



Climate-Induced Migration: Understanding the Challenges for our Region

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Arctic Relocation



ARCTIC:

Alaska Natives try to flee climate change impacts but find little help

Elizabeth Harball, E&E reporter

ClimateWire: Thursday, January 31, 2013

Superstorm Sandy was a dramatic preview of what cities on the Eastern Seaboard might expect as climate change intensifies, but 12 small, indigenous communities on Alaska's coast provide the most extreme example of how global warming can wreak havoc.

Flooding, building collapses due to erosion and severe water pollution are only some of the many problems that have troubled these villages.



An inukshuk, a stone cairn left as a mark by the Inuit, Inupiat and other people native to North America's Arctic region.

Photo by Sadi Junior, courtesy of [Flickr](#).

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But according to Alaskan human rights attorney Robin Bronen, the situation is worsened by the lack of government framework to help communities so battered by climate change that they must relocate entirely. Because such a move is unprecedented, several communities' relocation attempts have been stalled for up to 10 years.

Speaking at a Brookings Institution panel on Arctic Indigenous Peoples, Displacement and Climate Change yesterday in Washington, D.C., Bronen presented a paper on the challenges Alaskan indigenous communities face as they try to move to higher, drier ground. Many of these efforts have been stalled because there is little government support, on both the state and federal level, for the difficult and expensive task of relocating an entire town.

Three communities "have been desperately trying to relocate for decades," she said. "I'm just stunned by how challenging the relocation effort is."

Hurricane Katrina

August 29, 2005

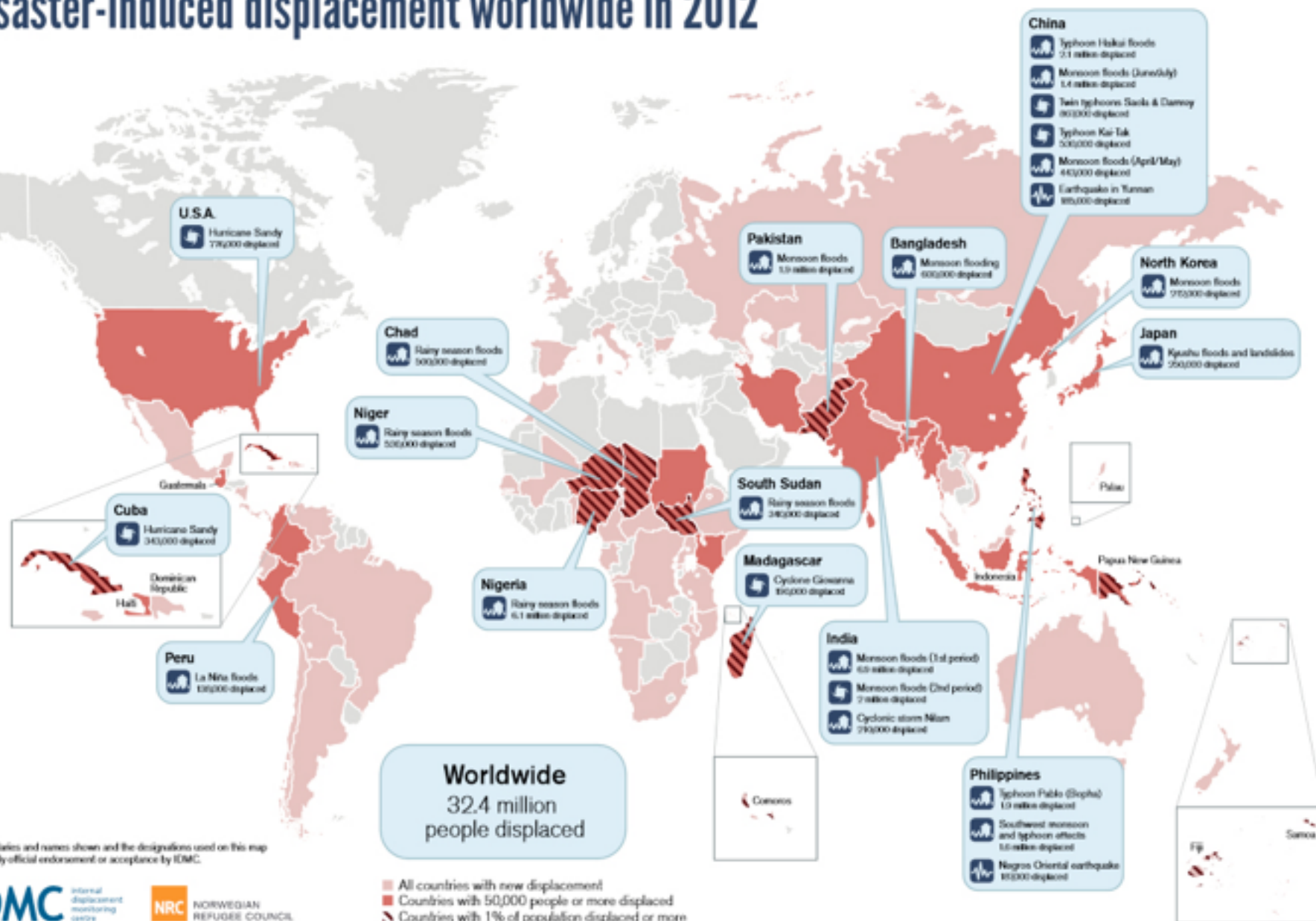


Photo: NOAA





Disaster-induced displacement worldwide in 2012



The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by IDMC.

“The maps of the
world will have to
be redrawn.”

