Study suggests costs of building flood protection from global warming far less than flood repair

February 4 2014, by Bob Yirka

Flooding in Key Haven caused by hurricane Wilma on 10/24/2005. Credit: Marc Averette/Wikipedia

(Phys.org) —A team of researches with members from several European countries has concluded that it would be far more cost effective for most

coastal area economies to employ flood prevention strategies rather than simply pay to clean up after flooding that occurs due to global warming. In their paper published in *Proceedings of the National Academy of Sciences*, the researchers describe likely flooding scenarios in the future as ocean levels rise due to global warming and the possible costs of building structures to prevent flood damage.

Global warming, it appears, is here to stay, thus, it's time, the researchers suggest, to start making plans for dealing with the inevitable flooding that will occur as ocean levels rise due to warmer water and melting snow and ice. They note that approximately a billion people currently live in areas that are likely to be at risk—low-lying coastal areas. And since it's not likely that towns and cities will be moved farther inland, other measures need to be taken. They note that flood prevention strategies are well established, e.g. building levees, barrier islands, etc., thus it's not difficult to draw up estimates for such schemes for individual areas. What is difficult is convincing municipalities to spend billions of dollars on preventing floods that won't occur for many years.

To make their point, the researchers highlight the high financial toll that floods take, compared to the relatively small investment costs for flood prevention. As one example, they note that one highly developed coastal urban area could see damages reaching to nearly $20 trillion annually—as in every single year. To offer a comparison, they note that the GDP for the United States as a whole is roughly $17 trillion a year. Clearly it would be cheaper to prevent the flooding in the first place.

The researchers acknowledge that costs for putting in flood control measures in different parts of the world could vary dramatically, but suggest that regardless, it would almost certainly be cheaper than enduring endless flooding. The key is in recognizing what the future holds and making plans for it, rather than taking a wait-and-see approach.

As one additional note of caution, the researchers also remind urban planners that history has shown that not all flood prevention efforts succeed as envisioned, and when they fail, catastrophic events can occur as a result—quite often due to building in a flood plain out of an exaggerated sense of security.

More information: Coastal flood damage and adaptation costs under 21st century sea-level rise, Jochen Hinkel, *PNAS*, DOI: 10.1073/pnas.1222469111

Abstract

Coastal flood damage and adaptation costs under 21st century sea-level rise are assessed on a global scale taking into account a wide range of uncertainties in continental topography data, population data, protection strategies, socioeconomic development and sea-level rise. Uncertainty in global mean and regional sea level was derived from four different climate models from the Coupled Model Intercomparison Project Phase 5, each combined with three land-ice scenarios based on the published range of contributions from ice sheets and glaciers. Without adaptation, 0.2–4.6% of global population is expected to be flooded annually in 2100 under 25–123 cm of global mean sea-level rise, with expected annual losses of 0.3–9.3% of global gross domestic product. Damages of this magnitude are very unlikely to be tolerated by society and adaptation will be widespread. The global costs of protecting the coast with dikes are significant with annual investment and maintenance costs of US$ 12–71 billion in 2100, but much smaller than the global cost of avoided damages even without accounting for indirect costs of damage to regional production supply. Flood damages by the end of this century are much more sensitive to the applied protection strategy than to variations in climate and socioeconomic scenarios as well as in physical data sources (topography and climate model). Our results emphasize the central role of long-term coastal adaptation strategies. These should also take into account that protecting large parts of the developed coast

increases the risk of catastrophic consequences in the case of defense failure.