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ISLANDS ON AN ANGRY EARTH

Climate Change, Disasters, and Implications for Two Island Communities

Heather Lazrus and Carlos Arenas

Introduction

Drought is devastating the Fertile Crescent, reversing the 9,000-year trend that supported early agriculture with two decades of the worst aridity in at least 900 years (Cook et al. 2016). Arctic sea ice is disappearing, exposing shorelines to incessant waves and reducing the buffer from storms, leading to severe coastal erosion and threatening long-established communities and their subsistence practices (Overeem et al. 2011; Marino 2015). Unprecedented in the meteorological record, Hurricane Sandy was a hybrid storm combining a hurricane as it transitioned into a post-tropical cyclone with a powerful nor'easter that then wreaked destruction in cities and towns along the east coast of the United States in 2012 (Galarneau et al. 2013). Low-lying islands are losing ground to rising sea levels, which carry higher storm surges, tsunamis, and high tides further inland, initiating actions around relocation (Lazrus 2012, 2015). These and other anomalous weather and climate events are occurring against a dynamic backdrop of climate change, which has emerged as one of the greatest threats of our time. While weather and climate extremes are, by definition, anomalies, the unlikely character of increasing numbers of hydrometeorological hazards, such as the expanding drought, diminishing sea ice, severe and unusual storms, and coastal inundations, reflects the planet's rapidly changing climate due to anthropogenic influences (Field et al., 2012).

Decades of research have exposed the numerous ways in which disasters are mutually constituted by environment and society (Oliver-Smith 1996, 1999). As an intensifier of disasters, climate change is above all an ecological manifestation of the social, political, and economic processes that characterize global society. Climate change is driven, literally, by our thirst for fossil fuels, and its variegated consequences fall most heavily on those with the least economic and political power. Small island-dwelling communities are among those most at risk from disasters precipitated by climate change, and are also those taking real actions to maintain their livelihoods and cultural integrity. Because islands are simultaneously isolated by water and connected globally by water-traversing materials, ideas, and values, they exemplify and accentuate the ways that climate-change-driven disasters are products of environment and society (Hau'ofa 1994; Lazrus 2012).

Anthropologists are at the forefront of centering people and their practices in understanding the causes and consequences of climate change, particularly as climate change is experienced through disasters (Fiske et al. 2014). In doing so, anthropologists rely heavily on theories related to risk, vulnerability, and adaptation that have been developed over the past five or more decades by interdisciplinary hazards scholars (e.g., Lewis 1990; Watts 1983; Wisner et al. 2004). By situating weather- and climate-related disasters in the context of climate change, anthropologists connect apparently discreet disaster events to the chain of land use change (e.g., Moran et al. 2005; Turner et al. 2007), fossil fuel production (e.g., Maldonado 2018), greenhouse gas emissions (e.g., Strauss et al. 2013), consumption patterns (e.g., Wilk 2009), scientific processes (e.g., O'Reilly 2015), and local and international policies designed to address climate change causes and consequences. Anthropology's holistic perspective—which considers how each of these links in the chain are interconnected, and situates them in broader social, political, and economic contexts as well as specific local and cultural settings—and cross-scale analysis makes it well suited to the study of disasters in the context of climate change (Fiske et al. 2014).

In fact, descriptions of weather- and climate-related disasters have long been part of the ethnographic record and are the basis of much early anthropological theory, which, from the onset, connected risk and vulnerability to larger processes such as modes of production and cultural worldview. For instance, Raymond Firth described the social as well as environmental causes of famine among islanders on Tikopia in the Solomon Islands (Firth 1936). Building on Firth's example, Marshall Sahlins described the *Crise révélatrice*, a revelatory crisis, or disaster, that exposes the inherent contradictions in modes of production (Sahlins 1972: 124). Along similar lines, Margaret Mead explained the ethnographic pertinence of disasters: "A storm, an earthquake, a fire, a famine—these are extraordinary conditions that sharply reveal certain aspects of a people's conception of life and the universe" (Mead 1993: 271). Anthropological inquiries of disasters born of climate change now also reveal the inherent values, inequalities, and contradictions of contemporary capitalism and governance, charting broader processes that entangle seemingly marginal communities and fragile ecologies in broader global processes.

This chapter begins by summarizing the links between climate change and disasters, and then charts the ways in which the theoretical underpinnings of anthropology of disaster extends to our interrogation of disasters precipitated by the planet's changing climate. Next, the chapter reviews anthropological framing of risk and vulnerability that are particular, revealing of the ways in which islands are enmeshed in broader processes of planetary change, bellying notions that islands are isolated or disconnected from broader ebbs and flows. These ideas are illustrated with two case studies—Gunayala, Panama, and Nanumea, Tuvalu—that demonstrate how island communities are experiencing climate-driven disasters and engaging in global political processes to address climate change.

Climate Change and the Amplification of Disasters

The current rate of climate change being driven by human activity far exceeds natural rates of change. The average global temperature over both land and oceans rose 0.85°C between 1880 and 2012 (Stocker et al. 2013). While the trend of rising temperatures likely began earlier, it was not until the late nineteenth century that the curiosity and ability to track temperature provided the instrumental record to verify the rise. Rising temperatures reflects increases in

greenhouse gas emissions in the planet's atmosphere that each of the three major mid-nineteenth century current rates for another 150 years of global records that far predates the Industrial Revolution was that warm, sea levels were rising, global temperature increased in magnitude, and location of extreme weather events were increasing. Because interconnections between the environment and discrete weather events is change is driving the live

Hurricane Sandy illustrates this point. Hurricane Sandy was forecasted, in particular by the European Centre for Medium-Range Weather Forecasts (ECMWF). The ECMWF's weather models and forecasts included its unusual left turn. The reason for this was the sea surface temperatures that were 1–1.5°C warmer than normal, caused by climate change. Anthropogenic climate change has increased the amount of precipitation in the eastern coast of the United States, and it would have been without climate change.