-Sir David King,

U.K. Science Advisor, in regard to what is
happening in Greenland





Dhaka, Bangladesh

❖ September 5, 2008



Northwest Pakistan

❖ August 2010



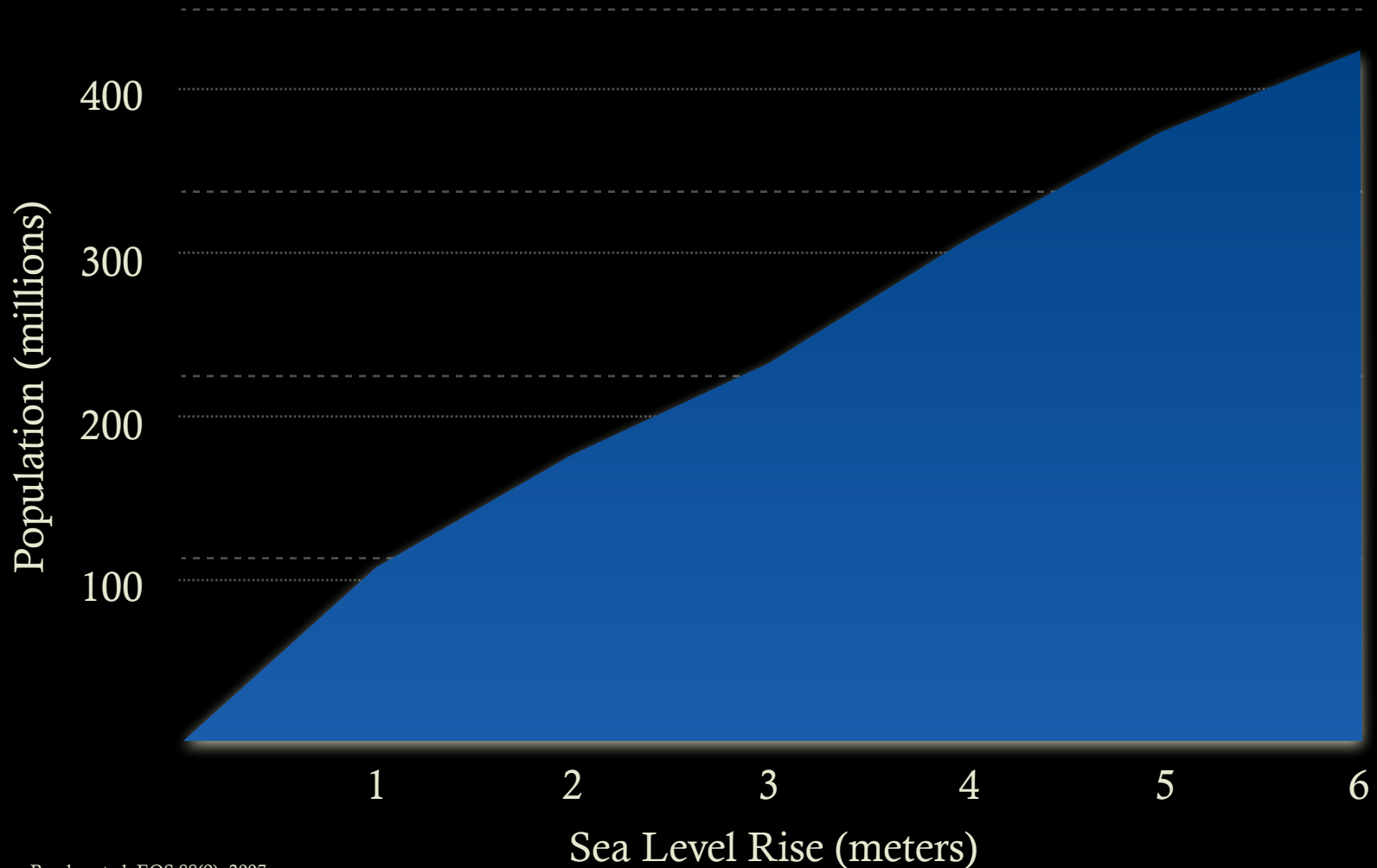


Nowshera District, Pakistan

❖ July 30, 2010

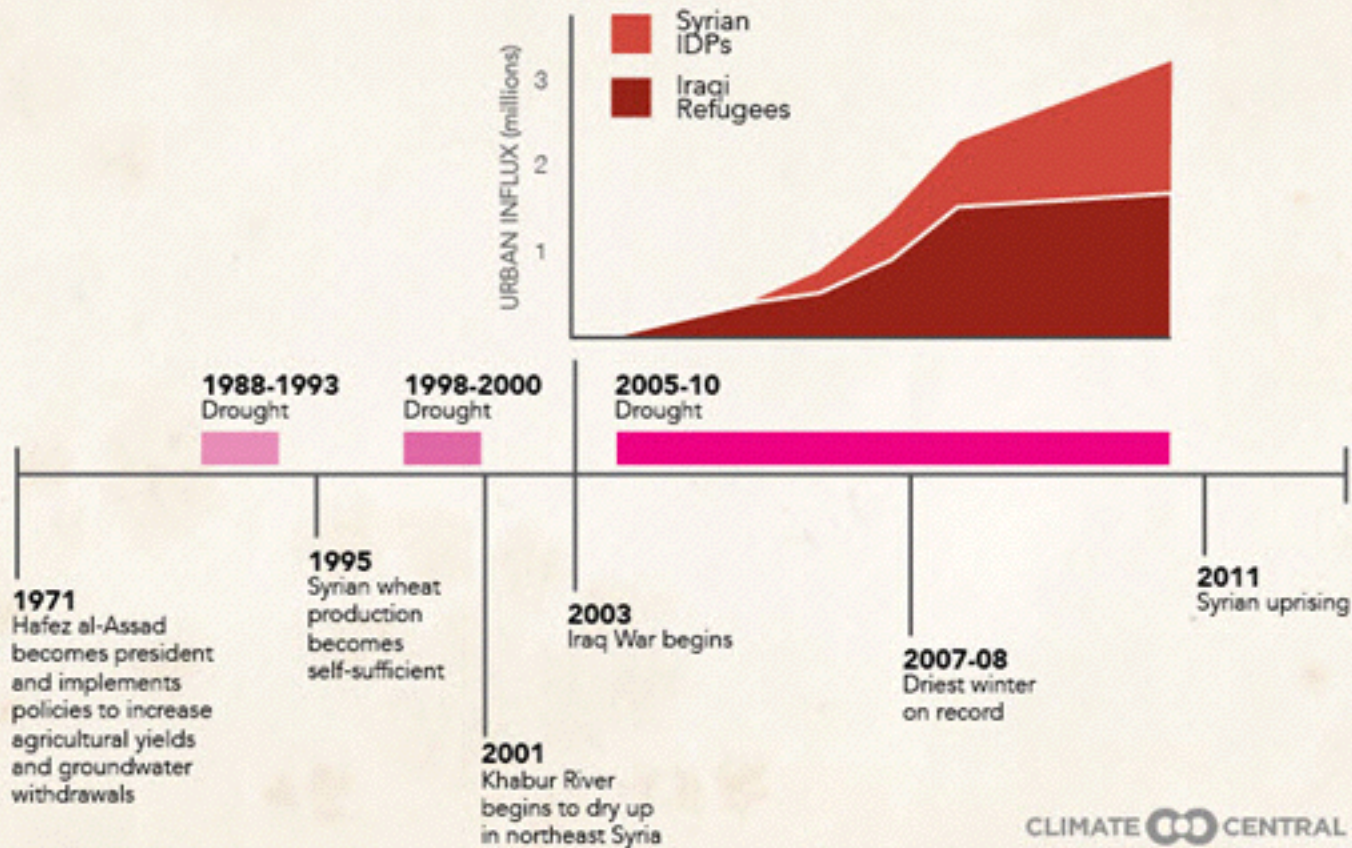


Population Displaced by Sea Level Rise



A Syria Timeline: Policy, Drought and Conflict:

A series of social and climate factors became confounding elements that contributed to the uprising in Syria.



Al Raqqa, Syria

September 23, 2010

**"I had 400 acres of wheat,
and now it's all desert."**

Ahmed Abdullah, Syrian farmer

October 2010

FAO Food Price Index

1990 – January 2011



Food Security and Migration



Linkages among climate change, crop yields and Mexico-US cross-border migration

Shuaizhang Feng^{a,b}, Alan B. Krueger^{a,c,d}, and Michael Oppenheimer^{a,e,1}

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Edited by Stephen H. Schneider, Stanford University, Stanford, CA, and approved June 24, 2010 (received for review March 3, 2010)

Climate change is expected to cause mass human migration, including immigration across international borders. This study quantitatively examines the linkages among variations in climate, agricultural yields, and people's migration responses by using an instrumental variables approach. Our method allows us to identify the relationship between crop yields and migration without explicitly controlling for all other confounding factors. Using state-level data from Mexico, we find a significant effect of climate-driven changes in crop yields on the rate of emigration to the United States. The estimated semielasticity of emigration with respect to crop yields is approximately -0.2 , i.e., a 10% reduction in crop yields would lead an additional 2% of the population to emigrate. We then use the estimated semielasticity to explore the potential magnitude of future emigration. Depending on the warming scenarios used and adaptation levels assumed, with other factors held constant, by approximately the year 2080, climate change is estimated to induce 1.4 to 6.7 million adult Mexicans (or 2% to 10% of the current population aged 15–65 y) to emigrate as a result of declines in agricultural productivity alone. Although the results cannot be mechanically extrapolated to other areas and time periods, our findings are significant from a global perspective given that many regions, especially developing countries, are expected to experience significant declines in agricultural yields as a result of projected warming.

