DISAPPEARING ISLANDS:
A Climate Change Wake-up Call

case study | climate change unit

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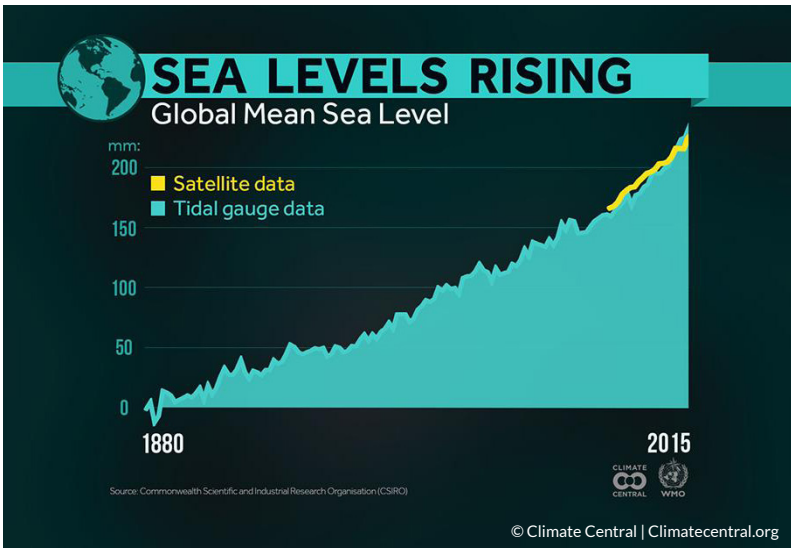
The headlines were startling: "Sea Level Swallows 5 Whole Pacific Islands."[1] "Sea Level Rise Is Here, And Is Gobbling Up Islands."[2] "Five Pacific Islands Lost to Rising Seas as Climate Change Hits."[3]

The islands in question were part of the Solomon archipelago, a collection of over 1,000 low-lying reef islands in the central Pacific Ocean, home to some 560,000 people. An Australian team of researchers had used aerial and satellite images from 1947 to 2014, together with on-the-ground surveys, to come to their stark conclusion: five vegetated islands, ranging in area from three to twelve acres, had disappeared in recent decades. Six additional islands were losing ground to severe erosion. Villages at two locations had relocated because of encroaching seas, and one provincial capital was slated to follow.[4]

The reason for the islands' disappearance is, of course, more complicated than the headlines suggest. Coral atolls shrink and grow depending on the health of the living reefs and the surrounding environmental conditions. But plant life on the islands had existed for at least 300 years. And now it is all under water. A combination of sea level rise, more powerful waves, and the building of seawalls and other "inappropriate development" all are thought to play a role.[5]

Seas are rising almost three times faster in that part of the Pacific than in most of the world's oceans, up by an average 11 millimeters each year from 1993 to 2009, an increase from the 3 millimeter average annual rise experienced between 1950 and 2009.[6] The researchers write: "These higher rates are in line with what we can expect across much of the Pacific in the second half of this century as a result of human-induced sea-level rise. Many areas will experience long-term rates of sea-level rise similar to that already experienced in Solomon Islands in all but the very lowest-emission scenarios."[7]



The science of sea level

Since 1880, as **greenhouse gas** emissions increased and the global temperature climbed, the average sea level rose by 8 to 9 inches (20-23 centimeters). The mechanisms for this are a matter of physics. For one, warmer water takes up more space than colder water. About half of the past rise is linked to this thermal expansion. The other contributors to higher seas are melting glaciers and melting on the ice caps of Greenland and Antarctica.[8]

Scientists tell us that we've barely seen a preview of sea level rise. Ice melting has accelerated in recent decades, and glaciers and ice sheets are expected to lose more water to the oceans in years to come. With projected warming, the average global sea level could be six feet higher than the present day before the end of this century.[9]

