



Managed retreat as a strategy for climate change adaptation in small communities: public health implications

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Abstract

In coming decades, sea level rise associated with climate change will make some communities uninhabitable. Managed retreat, or planned relocation, is a proactive response prior to catastrophic necessity. Managed retreat has disruptive health, sociocultural, and economic impacts on communities that relocate. Health impacts include mental health, social capital, food security, water supply, sanitation, infectious diseases, injury, and health care access. We searched peer-reviewed and gray literature for reports on small island or coastal communities at various stages of relocation primarily due to sea level rise. We reviewed these reports to identify public health impacts and barriers to relocation. We identified eight relevant small communities in the USA (Alaska, Louisiana, and Washington), Panama, Fiji, Papua New Guinea, Solomon Islands, and Vanuatu. Affected populations range from 60 to 2700 persons and are predominantly indigenous people who rely on subsistence fishing and agriculture. Few reports directly addressed public health issues. While some relocations were successful, barriers to relocation in other communities include place attachment, potential loss of livelihoods, and lack of funding, suitable land, community consensus, and governance procedures. Further research is needed on the health impacts of managed retreat and how to facilitate population resilience. Studies could include surveillance of health indicators before and after communities relocate due to sea level rise, drought, or other environmental hazards. Lessons learned may inform relocation of both small and large communities affected by climate change.

Keywords Managed retreat · Public health · Sea level rise · Climate change adaptation · Indigenous peoples

1 Introduction

Among other impacts of climate change, global mean sea level is projected to rise between 0.3 and 1.0 m by the year 2100 due to thermal expansion of sea water and melting glaciers and

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polar ice (Church et al. 2013). Sea level rise and associated erosion are already being experienced in some low-lying communities, especially during severe storms and extreme high tides. Where infrastructure hardening (Bloetscher et al. 2016) and related adaptation measures are impractical or cost-prohibitive, some small island and coastal communities are now adapting to their new reality by managed retreat or planned relocation before their communities become uninhabitable. Many of these communities are in isolated settings and are home to indigenous populations with few resources (Maldonado et al. 2013). Planned relocation may be a positive alternative to sudden displacement (Koslov 2016).

The terms “managed retreat” (Hino et al. 2017), “planned retreat” (Abel et al. 2011), “planned relocation” (UNHCR 2014), and “managed realignment” (Esteves 2013) are potentially interchangeable. Some communities prefer the latter two terms to avoid the negative connotations of “retreat” (Koslov 2016).

Managed retreat has disruptive health, sociocultural, and economic impacts on communities that relocate (Schwerdtle et al. 2018). McMichael et al. (2010) described the range of health impacts seen in large and small displaced populations, including those displaced by drought, flooding, war, and other causes. He suggested that the adverse health impacts of displacement due to climate change are likely similar to those of displacement from other causes, although the prevalence of specific impacts will vary by setting.

The direct health impacts of relocation relate to mental health, social capital, food security, water and sanitation, exposure to environmental hazards, injury, and health care services (McMichael et al. 2010). Displacement may trigger mental health problems, including anxiety, depression, substance abuse, and suicide, and undermine social capital (Uscher-Pines 2009; Asugeni et al. 2015; Torres and Casey 2017), especially among residents with a strong sense of place attachment (Agyeman et al. 2009). Food security is a concern for affected communities who rely on subsistence fishing and agriculture and may lose access to fishing sites and suitable agricultural land. Displaced residents may have reduced access to clean water needed for drinking and hygiene, and to sanitary facilities needed to avoid diarrheal diseases. Environmental hazards such as vector-borne and zoonotic diseases and chemical contamination of aquifers and soils are also considerations. Community members may be at risk of injury from trauma and drowning related to flooding and storms prior to and during relocation. Health care services are often limited in remote communities and may or may not improve with relocation.

While large and small communities may face similar challenges in adapting to sea level rise, large cities are likely to have access to more resources with which to respond. In this report, we focus on case studies of small communities that have identified their need to relocate or are in the process of relocating.

2 Methods

We searched peer-reviewed and gray literature including news articles for studies of managed retreat and for reports on small communities at various stages of relocation due to sea level rise. By exploring the cited references of the studies identified, the initial literature findings led to information on additional communities facing similar issues. Case studies were included if sufficient information was provided to determine the community’s motivation for relocation, processes undertaken, funding sources, and issues

encountered. Community relocations for which sea level rise was one of the several motivating factors were included if the other criteria were met.