human migration | global warming | environmental migrants | agricultural productivity | instrumental variables approach

Climate change presents many critical challenges to humankind (1, 2). One widely cited impact is the displacement of large numbers of people (3–9). Among all potential “climate refugees” or “environmental migrants,” those crossing international borders are likely to be of particular concern for both developing (in many cases, migrant-sending) and developed (i.e., migrant-receiving) countries. Although migration is a normal part of the development process (10, 11), and can be an important risk management strategy for households (12, 13), unmanaged and unexpected climate-related migration could exacerbate a range of problems, including deterioration of ecosystems, slowing of regional economic development, disruption of human and political rights, and increased international conflicts and border fortification (14).

Despite qualitative assertions and some local case studies (7, 8, 15, 16) (*SI Appendix, part 1*), climate-driven migration has not received sufficient attention in the immigration literature. Existing studies of immigration typically emphasize the roles of geographic proximity, relative economic opportunities for potential migrants, social and cultural networks, and political stability as causative factors. Climate factors may play an increasingly important role in the future, given the prospect of global warming. Although the underlying climate/migration relationship is complex and the evidence is sometimes elusive (8, 17–19), policymakers require elu-

Several aspects of climate change may drive changes in migration (20). In this study, we focus on the climate acting through its effect on agricultural productivity. Changes in crop yields that result from climate change occur over broad geographical areas (unlike sea level rise, which directly affects only coastal regions), and are likely to lead to long-term population shifts (more so than episodic flooding, for instance, the effects of which tend to be transitory). Such a phenomenon is especially relevant to developing countries, which typically have large rural populations that derive a living directly from agriculture. Lacking resources to adapt, developing countries are also most vulnerable to future warming (21, 22). Furthermore, the possible impacts of climate change on the agriculture sector have been estimated worldwide and are relatively well understood (23–25).

