MANAGALAS

A community case study on climate (im)mobility from Papua New Guinea

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Acknowledgements

Communities

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1. Research Context

Climate change is intensifying with a wide range of challenges to the sustainable development and resilience of all Pacific Island countries. Pacific political leaders collectively and individually continue to underscore that climate change remains the single greatest threat to the livelihoods, security, and wellbeing of the peoples of the Pacific. Community leaders also emphasise the need to mitigate and adapt to the effects of climate change because communities want to continue living in their own countries and villages, for as long as possible.

Mobility has always been a part of Pacific ways of living and is part of our resilience. This means that mobility is a measure of last resort when other options for the ongoing flourishing of life have been exhausted. In the context of climate change, mobility includes a broad range of responses influenced by individual, family, clan, tribe, and community circumstances. It can include temporary movement of people within and between communities, provinces and countries to support community resilience (e.g., via internal recruitment for work and international labour mobility schemes), relocation of people and communities within a district or province or country (whether voluntary or not, including in response to climate-related hazards), and permanent migration across the Pacific or further afield.

Consideration of climate-related (im)mobility also needs to account for other common forms of human mobility such as displacement, where people for forced to leave home to save their lives, and immobility, where people and communities adapt and respond to climate change without everyone moving, whether that 'immobility' is voluntary or not.

Climate change is adding to existing drivers of mobility, especially economic mobility, in the Pacific and elsewhere. Attributing current mobility decisions to the direct effects of climate change can be difficult, but climate change-related hazards will impact Pacific Island peoples' wellbeing including their heritage, culture, language, and ancestral connections to land; security, including water shortages, the actual loss of land and increased risk to life from intensifying extreme weather events; and livelihoods, including salt-water intrusion affecting agricultural production.

This case study is one of 17 undertaken as part of a comprehensive research project, funded by the New Zealand Ministry of Foreign Affairs and trade (MFAT), known as Climate Immobility Research in the Pacific. The overall goal of the research is to "enhance Pacific resilience and well-being and ensure the livelihoods, security and well-being of the peoples of the Pacific are protected in the context of climate change" (MFAT, 2021, p. 25). Underpinning the overall goal is acknowledgement of Pacific values, knowledge and culture, and Te Tiriti o Waitangi. Each case study explores themes of climate and hazard risk factors, resilience and decision-making practices, mobility patterns, land and marine tenure, understandings of wellbeing and climate mobility associated loss.

This case study was undertaken in Papua New Guinea (PNG), an island country in the western Pacific, northwest of Solomon Islands. The estimated population in 2021 was 11.8 million.

2. Managalas

The place

The location for this case study is the Managalas Conservation Area (MCA) in the Oro Province, which includes the rural communities of Serepuna, Naukanane, and Itokama.[1] This legally designated conservation area covers 360,000 ha. It is also referred to as the Managalas Plateau.

The MCA is a pristine native forested plateau, 1300m above sea level,[2] that lies west of Tufi government station and south of Popondetta – the capital of Oro Province (See Appendix 1 and 2) and Morobe Provinces.

The MCA is an area of rich biodiversity with relatively low population density. Community leaders have long recognised the value of the physical, cultural, and social environment of this unique area. By attracting global attention and resources to this unique model of a locally driven conservation project, the community have ensured the sustainability of

[1] For the benefit of this paper, we refer to all three villages as Managalas even though they are three separate villages.
[2] For the purposes of this study, we consider this a 'high land' inland area because most other communities are at lower altitudes and are coastal. However, we recognise that the Highlands regions in Papua New Guinea reach elevations up to 4,000 m and have their own climate dynamics.

their home in the face of strong threats from resource extraction and climate change (Schimel, 2019). Being situated at an elevation of around 1300 m, the main impacts of climate change are unseasonal drought.

The people

Managalas residents are Indigenous to their lands and waterways. They have ancestral origin stories as well as historical stories of mobility. In 2011, there were about 22,000 households comprising 152 clans, 11 tribes, 60 villages, and 49 settlements in the Managalas area. They represent a community that is 'staying in place'; however, this does not mean they are immobile. Rather social, cultural, and economic activities require considerable everyday mobility, as well mobility that involves staying overnight elsewhere.

Four main languages are spoken: Birari, Namiae, Samoi, and Ese. The former two are spoken by people on the western side of Managalas, while the latter two are spoken by people on the eastern side.

As mentioned earlier, this research was conducted in the villages of Serepuna, Naukanane, and Itokama. Population figures and ward locations for these villages from the 2011 census were:

- Serepuna (Kokoro ward) – 196
- Naukanane (Ufia ward) – 552
- Itokama (Ufia ward) – 254.