Climate change enters into the lives of people, cultures, and political systems. Climate change has been dubbed a "threat multiplier" because it can increase risks, create new risks, and exacerbate existing economic and political situations. Events in the climate system have far-reaching consequences of climate change, but rather as linked interactions through both ecological and political systems.

Applying an Anthropological Perspective

The interrelated concept of risk and vulnerability contextualizes disasters. These concepts have emerged in the field of disaster risk reduction and policy in anthropology. Risk is defined as "the probability of a social construction" (Oliver 1990), and vulnerability is defined as "the perception of risk when one's world is threatened" (Oliver 1990).

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greenhouse gas emissions, from fossil fuel combustion and land use change, which trap heat in the planet's atmosphere. The Intergovernmental Panel on Climate Change (IPCC) reports that each of the three most recent decades has been warmer than any other decade since the mid-nineteenth century (Stocker et al. 2013). If we continue to produce greenhouse gases at current rates for another five decades, temperatures will rise about 5°F. We know from geological records that far predate our instrumental record that the last time the Earth's temperature was that warm, sea levels were also eighty feet higher (Hoffman et al. 2017). Accompanying global temperature increases are many other changes that are affecting the frequency, magnitude, and location of disasters including decreasing cold temperature extremes, increasing warm temperature extremes, and increases in heavy precipitation (Stocker et al. 2013). Because interconnections between climate, land, and water are not linear, abrupt changes as well as "creeping environmental problems" will occur (Glantz 1994). Scientific attribution of discrete weather events is improving, solidifying what many are already observing: that climate change is driving the lived experience of extreme weather events (Otto et al. 2016, 2017).

Hurricane Sandy illustrates the influence of climate change on storms. Sandy was well forecasted, in particular by the European Center for Medium-Range Weather Forecasts (ECMWF). The ECMWF performed several predictions of the storm using a suite of numerical weather models and modifying certain variables to determine the most likely track, including its unusual left hook into the coast. One of the variables that the ECMWF scientists modified was the sea surface temperature. Under scenarios that used sea surface temperatures that were 1–1.5°C cooler than observed temperatures (effectively removing the warming caused by climate change), the storm track did not move drastically west and inland. Anthropogenic climate change was also shown to increase the depth of the storm as well as the amount of precipitation it carried by up to thirty-five percent. The storm surge that the east coast of the United States experienced from Sandy was nineteen centimeters higher than it would have been without the influence of climate change (Trenberth et al. 2015).

Climate change enters a world that is already patterned by difference—different societies, cultures, and political and economic systems. This variegation contributes to differential capacities to anticipate and cope with impacts of climate change. As a result, climate change has been dubbed a "threat intensifier" that will exacerbate climate variability, amplify existing risks, create new risks, and intensify threats that may not be directly climate related including economic and political struggles. Just as climate change shifts the distribution of extremes events in the climate system, it redistributes the lived experience of risk. Moreover, the negative consequences of climate change cannot be considered as isolated, individual shocks, but rather as linked intensifying, cumulative, and compounding disturbances that feed back through both ecological and human systems (Wrathall et al. 2015).

Applying an Anthropological Toolkit to Navigate Vectors of Change

The interrelated concepts of risk, vulnerability, and adaptation are integral to understanding and contextualizing disasters in the longer term and broader processes of a changing climate. These concepts have emerged over the past several decades to frame climate change discourse and policy in anthropology and beyond (Fiske et al. 2014). Anthropologists understand disasters and the risks that they harbor as material manifestations of "interwoven, often conflicting, social constructions" (Oliver-Smith 2002). According to the cultural theory of risk, risk is perceived when one's worldview is challenged (Douglas 1966; Douglas and Wildavsky 1982).

In this sense, risk is primarily about how society is structured and organized, and how that organization interacts with physical hazards. How risks are identified and responded to reveals cultural norms and moral underpinnings. Risks associated with climate change may be very different depending on whether they are perceived by those invested in fossil fuel production or by those worried about the future of their nation.

Vulnerability encompasses many complex and interconnected cultural, social, economic, political, and environmental processes interacting over time and across space, making it difficult to define succinctly (Thywissen 2006). Anthropologists treat vulnerability as the sum of multiple cultural, social, economic, and political processes and their interaction with environmental forces (Oliver-Smith 2004). It is not adequate to define vulnerability as the product of particular sociodemographic characteristics and hazard exposure, but rather as the outcome of what particular characteristics may mean in terms of broader economic and political structures that delimit access to economic, political, and natural resources (Wisner et al. 2004). Anthropologists also understand the ways in which vulnerability is not monolithic or static, but encompasses capacities and agency in complex and dynamic interactions with power. Communities that are facing ecological devastation due to fossil fuel extraction and climate change impacts are harnessing unique capacities to address risks they view as untenable.

Adaptation is perhaps the concept most used by anthropologists, even beyond work of disasters and climate change. It has been a core concept used to understand human biological and cultural evolution since the emergence of the discipline (Harris 1980). Applied to understanding human experiences of disasters in the context of climate change, adaptation refers to the developments humans make in order to thrive, including belief and knowledge systems, modes of production, and technologies. Anthropologists understand that human adaptation is not limited to technical solutions (Crate and Nuttall 2009; Roncoli 2006), but, as with risk, vulnerability, and resilience, exists within social and cultural parameters. Climate change has the potential to undermine primary adaptive strategies by changing weather patterns and resource availability. Communities in fragile ecologies facing deeper disruptions from climate change are considering relocation, and anthropologists are working hard to understand ways in which relocation happens to support adaptation, as opposed to a failure to adapt in situ.