Specifically, we study Mexico for the decade of 1995 to 2005, during which time a substantial increase in out-migration to the United States occurred. Studies have examined numerous factors underlying the so called “great Mexican emigration” (26–31), including negative labor demand shocks, labor supply shocks resulting from demographic changes, US immigration policy changes, migrant networks, and importation of cheap corn and other agricultural products following the North American Free Trade Agreement (NAFTA) (32). Yet to our knowledge no study has directly associated a component of the increase in emigration with changes in climate, despite numerous reports and anecdotes of Mexican farmers fleeing to the United States because they no longer could maintain their previous way of life because of climate-driven crop failures (8, 33). This omission is significant given that the period after 1994 also coincides with a historically rare period of drought in much of Mexico, especially in the north, that is comparable to the great Mexican drought of the 1950s (34).

We chose Mexico for our study because it is one of the biggest migrant-source countries, because there exists state-level data on emigration, and because it has undergone diverse degrees of climate variability across regions. In addition, Mexico is unique in that the relative ease of migration to the United States allows us to better capture the full potential emigration response to changes in crop yields than in many other cases. It is extremely important for policymakers to appreciate the magnitude of the “desired” or “potential” demand for out-migration when evaluating various policy options.

To estimate the sensitivity of emigration to crop yields, we employ a statistical estimator that uses only the portion of variations in crop yields across states that is predicted by variations in climate. Such yield variations, unlike those caused, for example,

Author contributions: S.F., A.K., and M.O. designed research; S.F., A.K., and M.O. performed research; S.F. analyzed data; and S.F., A.K., and M.O. wrote the paper. The authors declare no conflict of interest.

Linkages among climate change, crop yields and Mexico-US cross-border migration

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Displacement Categories

- ❖ Temporary displacement
- ❖ Permanent local displacement
- ❖ Permanent internal displacement
- ❖ Permanent regional displacement
- ❖ Permanent intercontinental displacement

“Refugee”

Art. 1.A.2 of the 1951 *Convention Relating to the Status of Refugees*

- ❖ Applies to any person who
 - ❖ “owing to well-founded **fear of being persecuted** for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is **unable or, owing to such fear, is unwilling** to avail himself of the protection of that country.”

“Legal definitions bind States in ways that descriptive labels cannot.”

-Prof. Jane McAdam

*Environmental Migration Governance,
University of New South Wales Faculty of Law Research Series,
2009*

Several Spheres of Governance and Related Institutions

- ❖ Migration and asylum law
- ❖ Environmental law
- ❖ International development law
- ❖ Human rights and humanitarian law
- ❖ National security law
- ❖ Property law
- ❖ Immigration law
- ❖ Indigenous rights