For included cases, we reviewed the community's features, history, and current activities, including public health issues, environmental hazards, and efforts to adapt prior to the relocation decision. We then synthesized the successes and challenges described in the available reports. While we had no direct contact with these communities, some available reports provided details of extensive interactions with community residents (Edwards 2013; Shearer 2011; Displacement Solutions 2016). The case studies identified are a sample of convenience and not a comprehensive survey of all small communities at risk from sea level rise.

3 Results

We identified eight small island or coastal communities at various stages of relocation in Alaska, Louisiana, and Washington in the USA, Panama, Fiji, Papua New Guinea, Solomon Islands, and Vanuatu (Table 1). Four communities are on the coasts of North America; the other communities are islands in the western Pacific Ocean. Affected populations ranged from 60 to 2700 persons and are predominantly low-income indigenous peoples; many rely at least in part on subsistence fishing and agriculture. Examples of health impacts of relocation in these communities are listed in Table 2. The vignettes below highlight some unique aspects of each community.

3.1 Kivalina, Alaska

Kivalina is an isolated Alaskan Native island community of 500 that needs to relocate due to coastal flooding, erosion, and repeated attempts at shoreline stabilization. Complex government permitting systems have complicated relocation efforts (Bronen and Chapin 2013). Multiple sites have been considered for the relocated town considering issues such as storm surge and coastline erosion vulnerability, water supply, and costs (Shearer 2012). In 2008, residents participated in an unsuccessful lawsuit against fossil fuel companies for contributing to climate change impacts on their village (Shearer 2011). The community is currently investing in community center, relocation archive, and biochar sanitation projects as positive steps to enhance its resilience (Marlow and Sancken 2017). While no federal or state agency has agreed to fund the relocation, in 2018, the state provided limited funding for a 7.7 mile evacuation road from the island to a mainland site where a new school is expected to be built (Oliver 2018).

3.2 Isle de Jean Charles, Louisiana

Isle de Jean Charles is a Native American coastal community of 80 people. Coastal erosion, land subsidence, hurricane related flooding, and sea level rise have become unmanageable for the community after many years of levee building and industrial canal dredging (Davenport and Robertson 2016). In 2016, it received a US Department of Housing and Urban Development relocation grant of \$48 million with a deadline of 2022 for project completion (Davenport and Robertson 2016). Residents have had substantial involvement in planning for the new community (Citizens' Institute on Rural Design 2016). Relocation has been

Table 1 Characteristics of selected case studies of managed retreat in small communities

Community	Population	Primary risks	Stage of relocation	Funding sources
Kivalina, Alaska, US	500	Coastal erosion, sea level rise, permafrost thawing	Slow progress; community initiated resilience projects in interim	Funds obtained for island evacuation road and new school
Isle de Jean Charles, Louisiana, US	80	Sea level rise, subsidence	New site selected and being purchased	\$48 million in federal relocation funds
Taholah, Washington, US	660	Sea level rise, storm surges, tsunamis	Land clearing at new site underway	\$700,000 from federal relocation planning grant
Giardi Sugdub Island, Panama	1000	Sea level rise, inadequate space for population growth	New land cleared but delays on completing new housing, school, health center	Some funds raised locally; more funds promised by national government
Vunidogoloa, Fiji	140	Sea level rise, salt water intrusion	Community moved successfully in 2014	Local and national funding
Cartaret Islands, Papua New Guinea	2700	Coastal erosion, sea level rise	Slow progress due to multiple barriers	Local grassroots organization and Catholic church
Taro Island, Solomon Islands	600	Sea level rise, cyclones, tsunamis	New site selected; town needs to be built from scratch	Some provincial funding
Tegua Island, Vanuatu	60	Tsunami, cyclones, earthquake, flooding	Community moved successfully in 2005	\$50,000 from post-tsunami Canadian relief funds

Table 2 Health issues in small communities potentially impacted by managed retreat. Adapted in part from McMichael et al. 2010 and Edwards 2013

