E tetele a Pesega ae matua i le Oo: Living with Climate Change in Apia, Samoa

Anita Latai-Niusulu
National University of Samoa
a.latai@nus.edu.ws

UCCRN Case Study Docking Station (2025)
DOI: 10.7916/57zv-mh84

Keywords	Adaptation, SIDS, Flooding
City Population	35,974
City Area	123.81 km^2
City GDP	230 million USD (approximation)
Climate Zone	Af (Tropical rainforest)
ARC3.3 Linkage	Equity, Informality, and Development; Nature-Based Solutions

Introduction. Samoa, like all other countries in the world today, is already experiencing the negative impacts of climate change, namely hotter days, slightly prolonged dry seasons, shorter heavier rainfall, and sea level rise. The town of Apia and the wider Apia Urban Area (AUA), where much of the nation's population and infrastructure are located, bear the biggest brunt. This case study discusses the climate related risks and challenges evident in the AUA of Samoa and how Samoans have developed strategies to absorb and endure its impacts.

During heavy rainfall events, Pesega, which is a part of the Faleata District and the village of Vaimoso, often floods. The waters quickly disappear once the rains stop, in Oo. The phrase, *E tetele a Pesega ae matua i le Oo,* literally means 'water overflow in Pesega and disappears in Oo'. A common interpretation of the phrase by Samoans is 'there are times when the tide shifts and the storm rumbles but after that, there will be calm'.

Context. Around 17.5% of the total population, 35,974 out of 205,557 people, currently live in Samoa's urban area called the Apia Urban Area (Samoa Bureau of Statistics, 2022), which is located on the main island of Upolu. The village of Apia developed as the nation's town, when it became the main trading port, in the early 1800s with the arrival of the Europeans. Since then, the town has expanded to include a mixture of other traditional villagers, suburban and commercial areas that are either government-owned, freehold (owned by churches or individuals), or under customary tenure. The Samoan government manages these lands through the Planning and Urban Management Agency (PUMA), in partnership with landowners (whether customary, church or private) (Latai-Niusulu, 2015).

Climate-Related Risks and Challenges. Recent scientific projections of climate change suggest enhanced risks on several fronts in Samoa and the wider Pacific region. Rising temperatures will continue to bring very wet and very dry weather events and seasons and it will likely intensify tropical cyclones in the region. Sea-levels around the island group are projected to rise between 5 and 15 centimetres by 2030 and by 36 centimetres to 2050 (Intergovernmental Panel on Climate Change (IPCC), 2023; Pacific-Australia Climate Change Science and Adaptation Planning, 2013).

Compared to other parts of the country, the Apia Urban Area faces multiple climate risks, and because of its relatively higher concentration of population and infrastructure, a greater number of people and properties are exposed to these risks. Days are becoming increasingly hotter as green spaces are replaced with cemented and tar sealed surfaces. Shorter heavier rainfall and associated flooding are also becoming more frequent (Government of Samoa and National Emergency Operation Centre (NEOC), 2020); Ministry of Natural Resources and Environment (MNRE) and GHD Limited, 2013). A greater part of AUA lies not only on the coast but on the floodplains of two main rivers in Upolu, Fuluasou, and Vaisigano. Topographic and bathymetric data collected through Light Detection and Ranging Technology (LiDAR) further confirm the increased risk of the Apia foreshore to storm surge events and coastal inundation from extreme sea levels.

The Apia waterfront from the Mulinuu Peninsula to the Matautu Area has several major buildings that are critical to the functioning of the capital, including the Samoan Parliament House, and is the base for many essential services. At only one metre above sea level, the Mulinu'u Peninsula is particularly vulnerable to flooding from tropical cyclones, and the risk will increase significantly with rising sea levels (Pacific-Australia Climate Change Science and Adaptation Planning, 2013). The likelihood of an increase in the intensity of tropical cyclones, rainfall and dry spells will mean more flooding will be faced by residents of this area at the beginning and end of every year (MNRE: Government of Samoa, 2010).

Samoans Enduring Climate Change and Other Urban Environmental Challenges. The Samoan people, with support from village councils, churches and the government, have already started adapting to such changes through various ways. According to the recent census report, there has been a rise in the number of households installing air conditioning units and water tanks in recent years (Samoa Bureau of Statistics, 2022).

Mobility of households has been, and still is, a key adaptive strategy evident in Samoa. Movements out of the Apia Urban Area, which were not directly connected to climate change, have seen many households already making the shift to live away from spaces which are deemed vulnerable to climate change. Recent statistics have shown that there has been a decline (by 1,417 people) in the population of the Apia Urban Area as people move inland or out of the country (Samoa Bureau of Statistics, 2022). In the early 2000s, those who were living in flood prone areas of Sogi and Taufusi were relocated to inland parts of Upolu Island by the Samoan government and Catholic church resettlement programs (Latai-Niusulu, 2015). Many of these households are now living on freehold/private lands and this trend continues, around the country, according to the 2022 census (Samoa Bureau of Statistics, 2022).