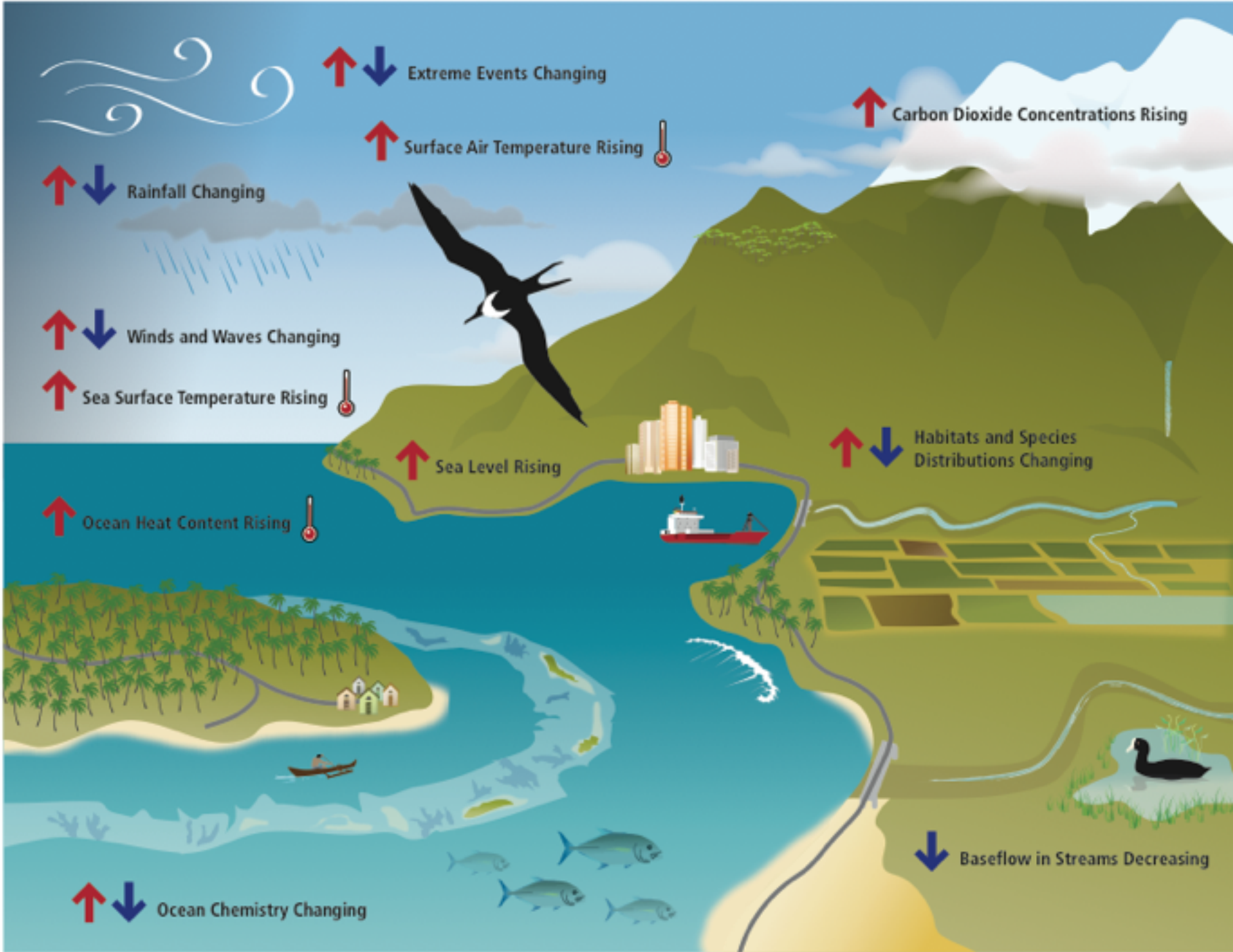
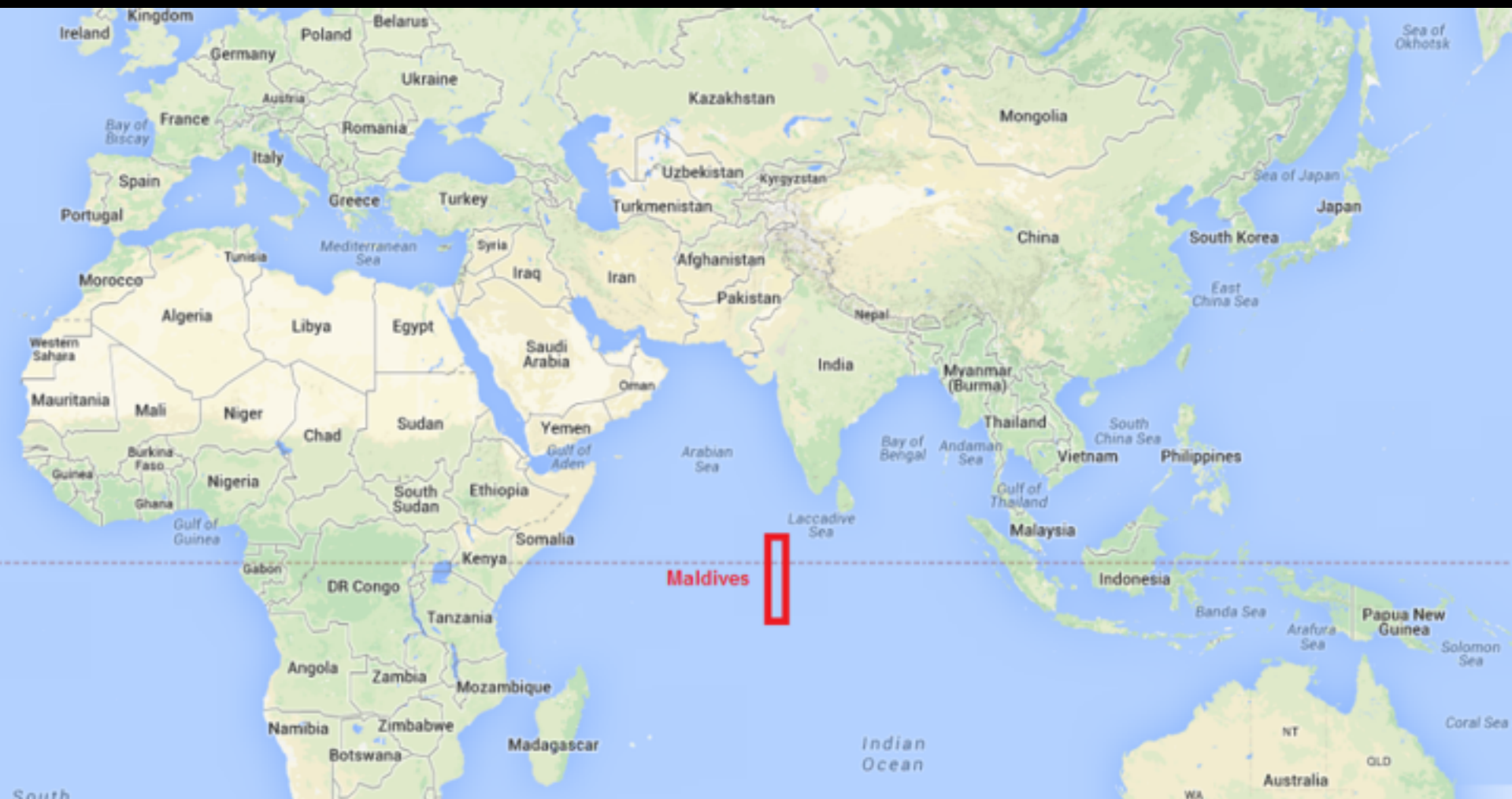