Health impact	Issues affecting health	Examples
Mental health, including well-being, anxiety, depression, suicide	<ul style="list-style-type: none"> • Change in exposure to flooding and extreme weather events • Change in quality of physical living environment • Loss of traditional livelihood • Disruption of place attachment • Reduced relevance of traditional knowledge • Change in land security/land ownership • Disruption of daily activities focused on beach and water access • Adequacy of new location for population growth • Conflicts with new neighbors • Disruption of clanship with strong social ties • Potential for improved community collaboration during relocation 	<p>Cartaret Islands: subsistence farmers unfamiliar with cultivating cash crops; Taholah: new community being designed with community input to have improved physical environment</p>
Social capital	<ul style="list-style-type: none"> • Host in new location may not welcome those relocating 	<p>Isle de Jean Charles and Gardi Sugdub Island: some community members moved elsewhere prior to relocation</p>
Food security and nutrition	<ul style="list-style-type: none"> • Potential loss of traditional subsistence food sources, especially fishing sites and agricultural land • Potential undernutrition, malnutrition, micronutrient deficiencies 	<p>Cartaret Islands: disputes over fishing access at new site; access to some unfamiliar foods; Vunidogolaa: residents received assistance in adjusting fishing and agriculture livelihoods</p>
Water security and sanitation	<ul style="list-style-type: none"> • Diarrheal disease risk associated with water quality • Hygiene and dehydration associated with adequacy of freshwater quantity 	<p>Tegua Island: new rainwater harvest tanks built to provide freshwater because of saltwater intrusion into groundwater supply; Kivalina: community developed a biochar reactor to improve sanitation</p>
Infectious disease risk	<ul style="list-style-type: none"> • Disease exposures may vary in new location • Potential new exposure from contact with new neighbors 	<p>Gardi Sugdub Island: malaria risk may be higher in new mainland site than on island</p>
Injury	<ul style="list-style-type: none"> • Trauma before, during, or after relocation 	<p>Taro Island: new location has lower tsunami risk</p>
Access to health care	<ul style="list-style-type: none"> • Potential disputes with new neighbors • Limited access to health care before, during, and after relocation due to community remoteness 	<p>Gardi Sugdub Island: new health center partially built</p>

slowed by a strong sense of place attachment, lack of community consensus on whether and where to move, lack of job opportunities, and distrust of government (Davenport and Robertson 2016). After considering community preferences, in 2017 the state selected a 208-ha site located 64 km from the existing village and 3 m above sea level (Baurick 2017); groundbreaking is expected to begin in late 2019.

3.3 Taholah, Washington

Taholah is a Quinault Indian Nation coastal community of 660 people. It has experienced repeated flooding and ongoing risks of tsunamis and storm surges. In 2013, the village received a \$700,000 Social and Economic Development Strategies grant from the federal Administration for Native Americans and conducted a multi-year master planning process for relocation to higher ground (Loftus-Farren 2017). The houses, businesses, and community structures of the new upper village will be built on 81 ha of land 800 m from the existing lower village center (Quinault Indian Nation 2017). The plan is designed with extensive community input to meet local needs and includes best practices for resilience, walkability, energy efficiency, and stormwater management. Land clearing for the new village began in 2016.

3.4 Gardi Sugdub Island, Panama

Gardi Sugdub is an island community of about 1000 indigenous Guna people who are seeking to relocate due to sea level rise and to accommodate population growth (Slobig 2016). The community acquired 17 ha on the mainland and began clearing land for a new village site in 2015, using funds from local residents and from island families who now live in Panama's capital city. Progress in building a school complex, a health center, and replacement housing at the new site has been slow, despite promises by the Panamanian government. Funding, coordination, and governance of steps forward have been difficult (Displacement Solutions 2014, 2016). Unlike the island, the new site may pose a risk of malaria and yellow fever.

3.5 Vunidogoloa, Fiji

Vunidogoloa is a small island village of 140 persons that successfully moved 2 km inland in 2014, after years of flooding, salt water intrusion, and seawall failure. The move exceeded the estimated time and budget. The community donated labor and timber for construction. Benefits of the relocation included solar panels, better school access for children, and improved overall quality of life according to residents (Tronquet 2015). Factors contributing to its successful relocation include public involvement in decisions, use of both government and community resources, the availability of community-owned land nearby, local church support, and assistance in adjusting agriculture and fishing livelihoods (McNamara and Des Combes 2015). The experience in Vunidogoloa is helping to inform the development of national relocation guidelines for Fiji.

