Climate-Related Displacement and Relocation in the U.S. and Abroad
A Message from the President

Climate Refugees: Already Happening in the U.S.

John Topping, Jr., Climate Institute President

The Climate Institute's interest in the issue of environmental refugees stems back over two decades. However, as the threat of population displacement due to climate change and its effects becomes more and more real, we found it valuable to revisit the issue in this most recent collection of articles from Climate Alert.

The threat of widespread human suffering and political disruption due to a profusion of environmental refugees from increasing sea level rise and weather variability provided a major impetus for the signing of the 1992 Framework Convention on Climate Change. In her landmark speech on climate change to the Royal Society in 1988, British Prime Minister Margaret Thatcher noted that the previous October the President of The Maldives had told other leaders that most of his nation was no more than two meters above sea level and could face devastation from even intermediate levels of sea level rise. The Prime Minister's wholehearted push in her last three years at 10 Downing Street for action on climate change may have been less attributable to a green conversion and more to this tough-minded realist's belief that climate change could wreak havoc on the international political order.

On climate change matters, Thatcher drew heavily on the counsel of British diplomat Sir Crispin Tickell, who had raised concern about a future climate refugee problem in his seminal book, Climatic Change and World Affairs, first published in 1977. Days after retiring from the position of UK Permanent Representative to the United Nations, Sir Crispin assumed the chairmanship of the Climate Institute. From 1992 to 1995 he also chaired an international advisory committee providing counsel to Dr. Norman Myers as he wrote Environmental Exodus: An Emergent Crisis in the Global Arena. This book (published by the Climate Institute in 1995) and subsequent articles by Myers and others brought new prominence to the prospect of climate refugees. At the time, however, this challenge was viewed as a problem limited to impoverished island or coastal nations or to drought-stricken regions; its impact on richer nations was expected to come mostly from "boat people" or desperate rural dwellers spilling across their borders.

The 1992 international prize-winning documentary film Vanishing Lands, produced by coastal expert and Climate Institute board member Dr. Stephen Leatherman, added another dimension to this "poor-country" perception of climate refugees. Vanishing Lands demonstrated that sea level rise and subsidence had already caused the disappearance of thirteen islands in the Chesapeake Bay region and had displaced hundreds of people, many of whom were "watermen" whose families had pried the Bay for fish and shellfish for generations.

Building on the interest both in possible climate refugees about a hundred miles from the United States capital and in environmental degradation of the nation's largest coastal estuary, the Climate Institute organized a conference on Climate Change and the Chesapeake Bay in October 1996. Held at Washington College in Chesterfield, MD with sponsorship by US Environmental Protection Agency (EPA), the University of Maryland, and the Thomas H. and Barbara W. Gale Foundation, this conference was a resounding success with participation by stakeholders from local planners to watermen. Its principal value, however, was in catalyzing collaborative action against such threats as local pollution and in creating a greater awareness of climate change risks in the region.

Despite the increasingly clear challenges that climate change poses for residents of the United States, Americans have continued to view climate change as an issue primarily for developing and coastal nations. That perception changed discernibly following an Indigenous Peoples Climate Change Working Group Conference in November 2013 at Dartmouth College. The conference helped solidify a CELT Tribal Sustainability Partnership Initiative that has already spurred some pilot project collaborations on sustainable energy and agriculture among members of the Dartmouth, Cornell, tribal college, and other university communities. One of the most ambitious components of this initiative occurred in response to conference presentations showing that two or three dozen Alaska Native villages may need to relocate to higher ground over the next generation due to a combination of sea level rise and loss of the coastal sea ice that buffers ocean waves during the colder half of the year. Equally compelling were presentations demonstrating that in
this same time frame, several hundred thousand residents of the Louisiana Bayou Country (many of them indigenous people) may be displaced through a combination of sea level rise; land subsidence due to oil/gas drilling, improvident dredging practices, and other factors; and land development that has removed buffering coastal vegetation.

The day after the conference at a one-day brainstorming session held at Sherman House (home of Dartmouth’s Native American Studies Program), members of the working group and CELT agreed to focus efforts on catalyzing talent and technical support to strengthen vulnerable indigenous communities in Alaska and Louisiana and historical communities in the Chesapeake Bay region. By developing both relocation strategies that preserve community integrity and innovative adaptation strategies for communities that decide not to relocate, interest groups and governmental agencies can help preserve as much as possible traditions and local knowledge that date back hundreds, if not thousands of years. This goal is undeniably daunting—the US experience in facilitating such relocation is a mixed bag at best, whether we look at the experience of the Resettlement Administration of the New Deal in aiding those people who fled to California during the Dust Bowl or at attempts to resettle communities uprooted to create dams or reservoirs.

Federal policy on recognizing Indian tribes is arbitrary and presents a significant obstacle to planning by vulnerable groups, such as the Houma Indian Nation in Louisiana. Moreover, some factors that contribute to land subsidence—especially intensive oil and gas drilling—also pit relatively powerless local populations against well-heeled and politically connected adversaries. Yet the working group members agreed to make community relocation and adaptation empowerment a central theme of its next meeting on April 7-8, 2014 at the National Center for Atmospheric Research in Boulder, CO. (See Climate Institute News in this issue of Climate Alert.) Meanwhile, CELT agreed to organize teams of volunteers to support relocation empowerment efforts in Alaska, Louisiana, and the Chesapeake Bay region. We hope to stimulate much more involvement of federal, state, and local agencies, tribal groups, and other NGOs as this partnership initiative builds strength.

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Much of this issue of Climate Alert consists of an early effort to highlight challenges in each of these three regions. The first is “Sea Level Rise and Possible Options for Relocation in the Chesapeake Bay Region” by Timothy Bushman, leader of the Chesapeake Team and co-founder of the Citizens Climate Lobby of Baltimore, with collaboration from Joy Jackson, a member of the Georgetown University class of 2017. “Coastal Louisiana – Tragedy in the Making,” is a collaboration of Kristina Peterson, Ph. D., Coastal Louisiana Team Leader, Tony Laska, Ph. D., and Richard Krajewski, M.Div., all of whom are affiliated with the Louisiana-based Lowlander Center. Melissa Udevitz, a resident of Eagle River, Alaska, member of the University of Maryland Baltimore class of 2015, and author of an article on the effects of climate change on native Alaskans published in the 2012 Arctic Special Issue of Climate Alert—has prepared an analysis of the daunting challenges Alaska native villages face as they ponder relocation. After reading these three articles, one might reasonably conclude that the United States, the world’s most prosperous economy and a leading military power, may well face a greater climate refugee challenge than any other OECD nation—a challenge that stems mostly from within its own borders.

Two articles place this discussion in an international context. The first piece, by Chris Walker, a Climate Institute Program Assistant, provides an overview of the international context in grappling with environmental relocations with a glimpse at a couple of case studies. The second contribution, a collaboration between the Honorable Tom Roper, Climate Institute Board Member and former Victoria Minister for Planning and Environment, and Nikita Perumal, a member of the Columbia University class of 2016, focuses on efforts of small island states in the Pacific to enhance energy efficiency. These islands also seek to make greater use of renewable energy to improve their balance of payments as they simultaneously face serious adaptation challenges and, in a few instances, must even contemplate relocating an entire nation before the end of this century.

Rounding out this issue is a complementary articles on the societal impacts of the winter of 2013-2014, which raised consternation in many parts of the northern hemisphere, and some informed speculation that the anomalous weather may in fact be a new normal due to changes in the Arctic. Ethan Forauer, CELT 2014 coordinator and environmental science major at Clark University, explores the effects of this unusual winter in the United States. The jury may be out for few more years on whether we are in transition to a new normal, but meanwhile, there are few people who envy the plight of city planners or emergency services officials worldwide.

Hanover, NH
Sea Level Rise and Possible Options for Relocation in the Chesapeake Bay Region

By Timothy Bushman and Joy Jackson

Introduction
Climate change can no longer be framed as an issue of the future. Climatic impacts are everywhere and are currently being felt across the United States and the rest of the world in many different ways (1). The Chesapeake Bay region of Maryland and Virginia is no exception and is especially vulnerable to climate change from the impacts of sea-level rise on coastal communities. The Chesapeake Bay is the largest estuary in the United States, spanning 200 miles from Havre de Grace, Maryland to Virginia Beach, Virginia. It boasts a whopping 11,684 miles of shoreline (including tidal tributaries), more than the entire west coast of the United States (2). As a consequence of its unique characteristics, the region has been ranked the third most vulnerable to sea-level rise of any geographical locale in the United States (behind Louisiana and southern Florida). This distinction carries with it a heightened level of susceptibility to coastal flooding, shore erosion, engulfment of wetlands and lowlands, and the contamination of ground water aquifers (3,4).