Photo courtesy Peter Essick/National Geographic Society

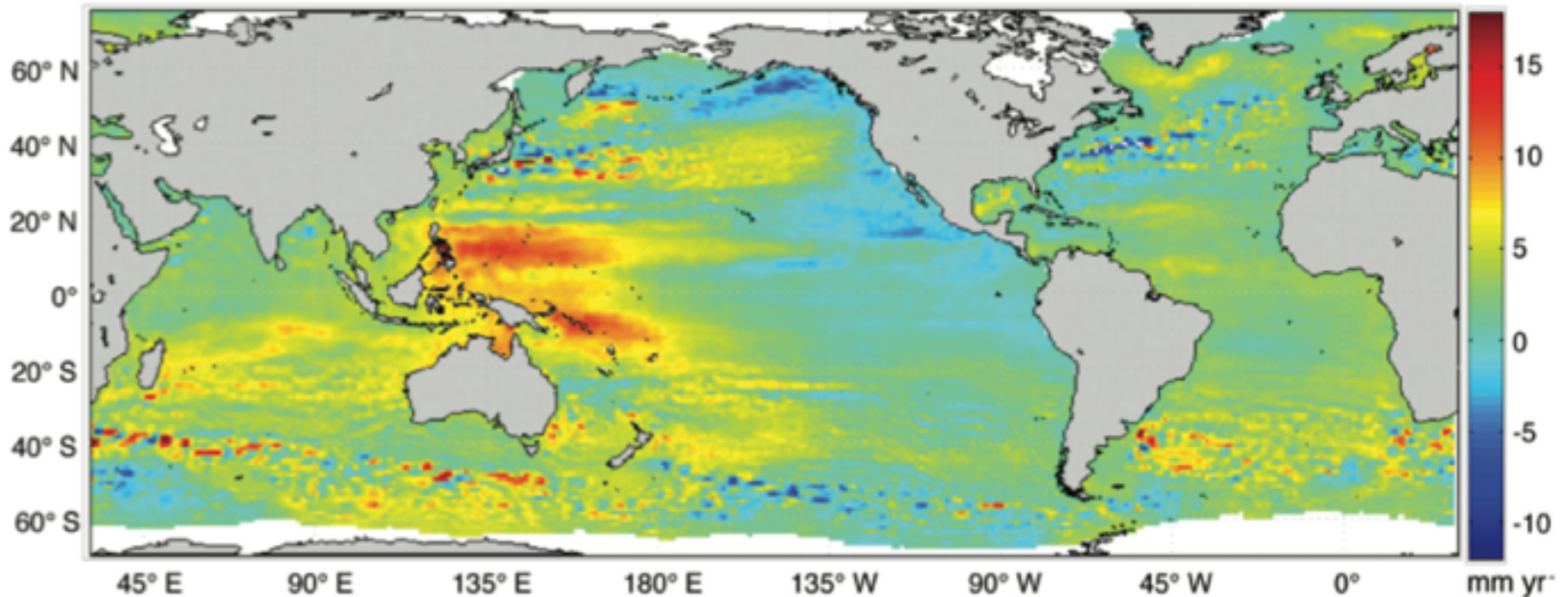


The Maldives

❖ October 17, 2009



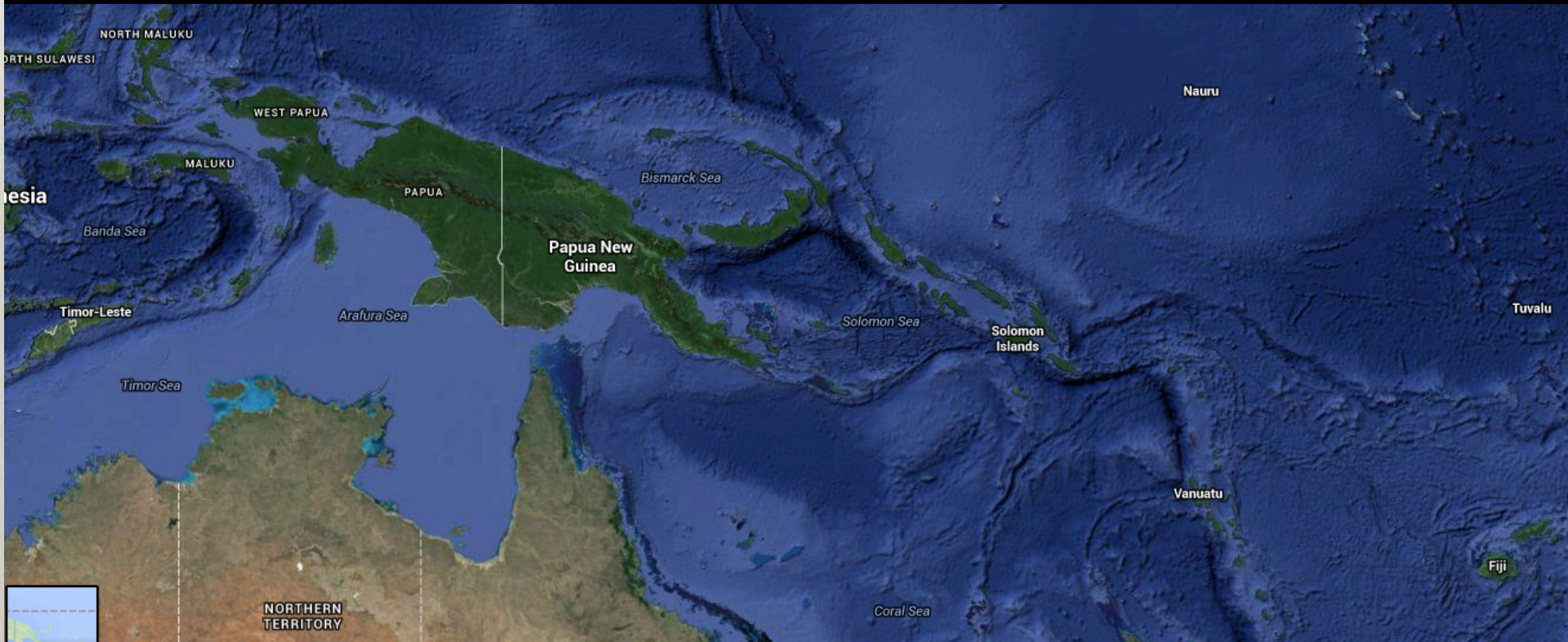
Sea Level

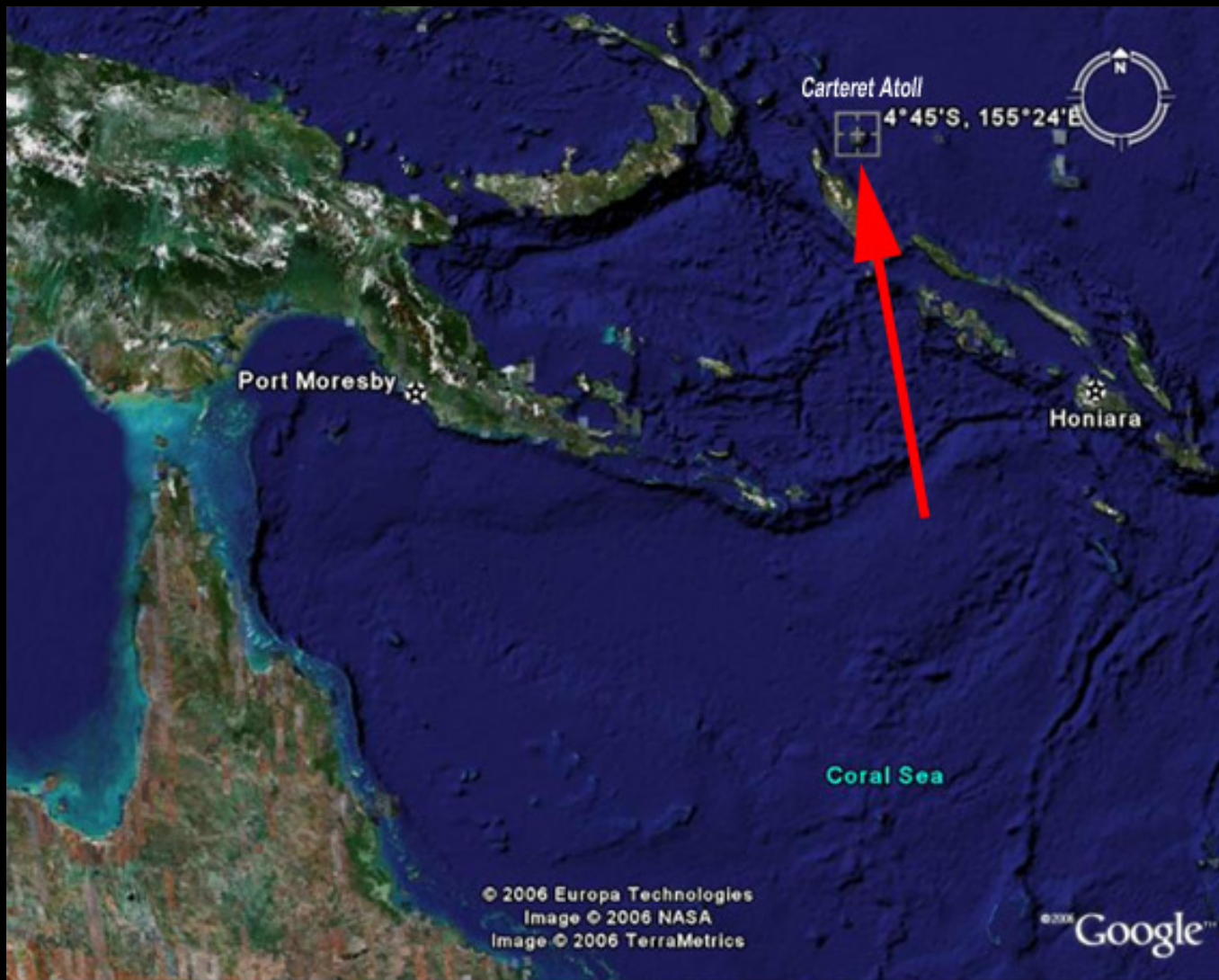


Between 1993 and 2010 **global mean sea level rose**, with the highest rise in the Western Pacific. Extreme water levels will occur when sea-level rise related to longer-term climate change combines with seasonal high tides, inter-annual and interdecadal sea-level variations, and surge or high runup associated with storms. *Source: Merrifield (2011), by permission of American Meteorological Society.*