Islands of Change

Islands are sites of continual transformation as their coastlines literally accrete and erode with the waves that arrive on their shores. Pacific anthropologist Epeli Hau'ofa offered a reconceptualization of islands as interconnected constellations of places—a “sea of islands”—in contrast to the notion of vulnerable, isolated, and small “islands in a far sea” (1993, 1998). According to Hau'ofa (1993: 6) “the idea of smallness is relative; it depends on what is included and excluded in any calculation of size.” This perspective emphasizes that islands are also not isolated regardless of how remote they may be cartographically. Instead, island communities may be all the more dynamically connected to global flows because of the work that goes into maintaining transboundary cultural, social, economic, and political connections (Lazarus 2012). For this reason, islands are particularly revelatory sites to chart how global systems become reified as locally situated disaster risks, vulnerabilities, and adaptation options or constraints (Marino and Lazarus 2015).

Climate change has arrived on the shores of islands like Nanumea, Tuvalu, and ~~Gunayvin~~, Panama, in the form of coastal inundation from storms and tides, and raises difficult questions.

about displacement in particular important settings. Resettlement discussions pelago off the eastern coast community. Despite geographical span the spectrum is not just about infrastructure integrity, human rights, legal citizenship. Such considerations and levels of impacts from knowledge, culture and

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The interrelated concept of distinct island communities in the archipelago of nine islands in the equator (Figure 19.1). Essentially Polynesian descendants

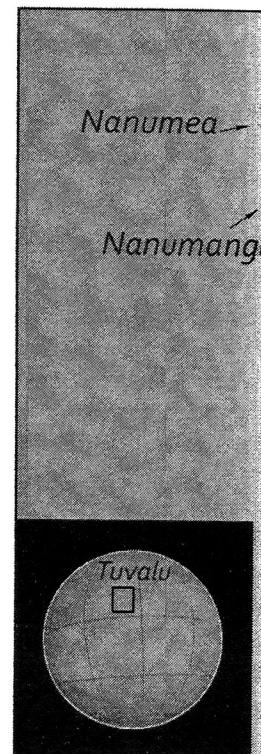


FIGURE 19.1 The Pacific

about displacement in the face of associated risk and vulnerability. Tuvalu and Panama are particularly important settings in which to explore climate-related community displacement and resettlement discussions. Tuvalu is an independent nation-state while Gunayala is an archipelago off the eastern coast of Panama, a semi-autonomous territory of the Guna indigenous community. Despite geopolitical differences, in both cases, opinions and actions about resettlement span the spectrum from proponents to opponents. And in both cases, resettlement is not just about infrastructure, but also about deep place-attachment, livelihoods, cultural integrity, human rights, and a sense of belonging which, in Tuvalu, extends to implications for legal citizenship. Such characteristics expose residents of these places to specific types of risk and levels of impacts from climate change displacement, including loss of identity, traditional knowledge, culture and customary livelihoods.

Tuvalu

The interrelated concepts of risk, vulnerability, and adaptation are particularly visible in the distinct island communities of the Pacific island nation of Tuvalu. Tuvalu is comprised of an archipelago of nine islands and atolls arcing across the Pacific Ocean between Fiji and the equator (Figure 19.1). The national population hovers around 11,000 people of predominantly Polynesian descent, who thrive on a largely subsistence-based economy anchored on

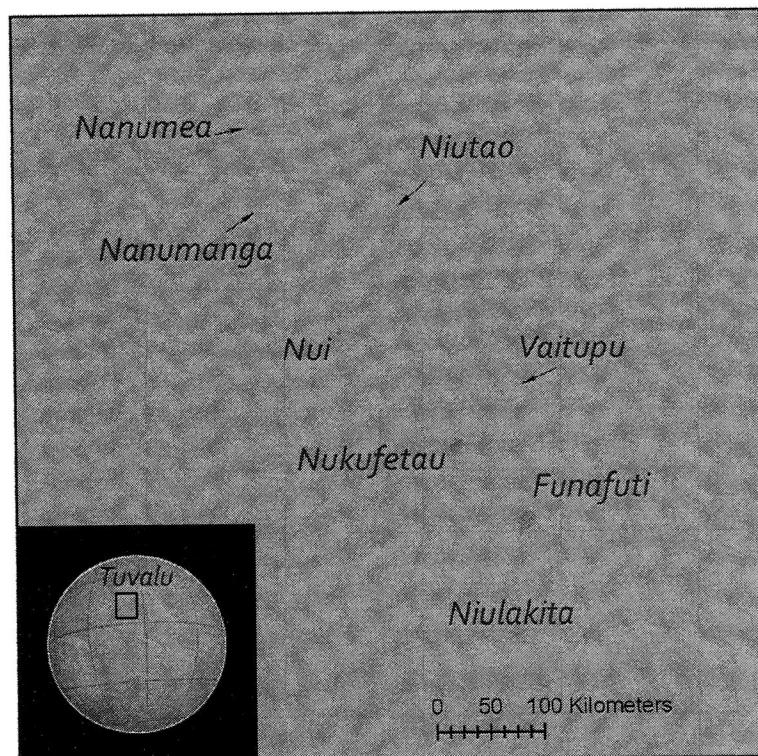


FIGURE 19.1 The Pacific Island Nation of Tuvalu, including the northernmost atoll of Nanumea.

pelagic fisheries and atoll agriculture consisting of growing coconut and taro, and raising pigs. Saltwater incursion from chronic sea level rise and acute storm surges or high tides, warming sea surface temperatures, and shifting precipitation patterns are the primary climate change impacts being observed in Tuvalu. The Tuvaluan Meteorological Service recorded a maximum tide of 3.4 meters in February 2006 and again in February 2015, a change particularly alarming in a country with an average elevation of just 4.6 meters above sea level. People on Nanumea, the northernmost island community of Tuvalu, are experiencing numerous changes from these climate-driven impacts, including coastal erosion and reduced freshwater availability. Together, these lead to fears about *te mafulifuliga i te tao o aso*, a phrase that does not translate fluidly into English but appropriately refers to changes in both the state of the weather and to the state of society.