In total, the Afore Rural Local Level Government of the Oro Province (in which the MCA is located) had a total population of 18,535 people in 2011 (National Statistical Office Papua New Guinea, 2021).

For many years, community leaders across the plateau have been caught in the unenviable bind of simultaneously wanting to continue traditional land-use practices, such as clearing new land and hunting wildlife; protect the area, especially birds-of-paradise; and earn money for school fees and health care.

In the past there were many opportunities to lease land for logging, gold mining, and oil palm plantations, but these arrangements have been recognised as being destructive to the environment.

> In 2017, the community leaders voted for conservation, and the government of Papua New Guinea declared 360,000 hectares of the plateau—nearly its entire reach—as a legally designated Conservation Area. The move blocked mining, large-scale logging, and other activities that threaten its biodiversity, but allows sustainable agriculture and limited construction of roads and other necessary infrastructure. It was a rare conservation success story in a region increasingly shaped by the twin forces of resource extraction and climate change, and it offered a unique model of local, community-driven conservation. (Schimel, 2019, para. 5)

The Managalas Project is a multiyear programme made up of multiple linked projects and initiatives that are primarily built on the foundational and conditional investments of communities and individuals residing in the MCA. Local input is augmented with co-investments from central government, provincial governments, multilateral donors, bilateral donors, private sector corporates, and private investors (Schimel, 2019).

A key feature of the Managalas Project is the aim to reinforce and strengthen the social capital and bonds amongst tribes, clans, villages, and individuals. The goals are to develop a green economy, raise awareness and appreciation of the Managalas Plateau, and create opportunities for other provinces to learn from Managalas. Initiatives include a solar energy farm, green agricultural programme, and, in time, a green economy that is the first of its kind.

Community leaders are aware of the impacts of climate change and were interested in sharing their stories of mobility even though their current concerns are focused on things like pressure on land and clean water.

3. Methodology

The research project *Climate (Im)mobility in the Pacific* was co-designed to utilise both formal and informal Indigenous qualitative social science methods. For each country

involved, the research approach was guided by methodological contributions and insights from Indigenous scholars to ensure consistency with Indigenous research principles.

The research approach taken and used in this study is one that is Pacific-oriented but anchored in and aligned with Te Titiri o Waitangi, recognising Aotearoa New Zealand's unique identity in the Pacific. On this basis, the Managalasian approach has been adopted in reflecting the values, knowledge, and culture of this people as much as possible.

Relationship building, ethics, and community approval

Professor Yvonne Underhill-Sem invited colleagues at the University of Papua New Guinea (UPNG), where she used to work, to be part of the project. They were enthusiastic and agreed to facilitate research approvals at the PNG end. A member of the University of Auckland (UoA) research team travelled to PNG in October 2022 to start the co-design process, and this was followed up, in April 2023, by two other members. This face-to-face engagement was critical to establishing trusted research relations, which was necessary since the UoA team did not get their PNG research permit in time to join the research team in Managalas.

The UoA research team obtained UoA Human Participants Ethics Committee approval on 29 March 2023. As part of the ethics application, we had already secured support from UPNG in the form of a letter of understanding between the Dean of the Faculty of Arts (UoA) and the Vice Chancellor of UPNG. This outlined the mutually beneficial aspects of the research collaboration and specified each party's responsibilities and commitments, including the allocation of resources.

Permission for the study was granted by the governor of Oro Province, Gary Juffa, as well as the community leaders on the plateau. A PNG research permit was finally granted on 10 October 2023, but this was too late to participate in the research. Instead, we worked remotely with the in-country researchers.

Research team

The PNG research project was overseen by Professor Graham Sem, a Papua New Guinean climate change scholar at UPNG. Two of his colleagues, PNG scholars Dr Madeline Lemeki and Dr Alfred Faiteli, were the lead field researchers. All are from provinces in the southern part of the country near Managalas. Professor Sem has visited the plateau many times in his role as principal scientist for the Managalas Project.

Participant and village selection

Initially, five communities were selected for this case study. These communities were Serepuna, Kokoro, Koae, Naukanane, and Itokama, visited over 3–4 days. Due to circumstances beyond our control, the time for the survey was reduced to only 2 days. Thus, another approach was taken to combine Serepuna and Kokoro in one session and have separate sessions for Naukanane and Itokama. However, time did not allow us to carry out the survey in Koae, so it was not included in the study as initially planned. The selection of these villages for the study generated many interesting stories and differences as well as clarifying many issues that would not have been identified if only one place had been selected for the study.

Table 1 demonstrates the number of participants recruited to each study activity in each village.