Sea Level Rise and Accompanying Issues
Sea level rise has not been occurring at equal rates across the globe, and it is projected to increase in a disproportionate fashion due to differences in water circulation, temperature, salinity and density in the sub polar north Atlantic. The U.S. Geological Survey projects that sea levels along the Atlantic coast will rise three to four times faster than the global average over the next century (5). It is estimated that average global sea levels have risen 6 inches in the last 100 years. However, the Chesapeake Bay region has experienced a relative sea level increase of nearly 12 inches (twice the rate of the global historic average) due to the impacts from climate change and subsiding coastal areas (3,4,6). Maryland itself has experienced a sea level rise of 3-4 mm/year, a rate nearly twice that of the global average of 1.8 mm/year (7). This issue is compounded by the occurrence of land subsidence in and around the Chesapeake Bay at a rate of approximately 1.3 mm/year (3). These sobering realities stand to increase flood risk in cities, inhabited islands, and tidal wetlands (8). The region has already witnessed the loss of 13 islands, with many more (such as James Island and Smith Island) at risk of being swallowed-up by the rising seas in the years to come (6,9). Water levels in this region could increase by as much as 17-28 inches above 1990 levels by the end of this century (4), with a relative sea-level rise of 2.7-3.4 feet by century’s end. Some low-lying coastal areas in Dorchester and Somerset Counties have already become inundated, with many areas at risk for the same fate (6).

Population Concerns
Of particular concern in the Chesapeake Bay region is the looming threat of population displacement due to sea level rise in the coastal regions. This vulnerability is amplified by the large population (approximately 17.8 million) that calls the Chesapeake Bay watershed home (which includes parts of Delaware, Maryland, New York, Pennsylvania, Virginia, West Virginia, and Washington, DC). The number of people inhabiting this area has more than doubled since 1950 and is projected to increase to 19 million by 2020 and to 21.4 million by 2040 (10,11). The state of Maryland is projected to see an additional one million new residents by 2030 (12).
Such a stark acceleration of regional sea-level rise in a densely-populated area (along with the potential for related flooding and erosion) poses a grave threat to coastal homes, infrastructure, and commercial development, including ports. Washington, DC (population: 646,449), Baltimore, Maryland (population: 622,104), Virginia Beach, Virginia (population: 448,479), and Annapolis, Maryland (population: 38,620) are the large urban areas on the western shore of the Chesapeake Bay that are the most vulnerable (13,14). Additionally, the large shipping port of Baltimore, three large airports (Baltimore-Washington, Reagan, and Dulles), a nuclear power plant, several fossil-fuel power plants, Naval Station Norfolk (largest naval station in the world), and over 200 sites on Maryland’s National Register of Historic Places lie in potentially vulnerable areas (12,15,16).

Among the many current (and former) islands of Maryland, Smith Island is the last to be inhabited on Maryland’s Chesapeake Bay. Once a prominent fishing community known for its annual oyster and blue crab harvest, scientists assert that Smith Island could be completely underwater in 30-100 years due to the combination of rising seas and land subsidence (17). Raghu Murtugudde, a professor at the University of Maryland’s Earth System Science Interdisciplinary Center, stated that “In the worst-case scenarios, Smith Island could be gone in, let’s say by 2025, 2030 or so.” In the past 150 years alone the island has experienced a loss of 3,300 acres of wetlands, according to a U.S. Army Corps of Engineers report (18). Consequently, the population on this small island has dwindled from a peak of 700 people in 1960 to approximately 267 full-time residents today (17). Smith Island still hosts the three towns of Tylerton, Ewell, and Rhodes Point, and the island itself has been inhabited since 1686; these small towns serve as a cornerstone for the communities that remain on an island that could face dramatic changes to come (18). It may be said that Smith Island now represents a microcosm of the larger issue at hand throughout the Chesapeake Bay region; how do we relocate entire (and perhaps reluctant) populations due to sea-level rise while continuing to maintain and preserve their cultural heritage and traditional ways of life? What long-term policy solutions can be crafted to help prepare for the difficult prospect of displacement and migration for vulnerable populations?

Preserving the Social Fabric
Faced with the possibility of having to uproot entire communities, questions arise as to where and how this can be accomplished in a manner that befits communities as a whole and preserves quality of life. In moving these communities, it becomes important to take into consideration not only the circumstances surrounding their relocation, but also the various sociocultural aspects that comprise the community. Though there has been very little discussion of designing a nationwide plan focused on relocating communities facing environmental degradation, the idea has not been completely left out of the political sphere. After the government became aware of the existence of toxic waste dumps such as Love Canal, the EPA created a branch (Superfund) dedicated solely to addressing abandoned hazardous waste sites. One of the actions that a community—with help from local governments, the EPA, and other institutions—can take in dealing with a toxic waste site is permanent relocation. The EPA provides resources for communities and governments to consult when looking into the relocation process (19). This information outlines the process by which these stakeholders may carry out a permanent relocation and offers guidance for protecting the integrity of the communities throughout the process. Some of the actions mentioned in these resources indicate that, in order to achieve the preservation of these communities, efforts should involve:

- Keeping the community informed of each step taken in the relocation process

There are also lessons to be learned from communities outside the Chesapeake Bay region that have endured relocation as a result of hazardous conditions. In 1981 the community of Alleville, Arizona, due to extreme vulnerability to flooding, relocated to the new town of Hopeville, Arizona. This relocation, in which government entities and local citizens worked in conjunction to preserve the already tight-knit community, was successful. Over the course of three years, four major concerns arose that can be applied to relocations in general: “keeping the community together during the wait for relocation, problems of communication and rumor control, maintaining commitment to relocation, and handling opposition to relocation by citizens of surrounding communities” (21). The case of Alleville provides support for future relocation efforts, specifically those that come as a result of climate change.
Options for Relocation
If governments in the Chesapeake Bay region opt to relocate these vulnerable populations, there are federal lands located nearby which could potentially serve as relocation sites. In the immediate vicinity of the Chesapeake Bay, the largest federally owned land tracts are situated in Prince George's, Anne Arundel, and Dorchester counties. Smaller federal lands are located in Frederick County in Northwestern Maryland (22).

Maryland’s Department of Natural Resources could also play an integral role in the acquisition of land tracts for relocation. Under this department, there are a number of programs in place that deal primarily with preserving natural landscapes and promoting environmental stewardship within Maryland’s communities. One of the most prominent programs, Program Open Space (POS), consists of two different mechanisms: one that “provides financial assistance for the planning, acquisition and/or development of recreation land or open space areas” on a local level and another that serves a similar purpose with assistance coming from the state (23). The latter acquires parks, forests, and other natural landscapes for public recreational use. Though POS does not deal directly with sustainable relocation efforts, its model (state acquisition of lands for the public) could be recreated within the context of emergency relocation. In this scenario, local governments could take advantage of state-funded assistance regarding land acquisition in order to find lands that could serve as possible relocation sites.

Adaptation Strategies
The threat of population displacement calls into question what adaptation strategies can be employed to lessen the social burden faced by groups and communities affected by relocation efforts (24). Of important consideration is the multitude of social factors that place certain groups at higher risk for a diminished ability to adapt to their changing environments. Individuals of lower income, minority status, lower educational attainment, older age, and lower economic and social mobility tend to have fewer adaptation options at their disposal and therefore may have a higher risk for displacement (1).

It is imperative for states and regions to develop a plan of action detailing mitigation and adaptation strategies to best prepare for the impacts of climate change. The state of Maryland has already drafted a plan to brace the region for sea level rise and associated coastal hazards. In April 2007 Maryland’s governor signed an Executive Order to establish the Maryland Commission on Climate Change working group. The intent of this group was to address and prepare for the impacts of climate change throughout the state. The recommendations for climate adaptation included hazard mitigation, natural resource conservation, and the restoration of coastal ecosystems in order to reduce the likelihood of damage to property, infrastructure, and the local economy (12). However, specific policy solutions for the potential relocation of vulnerable coastal populations are lacking and need to be addressed should sea levels continue to rise at its current pace. In the absence of effective interventions to mitigate the global drivers of climate change, relocation may become a feared last resort for some residents in the Chesapeake Bay region.

