognized that long-term planning is needed to ensure suitable resettlement of these communities, and reaffirmed an urgent need to resettle communities from the atolls north-east of Bougainville. Accordingly, the

Planning Division of the Bougainville Administration drafted the Atolls Integrated Development Policy (AIDP) in early 2007, which was adopted by ABG in November 2007. The AIDP's goal is: "to improve the level of living of the Atolls people of the Autonomous Region of Bougainville through an integrated development approach that targets the most vulnerable in the communities" (ABG, 2007). The major objective of this policy is to resettle Atolls islanders at designated resettlement land by the end of 2020. In the same year, the ABG received a PGK 2 million grant from the National Government to assist with resettlement of communities from the Atolls.

Through extensive consultations with relevant stakeholders, such as host communities of Haila and Peit (traditional owners of land) and Carteret islanders, the Karoola Memorandum of Agreement (MOA) was concluded in April 2013. However, the MOA has not been passed through the Bougainville Executive Council (BEC) due to lingering landownership issues (IOM, 2014b).

Although as part of the Social Survey Projects on the Carterets' initial resettlement preference was obtained from 40 settler families selected based on a set of criteria, notification and verification of the first 40 families of Carterets for resettlement to Karoola has not been undertaken yet. Moreover, the pre-settlement activities, such as reconciliation ceremony between the two host communities of Haila and Peit, as well as an exchange visit between the settlers (Carterets) and host communities (Halia, Peit), have not been implemented. In addition, the AIDP Steering Committee needs to decide on the material support that can be realistically provided to the settlers as a family package upon arrival at Karoola. This decision would need to be taken prior to the planned awareness and information session with the shortlisted families in the Carteret Islands before moving to Karoola. The family package would cater for the families' basic needs and necessities during their transition period only; afterwards, families should be encouraged to become self-reliant and establish their own livelihoods (IOM, 2014b).

Community-initiated relocation programme

Community-led resettlement initiatives are part of the informal system that compliments the formal government system for the resettlement of the Atolls people of Bougainville. While the Autonomous Bougainville Government maintains full control over its formal resettlement programme, the community-led resettlement is primarily run by locals. They take ownership of the initiative in its design, planning and implementation and management with oversight from the Atolls Resettlement Coordination Unit. This informal system is an integral component of the AIDP aimed at ensuring sustainable resettlement for the affected Atolls people of Bougainville. To facilitate the community-

led resettlement initiatives, the Atolls Resettlement Program (ARP) provides a guideline to the community illustrating the Government's standards to be met prior to resettlement, as well as a drafted workplan and implementation schedule. In the meantime, a resettlement subcommittee representing the host community has been established.

The ARP is currently facilitating a community-led resettlement initiative in partnership with the Suhiana community in the Halia constituency. The community has expressed strong desire in the resettlement of their "bloodline" relatives of Iolosa Island by reintegrating the Carterets people as people of Halia.

A key aspect of the community-led resettlement initiative is the role of the village authorities and Council of Elders (COE). As an initiative of the local community, the respective COE plays mandatory role as vetting mechanisms that ensure legitimacy and wider acceptance of the resettlement project, and serves as a channel of communication.

In 2006, as rising sea levels have been getting more severe, the COE of the Carteret Islands decided to form a local NGO called Tulele Peisa to coordinate a voluntary relocation of most of the Carterets population. While the Autonomous Bougainville Government had been talking about resettling the Carteret Islanders since 2001, locals were frustrated with the slow progress and began to take direct action themselves (Tulele Peisa, n.d.). In the local language, Tulele Peisa translates as "sailing the waves on our own", which reflects the organization's goal of empowering the Carteret islanders to strive for prosperity and well-being through community organizing and capacity-building (Rakova, 2007b:9).

Tulele Peisa's relocation programme has involved a range of strategies and activities to prepare the communities of the Carteret Islands for relocation and engage with host communities. Tulele Peisa developed the Carteret Integrated Relocation Project (CIRP), a community-led relocation model, to coordinate the voluntary relocation of Carteret islanders to Bougainville Island, 100 km to the north-east. The CIRP aims to relocate approximately 1,700 Islanders to mainland Bougainville and the Roman Catholic Church of Bougainville has donated land at Tinputz, Tearouki and Mabiri to Tulele Peisa (Tulele Peisa, 2011). The first group of Carteret islanders began to relocate in 2009 to Tinputz on Bougainville Island to land allocated by the Catholic Church. The relocation site is critical because Tulele Peisa wants to ensure there is sufficient land for the Carteret families to be economically self-sufficient and have secure food resources. Maintaining access to their traditional fishing grounds is also important so that people can still rely on this food source even though they no longer reside on the Carteret Islands. Working with the host communities – which are culturally, politically and

socially different from the Carteret islanders – has been a critical component of the relocation programme. Therefore, the CIRP ensures that the host communities will benefit from the relocation through upgrading the health facilities and schools (Bronen, 2014).

The CIRP highlights some of the core difficulties of relocating communities from their traditional homelands to integrate into existing communities that are geographically, culturally, politically and socially different. However, the resettlement process has been an extremely difficult venture for islanders. For Tulele Peisa, some of the main challenges are related to land, governance, funding and differences with the host environment and community. The real challenging issue is indeed to manage land, "home", and livelihood for these people in new areas. The current 80 hectare of land acquired by Tulele Peisa from the Catholic Church is not sufficient, as at least 1,500 hectares is needed to provide housing and food gardens for all of the families who intend to relocate (Böge, 2013:170).

Manam Island

Manam Volcano is located on Manam Island with an area of 83 sq km, lying 15 km off the coast from Bogia in the Madang province of PNG. Between 2004 and 2005, volcanic eruptions in Manam Island damaged or destroyed some 3,000 houses. The eruptions also caused widespread damage to properties, such as livestock, food gardens, cash crops, water wells and the natural environment. As a result, around 9,000 inhabitants of Manam Island needed to be evacuated to the New Guinea mainland. Most of the estimated 6,000 islanders were sheltered in temporary "care centres" established on government-owned coconut plantations along the coast in Bogia and Sumkar districts in Madang province, where they received humanitarian assistance and other required essential support for temporary living from a number of institutions including local authorities, national and international NGOs, local Red Cross, church organizations and a range of grass-roots initiatives. However, the other 3,000 relied on personal network and connection arising through family or trade relations for managing temporary shelter in neighbouring coastal villages (OHCHR, 2011).

It was initially hoped that the displacement was temporary, but by April 2006, after seven months, it was revealed that returning to their original place in Manam Island proved to be an unviable option as there serious risks of further eruptions. Moreover, damage from the volcanic eruptions indicated that the island was gradually becoming inhabitable. In this circumstance, it was perceived that the people from Manam Island most likely will have to resettle on the mainland of Madang province. However, it was difficult to provide durable solutions for adequate land, livelihood and shelter to these displaced communities.

At the same time, the presence of new settlers angered local villagers; thus, tensions between settlers and local people led to violence, leaving one person killed and destroying 160 homes and one care centre (Fox, 2010). The conflict between settler and host community has developed due to a number of factors (ABG, 2014):

- Perception from host communities that settlers are "looked after better" than mainland people.
- Settlers receive greater access to services, such as health care and education.
- Settlers attempting to access surrounding land to access resources and expand their gardens.
- Due to population pressures, the land available on the care centres is insufficient for sustaining the displaced population.
- Manam islanders are culturally and physically different from mainlanders. They are physically larger and culturally perceived to be closer to highlanders than coastal people.

Moreover, loss of income-generating opportunities was seen as one of the negative impacts of resettlement by displaced Manam islanders. On Manam Island, income is earned through cash crops, such as *buai*, but settlement land at the care centres is not sufficiently large for production of such crops. This issue is exacerbated by population pressures on the care centres, having doubled since resettlement and placing even more pressure on limited land available (ABG, 2014).

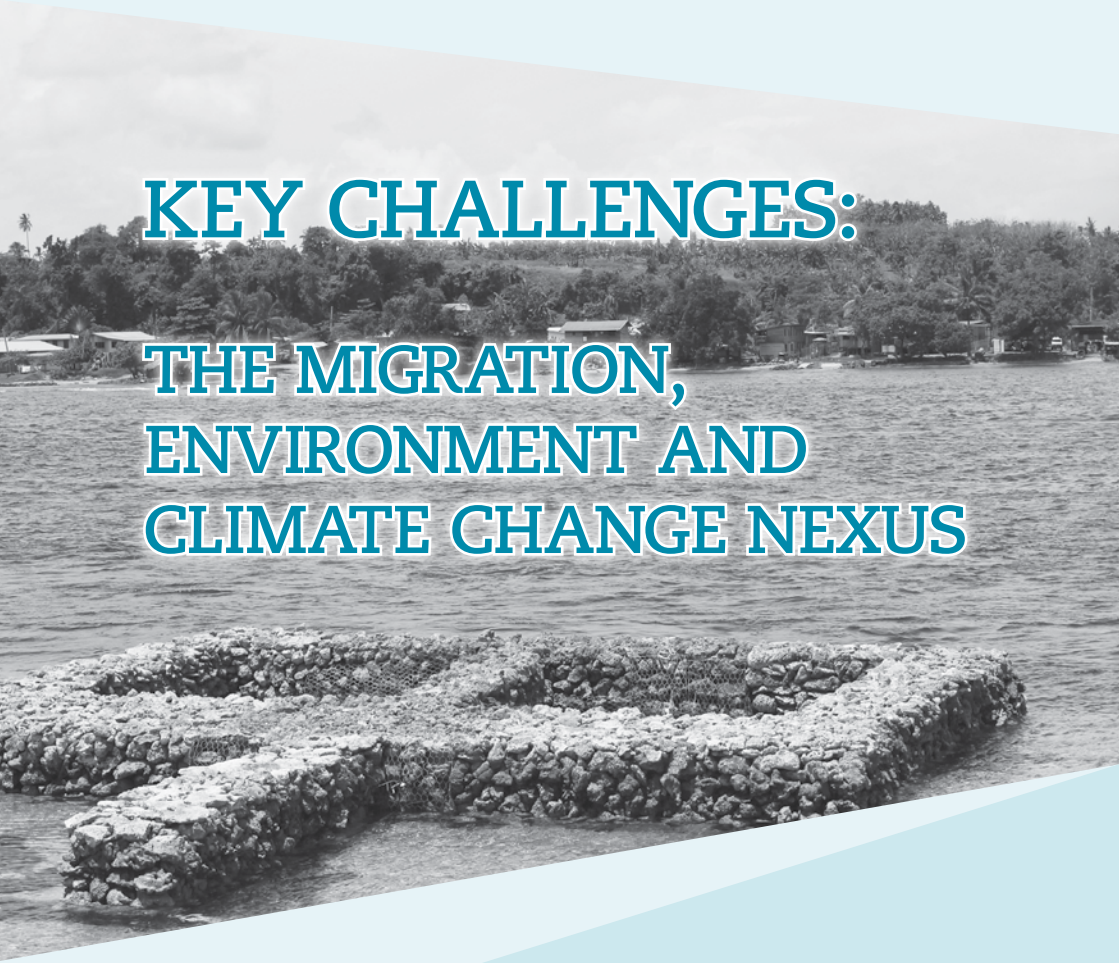
Due to these tensions, integration issues have arisen, and settlers do not feel welcome in Bogia. In some cases, disputes between individual settlers and host community members have escalated to inter-community disputes (ibid.). To alleviate these tensions, host communities have given access to care centre services, such as schools and health care. Settlers in the care centres identified a clear delineation of boundaries between care centres and surrounding land as another important strategy of preventing tensions between the two groups. There is very little intermarriage between settlers and host communities as Manam islanders want to preserve their bloodline (ibid.). By November 2010, approximately 3,000 people returned to Manam Island; about half of this number was compelled to return, and others returned due to fear for their security on the mainland of Madang Province.