3.6 Cartaret Islands, Papua New Guinea

Surrounding a lagoon, the Cartaret Islands include six small inhabited islands with a maximum elevation of 1.2 m above sea level. Its 2700 residents are facing ongoing coastal

erosion, saltwater intrusion, and sea level rise. Previous attempts since the 1960s to relocate residents failed primarily due to lack of suitable land (Edwards 2013). A local grassroot organization leads the current voluntary relocation program; the Catholic Church has donated land and provided other relocation support (Langenheim 2016). Progress has been slow with a small number of families relocated to date. Problems include land ownership rights, coastal fishing access, livelihoods, food insecurity, community engagement, malarial mosquito exposure, interactions with new neighbors, and relevance of traditional environmental knowledge (Edwards 2013).

3.7 Taro Island, Solomon Islands

Taro Island, a 1-km-long coral atoll, is a provincial capital with a population of 600 people. It has experienced three prior evacuations related to tsunamis and seismic activity. The island mostly lies less than 2 m above sea level and is expected to become uninhabitable in coming decades (Yeo 2014). Plans for relocating to a new site began in 1994. The provincial government subsequently ceased spending funds on new island infrastructure (Morton 2015). The province purchased 488 ha of swampy forest land for a new town site on the Choiseul mainland about 2 km away by boat. Although government funding has been inadequate so far, project planners are working with community members to design the new town.

3.8 Tegua Island, Vanuatu

Tegua Island, a small tropical coral atoll, has a population of about 60 residents all belonging to an extended family. After years of flooding from high tides and cyclones and a 1997 earthquake and tsunami, the village planned and moved to a new higher inland site nearby. The community built six communal structures at the new site with \$50,000 from post-tsunami Canadian relief funds (Boehm 2006). Rainwater harvest tanks were installed to provide fresh water that was otherwise unavailable. Favorable adaptive factors for the community include human capital, social capital, belief systems, land and marine resources, clear leadership, and history of dealing with environmental stressors. Barriers to adaptation include limited access to external support, services, and management skills (Warrick 2011).

4 Discussion

4.1 Reasons for managed retreat

In past years, communities have moved for reasons ranging from acute disasters such as the 1964 Valdez, Alaska, earthquake (National Research Council 1970) and the 1986 Chernobyl nuclear reactor meltdown (Goldman et al. 1987), to more gradual events such as the 1940s Bikini Atoll nuclear testing (Simon 1997) and the 1980s Times Beach, Missouri, dioxin contamination (Yanders 1986). Other communities have been abandoned when scheduled to be flooded by a new dam, when no longer economically viable, or due to famine, drought, or war.

Sea level rise associated with climate change has characteristics associated with both acute and gradual reductions in habitability. It frequently overlaps other environmental hazards, such

as erosion, storm surge, tsunami risk, saltwater intrusion, and ecosystem damage, which may be unpredictable and complicate decision-making processes. Periodic high tides and storms reduce useable coastal land over decades; communities may respond by building increasingly larger hardened barriers. Planning for and implementing relocation requires many years. If a planned relocation is not accomplished while a community experiences these warnings, a subsequent massive storm may overwhelm all defenses, providing little time to implement an orderly relocation process.

4.2 Health impacts of relocation

While the case studies reviewed provide qualitative suggestions of health impacts, no reports mentioned efforts to explicitly measure the health impacts of managed retreat. Studies to measure changes in disease rates before and after relocation may be difficult in these communities because of small denominators and minimal disease reporting systems. The most important climate-sensitive health risks in individual Pacific island countries have been described by McIver et al. (2016). Information on the health impacts seen in populations migrating due to drought, war, and other reasons may be relevant, although persons moving due to climate change generally have more time for relocation planning and are better able to retain most of their possessions.

Many reports on the eight communities in the present study discussed the indirect health impacts of relocation related to the physical and social determinants of health (ODPHP 2018). These health determinants include housing, source of livelihood, social capital, cultural identity and traditional knowledge, land security, and access to energy, social support services, and education. New housing is essential as part of relocation, and depending on resources, may be of higher quality than prior housing. Relocated residents may or may not have access to their prior livelihoods or to new jobs, depending on distance and available transportation. Children need continued access to school in the new location which needs to have teachers and a suitable physical place. Social capital is essential for health, especially in small communities facing the stresses of relocation. Whether community residents move as a group to one new location or disperse into multiple locations affects the integrity of existing social capital and community life (Albert et al. 2017).