References


[13] Annual Estimates of the Resident Population for Incorporated Places of 50,000 or More, Ranked by July 1, 2013...
Coastal Louisiana – A Tragedy in the Making

By Rev. Kristina Peterson, PhD, Tony Laska, PhD, and Rev. Richard Krajeski, MDiv

The fastest disappearing delta in the world is located in Louisiana. Louisiana contains approximately 40% of the nation’s wetlands and experiences 90% of the coastal wetland loss in the lower 48 states. The state is losing 25 to 30 square miles of wetlands per year. At current land loss rates, nearly 640,000 more acres (1000 square miles) of land in the state, an area nearly the size of Rhode Island, will be underwater by 2050. The highest rates of loss are in the Barataria and Terrebonne basins. These basins are losing wetlands at a rate of 10-11 square miles per year.

The Louisiana delta was built over thousands of years from sediment flowing down the waterways that cover most of North America. Like most deltas, it is a living organism that is teeming with wildlife and gives life abundantly to the region, to the Gulf of Mexico and to the global ecosystem.

Louisiana’s coast has world ecological significance, with an abundance of fisheries, wildlife and water fowl. As the delta disappears, the estuaries providing feeding and nesting grounds for migratory birds also disappear. It also serves as a critical migratory flyway.

Gone too are the wetlands that help cleanse the pollutants from 36 states and several Canadian provinces that end up in the delta. The result is a
larger “dead zone” every year, thus many square miles of Gulf water bottoms where no life can exist. Meteorologists in France have stated that their “strange” weather patterns can be attributed to the loss of the carbon sinks that the Gulf area wetlands provide. Overall, it is estimated that Louisiana’s wetland loss could cost the nation $36.6 billion from public use value over the next 50 years.

Louisiana’s commercial fisheries are the most bountiful of the lower 48 states, providing 25%-35% of the nation’s total catch. Louisiana is first of those states in the annual harvest of oysters, shrimp, crabs, crawfish, red snapper, wild catfish, sea trout and mullet. By 2050, the annual loss of commercial fisheries will be nearly $550 million. For recreational fisheries, the total loss will be close to $200 million a year.

Wetlands and barrier islands also provide a protection barrier from strong winds and hurricanes. Every 2.7 miles of wetlands absorbs one foot of storm surge. Data from past hurricanes indicate that the loss of every one mile strip of wetlands along the coast results in an estimated $5.75 million average annual increase in property damage from such storms.

In the past 50 years, this delta has lost a land mass equivalent to the area of the State of Delaware, and it continues to lose land every minute of every day. Deltas in their natural form change over the millennia, shifting the flow of water and sediment and building land and new estuaries. But, this delta is not in its natural state. It has been harmed and denaturalized by levees, by oil and gas canals, and by the harvesting of the coastal forests. Because Louisiana’s delta was so massive and vast, early extractors may have been unaware of the devastation that such extractive practices would ultimately wreak on the region and, indeed, on the world.

These unintended consequences, combined with disregard of laws and lack of regulatory enforcement, have placed the delta in a precarious situation that some have compared to a system that must be placed on “life support”, to use critical care medical terms. We can no longer continue in this development-extraction mode without suffering the more dire consequences known as “system collapse or failure”. The collapse of the system will cause long-term harm to the global environment and economy.

In general terms, the loss of the delta has major economic consequences:

- With 500 million tons of waterborne cargo passing through its system of deep-draft ports and navigational channels, Louisiana ranks first in the nation in total shipping tonnage. If present land loss rates continue, more than 155 miles of waterways and several of the ports will be exposed to open water within 50 years or less.
- 18% of U.S. oil production and 24% of U.S. natural gas production originates, is transported through, or is processed in Louisiana coastal wetlands. One-fourth of our nation’s energy supply depends on the support of facilities in South Louisiana. Louisiana’s oil and gas industries have a value exceeding $16 billion a year.
- Over 20,000 miles of pipelines are located in federal off-shore lands and thousands more such miles are located just inland. Wetlands protect pipelines from waves and insure that the lines stay buried in place. When pipelines are exposed to more waves and storms, it becomes more likely that they will pose a threat to passing water traffic.

Louisiana’s coast is a “working coast”, supporting critical infrastructure such as highways, ports, pipelines and navigational waterways of national economic significance. Without coastal restoration, people and businesses that power the nation will be forced to retreat from coastal Louisiana, resulting in severe national economic consequences. The infrastructure along this coast is estimated to be worth $150 billion.

Further, between 60% and 70% of Louisiana’s population, about three million persons, lives within 50 miles of the coast. Without adequate coastal restoration and protection, at least two million of those persons are at high risk to life-threatening storms and hurricanes.

Immediately, the collapse of the delta system is producing concrete and catastrophic impacts on historied and Indigenous communities. Some of the Indigenous communities have been caretakers of the region for thousands of years. The historied communities found their way to the swamps of the lower bayou region to escape slavery, reservations and colonization, Africans, various Tribal bands, Acadians, Islenos are some of the most prominent. The thick dense swamps and the rich abundant marshes provided a means for subsistence and community survival. Environmental degradation, expansion, and poorly planned development have left the region and people highly vulnerable to storm surges, high and rising water levels and storms of increased intensity, such as minor hurricanes. Some communities have already “disappeared” due to loss of land while others are anticipating relocation or other adaptive measures.

Most of the coastal historied and Tribal communities consider themselves organically, spiritually, and
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Communally connected to the land and water. These communities prize their deep understanding of how to live according the region’s pattern of seasonable change. The traditional knowledge of the communities is based upon centuries of observation of the complex natural patterns of land, water, air and creatures which is the envy of many scientists. The knowledge that has guided the stewardship of the communities has protected the once abundant resources and nurtured the ecosystems of North and South America. Critical and irreplaceable traditional knowledge- “environment-in-place” knowledge- is disappearing as drastic changes occur and dwell together as long as is possible. They are comprised of families and are not merely people living in the same place. For generations, the people have been community-sufficient, existing on the bounty of the local resources and sharing those resources with each other. The ethic of mutual aid and reciprocity is strong in these communities, thus creating flexible, tightly knit social systems and multigenerational households in an environment that is understood as a giving host.

We at the Lowlander Center have been closely involved in working with communities in the Barataria and Terrebonne Basins that are experiencing the highest rates of land loss in the delta. Many of these communities have this strong ethic and resilience although they have diverse populations. For example, the town of Jean Lafitte (named for the famous privateer) and its surrounding unincorporated area in the Barataria Region has a long term population of Acadians-Cajuns, Germans, French, Creoles, Native Americans but also a community of Filipinos who came to the area in the 1890s. Residents are involved in shipping and fishing and also in the oil and gas industry. rapidly due to the loss of land-place, the destruction of wetlands and estuaries, and the growing disconnect of the residents from environment-in-place knowledge. As the environment changes and they also become more engaged in a modern way of life, the native inhabitants of Louisiana cannot help but depend more on employment that is not based on the local ecology.

The loss of ecological knowledge by the separation of people from place is not easily regained. Indeed, it may not be able to be regained because it is taught through the experience of everyday living on the land and water and is passed down through inter- A recent NOAA-assisted study (2007-2009) carried out by the University of New Orleans- Center for Hazards Assessment, Response and Technology (Kristina Peterson, Project Manager) for enhancing resiliency in Jean Lafitte through participatory community engagement found a strong sense of attachment to place and the commons and strong social systems of support and neighborliness. This would indeed be a win-win scenario for everyone. The study and its Participatory Action Research (PAR) approach has contributed to and helped shape projects concerning levees, diversion and wetlands restoration, resiliency land use planning, and to a proposal to establish a fishers processing cooperative. Also the community is preparing a self-implemented mitigation plan and targeting its library as a location for community extended learning and job training. Finally, its organization and efficiency has made the Barataria Region a staging site for BP response operations following the major oil spill and a distribution site for needed cleanup resources. Thus this Study indicates the possibilities for strengthening all dimensions of community resiliency through a bottoms up approach as communities remain in place “for the time being”. The stronger this resilience, the greater the likelihood generational engagement with the environment. Some communities do not want to relocate and leave their ancestral homes, which would cause a dramatic break in the process of passing down this sacred environment-in-place knowledge and connection to the land and water. Other communities have chosen to start the process of finding another location to be their home but this type of response has been limited in the delta to moves along the banks of the Mississippi River after floods in the last half of the twentieth century.

In any case, it is crucially important for these coastal communities to remain that the community can deal later with relocation when it becomes necessary.