Table 1: Number of community participants

Day	Community	Key informant interviews	Men's discussion group	Women's discussion group	Youth discussion group	Total
2	Serepuna & Kokoro	6	3	6	11	26
3	Naukanane	10	3	9	11	33
3	Itokama	5	3	7	10	25
Total		21	9	22	32	84

Times frames for this research had to be changed from the original plan due to unexpected logistical issues including security issues on the main road leading to the plateau, the nonavailability of transport, unexpected visiting dignitaries, and the nonavailability of researchers as time frames changed. Eventually the research team had only 2 days to undertake the research, which is why they focused on three village communities in the central Managalas area within walking distance of the airstrip. The

revised plan meant that Dr Faiteli stepped in to lead a group of research assistants from UPNG to Managalas Plateau. This team was highly experienced and generated substantive material in the short time they had.

See **Appendix 3** for more detail on participants, including gender and age group breakdown.

Methods

The methodology used in this study was qualitative. Key activities were tok stori focus groups and key informant interviews.

These activities involved four main groups of people:

- village community leaders (mostly clan leaders and village elders)
- male community leaders and members
- female community leaders and members
- young people (male and female).

For each of the communities visited, four sessions occurred simultaneously. These sessions were the key informant interviews, and the tok stori discussions for men, women, and youth.

Tok stori focus groups

Research assistants received specific direction on how to pose questions to the adult groups via a fieldwork manual. The approach for youth was different, with the team using less formal conversation and asking about their views on how they saw their future at different points in time.

Key informant interviews

Questions were focused on traditional forms of mobility and the reasons for moving, or not, and the places of they moved from and to – origins and destinations.

The research team also asked each clan leader to explain the meaning of their clan name and the importance or significant feature of their clan and its contribution to the community. This was an innovation on the part of the in-country research team that understood that there were mobility stories that sat behind the explanations of clan names.

Figure 1: Interview with Naukanane Clan Leader

Naukanane village, 2023. Photographer: Dr Alfred Faiteli

Data transcription, analysis and sensemaking

All interview and workshop data were transcribed into English and coded using NVivo 14 data analysis software. Photographs and video clips were discussed so that all team members could share their insights. Research reports and reflections were produced and translated into English for dissemination of the findings.

In the next section, we present historical information about mobility relevant to the people of Managalas followed by feedback and findings that reflect a community proud of their intact cultural heritage and motivated to 'stay in place' despite environmental and socioeconomic challenges.

4. Historical Mobility and Settlement

Oral traditions in the Managalas area identify migration routes over generations from the mountains to their current place of residence, which are distinct from tribe to tribe and further differentiated by clans. While ancestral stories cover time periods that are truncated in ways other than western notions of centuries or years, historical mobility patterns are best understood in generations. Most historical stories extend back five or six generations to about the beginning of the 20th century.

According to a common legend, migration of people to the Managalas Plateau started from a cave called Muni in the Kokoda area when four brothers ventured out to find better hunting and settlement areas for their growing population. They moved to a sacred place called Awangol beneath the foothills of the Owen Stanley Range and then took different migration routes to find new settlements away from warfare and pestilence. Two of these brothers settled in the eastern part of Managalas and the other two settled on the western side. This became the origin of the four distinct languages of the Managalas people: Birari on the northwestern side, Namiae on the southwestern side, Samoi on the southeastern side and Ese on the northeastern side of Managalas.

From these original tribes came numerous (156) and distinctive clans, now scattered throughout the area. Each of these clans belonged to a common tribe that can be traced back to its origin using genealogical lineages traced through migration stories. This suggests there are Indigenous precedents for mobility and culturally appropriate ways to move to new places. For example, members of the Deubi clan in Itokama are related to the Manoiko clan in Serepuna who are related to the Tamaru clan in Kokoro who are also connected to other western Managalas clans through a genealogical connection that is revealed in the legends and myths of these people.

There are several factors that have influenced migration of people from their ancestral lands in recent times. For instance, migration from ancestral land for clans living in Itokama was prompted by factors such as schooling, health, and numerous new developments.

Itokama formed as a unity of different clans coming together to reside collectively. Originally it was called “I Tuama.” But before independence in 1975, a colonial officer renamed it “Itokama,” which translates to “sharing together.” Despite this, local people are now moving back to their individual ancestral clan lands to cultivate gardens. Table 2 shows clans identified during the interviews and discussions.

Table 2: Clan names and place

Name of village	Name of major clan	Name of subclans
Serepuna	Manoeko and Majanko	
Kokoro	Kavako, Zambiko, and Tamaru	
Koae	Sako, Moiko, and Dafari	
Naukanane	Kanamane, Sanai, and Vajamo	Suware, Simo, and Munumbi
Itokama	Deubi, Loiko, and Uva	

It was intriguing that when asked about the archaeological sites in their oral traditions and clan histories, many participants in this research said they knew the locations of these sacred and important places. Some said they had been to these places and that they hold strongly to these stories and sites as part of their cultural heritage and identity.