In 2006, for the resettlement of Manam islanders, the central government set up the Manam Resettlement Authority tasked with identifying and purchasing land for the Manam islanders. However, due to poor leadership, complexity of land issues and alleged corruption, this body was unable to identify and secure any

land for the displaced (IRIN, 2010). By 2010, this body was no longer functional and had lost the confidence of the local authorities and the displaced (OHCHR, 2011). A new entity, called the Manam Resettlement Task Force, was established by the Government in mid-2010 to revive the process of resettling the Manam IDPs. However, the displaced Manam islanders continue to face struggles in care centres in terms of food, income, health, proper housing, education for their children and poor living standards, as no comprehensive resettlement programmes by the National Government and the Madang provincial administration are still unavailable (IDMC, 2014). Thus, the poor living conditions in care centres and/or in host families, limited livelihood options and the potential risks of conflict with the local community motivate some of the IDPs living in protracted displacement to return to their original places, and many of them fall into further displacements. The durable solutions for these protracted displacements should provide secured living conditions and sustainable means of livelihood that are considered essential in ensuring operational resettlement.

In 2013, the governor of Madang introduced the Manam Restoration Authority Bill, but members of the Parliament did not sign its approval in November 2014 (PNG Parliament, 2014; EMTV Online, 2014).

II



KEY CHALLENGES:

THE MIGRATION, ENVIRONMENT AND CLIMATE CHANGE NEXUS

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II. KEY CHALLENGES: THE MIGRATION, ENVIRONMENT AND CLIMATE CHANGE NEXUS

II.1 Introduction

The South Pacific is a region prone to frequent natural catastrophe. Its location south of the equator results in the frequent occurrence of tropical cyclones with damaging winds, rains and storm surge. Naturally, PNG is at risk from a wide range of natural hazards, such as cyclones, floods and droughts. Some of these are expected to increase in frequency, magnitude and intensity due to climate change. Consequently, these effects can have a significant impact on the daily life of the population and on the economy. The Disaster Risk Reduction and Disaster Management National Framework for Action (2005–2015) for PNG (hereafter FfA) lists some of the natural events in the country: earthquakes, tsunamis, droughts, floods, landslides, volcanic eruptions, tropical cyclones and the impacts of climate change, climate variability and sea-level rise. The Government of Papua New Guinea's Strategic Program for Climate Resilience (SPCR), published in 2012, ranks climate change risks according to priority. The highest are sea-level rise and storm surges, leading to loss of low-lying land on islands and atolls (Ahus, Carterets, Duke of York, Nissan and Siassi). The second is increased incidence of extreme events and changes in rainfall patterns. Other risks emerge from technological and human-induced disasters (such as oil spills), large-scale pollution, unsustainable land use practices and rapid population growth (GoPNG, 2012:23)

II.2 Sudden-onset events and its effects on migration patterns

II.2.a Cyclones/windstorms/tropical storms

A tropical cyclone is a low pressure system over tropical seas with maximum winds over 33 m/s. Regional names for tropical cyclones are typhoons and hurricanes. Tropical cyclones develop over oceans with sea surface temperature of more than 26.5°C and are confined within 5°N and 5°S. PNG lies just outside of the main tropical cyclone belt within the South-west Pacific region and situated in a relatively free area from the cyclo-genesis compared to other neighbouring areas in the region. Nevertheless, there is a far higher probability of tropical cyclones forming outside and tracking into the country. In the period between 1969 and 2010, 23 tropical cyclones passed within 400 km of Port Moresby, an average of less

than one cyclone per season (International Climate Change Adaptation Initiative, 2013:3). The National Disaster Centre (NDC) states that on average, PNG receives one tropical cyclone per season. However, projections tend to show a decrease in the frequency of tropical cyclones by the late twenty-first century and an increase in the proportion of more intense storms in the PNG region (International Climate Change Adaptation Initiative, 2013:4).

On 12–16 November 2007, tropical Cyclone Guba struck PNG, bringing torrential rains and high tides (WMO, 2008:7). Consequently, the rivers burst their banks and swept away bridges, culverts, roads, trees, houses and gardens in their paths. Although exact numbers of displaced people have never been established, the final estimates compiled by the provincial government indicate that 1,800 to 2,000 homes were completely destroyed and approximately 9,500 people were displaced. The most severe damage was in Oro Province, where 149 people were confirmed to have been killed and the majority of the province's residents (approximately 162,000) were affected by the storm (IFRC, 2009:3).

In April 2014, Cyclone Ita hit the south-eastern province of Milne Bay in PNG. It is estimated that around 54,000 people were affected, and 1,134 houses and 5,390 good gardens were destroyed (RNZI, 2014).

II.2.b Floods, storm surges and inundation

Flood is a meteorological event that results mainly from heavy and prolonged rainfall, when the water level in rivers and streams rises over the banks and inundates the surrounding land. According to the PNG's NDC, there are three different types of floods in PNG: flash floods, rapid-onset floods and slow-onset floods (2013).

- Flash floods occur with a few hours of torrential rain with little or no warning and dissipate rapidly. This type of flood is most common in most parts of PNG.
- Rapid-onset floods occur with several hours of heavy rainfall that can last for several days and are very much specific to medium-sized river catchments.
- Slow-onset floods occur gradually over a fairly long period of time and are only characteristic of large river systems, such as the Sepik and Fly rivers. Coastal flood is another type of flood, which mainly occurs when waves, storm surges and/or extremely high tidal waves inundate low-lying coastal areas.

Every year, flooding in PNG causes damage to infrastructure, such as roads, bridges and urban centres, agricultural land and crops, loss of human life and mass human displacement. Based on 19 years of data, 22,000–26,000 people are affected annually by inland floods, displacing 6,000–8,000 and typically resulting in a few

deaths each year (OCCD, 2014:38). Public records estimate annual damage at USD 8–12 million, a burden usually shouldered by the poorest people in the country. PNG has already suffered from six major historical coastal flooding events between 1995 and 2009.

In 2008, an estimated 20,000 people in remote parts of East Sepik Province, north-western PNG, have been affected by floods, the worst in 40 years (IRIN, 2010). The most affected were Angoram, Ambunti and Wosara-Gowi districts. According to UNHCR, 75,000 people along the northern coast of PNG are estimated to have been affected and displaced due to flooding caused by abnormally high tides in the national northern coast in December 2008 (2010). The United Nations Office of the Coordination of Humanitarian Affairs (OCHA) situation report, released by the United Nations Disaster Assessment and Coordination (UNDAC) team on 31 December 2008, showed that 38,000 people were affected by flooding as a result of sea swells in December 2008; 2,000 houses were destroyed or damaged in Manus, East Sepik, New Ireland and the ARB (IRIN, 2009).

Rising sea levels worsen the effect of coastal floods and necessitate the evacuation of people from the Carteret Atolls and Duke of York Islands, as salinization and flooding are damaging fragile communities and cultures, making these areas uninhabitable (OCCD, 2014). Predictions from diverse sources confirm that more than a quarter of PNG's shoreline is expected to be moderately to severely inundated due to sea-level rise and associated impacts of climate change, affecting up to 30 per cent of the country's population (IDMC and NRC, 2013:27). PNG's SPCR (2012) warns that some very low-lying islands, such as barrier islands, are at risk of complete submersion. This submersion has already started in the outer lying atoll islands of Mortlock, Tasman and the Duke of York islands (Government of Papua New Guinea, 2012:15).

II.2.c Landslides

Landslide is the movement of rock, earth, debris or any combination down slope due to gravity, ranging from fast moving rock avalanches to very slow soil creep (PNG, n.d.). In PNG, heavy rain or earthquakes frequently cause landslides that may occur over a wide area. In PNG, months with higher rainfall totals coincide with larger number of landslides. Synoptic and meso-scale influences on rainfall affect the frequency, location and spatial spread of landslide events throughout the year (Robbins et al., 2014). Many landslides occur during the wet season as the rainwater infiltrates the soil and weakens the restraining properties of the soil or rock, thereby causing it to move. Landslides denude the soil and vegetation from steep slopes, destroy food gardens, bury people, dam rivers and destroy infrastructure. Landslide dams can be damaged from back flooding or flooding downstream when breached.