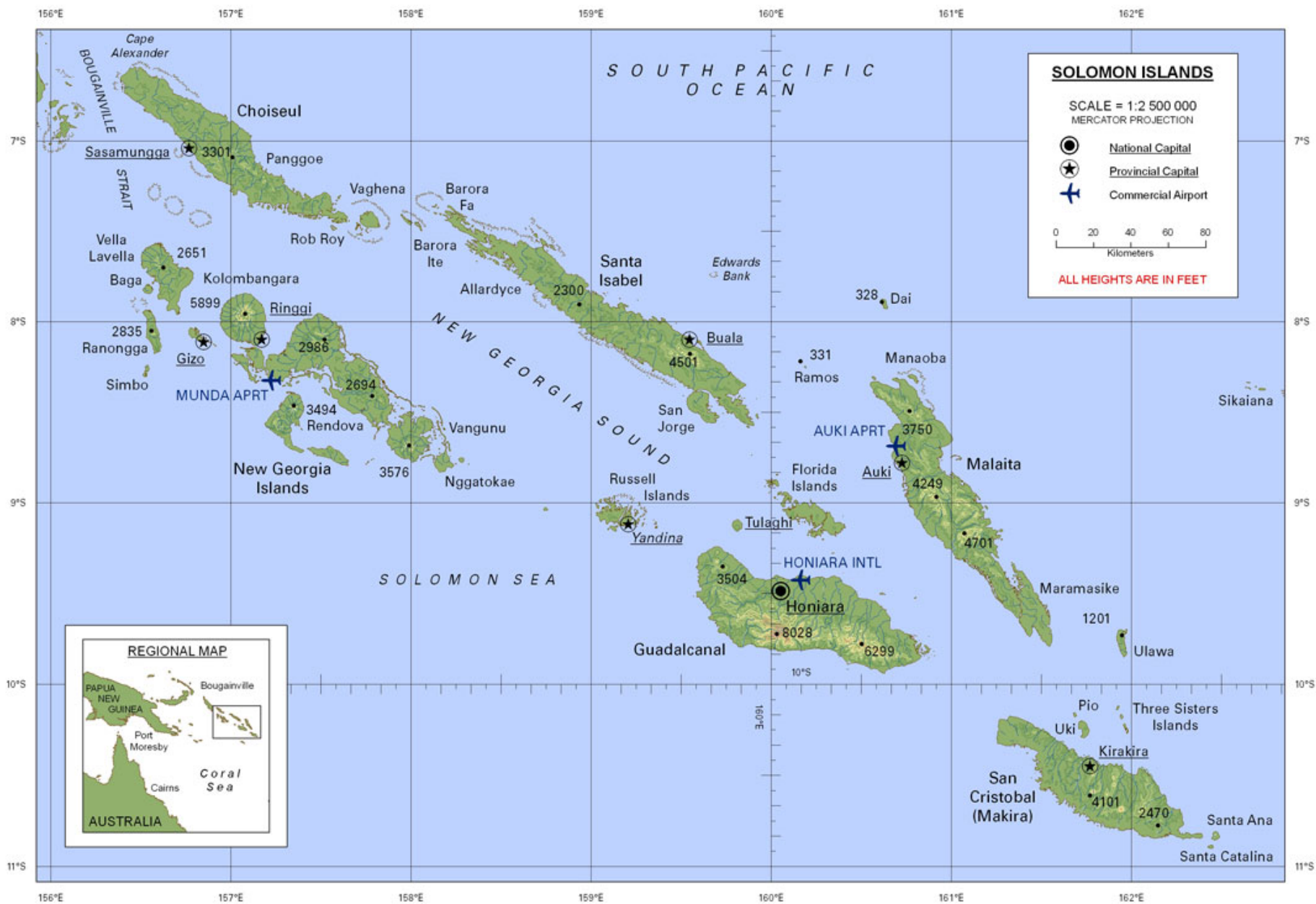






Carteret Atoll (Island)







Permanent Address: <http://www.scientificamerican.com/article.cfm?id=as-pacific-islands-flood-a-climate-driven-exodus>

As Pacific Islands Flood, A Climate-Driven Exodus Grows

Residents of Micronesia and others are relocating to Hawaii or the mainland U.S. as the atoll nations disappear

By Anne C. Mulkern and ClimateWire | Monday, September 9, 2013 | 66

HONOLULU — The village where Christina Deeley was born in the Marshall Islands is disappearing, bit by bit.

When she visits her family in the Laura community on the islands' Majuro atoll, Hawaii resident Deeley, 34, sees many changes confronting natives. The beach has receded by several feet. Cemeteries once located at the end of the town have vanished. Fish are becoming more scarce and fresh water polluted.

Deeley's mother, Maria de Brum, 57, still lives in Laura and wants to stay. But Deeley believes it's just a matter of time before the family matriarch will be forced to do what many others from the islands have already done. They've moved to the United States.

There's an exodus underway from Pacific Island nations to America, one driven by multiple factors, according to island leaders and migrants. People relocating to Hawaii and other states say they've come for better jobs and health care. But there's also a less recognized but unmistakable contributor, Deeley explained: climate change.



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ABANDONING PARADISE: Climate change and rising sea levels are producing stronger storms and beach erosion which are altering food, invading freshwater reservoirs and changing local cultures in the Pacific islands.

Image: Christopher Michel/Flickr

Hawaii to suffer most as global sea levels rise, study says



NASA

The Hawaiian Islands, seen from space, are the most vulnerable to uneven global sea level rise due to melting glaciers and ice sheets.

By John Roach, Contributing Writer, NBC News

Melting ice in Greenland, Antarctica and elsewhere will push up seas unevenly around the world,



Public Health Implications of Migration

- ❖ Maternal and Child Health
- ❖ Malnutrition
- ❖ Sexually Transmitted Infections
- ❖ Mental Health
- ❖ Chronic Diseases, and
- ❖ Infectious Agents
- ❖ Compounding Factors: Lack of sufficient language services by health care providers and literacy and cultural concerns