Risk is seen to arise not only from the encroaching tides and diminishing rainfall, but also from increasingly Western-style consumption practices on the island that both drive mining of coastal coral materials for concrete and purchasing of store-bought food in packaging that does not leave the island. For Nanumeans, vulnerability arises when some members of society amass more power than others, and when nature loses its precarious balance with society, a balance that is highly adapted to atoll-based livelihoods. Yet, although highly vulnerable to storm impacts under a changing climate, Nanumeans demonstrate resilience in their daily lives by maintaining strong community solidarity expressed in the their often-referenced motto, "unity of heart."

Nanumeans are also developing adaptations to limited water resources. These include increasing water storage through household water tanks and community cisterns, and complying with water rationing during times of drought. Responses to coastal erosion include fortifying coastal revetment projects, relocating inland and building away from coasts, and elevating buildings on poles above ground level. Migration is another potential adaptation that has begun to be discussed in Tuvalu (Farbotko and Lazarus 2012). However, there are meaningful limitations to migration as an adaptation response in Tuvalu. Pacific Islanders have a long cultural tradition of population movements. Tuvalu was originally settled by Polynesian seafarers, and networks of movement now continue to enmesh Tuvalu in broader networks of economic, education, and health care opportunities. Yet, full-scale relocation that would involve stepping outside of culturally meaningful temporary or permanent migration practices and that challenge the citizenship, sovereignty, and cultural integrity of a nation of people constitute a derivative disaster rather than an adaptation.

At the heart of much anthropological engagement with the disastrous manifestations of a changing climate lies the interrogation of deep injustices and inequalities. For instance, the Pacific islands region is home to 0.12 percent of the world's population and stands to be among the first and most drastically affected by climate change, but accounts for approximately just 0.03 percent of the global emissions of carbon dioxide from fuel combustion.

Internationally, strategies to mitigate climate change have given way to strategies to adapt to its impacts as the levels of greenhouse gases currently in the atmosphere mean that the planet is already committed to significant changes. Adaptation strategies have in turn begun to address some degree of climate justice, but this remains a largely unacknowledged idea within international climate policy. The international community currently pursues climate justice through financial compensation in recognition of the unequal distribution of historical and current emissions and of the impacts. Mechanisms such as the Global Facility for Disaster

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Although a country the early 2000s as hous role in exposing dispar justice for those with no attention and political plight in a changing cli lily in Tuvalu, was acting (AOSIS). AOSIS, an ass in 1990, is a collective o house gas emissions and plays a pivotal role in : ages suffered in develop Small Island Developing on Climate Change (U with the loose commiti reducing greenhouse ga in 2012, Tuvalu again pl and Damage, to at least j responds to the reality i adapted to, that are full-f cannot be mitigated (W

Tuvaluan leaders call ing mitigation, sovereig prime minister, is not a really have to contextual not dealing with soverei change. ... We are deali ing the world" (ABC N commitment to human adequate, and that climat webs of power and envir cise in basic adaptation b that extend beyond terri

The Guna of Gunaya

The Guna of the San Blas Islands of Latin America for the first time in 1520. For several centuries, the Guna lived in their traditional settlements, but finally settled in the 19th century in the town of Guna Yala, currently known as Gunaya. They moved to some of the 360 islands of the San Blas Archipelago and the mainland. They settled on

Risk Reduction allow for burden sharing among developed nations to transfer funds earmarked for adaptation within less developed nations (Mechler and Schinko 2016).

Although a country largely unknown internationally before making media headlines in the early 2000s as housing the world's first "climate refugees," Tuvalu now plays a significant role in exposing disparities highlighted by climate change and its impacts to seek climate justice for those with no voice (Farbotko and Lazarus 2012). Leveraging the newfound global attention and political savvy, Tuvaluan politicians began raising awareness of the country's plight in a changing climate in the 1990s. Enele Sopoaga, from a politically engaged family in Tuvalu, was acting chairman from 2005 to 2006 of the Alliance of Small Island States (AOSIS). AOSIS, an association that was formed at the Second World Climate Conference in 1990, is a collective of low-lying island and coastal nations that advocates for lower greenhouse gas emissions and negotiates on behalf of these countries at the United Nations. AOSIS plays a pivotal role in seeking financial compensation for climate-driven losses and damages suffered in developing and low-emitting countries. In 2009, Tuvalu led the coalition of Small Island Developing States to stall talks at the United Nations Framework Convention on Climate Change (UNFCCC) conference in Copenhagen because they were dissatisfied with the loose commitment on the part of developed countries to binding agreements on reducing greenhouse gas emissions. At UNFCCC conferences in Durban in 2011 and Doha in 2012, Tuvalu again played an active role in proposing a policy framework, known as Loss and Damage, to at least partially address climate injustices. The Loss and Damage Mechanism responds to the reality that there are already climate impacts that cannot be mitigated nor adapted to, that are full-fledged disasters whose risks cannot be reduced, and whose outcomes cannot be mitigated (Wrathall et al. 2013; Meschler and Schinko 2016).