Landslides are a common occurrence in the high mountainous regions of PNG and frequently damage vital infrastructure, upland forests, and the homes and gardens of thousands of residents (World Bank, 2011c:5). In recent decades, landslides have caused significant damage to road infrastructure and remote communities (OCCD, 2014:38). Between 1997 and 2002, landslides affected 19,707 people, killed 128 people, and cost the government PGK 1,090,000 (approximately USD 420,200) (World Bank, 2011c:5). Since the beginning of the cyclone season in November 2012, heavy rainfall had resulted in floods and landslides, affecting homes, food gardens, water sources and infrastructure in several provinces of PNG (Reliefweb, 2013). According to media reports, this event killed around 60 people (40 dead bodies were recovered and 20 people were missing), and up to 35,000 people were affected (The Guardian, 2012). On 2–3 November 2013, 9 people had died after two landslides swept through the village of Kenagi in PNG's Eastern Highlands, burying eight houses and a section of the Highlands Highway (Sciencythoughts, 2013).

II.2.d Earthquakes

PNG lies on the Pacific Rim of Fire, and such close proximity to the tectonic plate boundary means that much of the country is very active geologically (Barr, n.d.). A 2008 study by Geoscience Australia for AusAID shows that, out of 26 Asia-Pacific Region countries, PNG ranked within the top 6 of those with the highest percentage of population exposed to earthquake hazards (Simpson et al., 2008). The Bougainville Island and the New Britain region of PNG are among the most seismically active areas in the world. These are active seismic zones capable of generating large earthquakes and major tsunami travelling great distances. There are frequent earthquakes, particularly along the north coast of the main islands and in the vicinity of New Britain (Barr, n.d.). Shallow tremors of higher than magnitude 6.0 are not unusual, although many occur offshore, so damage may be light (Barr, n.d.). An earthquake with a magnitude 7.5 struck the country in April 2014 and a tsunami warning was briefly issued for PNG and neighbouring Solomon Islands (Global Disaster Alert and Coordination System (GDACS, 2014).

Another devastating earthquake took place on 17 July 1998 near the north coast region of PNG (Bryant, 2008:161). The shock caused a large undersea landslide, which in turn caused a tsunami that devastated the Aitape and Rabual coastal areas and islands, displacing many coastal communities and causing loss of lives (Kaluwin, Ashton and Saulei, 2000:13). At least 2,183 people were killed, thousands injured, about 9,500 were homeless and about 500 were missing as a result of a tsunami in the Sissano area (US Geological Survey, n.d.). Maximum wave heights were estimated at 15 m. Several villages were completely destroyed and others were extensively damaged (ibid.).

Table 5: Major flooding events in Papua New Guinea

Year	Province	Causes	Affected	Displaced	Missing	Killed	Damage
2008	East Sepik	Tidal waves hit the northern coast of PNG	20,000				2,800 homes damaged, USD 15,000,000
2008	Manus	Tidal waves hit the northern coast of PNG	20,000				USD 15,000,000
2008	New Ireland	Tidal waves hit the northern coast of PNG	20,000				1,500 homes damaged, USD 15,000,000
2007	Oro Province, Milne Bay	Cyclone Guba associated with several days of rain	15,000			10	Homes, USD 50,000,000
2002	Aitape, West Sepik	Small tsunami generated by an earthquake	4,400			3	Homes, cash crops, food garden, USD 12,000,000
1998	West Sepik	Tsunami following a magnitude earthquake	10,000				Homes, agriculture, airport, USD 12,000,000

Source: Griffin, 2012.

II.2.e Volcanic eruptions

Volcanic eruption is a significant environmental event in PNG, having huge implications on human displacement. PNG has 16 active and at least 28 potentially active or dormant volcanoes, which are potential dangers to the lives of about a quarter of a million people living in a total area of 16,000 sq km (NDC, 2015). Of the 16 active volcanoes, 6 of them are classified as high-risk volcanoes. These are considered as such as these have had explosive eruptions in the past and have the potential of repeating these eruptions in the future. Now there are many people living around these volcanoes, and economic activities located near these volcanoes, such as oil palm plantations, logging industries, sawmills, cocoa and copra plantations, are also prevalent. Most of the active volcanoes lie close to the tectonic plate boundary that runs just off the coast of New Guinea, New Britain, and then south into the Solomon Islands (Barr, n.d.). The six high-risk volcanoes in PNG are Rabaul in East New Britain, Ulawun and Pago in West New Britain, Karkar and Manam in Madang, and Mount Lamington in Oro.

The major urban centre of Rabaul, situated within a volcanic caldera at the eastern end of the island of New Britain, was virtually destroyed by eruptions in 1937 and again in 1994. Eruptions have also caused destruction on the islands of Manam and Karkar off the north coast of New Guinea in the last 20 years. An estimated 150,000 people are at risk from volcanic eruptions (Barr, n.d.). In October 2004, volcanic eruptions in Manam Island damaged or destroyed some 3,000 houses, and disrupted infrastructure, crops and forests.

II.2.f Tsunami

A number of Provinces in PNG including West and East Sepik, Madang, Morobe, Milne Bay, Manus, New Ireland, Autonomous Region of Bougainville, East and West New Britain are prone to tsunami. The tsunami that struck Papua New Guinea on 17 July 1998 may have been the most devastating tsunami in this century (US Geological Survey, n.d.). The earthquake recorded 7.1 in the Richter scale off the north-west coast of PNG (ADRC, n.d.) and triggered three big waves of tsunami with a maximum height of 15 m. This tsunami destroyed a 10 km area of coastline, killed more than 2,200 people, seriously injured about 700 people and 10,000 people were forced to relocate (World Bank:3; ADRC, n.d.).

II.3 Slow-onset processes and its effects on migration patterns

II.3.a Sea-level rise

The Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC) projected that global mean sea-level rise will very likely continue at a rate exceeding that of the past four decades (2014:25). According to the International Climate Change Adaptation Initiative, "satellite data indicate that the sea-level has risen near PNG by about 7 mm per year since 1993" (2013:4). This is larger than the global average of 2.8–3.6 mm per year between 1993 and 2010. This higher rate may be partly related to natural fluctuations that take place every year or every decade caused by phenomena, such as the ENSO. Sea level is expected to continue to rise in PNG between 4 and 15 cm by 2030 under a high emission scenario (International Climate Change Adaptation Initiative, 2013:7).

The sea-level rise, combined with natural year-to-year changes, is projected to increase with high certainty the impact of storm surges and coastal flooding on low-lying areas (ibid.). An increasing number of storms is anticipated to cause inundation more frequently, contaminating precious drinking water supplies contained in freshwater lenses beneath the islands and threatening human settlements and roads. Sea-level rise is already having a noticeable effect on coastal communities, the marine environment and the built environment of the city.

II.3.b Extreme temperatures

Annual maximum and minimum temperatures have increased in Port Moresby since 1950, and projections for all emission scenarios indicate that the annual average air temperature and sea surface temperature will increase in the future in PNG (International Climate Change Adaptation Initiative, 2013:4, 6). While maximum temperatures have increased at a rate of 0.11°C per decade since 1950, under a high emission scenario, this increase in temperature is predicted to be 0.4–1.0°C by 2030 (International Climate Change Adaptation Initiative, 2013:6). These temperature increases are consistent with the pattern of warming. Increase in average temperature will also result in a rise in the number of hot days and warm nights and a decline in cooler weather (ibid.).

II.3.c Salinization

The Papua New Guinea Initial National Communication under the United Nations Framework Convention on Climate Change (UNFCCC) describes the adverse effects of salinity on mangrove systems. According to this national communication, the distribution and zonation of mangroves is mostly influenced by salinity, tidal

fluctuations and drainage patterns. Secondary influences include temperature, land relief and shelter from storm surges and big waves (Kaluwin, Ashton and Saulei, 2000:42). Salinization of mangrove ecosystems could occur, given that they prefer a salinity level equal or close to that of seawater. Similarly, increased storms may also change the zonation through accretive or erosive action of the waves (ibid.). The distribution of tropical seagrasses is also affected by variation in water temperatures (which should be warmer than 20°C) and water movement. The loss of mangrove system integrity will have adverse effects on subsistence welfare of the local villagers living in or near such mangrove areas.

II.3.d Land and forest degradation

PNG's forest is the third largest forest after the Amazon and the Congo. Research conducted in 2002 on PNG's land cover estimated that 40 per cent of land was covered by lowland rainforest, 14 per cent by grassland, woodland and cleared plantations, 19 per cent by lower montane rainforest, 7 per cent by swamp forest, 2 per cent by dry evergreen forest, 2 per cent by upper montane rainforest, and 1 per cent by mangroves (Wickham, 2010:58).

While there are abundant natural riches below and on the surface of the land, there are concerns for the ability of land resources to support people and biodiversity in the future. Soil surveys and assessments reveal that only 1 per cent of total land area has high fertility status, approximately 58 per cent (470,000 sq km) is subject to erosion, 30 per cent is considered marginal land suitable for agriculture, and 18 per cent is regularly inundated (Wickham, 2010:58). Up to 200,000 hectares are cleared annually for traditional agriculture. It was estimated that 48.2 per cent of forest cover had already been degraded with extrapolations and that 83 per cent of all accessible forests would be cleared by 2021. Other drivers of forest change identified for this period include subsistence agriculture at 45.6 per cent, fires at 4.4 per cent, plantation establishment at 1 per cent, and mining at 0.6 per cent (ibid.).

II.3.e Loss of biodiversity

PNG is widely renowned for its biodiversity, which is estimated to comprise between 5 and 7 per cent of the global biodiversity. The country is one of the world's 10 largest tropical rainforest nations and is one of the top 20 most biologically diverse countries in the world, with a wide range of remarkably diverse environments that support a great variety of different habitats rich in species. PNG encompasses some of the world's last great tracts of mature tropical rainforest and largest coral reefs. These forests and marine ecosystems, combined with a unique array of species, have made PNG one of the world's most important biodiversity hotspots.

Any changes to the natural systems greatly affect the country's unique and very rich biodiversity. In the current century, the viability of the natural environment and biodiversity in PNG is already under constant threat due to an ever-increasing human population and current patterns of global economic activity that have led to accelerated urbanization, forest clearing, ecological degradation and climate change (Haberle, 2007:1). The major loss of biodiversity is contributed to the following factors:

Rapidly expanding human population: Current population growth rate in PNG is at 2.1 per cent annually. The increase in human population (3.2 children per child-bearing female) has increased the per capita consumption of biological resources.

