

Q&A:**Gauging climate change's economic toll on Caribbean**

Ramón Bueno, a researcher and policy analyst with the Tufts University-based U.S. branch of the Stockholm Environment Institute, is co-author of a new study that estimates economic impacts of climate change on Caribbean nations through 2100. Commissioned by the Environmental Defense Fund and issued in May, the report weighs three categories of damage—destruction from increased hurricane intensity, infrastructure loss due to sea-level rise and loss of tourism revenue. It does so using two scenarios: “low-impact,” in which the world acts promptly to address global warming, and “high-impact,” in which little is done to curb greenhouse emissions and adapt to climate change. Based on the difference, the study calculates an “annual cost of inaction,” which it pegs at \$21.9 billion, or 10.3% of the Caribbean’s current Gross Domestic Product (GDP), for 2050 and \$46.2 billion, or 21.7% of the region’s current GDP, for 2100. Bueno spoke recently with EcoAméricas Editor George Hatch.

**Ramón Bueno****What was the purpose of this study?**

Two things. One was to get a sense of global warming impacts facing the Caribbean as a whole. You can collect information on the impacts of a particular storm on a particular island, but we wanted to find out what could be said about the economic consequences for the entire region. For this brief and preliminary study, we assembled projections for two scenarios outlined by the Intergovernmental Panel on Climate Change (IPCC), leveraging a recent study of Florida by our group and a World Bank study in 2002 on the subset of islands then part of Caricom [the Caribbean Community and Common Market]. A second concern was to examine the dilemma of the Caribbean, a very small contributor to global warming, living next to a dominant contributor, the United States, yet facing the gravest consequences.

And the most important finding?

The very serious and costly potential consequences for the Caribbean—how vulnerable the region is. Of the limited categories we looked at, infrastructure damage from sea level rise stands out as the dominant one. For the region, increased damage to infrastructure from rising sea level accounts for over two-thirds of the model’s damages in our three categories. The main message from the results is that the Caribbean region stands to suffer greatly, and perhaps relatively soon, from the negative consequences of uncontrolled climate change.

Explain how you arrived at your assumptions for hurricane, infrastructure and tourism losses in the two scenarios.

The two scenarios generally correspond to the IPCC’s B1 [low-impact, or rapid-stabilization] and A2 [high-impact, or business-as-usual] scenarios. However, for the latter we use sea-level rise estimates that

account for the effect of the accelerated melting of ice sheets from recent research too late for inclusion in the IPCC's Fourth Assessment Report released last year. For tourism, we took the World Bank study's calculations for the aggregate percentage total loss of tourist revenue for the group of 10 Caricom islands under each scenario due to rising temperatures, loss of beaches and coral reefs, etc., and applied those to current tourist expenditures for the 24 islands in our study. The model's hurricane damages are proportional to average annual trends [from storms and floods since 1990] per island, and—as with our Florida study—include a doubling of damages per meter of sea-level rise and another doubling [in the high-impact scenario only] for each doubling of atmospheric CO₂, to account for greater storm intensity. For infrastructure, we used World Bank Caricom study results concerning replacement cost per affected household and the percentage of such households in each scenario, making modifications for nations on the largest, most populous islands—Cuba, Haiti, the Dominican Republic and Puerto Rico.

Which countries face the highest cost of inaction?

It depends whether you look at it in absolute terms or as a percentage of GDP, or national income. This model calculates for Haiti an annual cost of inaction in 2050 of 61% of current GDP and 123% by 2100. In Grenada the annual cost reaches 46% by 2050 and 111% by 2100. And for Saint Kitts and Nevis, the cost for those two years would be 36% and 89%, respectively. Dominica and Turks and Caicos aren't far behind, and others have significant impacts. These numbers are cause for concern. As you can see, in some cases total damages exceed the current-day size of a country's annual income. In absolute dollar terms, the larger, more populated islands incur the greatest damage in this order: Cuba, the Dominican Republic, Haiti, Puerto Rico and Jamaica. In Puerto Rico, the annual cost by 2050 would be 2.8% of current GDP, rising to 6% in 2100. These percentages are relatively low, since Puerto Rico has the Caribbean's largest GDP. But in absolute terms, Puerto Rico's annual costs of inaction are among the highest—\$2.5 billion in 2050 and \$5.2 billion in 2100. Haiti ranks near the top of both lists.

To what extent do the different geographical and social characteristics of Caribbean islands influence their vulnerability?

Some islands, like the Cayman Islands, Grenada, and St. Kitts and Nevis are in the path of more hurricanes and suffer greater such average damages [as a percentage of GDP], while Cuba's size and location place it in the path of many storms. Others, like Anguilla, Turks and Caicos, and several smaller islands, are extremely dependent on tourism, so they're highly vulnerable to rising temperature and sea level and to stronger storms. The most vulnerable in terms of infrastructure in our model are the most populous and/or poorer islands.

How, in your opinion, should this study affect the policy debate?

It should underscore that this is a global equity question. The islands' conditions make them vulnerable in a serious and extreme way to the actions of others. This puts extra responsibility on those with resources to control the problem. Caribbean countries don't have the resources to develop new technologies to remedy the greenhouse emissions problem, but they can get involved in the global debate. Their voice is very important. As these trends continue, the resources these islands will have to use to adapt will become an ever-greater drain on their development. They can adapt as best they can, but the source of the problem is global, and the larger actors must take the reins.