Motu Tabu Islet, Kiribati

The case of Kiribati

Such projections are worrying to coastal communities around the world, but to low-lying island nations, they are an existential threat. Consider Kiribati. This former British colony of 120,000 people, pronounced "Keer-re-bahs," is made up of 33 islands in the central Pacific. The capital is situated on the equator, about midway between Hawaii and Australia. The ocean area dotted by the archipelago's coral atolls is vast, covering an expanse roughly half the size of the continental United States, but the actual land area is just 310 square miles, about the size of Oklahoma City. The islands' average height is about 6.5 feet above sea level.[10]

Kiribati is threatened by a confluence of population growth and overcrowding, environmental contamination, and sea level rise. Rather than too much water, in many parts of the republic the pressing issue is too little. Clean drinking water is scarce. Groundwater is over pumped. In some places, seawater inundates freshwater wells; in others, water supplies are polluted by human waste. Pollution also harms the corals that are the islands' structural base. On the island that is home to the capital and half the country's population, many residents live in substandard housing. They rely on rainwater tanks for drinking water, leaving them vulnerable to drought.[11]

Former Kiribati president Anote Tong made his country a poster child for the perils of sea level rise over his 13 years of leadership, which ended in 2016. Tong is a strong advocate for international funding to help small islands cope with **climate change**. He favors "migration with dignity" rather than having islanders wait in harm's way until they had no choice but to flee as "**climate refugees**."[12]

Relocation or adaptation?

Photo credit: Erin Magee - DFAT, 2011

In 2014 Tong announced that the government purchased almost 6,000 acres of land in Fiji for close to $8.8 million. It would serve as a higher elevation destination for the Kiribati population to relocate or to grow food, never mind international immigration concerns or the fact that the island was at least a three-hour flight away. Though the Fijian mountains reach as high as 4,000 feet above current sea level, the country also suffers from freshwater shortages and the impacts of stronger storms.[13]

Additionally, in somewhat of an ironic twist, the land that Kiribati purchased from the Anglican Church was already inhabited, according to news reports, by descendants of plantation workers who had come to Fiji from the Solomon Islands, well before some of those islands were submerged. All together, these factors draw the feasibility of relocation into question.[14]

Maldives Minister of Fisheries and Agriculture, Dr. Ibrahim Didi, signs the decree of underwater cabinet meeting. October 17, 2009.

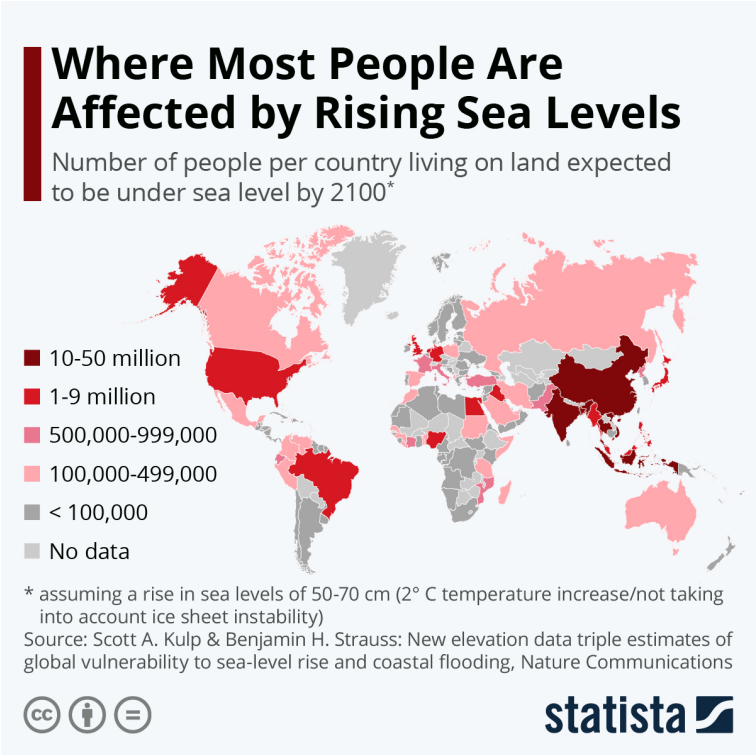
Kiribati is not the first country to look for safe haven overseas. The government of the Maldives, a chain of some of the world's lowest-lying islands in the Indian Ocean, has examined options for resettlement in India, Sri Lanka, and Australia. In 2009, then-president Mohamed Nasheed garnered international attention for holding an underwater cabinet meeting to illustrate the state of affairs if climate change were to continue unchecked. Ahead of a major international climate change negotiation he warned that "If scientists are not able to save the Maldives, then they won't be able to save the world."[15]