Forest conversion and degradation: Rapid and substantial deforestation and logging-related degradation has occurred in PNG's forests over the past 30 years (UNEP and GEF, 2010:vii). According to a report by the Chatham House Corruption, weak governance and powerful timber barons are illegally stripping the forests of PNG (Lawson, 2014). The policy institute finds that 70 per cent of current logging is illegal, despite the fact that 99 per cent of the land is owned by local indigenous communities (ibid.). The Chatham House report details licences being issued or extended in breach of regulations; extensive breaches of harvesting regulations by concessionaires; and most recently, the abuse of licences for clear-felling forest for commercial agricultural plantations. Illegal small-scale sawmilling to supply urban markets in PNG is thought to be a significant problem: wood balance analysis suggests that this may account for 10 per cent of all harvesting (ibid.). It is confirmed in a research paper that "between 1972 and 2002, a net 15 per cent of PNG's tropical forests were cleared and 8.8 per cent were degraded through logging" (Shearman et al., 2009). PNG raises most of its revenue from the extraction of natural resources; as such, destructive environmental developmental projects have always taken precedence over environmental protection. Each year, 50,000–60,000 hectares are cleared totally and permanently: 50 per cent for agriculture, 25 to 30 per cent for industrial logging, and the rest for infrastructure. The forest that took millions of years to grow is deforested at an average rate of 1 per cent per year.

Agricultural expansion: The country's high population growth rate means that increasing an area of land is converted to subsistence agriculture. Typically, fire is used for land-clearing and at times —especially during dry El Niño years — agricultural fires can burn out of control. For instance, during the 1997–1998 El Niño event, fires burned thousands of hectares of dried-out forest while thousands of people died from food shortages and famine in the central highlands (Tropical Rainforests: 2006).

Industrial expansion: The growing expansion of industries, such as cocoa, coconuts, coffee, tea, vanilla, forestry, fisheries, mining, timber, oil, palm oil and natural gas, is contributing to the degradation of environment and biodiversity. A report by the World Resources Institute stated that OTML, a mining company, has acknowledged that more than 2,000 sq km of rainforest could be affected by the mining operations (2003:189).

Climate change: The impacts of climate change on biodiversity are many. The vulnerability of an ecosystem to climate change depends on its species' tolerance of change, the degree of change, and the other stresses that are already affecting it. The effects of climate change are definitely showing on the coastlines. Coral bleaching, an effect of high temperatures and increased carbon dioxide in oceans, has been observed in PNG waters since 1996 (Davies et al., 1997).

II.3.f Coastal erosion

PNG has many coastal reefs and offshore patch reefs with high biodiversity. The coral reefs of the north and east coast of PNG lie within the Coral Triangle, which includes eastern Indonesia, the Philippines, Timor-Leste and the Solomon Islands. The coastline, coastal villages and rural coastal population in PNG are vulnerable to sea-level rise and other weather-related manifestations of climate change. The main impacts will be the inundation of coastal wetlands and foreshore areas, as well as the bleaching of corals, which will weaken the coral reefs as barrier protection systems. Most reefs in PNG are in relatively good condition, although some reefs are under pressure from: (a) sedimentation from poor management of logging, mining, land clearing and oil palm plantations; (b) overfishing of top predators, such as sharks, and invertebrates, such as sea cucumbers (bêche-de-mer); (c) live trade of ornamental fish and fish for human consumption; (d) crown-of-thorns starfish (COTS) outbreaks; and (e) coral bleaching (Secretariat of the Pacific Regional Environment Programme (SPREP), 2008).

The permanent or periodic inundation of deltaic flood plains, swamps and low-lying areas could affect up to 50 per cent of the Papuan coastlines, and 10 per cent of the northern shorelines (for a 1-m sea-level rise – IPCC's highest estimate). This may result in damage to mangroves and swamp forest ecosystems, as well as human productive systems. More than 90 per cent of the coastlines of the Gulf and Western Provinces are likely to be impacted (Kaluwin, Ashton and Saulei, 2000:41). Approximately, 4,500 km out of a total of 17,100 km of shoreline are expected to be moderately to severely inundated, affecting up to 30 per cent of PNG's population. In addition, there is danger that some very low-lying islands, such as barrier islands, will be completely submerged. Evidences of this are already occurring, especially in the outer-lying atoll islands of Mortlock, Tasman and the

Duke of York Islands (Kaluwin, Ashton and Saulei, 2000:41). Thus, loss of wetlands, freshwater sources due to seawater intrusion, and lands may eventually lead to displacement of communities, resulting in aggravated future social problems.

II.3.g Declining soil fertility

Kapal et al. (2010) found substantial evidence that the decline in soil productivity has adverse impact on sweet potato yields, PNG's main staple food crop. A study showed that sweet potato yields decline from around 8 tons per hectare in gardens that came out of a two- to five-year fallow period to 4 tons per hectare in gardens that were about to go into a fallow period. This decline was linked to inadequate nitrogen, potassium and sulfur nutrition and more pronounced where small mound tillage was practised. In contrast, soil management practices using Engan (large composted) mounds were the least affected by soil fertility decline (Kapal et al., 2010:1).

II.3.h Rainfall variability

PNG has wet season from November to April and dry season from May to October, but these seasons are only noticeably different in Port Moresby, where about 78 per cent of the yearly average rainfall comes in the wet season. Due to their location in the West Pacific war pool, islands in the north of PNG experience rain throughout the year. Rainfall in the north of PNG is affected by the ITCZ and, to a lesser extent, the South Pacific Convergence Zone. These bands of heavy rainfall are caused by air rising over warm water where winds converge, resulting in thunderstorm activity. The overall annual precipitation trend shows significant rainfall reduction in PNG over the last 30 years (Kaluwin, Ashton and Saulei, 2000:12), however, model projections by International Climate Change Adaptation Initiative show extreme rainfall days are likely to occur more often, increasing in the average annual and seasonal rainfall over the course of the twenty-first century. Projected increases are consistent with the expected intensification of the West Pacific Monsoon and the ITCZ. However, there is some uncertainty in the rainfall projections and not all models show consistent results (International Climate Change Adaptation Initiative, 2013).

II.3.i ENSO and climate variability

PNG's climate and sea level variability is considerably related to the ENSO phenomenon. ENSO is a natural climate pattern that occurs across the tropical Pacific Ocean and affects weather around the world. According to the Papua New Guinea Initial National Communication under the UNFCCC, "Effects of the southern oscillation of both mean sea level pressure and the sea surface temperatures show a definite correlation between the SOI [silicon oscillation index] and the rainfall

patterns of the southern Papuan coasts in particular. The correlation gradually fades towards the equator with equatorial regions precipitation patterns showing marked relationships only during the stronger phases of ENSO" (Kaluwin, Ashton and Saulei, 2000:14). In addition, Ramakrishna and Bang noted the following about ENSO: "There are two extreme phases of the ENSO: El Niño and La Niña. There is also a neutral phase. Generally in PNG El Niño years are usually drier than normal while La Niña events are usually wetter" (2015:73). The International Climate Change Adaptation Initiative added that La Niña-associated prolonged rainfall has led to flooding and landslides, while El Niño-associated droughts have also taken their toll on PNG. During El Niño events, the monsoon season starts later (2013:2). The dry season at Port Moresby is cooler than normal in El Niño years and warmer than normal in La Niña years, while the wet season tends to be warmer and drier than normal during an El Niño event (International Climate Change Adaptation Initiative, 2013:2). The past El Niño events of 1978, 1981/1982 and 1997/1998 significantly traumatized the country's economy (Kaluwin, Ashton and Saulei, 2000:38).

II.3.j Drought and frosts

According to the Papua New Guinea Initial National Communication under the UNFCCC, "Drought and frosts are generally common occurrences in the highlands of PNG and have significant impact on the economic and environment sectors" (2000:14). Drought in the lowlands of Central Province are usually associated or influenced by ENSO phenomenon (GEF, UNDP and SPREP, n.d.:17). The GEF, UNDP and SPREP Report of In-country Consultation noted that "the influence of ENSO in catalysing the development of frost and droughts in the country is quite evident as shown by the 1997/98 prolonged drought" (n.d.:8). Any unexpected long period without rain may lead to drought and widespread forest and grass fires. A UNEP project led by Joe Barr added that "lowland areas in the south and east coasts of the mainland of New Guinea regularly experience these hazards, while El Niño events are likely to bring drought to much larger areas" (Barr, n.d.:xii). The Vulnerability, Risk Reduction and Adaptation to Climate Change country profile report indicated that "droughts affect the Southwestern plains, Central Province plains, Cape Vogel area, Markham valley, Bulolo valley, Maprik-Angoram area, and areas on the Eastern Highlands and Madang Province. While only 13 droughts have struck PNG over the past 13 years, the occurrence of prolonged droughts, particularly in the lowlands of the Central Province, is rising likely due to the ENSO effect" (World Bank, 2011c:5)

The Highlands of mainland New Guinea yearly experiences frosts at altitudes above 2,100 m between May and October (Barr, n.d.). If the frequency or duration of the frosts increases, crops can be destroyed, affecting food security (Barr, n.d.).

II.4 Potential effects of (environmental) migration on vulnerability

Climate variability and change has and will continue to affect PNG. Vulnerability is a key factor that needs to be considered to identify the differential impacts of climate. Even in the absence of climate change, the people and environment of PNG are already experiencing other vulnerabilities due to increasing populations and the rapid expansion of modernization across the country, with its concomitant demand on scarce resources (Wickham, 2010:76). By overlaying the socioeconomic and environmental vulnerabilities of PNG with the predicted climate change impacts and consequences, the gravity of the vulnerability of local communities to climate-related disasters becomes more apparent (Wickham, 2010:76).