In addition, major efforts are being made at the federal, state and local levels to mitigate the risks and build up these areas as much as possible. These efforts have been increased since Hurricane Katrina in 2005. The Barataria-Terrebonne National Estuary Program (BTNEP), a non-profit organization under the federal Clean Water Act established by the State of Louisiana and the U.S. EPA in 1991, with a Comprehensive Conservation and Management Plan (CCMP) completed in 1996. The CCMP contains four categories of 51 Action Plans- coordinated planning and implementation, ecological management, sustained recognition and citizen involvement, and economic growth (with environmentally-sensitive practices). The Plan was prepared and its implementation priorities set by a Management Conference of over 100 persons representing a broad range of stakeholders- representatives of local, state and federal agencies, environmental groups, fisheries and farming interests, civil groups, oil and gas interests, economic development groups and of the communities and landowners throughout the estuary. The CCMP and its Action Plans are...
coordinated with the 2012 update of the State of Louisiana Action Plan and with the national Gulf Coast Ecosystem Restoration Task Force.

Locally, the programs for the Barataria and Terrebonne Basins are supported by Restore or Retreat, Inc., a non-profit coastal advocacy group of 250 businesses and individuals established in 2000 that seeks to identify and expedite implementation particularly of aggressive large scale projects. Such critical projects under the BTNEP Plan include long distance pipeline sediment delivery for the two basins, the Davis Pond freshwater diversion, the Third Delta Conveyance Channel, the Mississippi River Water Reintroduction into Bayou Lafourche, and the Caminada Headland and Beach Restoration Project.

Despite these efforts, due to accretion of adverse events in the last several years from Hurricane Katrina to the BP Deepwater Horizon Disaster that supplement the daily disappearance of more and more land, the region has reached a tipping point or "regime change" as described by Walker and Salt. (See Brian Walker and David Salt, Resilience Thinking: Sustaining Ecosystems and People In A Changing World (Island Press: Washington, DC, 2006).

Local authorities have been slow to develop plans for coastal restoration, and the monies to support those plans flow even more slowly. However, pipeline sediment diversion is proving to rebuild land quickly and could be readily employed across the region. Such diversion appears to be more cost-effective and efficient than more permanent installations. To do such restoration would take both a political and financial resolve. For small projects, it is possible to restore land and vegetate it within a short time period. Many strategically placed small projects can make a significant difference for eco-system and community stabilization. The technology is in place to do the restoration, and the local communities are willing and able to help in the selection of locations and to work on the implementation and monitoring of such projects.

Still lacking is the connection of communities to each phase of restoration and retention of the delta. The Local and Traditional Knowledge of the communities is essential in the creation, development, monitoring, adapting and evaluating of any coastal plan. Those who are deeply knowledgeable and committed to the area both physically and culturally want to be co-managers of their future along the coast. The concept of co-management was demonstrated in a Sci-TEK project funded by the State of Louisiana and coordinated by Dr. Matt Bethel, Assistant Executive Director of Research, Louisiana Sea Grant, Law and Policy Program. There must be more than lip service to the concept of involving community input into the plans for the coast, it must extend to co-management.

The restoration of the delta region is a win-win scenario for the United States and the failure of restoration would be a tragic loss for the world. Americans must find the political will and the financial appropriations to undertake as soon as possible the necessary pipeline sediment diversions. Even this action would only repay a fraction of all that Americans have taken from the region in gas, petro-chemicals, seafood, music, and culture. Yet these efforts will create jobs, save birds, cleanse water, sequester carbon, and keep in place storied tribal communities. This would indeed be a win-win scenario for everyone.

For further information on the Lowlander Center and for a publication list see www.lowlandercenter.org/.

For the Barataria-Terrebonne National Estuary Program see www.btnep.org.

For Restore or Retreat, Inc. see www.restoreorretreat.org.


See too, Fikret Berke’s many works on Co-Management.


The Challenges of Relocation for Alaskan Villages Threatened by Climate Change

By Molissa Udevitz

Winter storms devour 70 feet of land at once. Rivers erode shorelines within a few feet of buildings. Flooding strews sewage and waste across people's doorsteps. Ice freezes later in the year, making hunting conditions treacherous - some hunters fall through this thin ice and die. Melting permafrost causes infrastructure to sag. Floors are not level anymore, outdoor stairways no longer reach the ground, and ice cellars flood. Food stored in these cellars spoils, making people sick. Nature's carefully timed cycles get out of sync, affecting the availability of subsistence resources people depend upon for survival.

These scenarios are not futuristic projections or exaggerations. They are problems Western Alaska Native villages are already experiencing, results of a warming climate. A 2003 U.S. Government Accountability Office (GAO) report recognized 86% of 213 Alaska Native villages face risks of flooding and erosion "due in part to rising temperatures," with four facing imminent threats and planning to relocate. By 2009, a new GAO report increased the number of villages under imminent threat to 31, twelve of which wanted to relocate or explore relocation options. Five years later, little progress has been made on these unprecedented relocation efforts due a myriad of financial and bureaucratic hurdles (5,6).

Although Alaska Natives have lived in Western Alaska for centuries, they have not always lived where their present villages are located. They used to migrate seasonally in order to get the fish and game they needed to survive. This changed around 1900 when the federal government required Alaska Native children attend school. Permanent village sites were primarily selected based on their barge accessibility so that barges could deliver building materials for schools and other infrastructure. Therefore, villages were constructed near coastlines and rivers - areas susceptible to flooding and erosion, especially in the face of a changing climate. These villages are small, isolated communities that practice largely subsistence lifestyles, have cultures deeply influenced by their location, and can only be accessed year-round by small planes (1).

In the past 50 years, Alaska has warmed at twice the rate of the global average, and Alaska's temperatures are projected to rise 5-18°F by 2100. These warming temperatures are impacting Alaska Native villages by reducing the summer extent of Arctic sea which in turn delays the formation of nearshore pack ice. Villages rely on nearshore pack ice to help buffer hurricane-strength winter storms, but its delayed formation has left villages exposed to extreme waves and storm surges, causing drastic flooding and rapid erosion. Warmer temperatures are also melting permafrost around these villages, causing damage to infrastructure as it sinks into the ground. Furthermore, warming temperatures are altering the ecosystems that support the villagers' subsistence lifestyles, and these changes impact subsistence harvests (9).

The flooding and erosion exacerbated by climate change has forced 12 villages to seek relocation, but they are confronted with enormous challenges. Eight of these villages are trying to move to higher ground at their current location, while the other four are moving to completely new sites. However, no framework exists to facilitate relocation. Newtok, a Yup’ik village of about 350 people, is one of the villages moving to an entirely new location and is the farthest along in the process. Newtok has been forced to forge its own path, and its slow
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progress highlights the hurdles of relocation (1).

Newtok is located 480 air miles west of Anchorage, on banks of the encroaching Ninglick River. On average, the river swallows 72 feet of land per year, and Newtok’s highest point, the school, could be underwater by 2017. The erosion is not a new problem: Alaska’s state government provided funding for Newtok erosion control efforts in the 1980s. However, erosion continued to get worse and, in 2003, Newtok residents voted to relocate to a new site, named Mertarvik, nine miles away. Their site selection was approved by state and federal agencies, and they gained title to the land through a land swap negotiated with the U.S. Fish and Wildlife Service. No other Alaskan villages have been able to successfully choose relocation sites because there is no process to determine when protection in place is no longer appropriate or to select suitable relocation sites. For example, the Alaskan villages of Kivalina and Shishmaref are also experiencing extreme rates of erosion, and multi-million dollar erosion control efforts have failed. Both villages have voted to relocate and have proposed relocation sites, but their proposed locations have not met federal and state requirements. They therefore continue to search for new village sites (1,11).

Once a site is selected, the village must plan the relocation effort and find funding to cover expenses. For Newtok, planning began in 2007 and relocation costs are estimated to be as high as $130 million. Since current legislation does not recognize climate change impacts such as melting permafrost and erosion as disasters, there is no money specifically available for relocation efforts. Additionally, disaster policies are primarily focused on rebuilding communities in their current locations, not relocating them. Funding is not the only concern: navigating the bureaucracy and its rules is a burden in itself. Newtok has worked with approximately 25 different state and federal organizations, each with their own requirements (1,7,10).

One of the organizations Newtok is dealing with is the Alaska Climate Change Impact Mitigation Program (ACCIMP), formed in 2008 by the Alaska Legislature. It provides funding for six specific Alaska villages (including Newtok, Kivalina, and Shishmaref) that are facing some of the worst climate change threats and also provides competitive grants to other villages to carry out hazard impact assessments. An Alaska government agency is providing additional support to three of the six designated villages by establishing inter-agency working groups to develop relocation plans. Although these are steps in the right direction, they are very limited in scope and no similar efforts are happening at the federal level. Furthermore, the Alaska intergovernmental workgroup that was tasked with identifying the immediate needs of communities impacted by climate change and recommended the formation of the ACCIMP has not been reauthorized and last met in 2011 (1,2,3).