Other physical and social determinants of health include coastal access, familiarity with the outside world, room for population growth, and freedom from conflict with other populations. Each of these determinants needs to be considered in the relocation decision process. For example, in the Carteret Islands, conflicts over fishing rights, learning to sell cash crops, and interacting with new neighbors from different cultures contributed to social and mental health stresses during the relocation process (Edwards 2013).

The affected populations in this report are predominantly indigenous people who may be particularly vulnerable to the impacts of climate change because they may have fewer resources and poorer health than others in their home country (McMichael et al. 2010). Indigenous people may also have certain strengths facilitating their resilience, including experience in dealing with stressful circumstances, serving as keepers of traditional ecological knowledge, and having a “strong tradition of intergenerational stewardship of and responsibility for the land” (McMichael et al. 2010).

4.3 Success factors and challenges

The experiences in the eight communities suggest several factors that may contribute to successful relocation. Choosing new land within easy walking access to the old village site may reduce social and cultural stress by allowing continued place attachment and access to existing fishing sites. Detailed planning with extensive community engagement helps residents to feel ownership and attachment to the new community. In addition, improved infrastructure, including water, wastewater, energy, schools, and community centers, is attractive for residents relocating into the new community. Finally, clear governance structures that facilitate decision-making and community engagement can improve the likelihood of successful relocation.

These case studies also highlight the challenges faced when communities choose to relocate. The barriers to relocation frequently interact. Progress may be delayed by land ownership issues, lack of a new location acceptable to community members, and insufficient funding for building new community structures and housing. A lack of governance structures including local leadership makes it difficult to reach decisions and implement plans. While relocation processes are underway, resources to maintain infrastructure in the existing site may be limited. People with planning, building, and service delivery skills are necessary to provide housing, food, water, sanitation, health care, education, and jobs, as well as to reduce disruption to the sociocultural fabric of the community associated with relocation. Finally, community cooperation may be improved by timely information on current and anticipated hazards.

4.4 Other communities at risk

Many of the communities examined in this report are near other communities facing similar risks from sea level rise. The resources needed for all such relocations are substantial. For example, at least 30 other Alaskan Native communities are challenged by flooding and sea level rise including Newtok (Agnew 2011), Shaktoolik (Sea Grant Alaska 2017), and Shishmaref (Mele and Victor 2016) (Government Accountability Office 2009). Assessments of health impacts associated with climate change have been conducted for at least 14 of these Alaskan communities (Alaska Native Tribal Health Consortium 2010).

In Washington state, other Native American coastal communities facing relocation issues include the Hoh and the Quileute tribes (Loftus-Farrah 2017). In Panama, at least 40 other island communities are likely to need to relocate related to sea level rise and population growth (Displacement Solutions, p 2, 2016). In Fiji, the Vunidogoloa experience may serve as a model for relocation efforts in 45 other villages, including Narikoso (Jolliffe 2016; Tronquet p 139, 2015). Near the Carteret Islands, at least 70 other islands are similarly threatened (Edwards 2013). Several low-lying island nations, including Kiribati and the Maldives, are exploring options for relocation of their entire national populations due to sea level rise.

4.5 Implications for large cities

Small island and coastal communities, especially those with isolated indigenous populations, typically have few resources for relocating their communities. Large cities usually have more resources for disaster planning and response and relocating the portion of their population at

risk. Large cities are more likely to have the political influence needed to secure national funding for disaster response. For example, following Hurricane Sandy in 2012, the New York metropolitan area received substantial federal and state resources for area recovery, including buyout of some high-risk properties (Brown 2014; Koslov 2016).

There are between 4 million and 13 million people at risk of sea level rise by 2100 in large and small communities in the USA (Hauer et al. 2016). California, Florida, Louisiana, New Jersey, and New York have the most people at risk. Planning for the relocation of persons at risk will require substantial resources and needs to include awareness of the social, cultural, and health impacts on persons displaced. Lessons learned from relocation of small communities may be useful for relocation of persons in large cities.

4.6 Frameworks and tools for relocation

Structured frameworks and tools may facilitate relocation processes. The United Nations High Commissioner for Refugees provides guidance on best practices for planned relocation in relation to climate change (UNHCR 2014). For example, the Peninsula Principles outline a rights-based approach to managing internal displacement of populations affected by climate change, including those affected by sea-level rise (Displacement Solutions 2013). These principles highlight the importance of health concerns in triggering precautionary relocation efforts as well as the rights of communities to adequate health and other services during and after the relocation process.