Tuvaluan leaders call for significant shifts in international climate change policy concerning mitigation, sovereignty, and resettlement. Resettlement, says Enele Sopoaga, the Tuvaluan prime minister, is not adequate as "[climate change] is much bigger than ourselves, so we really have to contextualize it" (Radio New Zealand 2017). Previously, he has stated, "We are not dealing with sovereignties any more—there are no boundaries to the effects of climate change. ... We are dealing with saving human lives—and therefore saving Tuvalu is also saving the world" (ABC News Australia 2014). Tuvaluan's strong place attachment and fierce commitment to human rights underscores that population resettlement is neither easy nor adequate, and that climate change entangles even the seemingly most remote islands in global webs of power and environmental change. Responding to climate change is not only an exercise in basic adaptation but also broad-scale nation building and securing broad human rights that extend beyond territorial claims to sovereignty.

The Guna of Gunayala

The Guna of the San Blas archipelago are perhaps the most well-known indigenous group of Latin America for the defense of their culture within the context of the nation of Panama. For several centuries, they inhabited the forests of the Darien region and the San Blas mountains, but finally settled in a long strip of land between the mountains and the Caribbean Sea, currently known as Gunayala (Figure 19.2). In the mid-nineteenth century the Guna began moving to some of the 371 small coral islets along the Caribbean coast, in what is known as the San Blas Archipelago, mainly to escape from the endemic malaria and yellow fever on the mainland. They settled on those islets that were closest to the mainland and near the mouths

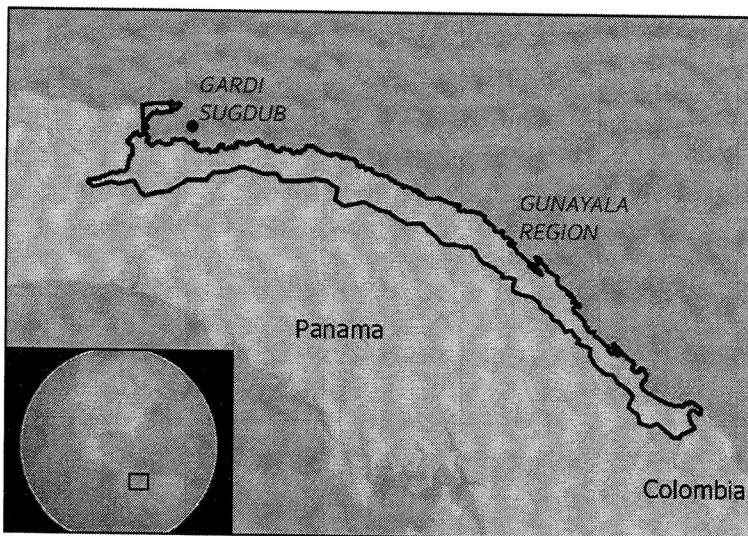


FIGURE 19.2 Gunayala and the community of Gardi Sugdub.

of rivers. Today they farm crops, hunt, and access water from rivers on the mainland, while living on the islets and engaging in fishing and tourism guiding.

Historically the Guna have resisted all efforts at colonization, successfully protecting their territory from colonial powers, pirates, small settlers, large entrepreneurs and even state officials. Today the Guna still maintain landholdings on the mainland that are farmed for subsistence crops to supplement their livelihoods from fishing, and now, increasingly from tourism to their region, well known for pristine island beaches, abundant sport fishing, and the beautiful fabric art called molas produced by Guna women.

Over the last fifteen years a series of weather-related events and disasters have highlighted the issues of rising sea levels and climate change, making the relocation of communities from the islands to the mainland an increasing priority. Population growth over several decades has also led to serious overcrowding on the islands and is a contributing factor to the need for relocation. It is estimated that approximately 28,000 people will eventually have to relocate from the islands to the mainland as a result of rising sea levels and climate-related events in the years to come. In addition, a further 12,000 people originally from the Gunayala islands who have moved to Panama City are expected to join the relocation back to their home province, bringing the total number to some 40,000 people (Displacement Solutions, 2014).

As elsewhere in the world in cases of climate change and hazard intensification, the possible outcomes of displacement and relocation, including Tuvalu, many of the Gunayala communities struggle with the idea of resettlement. While not all Guna communities are ready to relocate, some have taken concrete steps toward that end.

In 2010, the community on Gardi Sugdub (Island of the Crab) island, faced with growing population density, rising sea levels, storm surges, and flooding decided to relocate to the mainland and created a "neighborhood commission" to organize the relocation process. In 2014, 200 families ($\pm 1,000$ people) from Gardi Sugdub and another 100 migrant families living in Panama City had signed up to be relocated to the mainland. After the 2010 decision, the community acquired seventeen hectares of land through donations from several families.

from the communal buildings. The project in rural communities for a project to build

The ministry of the environment and pressure from their relocation, the houses. As of today, uncertainty about the

Unlike Tuvalu, the actions taken to address land availability, a key issue in addressing new land to start the provide land and houses of a school for 1,200 attract migrants to the to be found not only in communities facing

Public health is also an issue as islets was to escape the uncertainty about relocation to the area. Steps to address these are needed. Planning for the settlement of thousands

The right to access land is a key issue. After relocation to the islets because of fishing and, increasing Gunayala is now entering the industry. The current subsistence-based to the ways of life during the the mainland. However, and income-generating move. In addition, living in traditional environments may be at risk in reset

Finally, since some need to be carefully planned to mitigate the effects of climate change and flooding.

Island communities are navigating through disasters and uncertainty.

from the community for the new settlement. The committee also approached different governmental agencies requesting support, and secured agreement from the Ministry of Housing for a project to build the first sixty-five houses at the relocation site.

The ministry designed a plan for the project, which included housing, roads, and communal buildings. The houses proposed by the ministry followed a design used in other projects in rural communities in Panama, which failed to consider the cultural characteristics of traditional Guna houses and were summarily rejected. As a result of the continued activism and pressure from the Guna as well as the increasing interest at the international level for their relocation, the Panamanian government expanded its housing offer in 2016 to build 300 houses. As of today the construction of the houses has not yet started and there is considerable uncertainty about the future of the project.