Newtok’s relocation efforts continue despite the dismantling of this workgroup, but the village still faces a variety of complications. It has been eleven years since Mertarvik was selected for the new village site, and relocation efforts are behind schedule. Minimal infrastructure has been constructed at Mertarvik: only a road from the barge landing to the new village site, three houses, and the foundation of an evacuation shelter have been built. Meanwhile, Newtok’s infrastructure is damaged and falling apart, but organizations are not willing to invest in improvements because the community is supposedly relocating soon. Additionally, frustrations over the painstakingly slow relocation process sparked backlash against village leadership. Residents elected new members to the village council in 2013, but the old council refused to recognize the results. Also in 2013, a state audit found Newtok may have mismanaged state funds and requested the council repay $300,000 to the state (4,7,8).

While these obstacles emerge, the river continues to threaten Newtok. With only three years left before the U.S. Army Corps of Engineers say Newtok could be completely underwater time is running out. Newtok’s hard work and perseverance have helped their relocation efforts get this far, but both Newtok and the dozens of other Alaskan villages threatened by climate change would benefit from clear policies and adequate resources to facilitate relocation. If the challenges of relocation are not quickly addressed, the United States may soon be faced with its first climate change refugees (11).

References


Global Industrial Policy, Displacement, and Ecomigration

By Christopher Walker

President Obama recently acknowledged that climate change “has the potential of displacing people in ways that we cannot currently fully anticipate, and will be extraordinarily costly” (1). Events in recent years support this acknowledgment; climate change is already affecting where and how securely people live. In fact, between 2008 and 2013, natural disasters alone displaced 143.9 million people (2). And while natural disasters have most heavily affected high-population Asian countries, climate effects on human security and mobility are not confined to far shores in the distant future. As other articles in this edition illustrate, the United States is facing climate-related displacement and migration issues today.

But neither the context nor international setting of the president’s remarks was coincidental. They aired at the 2014 North American Leaders Summit in Toluca, Mexico, where Canadian Prime Minister Stephen Harper was characteristically vocal about getting approval for the Keystone XL petroleum pipeline and Mexican President Peña Nieto spoke about a range of transnational issues, including economic migration and border security.

Disaster-Induced Displacement in 2012, Subregional Share of Total (2)

The moment was illustrative. Industrial policy and development, environmental factors including climate change, and relocation issues (including immigration) are deeply entangled. As such, they have to be approached in tandem. But initial efforts to address the specter of an “environmental exodus” (3) have not been promising. A bewilderingly complex research program contributed to politics that were equally challenging. Rather than encouraging politicians to fund additional empirical case studies, bolster sustainable development, or fund a humanitarian response, the initial research may have (if inadvertently) led more to calls for additional border security. Even the North American chapter of the IPCC’S latest report on climate impacts, adaptation, and vulnerabilities seems preoccupied with the issue. Nevertheless, what former U.S. Geographer William Wood
called “green walls” – immigration controls to stem the flow of “ecomigrants” (economic or ecological migrants) – are not a systemic solution, but merely a bandage, and not a very good one at that (4).

**Disaster-Induced Displacement and Migration**

With climate change now manifest in increasingly visible ways, the global movement of people is already significant as a percentage of the global population. The world has some 232 million international migrants (5) and 740 million internal migrants (6). But how many people will be (or already are) on the move or displaced because of environmental or climate-related situations? Beyond natural disasters which represent the clearest cases, we do not really know. The world’s collective seriousness about climate action in the near-term will largely determine the ultimate size of this number.

The Intergovernmental Panel on Climate Change’s (IPCC) Fifth Assessment Report on climate change impacts, adaptation, and vulnerabilities concluded, “there is low confidence in quantitative projections of changes in mobility, due to its complex, multi-causal nature” (7). The IPCC is confident, however, that climate change will increase the number of displaced people in the twenty-first century (7).

**Extreme events are the clearest examples of how environmental causes can lead to at least temporary displacements. Population growth, rising disaster survival rates, massive urbanization in low-lying and coastal areas, and sub-standard housing all contribute to disaster-induced displacement.**

Pakistan’s 2010 floods, for example affected 20 million people when rain inundated 20% of their country (10). In 2010 and 2011, country-sized swaths of Australia and Brazil were submerged in flooding extensive enough to register as a measurable dip in global sea levels (11). Hurricane Sandy struck the east coast of the US in 2012 with clean-up initiatives still underway and 30,000 facing prolonged displacement as of December 2013 (12). Super Typhoon Haiyan/Yolanda, potentially the largest storm in recorded history, displaced 4.1 million Filipinos in 2013 and affected 16 million people (13).

Migration and displacement related to slower onset environmental disasters and to resource availability or conflict are more complicated. For instance, Somalia saw a swell in the number of refugee camp inhabitants in Dadaab, Kenya to nearly half a million people as the population responded to environmental and physical insecurity caused by drought, hunger, and al-Shabaab’s reign of terror (funded largely by desertification-causing charcoal production) (14). Somalis, now facing repatriation on the heels of a string of events including the Westgate Mall attack in Nairobi, must return to environmentally stressed areas that are even more vulnerable to conflict and continued environmental decline. In perhaps an even more dramatic example, leaked diplomatic cables have explicitly connected the dots between extreme drought in rural Syria, the resultant agrarian out-migration, and the explosion of tensions culminating in civil war in Syria, which has led to a humanitarian crisis affecting an increasingly wide swath of the Middle East (15). Slower onset disasters contribute to

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**Relocating Flood-Affected Slum Dwellers in India (9)**

A slum situated along the Mutha River in Pune, India had witnessed recurrent flooding, displacing vulnerable residents before forcing them to expend scarce resources on rebuilding after each occurrence, which would leave reptiles, rodents, insects, trash, and sewage along with destruction to housing. A local NGO, Shelter Associates, mobilized the community’s interest in a relocation project that ultimately won buy-in from both the municipal government, who granted land, and some local financial institutions, who designed new financial products for people who would normally be dismissed as un-creditworthy.

The community itself had a significant hand in both the design of new tenements and the logistics of the relocation effort. Ultimately, 176 tenements were built, 152 of which now house families who relocated from the flood-affected zone of the now-demolished slum.

The partnership built a series of small 2-storey tenements surrounding small courtyards approximately 6.5 miles away from the original location nearer to the city center. From their modest but dignified homes, some of the community’s tenants run small businesses and upgrade their homes, and all are safe from the Mutha’s floodwaters. Between 2004 and 2011, not a single tenant had moved away. But pressure on livelihoods and water access issues, remain substantial challenges.

The portion of the original slum not under direct threat from floods will ultimately be rehabilitated free of cost to dwellers under government programs. Those projects are still years from completion.

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Climate Institute – [www.climate.org](http://www.climate.org)
displacement and migration often as one part in a complex matrix of “push, pull, and intervening variables” (16).

And while the authors of the IPCC’s fifth assessment report are reluctant to forecast the demise of islands due to rising seas (17), several small island states (SIDS) are in real danger. Luckily, while many SIDS are at least partly at the mercy of the rest of the world’s actions on climate action, they are not powerless. Islands’ own clean energy transformations may be the shortest paths to improving their capacity to funding domestic climate adaptation projects by allowing them to amass foreign currency reserves savings. It is poetic, even, that the empowerment of island economies to buffer themselves from the effects of climate change would begin with the replacement of fossil fuels by local renewable resources. For these states – some of which suffer large and unpredictable shocks to infrastructure and GDP from hydro-meteorological disasters – the linkages between industrial policy, development, displacement, and migration are undeniable.

Internalizing Externalities

Climate change is causing and will continue to cause displacement and contribute to migration through environmental decline. But as the figure below illustrates, this is only one dimension in a set of complex, multilevel processes and sets of relations.

For instance, in 2013, the World Bank’s policy shift to fund coal generation projects “only in rare circumstances” (18) was heralded as a win for global climate action. But the Bank had only just resurrected hydropower financing after backlash over its history of environmental and social impacts led to precipitous defunding in the late 1990s (19). A retrospective Bank review estimated that at least 4 million people were displaced annually by dam projects entering into construction between 1986 and 1993 (20). Another survey of large-scale dam projects noted that only in 3 of 50 cases were resettlers better off after relocation, whereas in 36 cases, a majority of resettled households were further impoverished (21). Growing electricity demand in urban areas (due to the rural-to-urban ecomigration) and the imperatives of climate action have made hydropower more palatable to the Bank today.

According to the Bank, “the definition of acceptable hydropower has shifted,” and that a diverse cast of institutions have together “established a knowledge base for sustainable hydropower” (19). Nevertheless, it admits that some hydropower risks are inherent, that “implementation experience and technical capacity is lacking in many countries,” and that outcomes depend on the “resources, skills, and the will to invest responsibly.” (19). In other words, despite preferences for hydropower in global climate terms, the local...
sustainability of dams is less than a foregone conclusion.