5. Faith, Education and Mobility

Community members had clear ideas about the importance of faith and education in their villages; faith was paramount:

> *The leadership, particularly within the Barai and Manangula communities, thrives on a foundation of faith in God. For the Manangula people, survival is deeply rooted in their strong faith and belief. They put their trust in prayer during trying times, relying on their spiritual connection to guide them through adversity. This faith continues to grow and sustain them, reinforcing their belief in themselves and in the provision of a nurturing land and environment. (Member of the Naukanane men's community workshop)*

These proclamations of faith were widespread and offered much comfort to many. New faith-based entities have been invited into villages, and in the process have created new mobility patterns as adherents moved to be closer to their places of religious celebration. In addition, many faith-based entities are involved in events outside the plateau thus setting up flows of people to religious events. These are often small events, and not everyone travels, but they contribute to building relationships in other places.

Education was highly desired in the communities, but costly:

> *I'm facing difficulties providing for my children's education, especially in high school. With two or three children attending, the expenses for school fees and necessities like clothes become overwhelming. As a gardener, my income is*

limited, and it's challenging to sell my produce for sufficient earnings. (Member of the Itokama men's community workshop)

Higher levels of formal education, secondary, tertiary and vocational, are not available on the plateau, so students must leave. Some return, but most complete their studies and remain in towns where they seek wage employment.

Development on the plateau is also designed to provide sustainable income-earning opportunities that would be attractive for trained and educated community members. Projects that are part of the MCA aim to create economic opportunities to attract young people to stay or return after education.

In addition to these expressed plans to retain community members and attract returnees, there was also a recognition that a modern family planning service was needed to ensure families could have the number of children they could afford:

After a year or two in high school, my children often must stop due to financial constraints. This situation strains our household, leading to their return home and inability to continue their education. It would be beneficial to implement family planning measures within our community to receive support in managing our children's future education and ensuring their successful completion of higher studies. (Member of the Itokama men's community workshop)

Our once fertile soil is losing its richness because of climate change, chemicals, and various impacts affecting garden after garden. Additionally, our language, the Barai, is transitioning towards Pidgin, English, Tok Motu, and other unfamiliar languages, signaling significant cultural shifts. These changes significantly impact our community. However, thanks to the consensus-building foundation laid in our plateau, despite the influences and alterations, people remain connected. (Member of the Naokanene men's community workshop)

Figure 2: School classroom in Itokama

Managalas, 2023. Photographer: Dr Alfred Faiteli

6. Subsistence Gardening, Mobility and Wellbeing

In the Managalas there is a new focus on delineating areas for different purposes like gardening, cultivation, reserves, hunting, and conservation. Allocating specific places for gardening ensures everyone knows their designated area; however, the challenge lies in effective management:

> *Recently, there's a trend among the younger generation to construct houses wherever they please, often disregarding guidance from community leaders. While some follow guidance diligently, others hastily build incomplete houses or frequently move in and out. Consequently, the community is rapidly changing, with individuals settling in various locations – some in front, some at the back, and others wherever they find suitable. (Member of Naukanane men's community workshop)*

Given the importance of subsistence gardening to survival, some people from Itokama are moving back to their individual ancestral lands to cultivate gardens there rather than be bound by the rules of the MCA, which prohibit them from traditional slash and burn gardening practices.

Gardening practices affect migration between Itokama and ancestral lands, which may be elsewhere on the plateau. Traditionally, gardens are located further away from the

village. This is a traditional resilience strategy that allows communities to diversify their food supplies and mitigate risks associated with environmental changes.

Subsistence gardeners rarely have a single garden because there is high risk of disease and physical destruction by weather events, and possibly wild pigs. If drought spoils one garden, there is another garden to get food from. Gardens are made next to the river, in the mountains, and close to the village. This practice of having several gardens is a tradition passed down through the generations. Traditional practices of reciprocity also prevail.

People in the village take care of each other, for example, if a woman with many children runs out of food during a drought, she can always go to her sister who has fewer children and get food from her. This is an example of why social relationships and social networks are critical when thinking about mobility.

Due to climate change, communities are noticing changes in cultivation and harvesting seasons. In the past, ancestors cultivated according to seasons. Now, the current generation diverges from the traditional calendar, and planting and harvesting may occur at any time. There was a sense of pride in being able to adjust gardening practices to account for unseasonal changes, but also frustration that new patterns of subsistence gardening were not informed by traditional practices.