Unlike Tuvalu, where resettlement has not reached the stage of concrete action planning, the actions taken thus far in Gunayala point to several specific outstanding issues including land availability, public health, access to livelihoods, and timeframe of relocation. Land is a key issue in addressing climate displacement. Inevitably, people will lose land and will need new land to start their lives over. The Gardi Sugdub relocation project already planned will provide land and housing for only a portion of those wishing to relocate, but the presence of a school for 1,200 students funded by the Inter-American Development Bank will surely attract migrants to the settlement, a factor not considered in the project. More land will have to be found not only for the people of Gardi Sugdub, but also for the more than forty other communities facing similar threats.

Public health is another serious concern. Since the original reason the Guna settled on the islets was to escape the endemic malaria and yellow fever on the mainland, there is concern about relocation to the mainland because these mosquito-related diseases are still present in the area. Steps to address these public health issues, including vector management measures, are needed. Planning will also be needed for the impacts over the longer term of the potential settlement of thousands more people in the most well-preserved forest area in Panama.

The right to access and maintain livelihoods will determine the success or failure of relocation. After relocation to the mainland, affected communities will continue to maintain links to the islets because they are the current sources of the community's livelihood, principally fishing and, increasingly, tourism. As Tuvalu is already inserted into international networks, Gunayala is now entering into the regional and global circuits of exchange of the tourism industry. The current economic situation of the Guna, however, is fragile, since a shift from a subsistence-based to a service-based economy is underway. Maintaining access to traditional ways of life during the transition process will assist in the adjustment to new opportunities on the mainland. However, support will be needed to assist with the development of new labor and income-generating skills so that their livelihoods will not be negatively affected by the move. In addition, livelihoods are not just income-generating activities, but also repositories of traditional environmental knowledge, social organization, and cultural identity, all of which may be at risk in resettlement.

Finally, since some communities are reluctant to move, the timeframe for relocation will need to be carefully planned. While the threat of rising sea levels will be gradual, during some seasons the effects of coastal storms will be seriously intensified, resulting in dangerous surges and flooding.

Island communities facing both slow and chronic as well as rapid and acute climate-driven disasters are navigating turbulent waters of adaptation and resettlement actions. Resettlement

can have both positive and negative aspects. On the positive side, it can represent an important protection for vulnerable communities that would otherwise be left to their own devices. On the negative side, relocation can divide communities, presenting very difficult decisions for people to make, especially when they have deep historical roots in a place. Moreover, the track record of resettlement associated with large infrastructure and development projects is poor. However, marginally better results for disaster-induced displacement and resettlement suggest that there is hope for improvement. Resettlement not only relocates a people in space; it also remakes them. When a community is relocated, it is generally reconfigured in specific ways involving a restructuring of social, economic, and political relationships toward resembling those of the larger society.

Vulnerability and risks source from causes that extend far beyond the boundaries of an island, or any locale, and manifest locally to constrain options and opportunities. At the same time, communities, households, and individuals leverage adaptive capacities that may also stem from global interactions or from place-based knowledge and practices. Such adaptive capacities belie any notion of vulnerability as all-consuming and monolithic. As Hau'ofa's "sea of islands" illustrates, the global processes that surround island communities can be both diminishing and empowering forces.

Acknowledgments

Our thanks to Jennifer Boehnert, senior GIS coordinator in the Geographic Information Systems (GIS) Program at the National Center for Atmospheric Research, for producing the maps included in this chapter. Our sincere gratitude also to Anthony Oliver-Smith for collaboration on the Guna case material.

Bibliography

ABC News Australia. 2014. "Tuvalu Prime Minister Enele Sopoaga Says Climate Change 'Like a Weapon of Mass Destruction.'" August 15. <http://www.abc.net.au/news/2014-08-15/an-tuvalu-prime-minister-is-climate-change-27like-a-weapon-of-mass-/5672696> (accessed August 15, 2018).

Cook, B. I., K. J. Anchukaitis, R. Touchan, D. M. Meko, and E. R. 2016. "Spatiotemporal Drought Variability in the Mediterranean over the last 900 Years." *Journal of Geophysical Research* 121: 2060–2074.

Crate, S. A., and M. Nuttall. 2009. *Anthropology and Climate Change: From Encounters to Actions*. Walnut Creek, CA: Left Coast Press.

Displacement Solutions. 2014. *The Peninsula Principles in Action. Climate Change and Displacement in the Autonomous Region of Gunayala, Panama*. Mission Report. www.displacementsolutions.org.

Douglas, M. 1966. *Purity and Danger: An Analysis of Concepts of Pollution and Taboo*. New York: Praeger.

Douglas, M., and A. Wildavsky. 1982. *Risk and Culture: An Essay on the Selection of Technical and Environmental Dangers*. Berkeley and Los Angeles: University of California Press.

Farbotko, C., and H. Lazarus. 2012. "The First Climate Refugees? Contesting Global Narratives of Climate Change in Tuvalu." *Global Environmental Change* 22: 382–390.

Field, C. B., V. Barros, T. F. Stocker, D. Qin, D. J. Dokken, K. L. Ebi, M. D. Mastrandrea, et al. 2012. *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press.

Firth, R. 1936. *We the Tikopia: A Sociological Study of Kinship in Primitive Polynesia*. London: Allen & Unwin.

Fiske, S. J., S. A. Crate, C. Strauss, and R. Wilk. 1994. *of the AAA Global Climate Change and the Sea*. Galarneau, T. J., Jr., C. A. through Extratropical Glantz, M. 1994. *Drought*. Press.

Harris, M. 1980. *Cultural*.

Hau'ofa, E. 1993. "Our Sea of Islands: Rediscovering Our Sea of Islands." *Journal of the American Academy of Political and Social Science* 21: 1–12.