According to IOM, mostly rural people will be the worst affected by environmental change (2009). Indeed, a strong inverse correlation exists between levels of socioeconomic development of the coastal provinces of PNG and the extent to which they will be affected by environmental change (GoPNG, 2012:15). In PNG, around 80 per cent of the country's total population of about 7 million lives in rural areas where basic services are lacking. The primary strains of climate change will hit the most vulnerable village-based population who depend on nature for their livelihood. In PNG, more than 85 per cent of the population relies on farming for their livelihood (GEF, UNDP and SPREP, n.d.). Agriculture is the mainstay of the PNG economy, accounting for approximately 30 per cent of GDP and around 13 per cent of total export earnings. Agriculture production is very sensitive to climate and climate variability. Crop growth and yield is influenced by inter-annual variations in weather, temperature and nutrient status of soils. Climate change will affect soils primarily through changes in soil moisture, soil temperature and soil organic matter content (GEF, UNDP and SPREP, n.d.:18). The vulnerability of crops to climate change may either be increased or diminished by future technological changes. If technological advances narrow the optimal range of input conditions for agricultural production (for instance, need for high levels of fertilizer), and if climate change results in increased variability, such as increases in frequency of droughts as well, production risks may also be expected to increase (GEF, UNDP and SPREP, n.d.).

Thus, the livelihoods of rural population in PNG will be degraded by the changes in forests, rainfall patterns, degraded soils and fishing grounds. It will be difficult for them to switch to new crops and farming practices and methods, adopt effective irrigation methods, acquire cultivable land for continued farming and adopt better fishing methods. For instance, the impacts of coral reef deterioration in Bootless Bay, approximately 10 km from Port Moresby, create problems for community members who rely on fisheries and marine resources for their livelihood (UN-

Habitat, 2013:25). Moreover, the poor have limited access to services necessary to make them resilient to adverse climate effects.

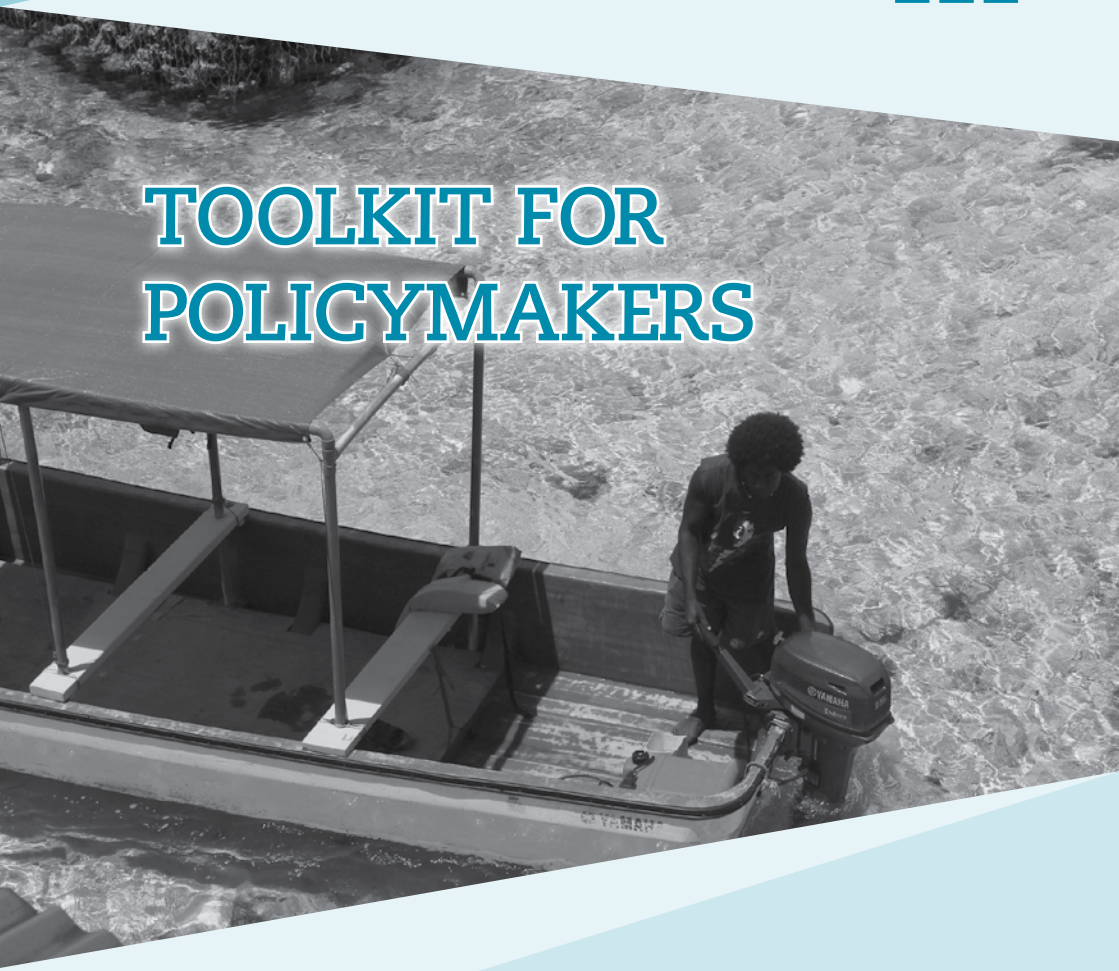
The Strategic Program for Climate Resilience (SPCR) of PNG notes that loss of wetlands, freshwater sources due to seawater intrusion and flooding of coastal lands "will lead to displacement of communities, resulting in aggravated social problems" (GoPNG, 2012:14). The case studies (Carteret Islands and Manam Island) demonstrate that environmental degradations due to the effects of environmental and climate change may trigger substantial magnitude of human displacement in PNG. Since low-lying islands can become uninhabitable long before their submergence due to rising demands of growing island populations, it is not unlikely that many more island communities from this particularly adverse environmental context could be displaced in the future (Mimura et al., 2007; ACP, 2010:15). Therefore, this type of migratory movement of people may have cascade effects that further deteriorate environmental conditions, affect human security and aggravate migratory movements.

Those who have already been displaced are living in protracted displacement, failing to return to their original place or successfully finding other durable solutions (IDMC and NRC, 2014:1). According to the IDMC and NRC Report, almost 85 per cent of the displaced are living in government established IDP camps, officially termed "care centres", while the remainder are living with "host families" (ibid.). The IDPs are exposed to inferior living conditions due to lack of food, clean water and adequate sanitary facilities, and reduced access to health care in IDP camps (ibid.).

In PNG, it is difficult to manage adequate land for resettlement of people who are displaced from certain areas due to natural or man-made hazards because of the prevalent customary land tenure system. The case study of relocating people from Manam Island shows that integration of relocated peoples with the host community is not straightforward. The settlement of new migrants in an area already vulnerable to environmental and socioeconomic stresses will generate competition for limited resources that will lead to a number of social pressures. In some cases, there is a perception among the host community that the relocated people are receiving greater access to services, such as health care and education, than the host community. In some incidents in PNG, relocation efforts resulted in violence and conflict (IDMC and NRC, 2014:1). Such challenges can lead to unmanaged resettlement and contribute to social tensions.

III

TOOLKIT FOR POLICYMAKERS



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III. TOOLKIT FOR POLICYMAKERS

Based on the available evidence on environment, climate change and migration in PNG in this report, it is possible to identify some potential policy tools and approaches that can form the starting point for discussions on this increasingly important issue. Following a brief overview of the existing policy framework, a range of suggestions and ideas are therefore presented in this section. These are broadly divided between policies and programmes that aim to minimize forced migration and protect the displaced, and those who seek to support migration as adaptation. It should be emphasized that these are preliminary in nature and should be viewed as an initial contribution to what will hopefully be an ongoing and constructive policy discussion over the coming years and decades.

III.1 Existing policy framework

III.1.a Migration (Emigration, immigration, internal displacement, labour migration, planned relocation programmes)

While PNG experiences a significant number of displacement caused by environmental and climate change-related effects, there is no policy framework that specifically deals with people displaced by environmental reasons. Interestingly, the PNG 2005–15 FfA does not mention migration, displacement, relocation or resettlement; the only reference to human mobility is on evacuations (NDC, 2005). However, the PNG Vision 2050 (Vision 2050) set aims to "develop mitigation, adaptation and resettlement measures in all impacted provinces by 2015" (The Independent State of Papua New Guinea, 2011). The PNG SPCR also outlines the issue of displacement and human mobility and explicitly links socioeconomic vulnerabilities to disaster and climate change vulnerabilities and to displacement risk. It stresses that extreme weather events and sea-level rise will lead to displacement of coastal communities and that certain communities, particularly on low-lying islands, will need to be resettled. It also identifies the challenges associated with resettlement, such as high financial and cultural costs involved with resettlement, relative poverty of the most vulnerable communities, and the customary land tenure system. All these will be compounding resettlement issues that may make the resettlement process complex (GoPNG, 2012; IDMC and NRC, 2013:28). Interestingly, the SPCR develops a project component that provides assistance to encourage vulnerable communities to create community adaptation plans that may develop or improve relocation plans.

At the local level, the ABG adopted the AIDP in 2007, which focuses on ensuring the ongoing sustainability of the settlement and long-term welfare of both settlers and host communities. The overarching objective of the AIDP is to improve the standard of living of the Atolls people of the ABG through an integrated development approach that targets the most vulnerable in the communities.

The AIDP includes the voluntary resettlement of Atolls islanders to designated resettlement sites on Buka Island or mainland Bougainville by the end of 2020, as well as support for communities remaining on the islands. Under this policy, land will be purchased and registered as Atolls Districts Land to allocate to Atolls people permanently. Each settler family will receive 2 to 4 hectares for dwelling, food gardens and cash crops (ABG, 2007:26).

A multisectoral approach to planning and implementation is being promoted through involvement of various divisions of the Bougainville Administration, as well as NGOs and other stakeholders. The ABG also adopted the AIDP Implementation Plan and Schedule that combines objectives, strategies, targets, actions and measurable outputs for all sectors. Its key objectives are:

1. Acquiring suitable land and establish as a resettlement site for relocated Atoll communities;
2. Developing and implementing strategies to promote the ongoing social and cultural well-being of communities affected by the resettlement, including Atoll and host communities;
3. Developing and implementing strategies to promote ongoing economic development at the resettlement site;
4. Establishing and maintaining infrastructure and facilities to promote development at the resettlement site;
5. Relocating settlers to the resettlement site;
6. Reducing risks associated with and improve capacity to respond to natural disasters affecting the atolls;
7. Long-term protection and conservation, and support for communities remaining on the islands; and
8. Maintaining effective systems for planning, management, coordination and monitoring of the ARP and wider Atolls development issues.