New and often faster growing crops have been introduced from other places and brought into the plateau, for example different types of green vegetables and root crops. This positively adds to food security and pride in the community that they can consume locally grown, home-produced food from their own gardens rather than store-bought rice and canned food like fish or corned beef.

> *This food is fresh and abundant in vitamins and essential ingredients that our bodies need for strength, energy, and overall wellbeing. Our shift towards consuming local, homegrown food has made a significant difference in our health. (Member of the Itokama men's community workshop)*

7. Land Ownership

The allocation of land is determined by the clan chief and the head of the family, typically the eldest male in the family.

> *As the firstborn, I am often responsible for managing the areas of land cultivated by my father. It's my role to make decisions and assign plots to my brothers for gardening purposes. This responsibility is passed down from the clan chief to the father and then onto me, as the firstborn and next of kin, to make decisions regarding land allocations within our clan boundaries. (Member of the Itokama men's community workshop)*

> *Land is passed down to sons and the father decides who the landowner is. If the father chooses the first born, then anyone living on that land is under the firstborn's wings. (Serepuna key informant).*

These traditional practices favour men, with women often losing access to land when they marry. However, this is changing as women have been claiming their rights to land, which has caused some tension. Women claiming this right has meant that land is in higher demand which affects boundaries and has flow-on effects in future generations. It also means people might need to travel further to gardening land.

> *Through clan discussions spanning more than three decades, we've established clear knowledge of where each family and clan resides, their limits, and how to coexist. Disputes occasionally arise, but our community has mechanisms to resolve these by revisiting agreements and finding compromises that ensure peaceful cohabitation and resource utilization. However, the rapid surge in population is now causing concerns. This growth might lead to land disputes in the future, despite our existing understanding of boundaries. (Member of the Naokanene men's community workshop)*

Figure 3: Welcome ceremony for researchers

Serepuna, 2023. Photographer: Dr Alfred Faiteli

8. Water Security

There were considerable discussions about water contamination and shortages. Itokama had a river nearby that did not dry out, but Serepuna struggling with availability during dry periods:

> *It used to be okay before but lately due to climate change, there has been longer periods of dry season where the smaller creeks nearby tend to dry out, so the villagers have to go further to the bigger rivers to do their washing and fetch water for cooking, and because of this reason, access to drinking and cooking water is harder due to the mountainous nature of the area. (Serepuna key informant.)*

However, over time, water quality at Itokama has noticeably declined:

> *In the past, our ancestors used to enjoy good-tasting water. However, today, it has become incredibly challenging. The water does not taste good anymore due to the increase in population and activities within our community, affecting its quality. (Member of the Itokama men's community workshop)*

Water contamination examples given by community members included the use of detergents for washing clothes, throwing waste in waterways (i.e., empty bottles and leftover food) and even improper disposal of human waste. The contamination has meant that people have had to relocate to other parts of the village, or even further to another village, to find cleaner water sources for drinking. Contaminated water is used for cooking but not drinking, however other practices of using the same creek for both washing and drinking has led to health problems.

In forested areas, community members talked about having excellent flowing water compared to villages where trees have been cut down. They attributed the decline of water quality in the villages to land development for gardening, clearing sections of the bush where the river flows, and the direct exposure of the water to the sun. Reduced access to clean, fresh water for drinking and washing has had a range of consequences:

> *Some of our toilets have been built close to these water sources, contaminating the water we drink. (Member of the Itokama women's community workshop)*
>
> *Regarding our school, the lack of proper water facilities during the dry season poses a challenge for students and staff. They often have to seek water from distant locations, making it difficult for teachers to attend school consistently. The absence of adequate water supply at the school leads to exhaustion among both students and teachers. (Member of the Itokama men's community workshop)*
>
> *Previously, people had easy access to drinking water because the water springs nearby had flowing water. These days people have to walk some distance to wash and bring back drinking and cooking water. Drinking water comes out from the rocks in the ground. These springs of water are away from the village, so women have to walk far to get water. It's usually the women who collect water. (Serepuna key informant)*

There have been campaigns by national and local government and NGOs to emphasise the safe use of springs with a clear distinction between activities in different parts of the village, and there has been some improvement. Having clean safe water sources is an important factor to enable staying in place.