———. 1994. "Our Sea of Islands." *Journal of the American Academy of Political and Social Science* 22: 1–12.

———. 1998. "The Ocean and the Atmosphere." *Journal of the American Academy of Political and Social Science* 26: 1–12.

Hoffman, J. S., P. U. Clark, and J. A. Marshall. 2000. "Sea Level Change during the Last Interglacial." *Journal of Climate* 13: 285–301.

Lazarus, H. 2012. "Sea Change: The Guna Case." *Disasters* 36: 41: 285–301.

———. 2015. "Risk Perception and the Use of Traditional Knowledge." *Disasters* 39: 141–158.

Lewis, J. 1990. "The Vulnerability of Small Island Communities: A Strategy for Survival." *Disasters* 14: 1–12.

Maldonado, J. K. 2018. *Sea Level Rise and Coastal Erosion in the Gulf of Mexico: A Guide to Sea Level Rise and Coastal Erosion in the Gulf of Mexico*. New York: Routledge.

Marino, E. 2015. *Fierce Climate Change: The Story of Anchorage, Alaska*. Anchorage, AK: University of Alaska Press.

Marino, E., and H. Lazarus. 2012. "Climate Change and Disaster Management." *Journal of Climate Change and Disaster Management* 4: 341–350.

Mead, M. 1993. "From a Woman's Point of View." *Disasters* 17: 1–12.

———. 2015. *From a Woman's Point of View*. New York: Vintage Books.

Mechler, R., and T. Schinko. 2015. "The Implications of Climate Change for Landscapes and Households." *Journal of Climate Change and Disasters* 1: 354: 290–292.

Moran, E. F., E. Brondum, and J. B. Campbell. 2012. *Landscapes and Households in the Anthropocene: Research Directions*. Oxford: Oxford University Press.

Oliver-Smith, A. 1996. "The Anthropology of Catastrophe." *Journal of Anthropology* 25: 303–322.

———. 1999. "What Is Disaster Anthropology?" *Journal of Anthropology* 28: 1–22.

———. 2002. "Theorizing Disaster Anthropology." In *Theorizing Disaster Anthropology*, ed. A. Oliver-Smith (eds.), 1–22. London: Routledge.

———. 2004. "Theorizing Disaster Anthropology." In *Theorizing Disaster Anthropology*, ed. A. Oliver-Smith (eds.), 1–22. London: Routledge.

Bankoff, G., Frerks, and D. D. van Riet. 2004. *Catastrophe: A Global Guide to Natural Risk and Disaster*. London and Sterling: Earthscan.

O'Reilly, J. 2015. "Glacial Disasters and Climate Change." In *Glacial Disasters and Climate Change*, ed. J. O'Reilly, 1–22. New Haven: Yale University Press.

Otto, F., G. van Oldenborgh, and J. Fuglestvedt. 2015. "Climate Change and Extreme Weather Events." *Nature Climate Change* 5: 1–12.

Otto, F., R. Skeie, J. Fuglestvedt, and J. M. Arblaster. 2015. "The Impact of Climate Change on Extreme Weather Events." *Journal of Climate* 28: 1–12.

Fiske, S. J., S. A. Crate, C. L. Crumley, K. Galvin, H. Lazarus, L. Lucero, A. Oliver-Smith, B. Orlove, S. Strauss, and R. Wilk. 2014. *Changing the Atmosphere. Anthropology and Climate Change. Final Report of the AAA Global Climate Change Task Force*. Arlington, VA: American Anthropological Association.

Galarneau, T. J. Jr., C. A. Davis, and M. A. Shapiro. 2013. "Intensification of Hurricane Sandy (2012) through Extratropical Warm Core Seclusion." *Monthly Weather Review* 141: 4296–4321.

Glantz, M. 1994. *Drought Follows the Plow: Cultivating Marginal Areas*. Cambridge: Cambridge University Press.

Harris, M. 1980. *Cultural Materialism: The Struggle for a Science of Culture*. New York: Vintage Books.

Hau'ofa, E. 1993. "Our Sea of Islands," in E. Waddell, V. Naidu, and E. Hau'ofa (eds.), *A New Oceania: Rediscovering Our Sea of Islands*. Suva, Fiji: The University of the South Pacific Press. pp 2–16.

———. 1994. "Our Sea of Islands." *The Contemporary Pacific* 6, 1: 148–161.

———. 1998. "The Ocean in Us." *Contemporary Pacific* 10, 2: 391–410.

Hoffman, J. S., P. U. Clark, A. C. Parnell, and F. He. 2017. "Regional and Global Sea-Surface Temperatures during the Last Interglaciation." *Science* 355, 6322: 276–279.

Lazarus, H. 2012. "Sea Change: Climate Change and Island Communities." *Annual Review of Anthropology* 41: 285–301.

———. 2015. "Risk Perception and Climate Adaptation in Tuvalu: A Combined Cultural Theory and Traditional Knowledge Approach." *Human Organization* 74, 1: 52–61.

Lewis, J. 1990. "The Vulnerability of Small Island States to Sea Level Rise: The Need for Holistic Strategies." *Disasters* 14, 3: 241–248.

Maldonado, J. K. 2018. *Seeking Justice in an Energy Sacrifice Zone: Standing on Vanishing Land in Coastal Louisiana*. New York: Routledge.

Marino, E. 2015. *Fierce Climate Sacred Ground: An Ethnography of Climate Change in Shishmaref, Alaska*. Anchorage, AK: University of Alaska Press.

Marino, E., and H. Lazarus. 2015. "Migration or Forced Displacement? The Complex Choices of Climate Change and Disaster Migrants in Shishmaref, Alaska and Nanumea, Tuvalu." *Human Organization* 74, 4: 341–350.