The Atolls Resettlement Program falls under the broader AIDP, which also includes improving services and support for communities remaining on the atolls and disaster management activities. The overarching objective of the ARP is aligned

with the second broad objective of the AIDP Implementation Plan, which is to develop and implement strategies to promote the ongoing social and cultural well-being of communities affected by the resettlement, including Atoll and host communities.

To this end, the administration focuses on: (a) stakeholder awareness and consultation; (b) securing permanent resettlement land; (c) identifying the economic, social and cultural impacts of the resettlement on affected communities and developing strategies for addressing these impacts; and (d) incorporating these strategies into the AIDP Implementation Plan. Key stakeholders include (a) the Atolls communities, host communities and customary landowners (including chiefs and elders, women and youth); (b) government agencies, such as Bougainville Administrative Divisions and District Administrations; (c) churches (in particular, the Catholic Church); and (d) local and international NGOs (such as Tulele Peisa and UN agencies).

The Papua New Guinea Migration Act 1978 is enacted to regulate the entry into the country. It provides procedures for entry into PNG, conditions of entry and the procedures to be followed when dealing with persons accused of "unlawful presence" into the country.

Recognizing the important role of foreign workers, the Government of Papua New Guinea revised two key immigration policies: the Employment of Non-Citizens Act and the Employment of Non-Citizens Regulation in 2007. These policy changes liberalized the immigration of foreign workers with tertiary education. While these policy amendments explained the immigration procedures, skill-transfer procedures and an update of the labour-base coding system to streamline procedures for entry of skilled migrants, protection for low and semi-skilled jobs reserved for national employees was also ensured. Following the policy changes, in 2010, the Foreign Employment Division of the Department of Labour and Industrial Relations introduced a work permit that facilitated the recruitment of foreign workers to address emerging skills shortages, as well as help raise productivity to international standards.

Poverty reduction

PNG's overall development strategy is set out in the Vision 2050, PNG's Development Strategic Plan 2010–2030 (DSP) and the Medium Term Development Plans (MTDP 2011–2015). These strategies and plans overall address the vulnerability of people due to environmental degradation and climate change, and set strategies to reduce disaster risks, adapt to domestic impacts of climate change and improve the standard of living of PNG people. More notably, the National Climate Compatible

Development Management Policy (NCCDMP) was adopted in 2014, which sets the target to "develop […] resettlement measures in all impacted provinces by 2015".

Urbanization

The National Urbanisation Policy for PNG for 2010–2030 (NUP) sets out the framework for the proper planning and development of town and cities, including those in rural areas, over the next 20 years. This policy is correlated with the goals, objectives and aims of the Constitution, the National Development Strategy 2010–2011 and the National Population Policy of 2000–2010. The urgent challenges, as pointed out in the NUP, include population and employment, housing, informal settlements and social issues, governance and institutions, environment and climate change, rural urban linkages, transport and infrastructure, land availability, security, law and order, gender and HIV/AIDS. The policy aims to narrow the gap between population and employment growth through the implementation of a hierarchy of cities that could be well planned and managed. The NUP identified shortage of land for urban development as a hindrance to sustainable development. The policy aims to facilitate the provision of adequate supply of land – that is, customary, State and private – so that there can be a robust land market and orderly urban development. The policy, inter alia, highlights the importance of incorporating climate change issues (migration likely to arise from climate change impacts) in the urban planning processes for sustainable urban development.

Climate change

The SPCR of PNG aims to achieve "transformational" change by supporting implementation of PNG's national strategies, outlined in its Vision 2050, Development Strategy Plan, Medium Term Development Plan, Public Investment Plan (PIP) and Climate Compatible Development Strategy (CCDS), to make PNG's development investments climate resilient, or facilitate climate-compatible development in PNG's own terms.

The SPCR includes three project components: (a) building climate-resilient communities; (b) addressing risks to food security; and (c) developing climate-resilient infrastructure (GoPNG, 2012:30). The activities under component 1 of the SPCR include providing "training of and assistance to pilot vulnerable communities on low-lying islands and atolls to undertake community climate change vulnerability mapping and adaptation planning. Community adaptation plans developed through this process will define viable adaptation options, and may include relocation - develop or improve existing relocation plans (land ownership); addressing social-cultural, socio-economic, and health issues; and viable coastal defences (soft and hard engineering options), including land reclamation" (GoPNG, 2012:28). The SPCR establishes a Climate Change Trust Fund (with USD 5 million) to provide fast

start financing to vulnerable communities to implement community adaptation plans and early warning systems (GoPNG, 2012:30, 34).

PNG's CCDS recognizes the sensitivity of PNG to natural hazards, such as drought, landslides and coastal and inland flooding. The CCDS has highlighted the significant risks posed by climate change to PNG's environment, economy and population, as well as risks from natural disasters enhanced by climate change and gradual shifts in climatic conditions. The CCDS has stressed that these will likely disrupt daily life, destroy livelihoods, kill or injure people, cause damage to assets and infrastructure, and endanger cultural and ecological treasures.

Since 2007, efforts have been undertaken to incorporate climate change adaptation (CCA) considerations into national development, primarily at the national strategic level. The Vision 2050 adopted in 2008 emphasizes that environmental sustainability and addressing climate change issues are crucial in the achievement of the development goals and visions envisaged by the Government of Papua New Guinea by 2050. The Vision 2050 adopted in 2008 is underpinned by seven strategic focus areas, which are referred to as pillars. One of the pillars is Environmental Sustainability and Climate Change.

PNG submitted its First National Communication to the UNFCCC that identified priority sectors, such as agriculture, biodiversity, fisheries, human health, coastal zones and water resources. The document also outlined specific adaptation measures to be taken in each of these priority sectors to address both current and projected changes in climate across the country.

III.1.b Environment (Disaster management)

Conservation of PNG's natural resources and the environment is enshrined in the fourth goal of the Constitution:

> We declare our fourth goal to be for Papua New Guinea's natural resources and environment to be conserved and used for the collective benefit of us all, and to be replenished for the benefit of future generations.

Premised on this fundamental pillar of the Constitution, there are over 45 various regulations, acts and policies on environment issues, yet compliance, enforcement and adherence to standards remain a key challenge (DNPM, 2010:103). The Environment Act 2000 articulates the promotion of sustainable development concept through "wise use" principles and that proper environmental management will ensure "environmental benefits" to be enjoyed by the present generations and investment for the future generations. Also, the National Biodiversity Strategy

and Action Plan is the road map to the sustainable use and management of the country's resources and provides the initial response to the Convention on Biological Diversity in which PNG is a party to. While these acts concentrate on the conservation of the environment and sustainable use of environmental resources, impacts of vulnerability of disaster-affected people and migration on environment are not anticipated.

The Disaster Management Act 1987 (DMA) is the basic disaster management document that provides legislative and regulatory provisions for disaster management in PNG. It describes the basic disaster management structure and responsibilities and requires disaster plans to be prepared. However, the Government of Papua New Guinea's approach to disasters has significantly been changed in recent years, which is reflected in a number of policy documents including the FfA, Vision 2050 and the CCDS. Apart from the emergency responses required during disaster situations, these policies emphasize integrating disaster risk management (DRM) into CCA and development, which are not incorporated in the DMA yet. However, the NDC of PNG has commenced the review of this Act to have it adjusted to the contemporary disaster management measures and administrative reforms in the local government levels with technical assistance from the PNG Constitutional Law Reform Commission.

The Papua New Guinea 2005–2015 FfA was adopted in 2005 to ensure safe and resilient communities in PNG. Based on six guiding principles, it aims to build the capacity of PNG and its communities by accelerating the implementation of disaster risk reduction and disaster management policies, planning and programmes to address current and emerging challenges.

The National Disaster Mitigation Policy and disaster risk management strategy focuses on reducing disaster risk throughout the country through establishment of appropriate institutional and legislative mechanism and people-centred early warning system. Knowledge, education and public awareness to improve disaster awareness, planning for effective preparedness and recovery, and identifying risks and hazards are the key elements of existing disaster management strategies and policies.

The Provincial Climate Change Implementation Strategy (PCCIS) aims to guide the provincial governments in disaster management and responses. This policy intends to ensure that the provincial disaster response measures and issues are well captured into the provincial planning. The Public Health Act, Royal Papua New Guinea Constabulary Act, Internal Revenue Act and Insurance Act also contain stipulations on disaster management.

However, all these acts, plans and strategies on disaster still focus on emergency responses; no strategies are devised for displacement, both short-term and long-term, likely to be triggered due to natural disasters. Similarly, the NDC – established by the DMA in 1987 to provide the necessary and appropriate disaster management services to the government and the people of PNG – is not equipped enough to manage displacement caused by natural and human-caused disasters.

III.1.c Land use planning

In PNG, there is no constitutional basis for compulsory land acquisition, and conversion of use is determined by a negotiating process. PNG has enacted various laws in which a type of tenure called "customary land title" gives legal basis to the inalienable tenure of traditional lands to the "indigenous peoples". Customary land notionally covers most of the usable land in the country (about 97% of total land area) (Filer, 2012:1). Remaining land is held privately by PNG citizens under state lease or by the government (ibid.). The present regulatory framework that provides for settlement improvement in PNG includes the Land Act, the Physical Planning Act, the Building Act, the Informal Sector Act and the National Capital District Commission Act. The Physical Planning Act 1989 and the Physical Planning Regulation 2007 govern the control of zoning, sub-division, consolidation, development and use of land in designated Physical Planning Areas in PNG. The Physical Planning Act gives the provincial government (Provincial Physical Planning Board) planning responsibility because city councils lack the capacity to plan, including the areas of traditional land and settlements.