As Stephen Castles has argued, “if we really want to deal with the root causes of forced migration, the first step is to stop Northern practices that make things worse in the poor countries of the South” (22). An April 2014 report assessing the sustainability of a selected portfolio of the World Bank’s projects in 2012-2013 concluded that while environmental and social risks were largely assessed in 82% of the projects, only half would benefit vulnerable populations, and 88% did not assess likely project-related emissions relative to a baseline (23). The need to internalize externalities in projects conducted by and with international financial institutions therefore persists. But increasingly, as non-Annex I countries assume high-impact development paths themselves with regard to people and ecosystems, they must also internalize externalities in policy and practice while demanding “triple bottom line” development partnerships with international financial institutions. While project costs are likely to grow under this scenario, the number of cases in which projects contribute to self-defeating cycles of impoverishment are likely to shrink while contributing to longer-term savings in other areas, as well as to improved human development outcomes overall.

Building a Sustainable, Rights-Based Ecomigration Regime

Conceptualizing ecomigration as a mode of adaptation assumes that it is effective in improving human security. That can be the case, but is not a foregone conclusion. In practice, it entails significant risks that can make it a maladaptive or self-defeating response to migrants themselves. Ecomigrants and the displaced can become more vulnerable or vulnerable in different ways in receiving areas; they can also make people or systems in sending areas more vulnerable, but this is less often the case than anti-immigration circles argue. Ecomigration can worsen climate change and climate impacts by socializing migrants into more resource and emissions-intensive lifestyles or by further concentrating populations in low-lying coastal urban environments threatened by climate change, rather of raising local living standards through sustainable development practices in sending areas.

As states broker climate action in preparation for both the 20th meeting of the Conference of the Parties in Lima later this year and a potential climate treaty in Paris in 2015, there is a need to internalize the holistic risk calculus associated with vulnerable ecosystems, people, and institutions. As others have argued in more detail, this demands a global cross-pollination among migration, humanitarian, development, and climate change policy, academic, and civil society communities (24).

But more important is the need for a more distributed and intense engagement between these networks with vulnerable communities, who, with empowerment, often can leverage traditional knowledge frameworks to solve local problems. By making people less vulnerable, planning and investment in economic and livelihood diversification; sustainable agricultural and land use policies; resilient homes and infrastructure; ecosystem-based adaptation measures; and disaster preparedness and response will prove critical to the mitigation of forced or undesired relocation.

Meanwhile, the global justice implications of Annex I countries’ actions should not be overlooked with respect to people fleeing the harms of global processes and conditions originating in richer countries. For instance, the drought pattern that swept central Africa between the 1970s and 1990s – effecting years of widespread agricultural failure and starvation – has been empirically linked to North American and European emissions (29). It also contributed to massive displacement. But even where theoretical protections exist, the problem of enforcement seems intractable.

Where displacement has occurred, strengthening the application of the existing frameworks for protection is even more important than developing new ones. Examples of these frameworks include the Guiding Principles on Internal Displacement, the African Union’s Kampala Convention, IASC Operational Guidelines on the Protection of Persons in Situations of Natural Disasters, the World Bank Procedure on Involuntary Resettlement. As nice as protections look on paper, the international community must actually put them into action for them to be effective.

Finally, rich countries must reexamine immigration systems in the light of the history of global development, emissions, and climate change. Accountability demands broad, sustainable development and serious climate action first. Both must emanate from a new mode of industrial policy, optimized to account for (and to be accountable for) past, present, and future harms to global and human systems while providing triple bottom line value. Where those measures arrive too late, rights-based community-led relocation can potentially offer a just, hopeful, and...
productive mode of adaptation. “Green walls” and the business-as-usual scenarios in development and climate action fail to rise to the scale of these challenges.

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The Threat of Climate-Induced Displacement: Lessons from the Pacific Islands

By Nikita Perumal and the Honorable Tom Roper

Locals in Tebikenikora, a village in the Pacific island nation of Kiribati. Photo: United Nations, Flickr Creative Commons.

The narrative of global climate change is steeped in extensive inequity and imbalance. All too often, the geography of greenhouse gas emissions fails to align with the distribution of the impacts of climate change. The result: several relatively “innocent,” low-carbon communities face a disproportionate amount of the environmental devastation caused by global climate change. This environmental justice concern is particularly resonant in the ever-looming threat of climate-induced displacement for many small island developing states (SIDS) in the Pacific Ocean.

The Pacific members of AOSIS (the Alliance of Small Island States) have long served as poster children for potential climate-related migration and relocation; the menace posed to them by a changing climate is pressing in a way that few other states can quite comprehend (1). In the words of Ambassador Marlene Moses of Nauru, “small islands are already experiencing the dire and immediate impacts of climate change, including the inundation of coastal areas, the submergence of islands, loss of freshwater supplies, flooding, drought, damaged crops and increased disease” (2). The IPCC forecasts that just one meter of sea level rise will completely submerge roughly 15% of all Pacific Island States; some, such as Kiribati, already look upon the loss of their homes as inevitable (3). Even in islands safe from complete destruction, such as French Polynesia and the volcanic Cook Islands, nearly all economically viable land lies along their now-endangered coastlines.

Disheartening as the fate of Pacific island states seems, however, victimizing their communities is unproductive. What is constructive is a targeted focus on solutions, adaptation, and sustainable response. A host of renewable energy projects that help manage disaster risk, mitigate climate change, and fund adaptability are already underway in several SIDS, with more still encouraged by the likes of the Climate Institute and the Global Sustainable Energy Islands Initiative (GSEII).

The notion of climate change migrants is expectedly fraught with complexity—intersecting a host of diverging policy issues, invoking a more human element to the “science” of climate change, and simultaneously sparking much controversy regarding the scope of the problem and the extent to which it should be addressed. The ingenuity of transforming Pacific island states’ energy economies is that it cuts through this complexity in a way that provides solutions and promotes agency to the ostensibly “vulnerable” communities. This is all too valuable at a time when the construction of international climate and migration frameworks seems frustratingly slow.

The Complexities of Climate Migration

Environmentally-fueled displacement is no modern-day phenomenon; humans have been migrating due to environmental reasons for millennia. But as the intensity of environmental damage heightens with climate change and related hazards, so too does the need for associated population movement. After the 2004 tsunami in the Maldives, 8,500 island inhabitants were temporarily relocated and another 12,000 were displaced by the tsunami entirely (4). Meanwhile, Fiji has already begun relocating certain flood-prone villages in the wake of rising sea levels, and the population of Papua New Guinea’s Carteret Islands sadly possesses the label of being the first “climate refugees” in the world (5).

The United Nations Environmental Programme first conjured the idea of “environmental refugees” nearly thirty years ago, in a 1985 paper by Essam El-Hinnawi (6). The Climate Institute itself was instrumental in the introduction of the concept into the international environmental agenda, with the 1995 publication of Environmental Exodus: An Emergent Crisis in the Global Arena by our very own Norman Myers. Myers helped contribute to some of the first estimates of displaced populations over time as a result of climate change (7). Environmental migrants have only garnered increased traction, however—particularly in the last decade, as the intensified effects of major natural disasters (2005’s
Hurricane Katrina, the 2004 Indian Ocean tsunami, 2013’s Typhoon Haiyan, etc.) have attracted more public and international attention (8).

As alluded to in the other articles of this Climate Alert, matters are nonetheless complicated both in the Pacific and elsewhere by the weights given to certain terminology in the climate migrant discourse. For instance, while the term “migration” incorporates a degree of voluntary will, “displacement” implies a more forced response to disasters (9). Due partially to this fairly ambiguous element of choice, environmental migrants are excluded from the still outdated international refugee regime, which only benefits forced migrants in the traditional migration dichotomy (8). This leaves climate change migrants relatively unprotected by the international community, as policies and regimes struggle to catch up to this added variable in the international population movement dialogue. Exceptions to this international silence, such as the Climate Change, Environment, and Migration Alliance (CCEMA) (10) and the Cancun Adaptive Framework remain somewhat feeble (11).

But even as international frameworks lag behind, the prospect of climate-induced displacement in the Pacific islands remains uniquely urgent. These islands now face overwhelming challenges to ways of life—take the huge impact of Pacific coral reef damage from climate change, for instance, which in turn impairs ecosystem services and local industries (12). Their capacity to grow food is compromised, as are their fishing industries, on which much of their economy depends. And unlike regions that may in distant years face climate-induced displacement of an entire population, certain Pacific SIDS face this danger today. The problem with current international regimes, then, is their slow response to climate change mitigation and to the legal question of whether climate migrants apply as refugees (13). While Pacific SIDS await the crystallization of a new legal consensus in the international community, they can hardly remain inactive.