Mead, M. 1993. "From a Way of Seeing," in M. Morris (ed.), *Maiden Voyages: Writings of Women Travelers*. New York: Vintage Books.

Mechler, R., and T. Schinko. 2016. "Identifying the Policy Space for Climate Loss and Damage." *Science* 354: 290–292.

Moran, E. F., E. Brondizio, and L. K. VanWey. 2005. "Population and Environment in Amazonia: Landscape and Household Dynamics," in B. Entwistle and P. C. Stern (eds.), *Population, Land Use, and Environment: Research Directions*. Washington, DC: The National Academies Press.

Oliver-Smith, A. 1996. "Anthropological Research on Hazards and Disasters." *Annual Review of Anthropology* 25: 303–328.

———. 1999. "What Is Disaster?": Anthropological Perspectives on a Persistent Question," in A. Oliver-Smith and S. M. Hoffman (eds.), *The Angry Earth: Disaster in Anthropological Perspective*. New York: Routledge.

———. 2002. "Theorizing Disaster: Nature, Power, and Culture," in S. M. Hoffman and A. Oliver-Smith (eds.), *Catastrophe and Culture: The Anthropology of Disaster*. Santa Fe, NM: School of American Research.

———. 2004. "Theorizing Vulnerability in a Globalized World: A Political Ecology Perspective," in G. Bankoff, G. Frerks, and D. Hillhorst (eds.), *Mapping Vulnerability: Disasters, Development, and People*. London and Sterling: Earthscan.

O'Reilly, J. 2015. "Glacial Dramas: Typos, Projections, and Peer Review in the Intergovernmental Panel on Climate Change," in J. Barnes and M. Dove (eds.), *Climate Cultures: Anthropological Perspectives on Climate Change*. New Haven, CT: Yale University Press.

Otto, F., G. van Oldenborgh, J. Eden, P. Stott, D. Karoly, and M. Allen. 2016. "The Attribution Question." *Nature Climate Change* 6: 813–816.

Otto, F., R. Skeie, J. Fuglestvedt, T. Berntsen, and M. Allen. 2017. "Assigning Historic Responsibility for Extreme Weather Events." *Nature Climate Change* 7: 757–759.

Overeem, I., R. Anderson, C. W. Wobus, G. Clow, F. E. Urban, and N. Matell. 2011. "Sea Ice Loss Enhances Wave Action at the Arctic Coast." *Geophysical Research Letters* 38, L17503. doi:10.1029/2011gl048681.

Radio New Zealand. 2014. "Tuvalu's Prime Minister Says Relocating is not Answer to Climate Change." July 4. www.radionz.co.nz/international/pacific-news/334447/tuvalu-s-pm-says-relocating-is-not-answer-to-climate-change (accessed August 15, 2018).

Roncoli, C. 2006. "Ethnographic and Participatory Approaches to Research on Farmers' Responses to Climate Predictions." *Climate Research* 33: 81–99.

Sahlins, M. 1972. *Stone Age Economics*. New York: de Gruyter.

Stocker, T. F., D. Qin, G.-K. Plattner, M. Tignor, S. K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex, and P. M. Midgley. 2013. *Summary for Policymakers*. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge: Cambridge University Press.

Strauss, S., S. Rupp, and T. Love. 2013. *Cultures of Energy: Power, Practices, Technologies*. Walnut Creek, CA: Left Coast Press.

Thywissen, K. 2006. "Core Terminology of Disaster Reduction. A Comparative Glossary." In J. Birkmann (ed.), *Measuring Vulnerability to Natural Hazards: Towards Disaster Resilient Societies*. Tokyo: United Nations University Press.

Trenberth, K. E., J. T. Fasullo, and T. G. Shepherd. 2015. "Attribution of Climate Extreme Events." *Nature Climate Change* 5: 725–730.

Turner, J., J. Overland, and J. Walsh. 2007. "An Arctic and Antarctic Perspective on Recent Climate Change." *International Journal of Climatology* 27: 277–293.

Watts, M. 1983. "The Poverty of Theory." In K. Hewitt (ed.), *Interpretations of Calamity*. London: Alien & Unwin.

Wilk, R. 2009. "Consuming Ourselves to Death." In S. Crate and M. Nuttall (eds.), *Anthropology and Climate Change: From Encounters to Actions*. Durham, NC: Duke University Press.

Wisner, B., P. Blaikie, T. Cannon, and I. Davis. 2004. *At Risk: Natural Hazards, People's Vulnerability and Disasters* (2nd edition). New York: Routledge.

Wrathall, D., J. Bury, M. Carey, B. Mark, J. McKenzie, K. Young, M. Baraer, A. French, and C. Rampini. 2013. "Migration Amidst Climate Rigidity Traps: Resource Politics and Social-Ecological Possibilities in Honduras and Peru." *Annals of the Association of American Geographers* 104, 2: 292–304.

Wrathall, D. J., A. Oliver-Smith, A. Fekete, E. Gencer, M. L. Reyes, and P. Sakdapolrak. 2015. "Problematizing Loss and Damage." *International Journal of Global Warming* 8, 2: 274–294.

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AFTER ATLA

Cultural Persist
Context of Disa

Susanna M. Hoffn

In every scientific inquiry course. In the field of disaster and society change ... or

The question is a burning debate. Its importance emerges as leaders, dealers, and brokers after a calamity pique personal hand, betokening opportunity. Question fires up long-run social change in general, perhaps to fine-tune theory. F to mitigation of future disasters

For the victims of calamity is whether they can return home. Fated to linger in a sea of displacement they endured could be low? The wider inhabitant shift to a new social and economic Change or no change entangles in the amalgam of a disaster

The concern extends to in fact, looms large. Due to habitats, more perilous tectonic tragic consequence to 1 of many events appears more homogenization of human with the intense exploitation capacity of people to adapt to