The Land Act of 1996 allows the Government to control and manage land through the establishment of a Land Board and through the authority of the Minister for Lands and Physical Planning. Under this act, the Government, through the Minister, can acquire land by agreement with the landowners or by compulsory means. The act also makes provisions for the rights to compensation of landowners for land acquired. Under the act, a private entity cannot purchase customary land. It is possible for a private entity to obtain a lease over land either by: (a) a "lease/lease back" arrangement with customary owners whereby the land is released to the State, which in turn issues a State lease to those customary owners, who in turn may sub-lease the land to a private entity; or (b) receiving a lease directly from the State where the State has compulsorily acquired that land under the Land Act with compensation paid to the original owners usually in a lump sum.

Under the Organic Law on Provincial and Local Level Governments (1997), provincial governments are empowered to establish procedures and systems for the protection of the environment and resources.

However, this is mostly for large projects with significant environmental impact. The Physical Planning Act 1989, administered by the Department of Lands, provides a strong enabling tool for managing land use to reduce hazard or climate change risk. It has the ability to apply to both customary and alienated land. About 97 per cent of PNG land is customary land, and 3 per cent is alienated. The Physical Planning Act has been applied to just 2 per cent of customary land, which is subject to a government lease and leased for development purposes. Where land is subject to physical planning, it is required that both environmental and hazard issues should be addressed.

The Land (Tenure Conversion) Act of 1963, the Land Groups Incorporated Act of 1974, the Land Disputes Settlement Act of 1975 and the Land Registration Act of 1981 have provisions on customary land.

These acts on land use and land management have no specific guidelines for forest management or conversion. More importantly, due to the protection of customary land tenure system, the Government of Papua New Guinea has limited scope in managing land for resettlement of potentially large number of people displaced by environmental degradation and natural disasters. However, a sustainable land use policy is currently being developed that recognizes the threats of climate change to environment, biodiversity and sustainable land use in PNG and highlights the importance of incorporating climate and disaster risk concerns in the land using planning for risk reduction and sustainable development.

III.2 Policy options: Some initial suggestions

This section identifies some potential policy tools and approaches based on the available evidence described in the previous sections, which aim to minimize forced migration, protect the displaced and support migration as adaptation. It also highlights the gaps and research priorities for the future.

III.2.a Integrating disaster-induced displacement into other laws including disaster risk management and climate change adaptation

The policy framework for disaster management previously mentioned stresses evacuation of affected people during natural disasters. However, evacuations are not linked in a broader discussion of disaster-induced displacement. The focus on evacuations typically frames displacement as a short-term, temporary issue with the option for evacuees to return to their homes. This, however, ignores medium- to long-term planning for evacuees who remain displaced, where in reality, several disaster-related displacement events have not been short-term. The case studies of Carteret Islands and Manam Island indicate that short-term solutions for people

internally displaced by environmental changes and events are not effective, and rather long-term strategies building adaptive capacity could ensure sustainable resettlement for displaced people.

The review of existing policy framework reveals that environment and climate change-related migration has not been addressed in CCA or DRM policies. Similarly, migration-related policies do not deal with climate change and environmental migration. Section II of this report has exposed the inviolable nexus between climate change, environment and migration. Therefore, the Government needs to reconsider national laws and policies on DRM and CCA in terms of displacement, and integrate displacement risk into national laws and policies on DRM and/or CCA.

III.2.b Links between internal migration and urbanization

PNG's urban population is growing rapidly mostly because of rural-urban migration (Jones, 2012:11). Since most of the PNG population lives in rural areas where they are most vulnerable to climatic impacts, it is likely that in response to the increased vulnerability as a result of frequent flooding, storm surges and landslides, many people from rural villages will move massively to the cities to avail of better economic opportunities, and also as an adaptation strategy to climate change (Esteves, 2013:14). Moreover, poor or non-existent infrastructure in most areas in PNG hinders the movement of goods and services, which in turn undermines economic and social opportunities. Therefore, people are moving from rural areas to the cities for better access to markets, education and health services because of poverty, as well as limited economic opportunities; and in most cases, they end up in peri-urban squatter settlements (Wickham, 2010:18).

It has already become obvious that population growth in the urban areas is exceeding national growth rates and the availability of economic development opportunities. While the estimated urban population was 1 million persons in 2010, the National Research Institute (NRI) estimated that it is likely to rise to 3.5 million persons by 2030, more than double between 2010 and 2030. The increasing population in urban areas has presented many challenges, such as squatter settlements, lack of service provision, and increase in crime, unemployment and poor basic urban services. (UN-Habitat, 2014). The potential environmental migrants will put additional pressure on urban services and urban management, further straining basic services (Esteves, 2013:14). To reduce the potential negative elements of dwelling in informal settlements, efforts will be needed to support adequate housing and provision of services.

Current urban living is challenging due to extremely high land and housing prices and dysfunctional land titling system. Access to customary land in urban centres remains problematic. Many city dwellers are compelled to live in settlements – most with inadequate access to electricity, water and sanitation – and secure land tenure. Thus, living conditions in urban areas are rapidly declining, and PNG towns and cities are under major stress from unmanaged urbanization exacerbated by the major economic upturn generated by the multimillion-dollar LNG project in the Southern Highlands of PNG.

In this context, major challenges remain for urban planners and managers to find ways on how to facilitate access to customary land for affordable housing and other urban infrastructure (Numbasa and Koczberski, 2012:145). Key urban infrastructure and services, such as roads, drainage systems, as well as water and sanitation systems, have deteriorated over the years due to poor maintenance and increased demand of a rising population. Due to the absence of key urban policies, such as land use planning and housing, lack of capacity, poor management, and dysfunctional governance structures, all levels of government have become major stumbling blocks to the country's development. Unless properly managed, quality of life issues, such as urban security, customary land development and affordable housing issues will further deteriorate. Further research on internal migration trends to urban areas, urbanization planning and urban development is imperative to mitigate negative effects of rural-to-urban migration and ensure that Papuans live their lives in dignity. The concept of mega-cities and service centres would greatly assist in managing the movement of people and prevent their concentration in very few major locations.

III.2.c Land use planning

PNG has unique and diverse arrangements in land ownership that complicates the process of making the land readily available for resettlement of people likely to be displaced by environmental reasons (IDMC and NRC, 2014:1). Almost 97 per cent of all land is customarily/communally owned either by individuals or under some form of clan ownership, and only 3 per cent is alienated land owned by the State (Kaluwin, Ashton and Saulei, 2000:18; Department of National Planning and Monitoring, 2010:19). Unfortunately, traditional landowners with short-term cash needs and desire for development through the sale of timber have often outweighed the long-term needs for conserving their resources for future generations (Kaluwin, Ashton and Saulei, 2000:18).

The NUP identified shortage of land for urban development as a hindrance to sustainable development. The absence of adequate land use plans or proper management frameworks results in increased vulnerability, low quality of life and natural resource exploitation. With the lack of a national land use policy

and the national housing policy, land allocations based on housing needs are not met. Hence, the demand for shelter in urban areas far exceeds supply, fuelling the growth of squatter and informal settlements. The problem is worsened by corruption associated with multiple land sales and the lack of effective land management and administration systems. There are also no up-to-date cadastral surveys and land information systems (UN-Habitat, 2014). Moreover, more people are losing lands due to flooding and inundations.

The NUP aims to facilitate the provision of adequate supply of land – that is, customary, State and private – so that there can be a robust land market and orderly urban development. It is essential that land is made available to meet the increasing demand, thus supporting current and future economic and social needs in improving urban development. These lands can be allocated for resettlement of people displaced by the impacts of climate change and/or those who have lost their land due to flood, inundation or sea-level rise. The NCCDMP identified the necessity of land acquisition in the future for implementation of climate-related projects (including resettlement of displaced persons). Given that most of the land are customarily owned, the NCCDMP urged for the introduction of "proper land mediation process to facilitate the development of land for adaptation and mitigation projects" (OCCD, 2014:40).

Land use planning is hindered by lack of a national land use policy and associated uncertainty in the forestry and land use sector, which poses a particular challenge for forest conservation and reduction of emissions efforts. The Government of Papua New Guinea needs to develop a land use planning scheme to identify the best use of land. This will ensure that the natural environment supporting the diverse culture is protected, that a particular economic activity is suitable for the designated parcel of land, and that there is sustainable economic development. The Department of Lands and National Planning Office could play a defining role in sustainable natural resource management in PNG by leading consultative development of a national land use policy to coordinate forest and land use management.

III.2.d Community-based policy formulation and implementation

Vision 2050 stresses that "the successful realization of Vision 2050 depends on the level of citizen participation and ownership" and to ensure effective citizen participation, it stresses upon increasing "access to finance, land, and other resources" (The Independent State of PNG, 2011:14).

The community is able to assess the practical methods of coping with the situation with local capacity. When the community is engaged in planning and policy design, their leaders in the community will design a vision. They need to be in

control, giving the tasks of setting priorities, allocating duties, setting development priorities within local context with a forward-looking attitude, and identifying priority adaptation and resilience building. As UNHCR Regional Representative in the Pacific, Richard Towle, urges "finding solutions […]means listening, consulting, and responding to the specific needs of affected populations – whether they be coping mechanisms and adaptation or eventual relocation" (Farrell, 2009).

Given that ongoing negotiation with the host communities on resettlement would ultimately affect the rights and obligations of the prospective resettled community, IOM recommended involving the Carterets people in both the negotiation and resettlement process (IOM, 2011:1). Additionally, since the neighbouring communities' land, fishing and gardening rights are likely to be violated by resettlement, they also need to be integrated in the process (IOM, 2011:2).