Water availability also affects subsistence gardening:

When the dry season comes, some food in the gardens gets dried up and dies so banana trees are planted near the rivers where they survive the dry season and are preserved for consumption. (Member of the Serepuna women's community workshop)

Despite these challenges community members remain resilient with planting techniques. Women are key to the resilience of the community with the large role they have when it comes to planting:

Most of the planting and harvesting too is done by women. So, one can only imagine the burden of work that increases for women during dry season. However, women still feel that it is their responsibility to find food to feed their children and husbands. (Member of the Serepuna women's community workshop)

9. Decision Making

There was a commonly expressed opinion amongst the participants about the benefits of a collective society:

For our future, a comprehensive integration of our ancestral culture, education, and the teachings from missions and churches is crucial …To ensure a normalised and beneficial change, it's imperative that everyone embraces this collective way of life for our community's betterment. (Member of the Itokama men's community workshop)

In communities on the plateau, decisions are crafted collectively, often through traditional gatherings known as *kuaefienami* in the Barai language. Ultimately, decisions are consolidated into community laws that everyone commits to follow:

The decision-making process involves various stakeholders such as council members, community leaders, law-enforcement authorities, prominent figures like the chief of chiefs, clan leaders, church representatives, mothers, and the youth. We gather collectively to discuss various issues and reach agreements on matters of discipline or issuing warnings. Through discussions, we aim to find mutually agreed-upon solutions that address the concerns raised. Once a consensus is reached, these decisions are communicated to our villages, clans,

and families, ensuring that everyone is informed and aware of the outcomes from our discussions. The leaders collaborate closely with the community to formulate these solutions, fostering awareness and understanding among the people. (Member of the Itokama men's community workshop)

In Itokama, there are community laws aimed at improving living standards. People are very conscious of them. They understand the impact these laws can have. There is a sense that if anyone violates these laws, the government might intervene and perhaps the police might get involved. While some might be a bit careless and disregard them, most people follow these laws diligently.

The church is also key in decision making and resolving conflict:

The church holds a significant role in our community and across the plateau. It's incredibly important. Pastors and leaders within the church play a major role during times of trouble. They actively engage in reconciling issues that are difficult for our cultural practices or individuals to resolve. Their efforts, such as organizing crusades and reconciliation processes, greatly contribute to restoring peace and harmony within our community. (Member of the Naokanene men's community workshop).

10. Thoughts on (Im)mobility

The general findings from all groups interviewed for this case study (clan leaders and elders, men, women, and youth) was that most were not in favour of moving from their place (in the context of climate change or any other reason). The decision to move rests with couples:

Decisions will be made by married couples for themselves and their children. They may move temporarily and return when the situation returns to normal. The decision to move is personal. (Serepuna key informant)

Community participants never thought seriously about mobility, displacement, and relocation in the event of a natural disaster, when people would be left vulnerable to food and water shortages. The Managalas people come from communities and societies that have high levels of intact cultural heritage and preservation linked to their natural

environment. Their conservation practices are a testimony to the sustainability of the people through good and bad times.

When discussions turned to the volcanic eruption of Mt Lamington in 1951 and Cyclone Guba in 2007, the participants said that they were not greatly affected except for breathing in thick ash for a few days. Apart from that, during these natural disasters they survived living on the natural resources they had available: garden food, water, fruits, seeds, and edible leaves from the forest – just as their ancestors had done for generations.

To them, the option of moving either by displacement or relocation is one that they do not envisage or see as an option because their traditional and social organisational structures and networks are intrinsically and intricately connected and embedded in nature for their sustenance and survival. This can be seen in their art (tapa designs), clan names, village names, and legends, which all relate to the forest and its surroundings. For example, some of their clan totems refer to the green bamboo, banyan tree, and pikus tree, while their village names refer to the wild breadfruit, okari nut, and bush cucumber.

> *That is the position of the Managalas people. If I relocate my living standards will get worse. Therefore, I would prefer to remain on my own land regardless. I am willing to move within the Managalas area only, close to my home, the places, and people I am familiar with. I will not move far away to another province or to another location because life would be worse in a relocated environment. People from other places have their own challenges and resources. They will share for the first few days, but the longer I stay, life will get tougher for me, therefore, I prefer to remain in my village and not get relocated. (Naokanene key informant)*
>
> *If there is a major natural disaster, it will be difficult for me to move to neighbouring villages, or to my spouse's village or other locations. The only way to move out of Serefuna would be with government support to settle somewhere, and when the disaster is over, I would be returned to my own land. It is only through government support and evacuation that I will move. (Serepuna key informant)*

Of the challenges the communities mentioned, the most significant was the possibility of relocating due to population growth. Many families have made Itokama their home,

having arrived for government service. Leaving Itokama and returning to their original homes is difficult:

> *Our children, born here, make this place our own. Our connection to Itokama is strong; it's where our roots are. Although we might consider tending gardens or other activities back in our original places, essentials like the airstrip, school, and health facilities anchor us here. These services are integral to our community, so we maintain and care for them collectively. Unity binds us, making it hard to imagine separation or going back, as we've grown and built our lives here. (Itokama key informant)*

Comments like this signal the existence of more than one narrative of movement and staying. One narrative is the pride in being able to stay and survive on ancestral lands, notwithstanding the need to manage water and other resources like land carefully. Another narrative highlights the desire to remain close to education, health, and religious services that the larger towns offer, but having ancestral roots elsewhere on the plateau. Moving and staying become one and the same thing to continue living on their own lands. That is some need to leave - for instance young people who have the opportunity for higher education - for others to remain on their ancestral lands.