Ongoing national adaptation initiatives, characterized by hard infrastructural projects such as sea walling the coasts, expanding coastal roads and tar sealing access roads to inland parts of villages, and improving household access to electricity and water supply, are supporting the incremental inland shifts of many households and communities (Government of Samoa 2009; Government of Samoa, 2013). These national adaptive approaches, largely supported by external technical and financial agencies, such as the World Bank, started mainly in the 1990s, after Cyclones Ofa and Val flattened peoples' homes and villages and destroyed much of the country's infrastructure (Latai, 2008; Williams and Faasau, 2015).

Recent development projects introduced in the 2000s have also seen the implementation of softer adaptive approaches by the government to help Samoans deal with climatic and other serious social challenges such as Non-Communicable Diseases (NCDs) and family violence. The Apia Waterfront Development Project (AWDP), 2017-2026 (Government of Samoa, 2016) is particularly promising as it currently develops spaces in Apia which are already helping people adapt to the increasingly hotter days in Samoa. The project prioritizes Samoan identity and culture, public access and public safety and security in the urban area, cleanliness of the coast, provision of local business opportunities and livelihoods, and peoples' connections to the sea (Government of Samoa, 2016).

The 'Friendship Park' in Apia has already opened and contains green spaces and a small wetland that have helped absorb the heat during the day. This place has become a popular spot for young families in the evenings because it provides spaces for children to play and for adults to exercise and unwind. The Samoan cultural village opens weekly for tourists and during cultural festivals such as the *Teuila*, a festival celebrating the national flower. The outdoor entertainment center allows the public to view free cultural performances and modern concerts.

Tree planting, mangrove and forest conservation and supporting household livelihood initiatives have been part of ongoing externally funded projects such as the Moataa Community Mangrove Conservation for Eco-tourism (Fuller et al., 2022) and the Vaisigano Catchment Project (VCP) that is funded by the Green Climate Fund (UNDP, 2016). Both projects demonstrate the practicability of an integrated catchment approach to addressing not just climate change but other environmental challenges in Samoa. These projects involve multiple government ministries such as the Ministry of Natural Resources and Environment and the Ministry of Finance, civil society organizations and village communities. Social protection of vulnerable populations and businesses in the Vaisigano Catchment Area underpin the purposes of these projects and their activities. The VCP 'Cash for work' initiative provides employment for 35 young people residing in the vicinity of the Vaisigano River catchment to reforest the catchment (UNDP, 2016).

The VCP project also gave the opportunity to residents to think about relevant 'green' ways to adapt to the heat and heavier bouts of rainfall they are experiencing. Many families were able to obtain funding between $20,000-$50,000 to develop and support activities such as home gardening, piggeries, chicken farms and plantations. Others used the money to develop small businesses that have low carbon output such as sewing shops, flower shops, and bicycle rentals. Some businesses are flourishing such as sewing businesses, gardens and plantations, piggeries, and the PJ Flower Shop at Moataa, while others, such as Ioane's Bicycle Rentals and Tours, are slowly awaiting interested customers.

Conclusions and Ways Forward. Small Island Developing States are at the forefront of the fight against climate change. Since the majority of Samoan islanders now reside in cities and towns, urban areas have become the focus of many climate change adaptation and mitigation activities. In the case of Samoa, those living within the Apia Urban Area are already adapting not only to climate change, but to other environmental challenges at all levels of society by developing multiple initiatives at the household and national levels. Initiatives that support, rather than restrict, people's mobility, household livelihood development, and the restoration of parts of the physical environment have helped both urban residents and the wider population adapt to recent and ongoing climate changes, including hotter days, shorter but more intense rainfall, and rising sea levels. In order to deal with future climate change, it is important that Samoans continue to develop strategies incrementally so that these strategies draw on existing and tried tools, knowledges, and processes. Moreover, the development of future strategies must involve multiple actors and stakeholders at all levels of Samoan society, so the strategies are relevant and sustainable.

See the next page for photographs of Apia.

Figure 1. *Coastal view of Apia*
Source: Rickard Törnblad, 2016

Figure 2. *Floods in Apia*
Source: Disaster Management Office, 2020

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Acknowledgments

We thank Jaad Benhallam for reviewing this case study.

Additional Data

- **Population Density:** 569 people/km^2
- **Per Capita Gross National Income (GNI):** 9,228 USD (Lower-Middle Income) [2023]
- **Gini Coefficient:** 38.7
- **Human Development Index (HDI):** 0.722 (High) [2023]
- **Type of Climate Intervention:** Adaptation