III.2.e Labour migration as an adaptation strategy

Adaptation strategies to climate change and environmental degradation define how populations reduce vulnerability to and build resilience against those changes. CCA strategies allow people to remain in their original settlements by reducing vulnerability to and building resilience against climate change (ACP, 2011:19). CCAs include: (a) adaptation of agricultural practices (for example, drought-resistant crops); (b) building of infrastructure, such as dikes and coastal barriers; (c) voluntary labour migration; and (d) planning of resettlement if it is impossible to remain (Martin, 2010; ACP, 2011:19). Traditionally, seasonal and circular labour migration has always been used as an adaptation strategy to cope with the degradation in the environment (ACP, 2011:9). It is confirmed by many contemporary studies that "migration is a widely used adaptation strategy that reduces risks in highly vulnerable places" (Warner, 2012; Adger et al., 2014:770). Research drawing on experience of migration policy concludes that a greater emphasis on mobility within adaptation policies would be effective when undertaken in a sensitive manner (Bardsley and Hugo, 2010; Barnett and Webber, 2010; Warner, 2010; Gemenne, 2011). This emerging literature shows that migration can be promoted to successfully reduce risks. The prospect of migration as an effective adaptation strategy is recognized by its inclusion in the 2010 Cancun Agreements of the UNFCCC (Warner, 2012).

While migration is a traditional adaptation to relieve environmental stresses and shocks, it is not prominently recognized as a form of beneficial adaptation in the policies of PNG (ACP, 2010:17). In this context, it is recommended that the Government of Papua New Guinea explore the scope of facilitating migration as an adaptive strategy to cope with the adverse situations low-lying island communities likely face during displacement. Therefore, policy measures need

to facilitate voluntary movements out of vulnerable regions by: (a) providing microfinance schemes and education; (b) facilitating remittances, knowledge and skills transfer to vulnerable communities and access to labour markets; and (c) developing international temporary and circular labour migration schemes for environmentally vulnerable communities, particularly at less advanced stages of environmental degradation (ACP, 2011:20).

Labour migration is an essential catalyst in the development process that may play an important ongoing role in PNG's development. Both internal and international labour migration can enhance the adaptive capacity of the migrant-sending community through the generation of remittances and reduced population pressure on homeland environments. The great majority of PNG citizens live in rural areas and work in agriculture. The PNG LNG project is likely to attract both internal and foreign labour migration. The rural people, who are most vulnerable to adverse impacts of climate change, feel more motivated to work in the LNG project. Therefore, careful planning is needed to engage them in employment-generating capacity of coping with adverse situations brought by climate change.

It is necessary to devise clear and effective policies, as well as organizational structures promoting international migration – particularly social integration of the migrant population, labour migration and consequent exchange of ideas, skills and knowledge – to enhance its human and economic development. Although the Government of Papua New Guinea actively participates in a wide range of international labour mobility schemes, such as the PSWPS with Australia and RSE scheme with New Zealand, the Government could explore further scope of international labour migration to facilitate future employment opportunities abroad for PNG nationals.

The Government may also engage in a region-wide dialogue on the issues of cross-border migration, relocation and resettlement. Under this initiative, lessons can be learned from other regions on how to incorporate displacement and human mobility issues into regional frameworks and policies – particularly the African Union's Convention for the Protection and Assistance of Internally Displaced Persons in Africa (the Kampala Convention). Voluntary temporary or circular labour can diversify family income and improve livelihood conditions of the region by transmitting financial and social remittances (ACP, 2011:19).

III.2.f Durable solutions for resettlement: Integrated approach to planned and managed relocation

Generally, people in the face of environmental vulnerabilities primarily try to cope with the adverse situation. However, as stated in the SPCR, in some cases, planned relocations might be inevitable as a last resort. It is evident from the case studies of "relocation measures in Carteret Islands and Manam Island" that the resettled migrants received little assistance from the Government. Moreover, the resettlement measures partially failed due to insufficient livelihood measures for resettled migrants. Moreover, tensions over land rights, as well as loss of cultural and community cohesion, likely constitute some of the negative effects of population relocations (Ferris et al., 2011:20).

Multifarious challenges are involved in the resettlement of people in new safe areas. First, identifying and acquiring land that is suitable for resettling people is difficult. For a multitude of reasons, communities in nearby areas may not be in a position or necessarily want to make land available for resettlement. Moreover, governments may not approve of the settlement, and lands may be insufficient to support both the residential and livelihood needs of settlers. While prior relocation schemes in PNG have not been very successful, as in the previously mentioned cases, it is essential to focus on how the sufferings of the relocated people in the future can be mitigated. Aside from seeking funds for the programme and logistical issues, integration with local host communities and the re-establishment of livelihoods are some of the key challenges in every resettlement process (Ferris et al., 2011:20).

Relocation and resettlement measures for the people affected by the impacts of climate change need more coordinated, systematic and permanent solutions facilitated by the government, as well as NGOs, to avoid trauma, marginalization and upheavals associated with relocation (Edwards, 2013:53). Furthermore, participation of host communities and the settlers themselves is paramount. The relocation process needs to enhance the ability of settlers to meaningfully participate in the social and economic activities that will improve their living standard (ABG, 2007:7). It is essential to develop laws and policies on planned relocations based on broad stakeholder involvement, human rights, international norms and respect for cultural, socioeconomic and land-tenure issues. There should be a total approach, in which climate change and development must be integrated.

IV

CONCLUSION

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IV. CONCLUSION

PNG is susceptible to a wide variety of natural disasters, such as earthquakes, tsunamis and volcanic activity. Climate variability and change are set to accelerate the occurrence of landslides, soil erosion, deforestation, and loss of biodiversity, as well as increase the occurrence of recurrent floods and droughts. The agriculture and water resources sectors, as well as ecosystems and health sectors, will be hardest hit. Widespread poverty, limited and expensive access to inputs and markets, poor infrastructure, ineffective extension services, limited access to credit, corruption, safety and security concerns, and insufficient awareness or mitigation of environmental impacts all heighten the vulnerability of the local population across PNG.

The main challenge concerning migration in PNG is that there is lack of comprehensive and concrete data on internal and cross-border migration patterns (Esteves, 2013:5). As a result, inconsistent numbers and figures are found in the literature regarding people displaced by disasters. There are many reasons for these varying figures of migrants: first, there is no comprehensive monitoring of displacement at national and provincial levels; second, there is no clear definition of IDPs or environmental migration (IDMC and NRC, 2014:6). Moreover, IDPs are not yet considered as a distinct category of migrants that require special protection and assistance needs in PNG, whereas they face challenges specific to their displacement, such as: (a) disarticulation from their traditional land and livelihoods; (b) face difficulties integrating into the social and political life of the host community; (c) have hindered access to services, such as livelihoods and basic services; and (d) have little or no land tenure security. One initiative to address this gap is IOM's Displacement Tracking Matrix for people displaced by both disasters and conflict settings. Comprehensive data on the relationship between migration, environment and climate change is lacking in PNG, making it difficult to devise national and local adaptation plans. The majority of the statistics reveal various factors leading to displacement, and the influence of environmental change is difficult to determine because it can hardly be isolated from the other migration factors. In addition, migration influenced by environmental change is a cross-cutting issue that affects several areas of national and international governance. Therefore, this transversality on the topic of migration, environment and climate change makes inter-agency cooperation necessary, such as the TWG of the MECLEP project, since there is no single authority that is concerned with migration and climate change. Further research and analysis is required for an enhanced understanding of climate risks, drivers of migration, patterns and

extent of environmental migration, policy responses towards climate change and migration and planned and managed resettlement programmes.

Migration issues are being taken up more prominently in policies in recent years. In 2011, a section on migration was included in the households and census survey done in PNG (ACP, 2014). In response to the critical displacement scenario in Madang and Bougainville Provinces, separate institutions, namely Manam Restoration Authority and Atolls Resettlement Programme, were established by the concerned provincial governments. These institutions were given the authority to manage appropriate land and resettle the displaced people who failed to return to their original place and are currently living in government care centres or temporary shelters. However, the resettlement programmes encountered many complexities in relocating people from their traditional homelands and integrating them into existing communities that are geographically, culturally, politically and socially different. Moreover, the provincial governments have limited funds to implement the resettlement programmes for the large number of people already displaced and also those who are likely to be displaced in the near future and unable to return to their original home due to environmental degradation and natural hazards. Given the customary-based landownership system, the real challenging issue is indeed to manage land, "home", and livelihood for the displaced people in new areas. The local community and NGOs need to be involved in this process. Dialogue between settlers and host community will help identify the needs of the settlers and expectations of the host community. This communication will ultimately reduce the scope of potential conflict between settlers and host community. The international community, such as intergovernmental organizations and INGOs, also need to be involved on issues in internal displacement to fill up the resource constraints, both technical and financial, which hinder the protection of protracted displacement (IDMC and NRC, 2014:3).

Currently, there is a large number of people (at least 15,000 people displaced by disasters) living in protracted displacement either in government care centres or individually managed host families in PNG (IDMC, 2014). These are IDPs who failed to return to their homes either because they were extensively damaged or destroyed or because their origin area became uninhabitable due to environmental change. In both government-run care centres and host houses, these people have limited access to food, water, sanitation, health care and adequate housing. This number is likely to increase with the mounting effects of climate change. Given the current staggering conditions of protracted displacement in PNG, and projected displacement scenario with mounting impacts of environmental and climate change, the Government of Papua New Guinea needs to address the issues of migration and displacement as a priority, and "recognise it as both a humanitarian and development concern" (IDMC and NRC, 2014:3). The Government needs to

devise well-planned and managed relocation to ensure that displaced people can move to well-prepared resettlement areas and start a new life with dignity. The regulatory framework for climate change and disaster management needs to be revised and reoriented to include the concerns of migration and displacement.

The Government of Papua New Guinea has already taken various adaptation and development measures to improve the capacity of the people so they can adapt with the deteriorating effects of environmental change. In this respect, migration could be considered as an effective adaptation strategy and integrated into development planning. The rural people, who are the most vulnerable to the adverse effects of environmental change, are prone to displacement because of the lack of capacity and resources for sustainable livelihood. The adaptation and development programmes may explore the scope of engaging these people in booming industries, such as mining and LNG sectors, by providing the required training and education for employment. Simultaneously, the Government needs to enhance the international labour mobility schemes reinforcing the dialogue with regional countries, such as Australia, New Zealand and other developed countries. The remittances earned through international labour migration can potentially improve the capacity of rural people and help diversify family income. Thus, migration, if facilitated as a form of adaptation strategy, may help build the resilience and capacities of environmental migrants in PNG to tackle the challenges posed by environmental and climate change.

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ASSESSING THE EVIDENCE:

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