> *So, we were born here, making us citizens of this community. Moving away is difficult, especially considering our connections and resources here like coffee and other essentials. Staying is a choice, yet we plan for our children's future. I'm starting to cultivate a garden on my land for them. In case circumstances change, they'll have a foundation. Although it's hard to leave, we understand the need for change. We're deeply connected to this place, but life brings change, and we adapt. (Itokama key informant)*

> *Our origins from various villages brought us together here due to unity, love, and shared values. We value the community, government services, and those who contribute here, such as church leaders, educators, and health workers. (Itokama key informant)*

> *We've reached a collective agreement: while we can stay and cultivate gardens here, it's important to teach our children about their roots and ancestral lands.*

They should understand where their original land lies, even if we may eventually need to relocate due to future changes. We wish to preserve the unity and essence of our community, maintaining the spirit of Itokama. (Itokama key informant)

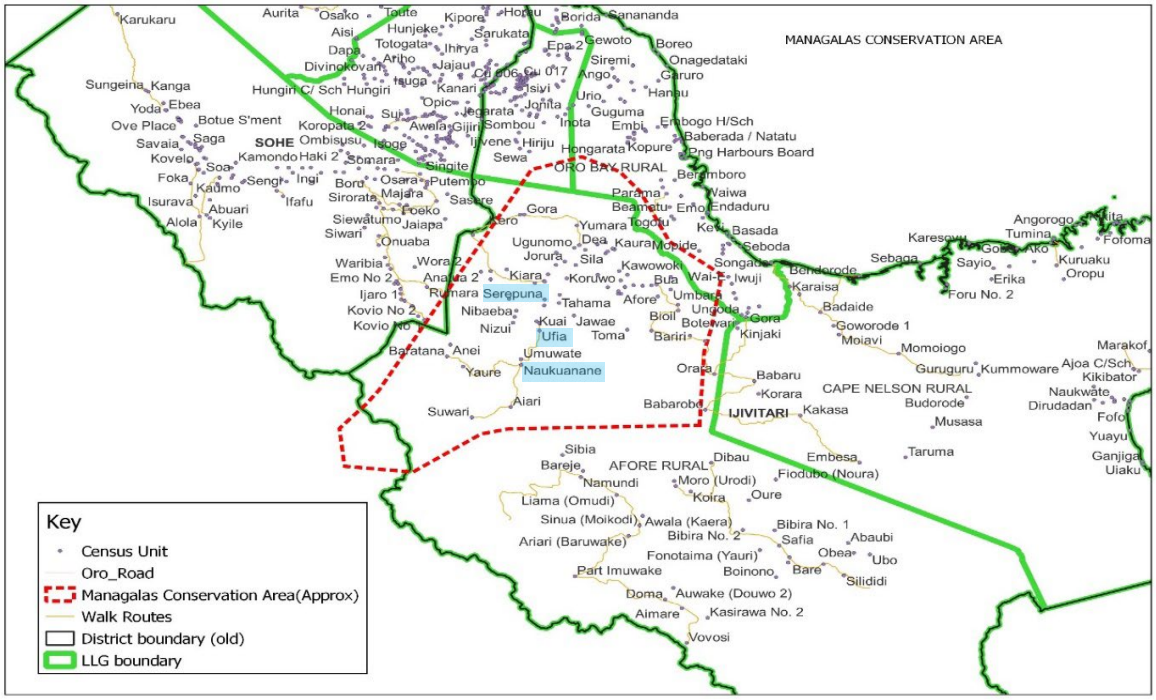
The co-existence of these sentiments provides for a range of possible mobility futures, but climate mobility is not a prominent one. Even in a relatively low-density area like the Managalas plateau, the drivers of mobility are still mostly social and economic. Population growth is an important social driver that could be addressed by investing in comprehensive reproductive health programmes. The development of the MCA provides opportunities for attracting educated and trained people back to their homelands. These are mobility patterns that are new and emerging, with climate mobility playing a less significant role.

Appendix 1: Map of Papua New Guinea and Communities

Figure 4: Map of Managalas and Matupit locations in Papua New Guinea

Appendix 2: Detailed Map of Managalas Conservation Area and Surrounding Villages

Figure 5: Detailed map of Managalas conservation area and surrounding villages



Map generated by in-country fieldworker under guidance of Dr. Alfred Faiteli.