**Innovative Change: Mitigation to Fuel Adaptation**

Despite the common approach to climate-related migration as an extreme, “last resort” form of adaptation (or some might even argue, a failure to adapt), much can also be gained from regarding migration as an adaptive strategy that reduces risks (8). Oftentimes, the most vulnerable are not those who resort to migration, but those who have no means to do so and are forced to stay (8). Whether or not we regard climate migrants as forcibly displaced or strategically adapting, however, one thing that is clear: migration is a form of adaptation to climate change and should be approached as such. This is where the international community dwindles behind—but, luckily, where Pacific island states themselves are confidently leading the way.

To illustrate this, we can look towards the nations of Tonga and Tuvalu, both of which are revitalizing their national energy strategies with aspirational renewable energy targets. Tuvalu’s Minister Natano looks “forward to the day when [the] nation offers an example to all—powered entirely by natural resources such as the sun and the wind,” while Tonga bolstered its voluntary renewables goal with initiatives to maximize utility performance and energy efficiency (4). Meanwhile, the Federal States of Micronesia’s Climate Change Act requires a wide range of policy sectors (from education to health to transportation) to address climate change adaptation.

Equally compelling about these case studies is the promise they offer to the adaptation process as a whole. The need to assess and react to hazard risks in these countries is very real (eight of the twenty states with the highest average disaster loss scaled by GDP are PacificSIDS). Risk management, as well as other forms of adaptation (including full-scale relocation), may in fact be funded by the potential of these projects. It can be argued that with such exemplary initiatives of green energy underway, Pacific Island states can perhaps more easily obtain external financing both for adaptation and green development projects—possibly taking advantage of such programs as World Bank funds, the Energy for All Partnership, and Clean Development Mechanism projects, of which only 0.006% have been in AOSIS member states so far (2).

Studies by GSEII in the Caribbean have discovered the potential in simply bolstering energy efficiency through certain technical interventions and the phasing out of older diesel energy sources. A GSEII project to address this in Dominica, for example, reduced energy losses by 6.2% and saved roughly $525,000 USD per year—all the while reducing carbon dioxide emissions by 3,042 tons (2). The large majority of these savings, as well as the foreign currency reserves saved from not importing fossil fuels, will most likely be dedicated to the infrastructure task of replacing existing non-sustainable energy facilities with their renewable counterparts, as well as in providing energy to more residents. (Seventy percent of Pacific Islanders currently do not have access to electricity (2). However, there is still merit to looking ahead to future years—one the startup costs of renewable energy facilities have been addressed. Indeed, future savings, in addition to our hoped-for increase in coordinated financing from the international community, may directly funnel into further adaptation projects: formulating strong national action plans, strengthening infrastructure, rehabilitating ecosystem services that provide natural defenses to natural disasters, and even plans towards relocation.

A perfect example of such adaptation measures is the Republic of Kiribati. The nation’s Migration with Dignity program seeks to qualify Kiribati citizens as more attractive migrants and to encourage those who wish to voluntarily migrate now to do so. This establishes expatriate Kiribati communities and eases the lives of those who choose to stay through remittances and high-quality local services. To further complement these plans, Kiribati has also purchased 6,000 acres of land in Fiji’s Venua Levu island in order to grow food (14).
The value in these solutions, then, (in addition to their clear contributions to global mitigation efforts) is that they advance SIDS’ agency in the face of seemingly insurmountable problems. Forced displacement can be reduced through strategic adaptation measures, while voluntary migration can even be enabled through appropriate funding and programs. These energy solutions allow Pacific islands and low-lying coastal states to take immediate strides to cope with climate mitigation and related migration, while waiting for the slow-moving gears of international and legal frameworks on environmental migration to solidify and enact change.

**The Need for International Climate Justice**

Much can be learned from the National Energy Roadmap of Vanatu and the Pacific region’s Strategy for Climate and Disaster Resilient Development (which encourages low-carbon development and disaster risk reduction). But fixating on this alone would be to neglect one crucial last point: international climate justice requires international action.

Although the renewable energy projects proposed by the Pacific SIDS are commendable, allowing them to continue single-handedly would be morally unjust and reprehensible. The “52 [SIDS] nations, home to over 62 million people, emit less than one percent of global greenhouse gases,” noted UNEP’s Achim Steiner on World Environment Day this year (12). These are communities whose contribution to aggregate global emissions is a metaphorical drop in a bucket, who are more and more frequently open to the idea of mitigating climate change through their own initiatives – and who are facing irreversible loss in the face of it all, either way.

The nations that do contribute the most to this global crisis arguably bear a moral responsibility to cooperate and move towards tangible solutions to assist all current and future peoples displaced by climate change. The need for coordinated funding and assistance from the international community towards vulnerable Pacific Island states is already clear (15). Furthermore—and without victimizing migrants—we must enable both the right to choose and the right to leave through updated migration and asylum policies, legal frameworks, and a frank consideration of climate change as a factor in both forced and voluntary migration.

The recent case of a Tuvaluan family granted residency in New Zealand for reasons that included “natural disasters and the adverse impact of climate change” offers us a tentative degree of hope—but it is far from legal precedent or concrete policy (16). There remains a need for the international community to coordinate on and reassess migration policy – and better yet, to engage in meaningful negotiations towards a viable global emissions plan that can help curb climate change. Small Pacific island states have already begun their first hesitant steps in this direction. It’s time to follow suit.

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Social and Economic Impacts of the “Polar Vortex”

By Ethan Forauer

The winter of 2013-2014 was a memorable one in many ways. From seemingly endless storms in the Northeast to bone chilling cold in the Midwest and unseasonable warmth and drought in the west, old man winter certainly left his mark as the now infamous “polar vortex” plunged the eastern United States into dramatic low temperatures multiple times.

The polar vortex is a pool of cold air located and usually contained around the poles both north and south. This low-pressure area weakens in the summer and strengthens in the winter due primarily to temperature differentials (1). The polar vortex is irregularly shaped with multiple meanders, or longwaves, in its border. Areas where cold air extends south are known as longwave troughs whereas areas where warm air extends north are known as longwave ridges (1). The troughs and ridges fluctuate constantly and are responsible for the changing weather patterns, some of which we experienced last winter (1). On the whole the polar vortex tends to be more pronounced in the winter than the summer.

The polar vortex can also be characterized as strong or weak, although it is usually strong. A strong vortex creates an area of low pressure in the high latitudes of the arctic. As such, air flows into the center of the low pressure and confines the coldest air to the higher latitudes. Mild winters in the mid-latitudes are usually indicative of a strong polar vortex. On the other extreme, a weak polar vortex leads to more meandering of the boundary, which allows arctic air to spill into the mid-latitudes while warmer, sub-tropical airflows into the arctic. The mixing of air masses produces more storms in the mid-latitudes. During a weak polar vortex, an area of high pressure forms in the higher latitudes. As cold air flows out and away from the center of the high pressure, cold air moves down to the Eastern United States, Europe, and East Asia. Thus, the coldest winters occur during weak polar vortexes, as demonstrated last winter (1).

Climate change deniers point to cold winters such as the winter of 2013-2014 as evidence that global warming is not happening. The evidence suggests, however, that since the heat balance of the planet regulates the vortex, as that balance becomes increasingly lopsided, weak polar vortexes occur more frequently.

The northeastern United States experienced many of the effects of the polar vortex and its meandering nature during the winter of 2013-2014. In Boston the winter was, on average, slightly colder and snowier. The average winter temperature was 29.9°F, 1.9°F below average. Furthermore, the final total snowfall was 56.4 inches, 22.0 above average. New York City faced a similar situation. The average winter temperature was 26.4°F, 2.2°F below average. The snowfall total was 57.3 inches, 35.8 inches above average. It is important to note, however, that these totals are just for the meteorological winter between December and February (2). Many other areas in the Northeast also had other noteworthy statistics: Worcester, Massachusetts had 25.6 inches of snow in a seven-day period from February 13-19, and Bridgeport, Connecticut experienced nine days with minimum temperatures below 10°F.

Last winter was record breaking in other parts of the country as well. Some southern states saw snow for the first time in years. Most notable was the Atlanta snowstorm, in which stranded drivers on area expressways for several hours and even overnight. The Midwest witnessed some of the coldest temperatures on record. On many occasions high temperatures did not even make it above zero, and howling winds sent wind chills into violently dangerous zones. Green Bay, Wisconsin experienced its second coldest winter ever, and La Crosse, Wisconsin, Rockford, Illinois, Detroit, Michigan, Dubuque, Iowa, and

A January 2014 snowstorm in Atlanta left hundreds of people stranded for hours while snow brooms like this one, in short supply, scrambled to clear the highways of a thin layer of snow. Photo: John Murphy, Wikimedia Commons.
Waterloo, Iowa all experienced their third coldest winter ever (2).