Kiribati's current president, Taneti Maamau, has rejected his predecessor's migration strategy, arguing that the right adaptation measures will enable the people to stay in their home country and prosper. With financial and engineering help from China, Maamau proposes that Kiribati raise its most populous island, Tarawa, by dredging a neighboring lagoon. Other adaptation measures include rebuilding homes on stilts. To alleviate population pressures on Tarawa, Maamau is looking to expand Kiribati's coconut trade on the less populated islands in the archipelago.[16] "We don't believe that Kiribati will sink like the Titanic ship. Our country, our beautiful lands, are created by the hands of God," he said in a recent promotional video.[17] Maamau's 20-year plan is ambitious for a nation that now struggles to provide its people with safe drinking water and reliable electricity.

Not just the tropics

It is true that the threat of sea level rise does not just apply to tropical islands. Low-elevation river deltas, which are home to millions and also major food producers, are also at risk. The World Bank estimates that 40 percent of Bangladesh's farmland would be lost with a 2-foot rise in seas. Much of Vietnam's highly productive rice paddies would similarly be covered with seawater.[18]

Cold areas are in trouble, too. Climate change has shrunk and thinned Arctic sea ice. The melting of floating ice does not directly change sea level (picture ice cubes in a glass of water), but without the sea ice buffer, storms and extreme waves more easily erode coastlines. The lack of reflective sea ice also accelerates regional warming. Dark open water absorbs more heat than snow and ice, creating a positive feedback cycle of additional warming and melting. **Permafrost** thaws. The result: homes sliding into the sea.[19]



In August 2016, the village of Shishmaref on an island off the northwest coast of Alaska voted to move their community to a site on the mainland about five miles away. It is one of at least a dozen native Alaskan villages intending to relocate because of severe erosion or flooding. This was not the first time Shishmaref's residents voted to relocate. The discussion dates back at least as far as the 1970s, before conditions became so precarious. But without funding to make the move possible, the population grew and built a schoolhouse and an airport. Just between 2005 and 2009, over $27 million was spent on coastal protection that is only anticipated to last 15 years. But the cost to move the 600 villagers could add up to $180 million. Who will pay?[20]

Costly consequences

There's the rub. The people immediately at risk from sea level rise are some of the least culpable for warming the planet. Their **carbon emissions** are typically very low. And often their economic capacity is limited.

In what some consider the first federally-assisted climate migration, the U.S. Department of Housing and Urban Development announced in January 2016 that it would pay for the relocation of a community on Isle de Jean Charles in Louisiana – a state hit by the triple threat of sea level rise, storm surge, and **subsidence** (sinking of the land, due in part to groundwater pumping and a reduction of sediment flow down the Mississippi River because of the damming and channelization). The grant is part of a $1 billion allocation to communities in 13 states for "disaster resilience."[21]

Like most of the populations being displaced by climate change, this community is relatively small, though if you count the tens of thousands who fled during Hurricane Katrina in 2005 and never returned home, the Gulf coast region has already seen a major flow of climate migrants.[22]

Looking forward, many of the world's largest cities are also located on coasts. The major financial centers of New York, Tokyo, and Shanghai, are among the megacities vulnerable to the higher seas and more powerful storms and storm surges that accompany **global warming**. If climate migrant flows grow to the hundreds of thousands, as some studies project, the planet's social and economic systems will be strained.[23]

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