Appendix 3: Community Research Participants

Information in this section was taken from the forms returned by the in-country researchers. It differs slightly (10 fewer) from the information in Section 3 above which was written before all the forms were collated. Some forms were not sighted but their information was captured by the in-country researchers.

Research workshops and interviews took place on October 23 and 24, 2023 on the Managalas Plateau. Community participants listed 12 different villages they called home. These include Itokama, Serepuna, Naukanane, Naokanane, Kokoro, Anatua, Naukuanane, Emo Riva, Farairo, Serefuna, Tama and Umbuwara. The three villages with the most community participants were Itokama (27), Serepuna (12) and Naukanane (11), these were also the three villages visited (see Table 3).

Table 3: Distribution of participants by village

Village	Number of participants
Itokama	**27**
Serepuna	**12**
Naukanane	**11**
Naokanane	8
Kokoro	7
Anatua	2
Naukuanane	2
Emo Riva	1
Farairo	1
Serefuna	1
Tama	1
Umbuwara	1
Unknown	2
Total	74

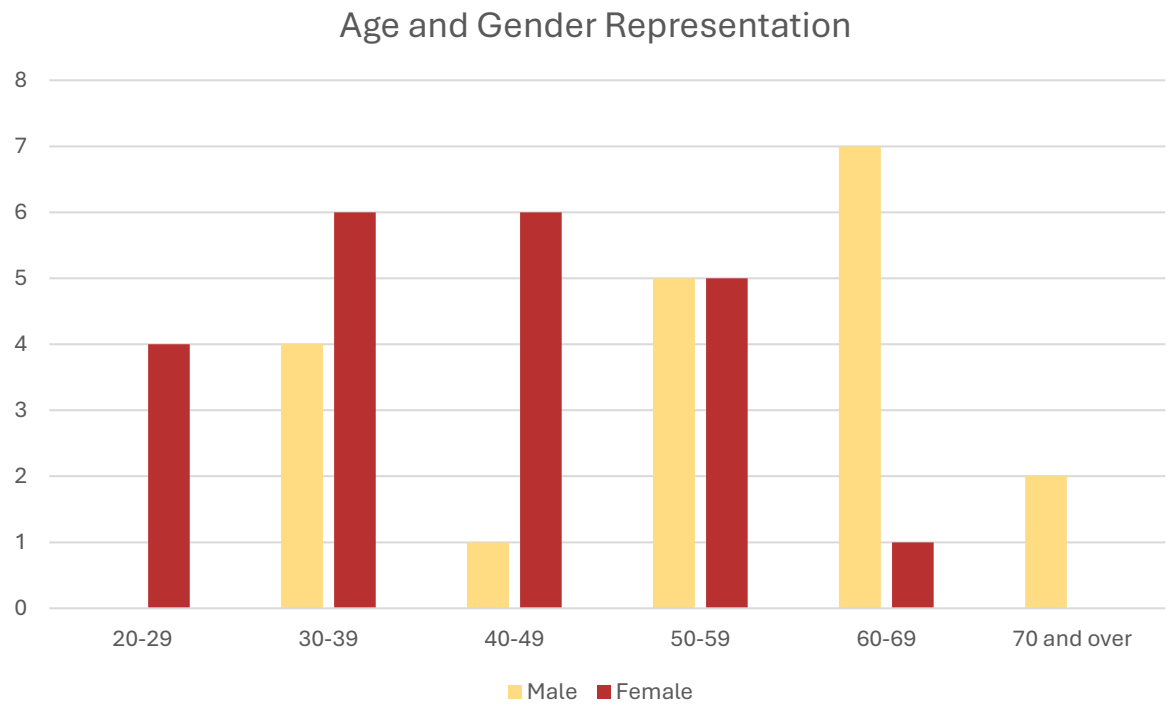
Overall, 76 community members participated from the Managalas Plateau. Thirty-two people participated in the community youth workshop (CWY). The women's workshops (CWW) had 23 community members, and men's workshops (CWM) had 21 (see Table 4). Though there is no documentation of gender for the youth community workshops (CWY), there was fairly well-balanced representation of men and women's workshops. Notably, 14 of the men participating in the CWM identified themselves as a clan, church, or other community leader.

Sixty-five of the 76 community participants shared their age. They ranged from under 19 to over 70 years old. The majority (36) were under 39 years old. Only 10 were over 60 years old (Figure 6).

Table 4: Number of participants by type of participation

Type of participation	Number of participants
CWY	32
CWW	23
CWM	21
Total	76

Figure 6: Gender by age group for the 41 community members where both the gender and age were known



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