Hino et al. (2017) reviewed 27 cases of managed retreat associated with earthquakes, tsunamis, landslides, tropical storms, riverine flooding, and coastal hazards. These cases ranged from small communities up to areas impacting over 500,000 persons. Hino proposed a four-quadrant conceptual model for managed retreat based on who initiates the relocation (those being relocated vs. a larger government entity) and on who benefits from the relocation (local residents only vs. the greater population). The best results may emerge when the move is initiated voluntarily by those being relocated and when there will be benefits for populations beyond those communities. In the eight small communities reviewed, the moves were initiated primarily by those being relocated, but few benefits for populations beyond these communities are identified. Such communities may have strong local ownership for the relocation efforts, but face substantial funding, legal, and institutional obstacles due to the lack of a motivated external implementing party (Hino et al. 2017).

Other tools and experience from the health sector may be relevant. Grief counseling may be useful in settings where rupture of place bonds constitutes a grievous loss for community members (Worden 2009). Cost-benefit analysis can be used to bring an evidence-based perspective to management discussions that focus on political, ideological, and feasibility concerns (Marseille et al. 2015; Jolliffe 2016). Cost-effectiveness analyses are used to compare multiple options but rarely done on broad interventions such as community resettlement. Cost-benefit analysis should not be the sole deciding factor in relocation decisions. For example, providing housing in Anchorage for Kivalina residents may cost less than building a new rural village, but it would destroy Kivalina's sociocultural heritage.

4.7 Research needs

Further research is needed to better understand the public health implications of managed retreat and how to facilitate population resilience before, during, and after relocation. For

example, one could conduct surveillance of selected health indicators before and after a community's relocation to better document health impacts, such as changes in infectious diseases, and in access to food, water, housing, and health care. The health impacts in a population that relocates early as sea level rise affects their community could be compared with the impacts in a similar community that delays its relocation. Other research could help integrate economic considerations with social dimensions of decision-making such as place attachment and cultural heritage (Hino et al. 2017).

Additional research could compare health impacts in population relocation due to sea level rise to health impacts in populations migrating due to drought or other environmental hazards. Frameworks designed to protect the rights of displaced persons from refugee camps and other settings may be useful in such studies (United Nations Commission on Human Rights 1998).

4.8 Study limitations

Several limitations should be considered in interpreting study findings. First, relocation efforts are ongoing in most of the communities discussed and their most recent progress may not be described in this report.

Second, this report highlights well-documented examples that may not be representative of all small communities at risk of sea level rise. In an extensive search, Hino et al. (2017) identified 27 cases of managed retreat in large and small communities (including five of the eight discussed in this report) in which relocation was associated with reasons mostly unrelated to climate change, such as earthquakes, tsunamis, river flooding, and landslides.

Third, this report is based on findings reported in available literature, not on independent sociological investigations in the affected communities. Available information primarily focuses on determinants of health in these communities, rather than on specific measures of morbidity and mortality. Few of the overall costs, direct impacts on health, and impacts on social determinants of health in these communities have been examined quantitatively.

5 Conclusions

Study results suggest some common themes and steps forward. First, health should be a consideration in managed retreat processes, although health concerns are rarely the principal driver of resettlement decisions. Many countries have national climate adaptation plans that may or may not address managed retreat and health issues (United Nations Climate Change 2016).

Second, managed retreat is a proactive response to known risks prior to catastrophic necessity. A cost-benefit analysis of the human and financial costs of managed retreat compared to post-disaster response could help document the value of planned relocations. Planned moves are less disruptive and less costly than moves done on short notice, although external funding is more available for disaster response than for planned relocations (Marlow and Sancken 2017).

Third, managed retreat allows time for thoughtful decision-making as it unfolds over several years. Clear governance processes and local leadership are essential, particularly for community engagement and for achieving consensus on how, when, and where to relocate.

Fourth, funding for relocation varies widely, is derived from local, regional, national, and international sources, and is generally inadequate. Funds designated for relocation planning processes are particularly valuable. Most managed retreat is internal to a country, although some island nations are exploring countrywide relocation.

Finally, by proactive management, communities that need to relocate can take advantage of the opportunity to engage in community planning and may reap co-benefits from the move. The sociocultural and health implications of managed retreat deserve substantial attention. As a Fiji official commented about Vunidogoloa: “relocation ... [is] not about moving houses, it’s about moving lives.” (McNamara and Des Combes 2015, p 317).

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