Moving across the United States, western states had a contrastingly warm winter. The beginning of 2014 ushered in record warmth for western cities such as Los Angeles, Las Vegas, and Phoenix (3). These warm temperatures and lack of precipitation resulted in worsening drought conditions that persist even today.

It is evident that the past winter was one for the record books meteorologically. Yet the economic impacts of the weak polar vortex were also far-reaching (2).

Extreme weather affected almost every industry imaginable. While it is difficult to specify the exact economic losses, in the United States it is estimated that the cold and stormy pattern may have cost the economy as much as $50 billion and 76,000 jobs. This impact resulted mostly from lost work hours and lost sales.

Several large department stores had to close at some point during the winter due to inclement weather. For example, 244 of 840 Macy’s or Bloomingdale’s locations had to be closed at some point due to weather, resulting in hundreds of thousands of lost sales. Automobile sales also fell. People were discouraged by the weather from purchasing new vehicles, though it is thought that those people who intended to buy cars in the winter did return to complete the purchases in the spring. The housing industry was also affected in interesting ways. In many of the midwestern states, construction companies had to delay starting projects. Construction companies had to wait longer to begin their projects and hire their seasonal workers because the conditions were too harsh, even into the early spring (4, 5).

Travel was disrupted in many ways and many times during the winter. Airlines cancelled 6.5% of their January flights, up from 1.5% percent in 2013. While it is difficult to estimate the exact economic loss from these cancellations, it is believed to be between $75 million and $150 million (5). Rail travel was also affected. One of the nation’s largest railroad operators, Union Pacific, saw trains moving at a rate 9% slower in March 2014 than in March 2013 (5).

Food and utility costs rose as well. As a result of the prolonged drought in the western United States, approximately 10% of California’s cropland is no longer useable, resulting in approximately $3.6 billion in crop losses. Natural gas prices rose over 20%, which, when combined with a longer winter and colder temperatures, resulted in larger bills for many people (5).

As we cope with the weak polar vortex’s lingering effects on the economy and enjoy the dog days of summer, the message to take away is that abnormal is becoming the new normal. While it is difficult to blame any one event on climate change, it is important to understand that climate change affects weather systems in complex ways, many of which we have yet to discover.

References


Performances inspiring delegates from many countries.

Building on the Earthsavers’ central message that young people can surmount seeming disabilities to become especially powerful messengers, the Alvarezes combined to organize an event in February 2014 highlighting the resilience of the Philippine people in the wake of two recent disasters—a 7.2 Richter scale earthquake that ravaged the Bohol Province on October 15, 2013 and Typhoon Haiyan (known locally as Yolanda) that caused thousands of deaths in the Philippines after battering on some of the nation with what may have been the greatest wind speeds ever experienced in a tropical cyclone on November 8, 2013. Earthsavers, together with other Philippine organizations, international agencies, and NGOs, including the Climate Institute, convened “A Regional Forum and Workshop to Forge an Interdisciplinary Interfaith, Culture Roadmap to Healing Trauma and Helping Rebuild Disaster-Impacted Communities, while Weaving Communication of Climate Change Solutions” from February 23-26, 2014 in the Bohol Plaza Hotel in Dauis. The meeting brought together performing artists, civic and religious readers, environmentalists, and governmental officials both to celebrate the resilience of the Philippine people and to discuss how they might plan to meet the challenges of a world facing increased risk of very disruptive weather events.

An article published March 31, 2014 in the Manila Bulletin entitled “Handicapped: People with special needs use theater to touch lives” described Earthsavers’ success in empowering special needs youth to be powerful communicators. On April 29, 2014 Cecile Alvarez was honored with the Golden Dove award for her show on radyo balintalaw, which has now run for 22 years.

Charles Bayless, Chair of the Steering Committee of the Arctic Climate Action Registry, Joins Climate Institute Board

In December 2013 Charles Bayless, former CEO of two major national utilities and former president of the West Virginia University Institute of Technology, was elected to the Climate Institute’s Board. An accomplished nature photographer and avid public speaker, Bayless speaks extensively to business, civic, and student audiences on the need for aggressive and innovative responses to climate change.

Indigenous Peoples Climate Change Working Group Meeting at NCAR Highlights Likely Effects of Climate Change Forcing Dislocation of Indigenous Communities in Alaska and Louisiana

Building on the momentum of a November 3-5, 2013 conference at Dartmouth College convened by Professor Daniel Wildcat, a member of the Climate Institute Board since 2008, the Indigenous Peoples Climate Change Working Group met April 7-8, 2014 at the National Center for Atmospheric Research in Boulder, Colorado to discuss potential responses of indigenous communities in Alaska and Louisiana to the need for relocation due to threats posed by climate change and other environmental stresses. The meeting included representatives of indigenous communities in both states. The summer 2014 issue of Climate Alert on environmental relocation discusses in detail these challenges and the signs of an emerging climate refugee problem in other parts of the US and the Pacific. Besides Climate Institute Board member Dan Wildcat, who led the meeting, other Institute
The Climate Institute is a non-profit organization with a mission to advance the conservation of natural resources and the quality of life worldwide through the development of sound environmental policies and the advancement of innovative, sustainable solutions.


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Center for Environmental Leadership Training (CELT) Grows in Partnership with Dartmouth College Community, Broadens to Include Increasing Number of Virtual Fellows and Interns

Founded in 2010 by three Dartmouth graduates, Robert (Bob) Bartles, who chairs the CELT Steering Committee, Loren McGeen, and John Topping, Climate Institute President, CELT is located about two blocks from the Dartmouth campus. With about three dozen members, CELT has worked closely with the Dartmouth’s Rockefeller Center, which not only has provided venues for meetings but has also granted public service internships to several Dartmouth undergraduates, including two members of the class of 2015, Armand Thompson and Autumn Brunelle, who served respectively as CELT fall 2013 and spring 2014 coordinators. Together with Dartmouth student Ma’ Ko’ Quah (Abigail) Jones, who has an M.A. in civil engineering; Sophie Wang, who has an M.A. in economics from the University of Toronto; Moon Oulatta, who is pursuing a Ph.D in economics at American University; and He Chang, who has an M.A. in Economics from Western Michigan University and is working toward a PhD in Economics from American University. Counseling the team on policy aspects are two Climate Institute Board members, each with a decade and a half of experience in island energy work: Institute COO Nasir Khattak and Hon. Tom Roper, who recently spoke at the Pacific Power Association.

Mike MacCracken contributes to Leadership Training Workshop in Australia Led by Al Gore

Mike MacCracken, the Climate Institute’s Chief Scientist for Climate Change Programs, was in Melbourne, Australia in late June serving as one of the two scientists to help in addressing questions at the leadership training workshop held by former US Vice President Al Gore and the Climate Reality Project. This workshop brought together about 500 individuals, mostly from Australia and other nations in that part of the world, to hone their skills in climate change communication and outreach. Mike also found time to visit the Marine and Atmospheric Research branch of CSIRO in nearby Aspendale; the Commonwealth Scientific and Industrial Research Organisation is Australia’s national science agency. In addition to hearing about their internationally cutting-edge activities in, for example, reconstructing past changes in atmospheric composition from ice core records, he presented a talk on his suggestions for the possibility of regionally focused climate engineering approaches to help offset some of the worst impacts of climate change while international actions focus on aggressively cutting greenhouse gas emissions.

Climate Institute Undertakes Analysis of Advantages of Low Carbon Energy for Economies of Small Island States for Use in Discussions at Early September Meeting in Samoa of Island State Leaders.

At the request of Dr. Al Binger, Director of SIDS Dock, an island state clean energy transformation group, the Climate Institute is preparing an analysis of macroeconomic benefits, enhanced GDP, improved balance of payments, etc. that might ensue from increased efficiency in energy use, transportation sector improvements, and replacement of diesel electric generation by renewable energy. Climate Institute Graduate Research Fellow Christopher Walker is leading a five-member team, all based in the Washington area during the summer of 2014. Other team members include Khiana Lowe, a member of the class of 2016 at Stanford University where she studies civil engineering; Sophie Wang, who has an M.A. in economics from the University of Toronto; Moon Oulatta, who is pursuing a Ph.D in economics at American University; and He Chang, who has an M.A. in Economics from Western Michigan University and is working toward a