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AN ASSESSMENT OF THE ECONOMIC IMPACT OF CLIMATE CHANGE ON THE TRANSPORTATION SECTOR IN MONTSERRAT

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Executive Summary

Montserrat is at great risk from the economic impact of climate change on its international transportation sector, which brings nearly all of its visitors (mainly tourists) from the main markets in North America and Western Europe and moves virtually all of its merchandise trade. The presence of a 'persistently active' Soufrière volcano into, at least the next decade worsens the situation.

The total cost of climate change on international transportation in Montserrat was calculated by combining the impacts of changes in temperature and precipitation, new climate change policies in advanced countries, sea level rise and an eruption of the Soufriere Hills volcano. The impact for air transport could range from US$630 million (SRES B2 scenario), to US$742 million (SRES A2 scenario) and for maritime transport impact estimates range from US$209 million (SRES B2 scenario) to US$347 million (SRES A2 scenario). For international transport, as a whole, the impact of climate change varies from US$839 million under the SRES B2 scenario to US$1,089 million under the SRES A2 scenario.

While further study is needed to examine in more detail the potential impacts of climate change on the two key international transportation assets - John A. Osborne Airport and Little Bay - the findings of this preliminary assessment are so important that transportation decision makers should begin immediately to assess them in the development of transportation investment strategies in Montserrat. Mitigation strategies to deal with green house gas (GHG) emissions from international aviation and shipping are especially challenging, because the 1997 Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) specifically excludes these from developed countries' national targets. Instead, countries are expected to work through the International Civil Aviation Organization (ICAO) and the International Maritime Organization (IMO), but so far neither organization has reached agreement on binding actions, and many key issues remain unresolved.

Montserrat has the institutions set up to implement the adaptive strategies to strengthen the resilience of the existing international transportation system to climate change impacts. Air and sea terminals and facilities can be hardened, raised, or even relocated as need be and where critical to safety and mobility; expanded redundant systems may be considered. What adaptive strategies may be employed, the associated costs, and the relative effectiveness of those strategies will have to be determined on a case-by-case basis, based on studies of individual facilities and system-wide considerations.

INTRODUCTION

CLIMATE CHANGE AND INTERNATIONAL TRANSPORTATION

The Intergovernmental Panel on Climate Change (IPCC) in its Fourth Assessment Report (IPCC, 2007) provided compelling scientific evidence that human activity in the form of GHG emissions is responsible for many observed climate changes, but noted that use of this knowledge to support decision making, manage risks and engage stakeholders is inadequate. The international transport sector is a relevant case in point. Several studies have examined the contribution of both air and sea transport to climate change through the burning of fossil fuels [Environmental Protection Agency, 2006; International Energy Agency, 2008; and IMO, 2008]. Far less attention, however, has been paid to the consequences of potential climate changes for planning, designing, constructing, retrofitting, and operating the international transportation infrastructure. This inaction partly stems from the difficulty of defending the case for substantial investments in transportation infrastructure on the basis of climatic changes that may or may not occur years or even generations into the future.

Nevertheless, there are many reasons for transportation professionals and decision makers to consider climate change impacts and adaptation requirements as a matter of priority. First, climate change is not just a problem for the future. IPCC (2007) identified five climate changes of particular importance to transportation: increases in very hot days and frequent heat waves; increases in Arctic temperatures; rising sea levels; increases in intense precipitation events; and increases in hurricane intensity. The latest scientific findings suggest that forecasts about the intensity and frequency of extreme climatic events may be worse than previously thought, moving the issue of climate change to the forefront of the international agenda as one of the "greatest challenges of our time" (Allison et. al., 2009). Even if drastic actions were taken today to stabilize or even eliminate GHG emissions, the impact of climate change on international transport networks would continue to be felt far into the future, forcing transportation professionals to adapt to their consequences.

Second, climate change could lead to potentially sudden or dramatic changes far outside historical experience (e.g. record rainfall and record heat waves). Transportation infrastructure is designed for typical weather patterns, incorporating assumptions about reasonable changes in temperature and precipitation. But what if the 100-year tropical storm were to become the 50-year or 30-year storm, or design thresholds were frequently to be exceeded, or evacuation routes themselves were to become vulnerable? Historical climate projections used by transport professionals to guide transport operations and investments would no longer be a reliable guide for future plans. Improving adaptive capacity must, therefore, be an urgent priority.

Third, decisions taken today by transport professionals about the location of infrastructure help to shape development patterns far beyond the transport planning horizon of 20-30 years. Similarly, decisions about land use, zoning and development often generate demand for large investments in transport infrastructure. It is therefore important for transport decision makers to consider the potential impacts of climate change now in making these important investment choices - rebuild, rebuild differently, or relocate critical transport infrastructure. Focusing on the problems now should help avoid costly investments and disruptions to operations in the future.

Fourth, international transportation is crucial for the sustainable development of trade and tourism in developing countries, which are likely to be hardest hit by climate change (Dasgupta et.al., 2009). Air transportation supports 8% of global economic activity, carries 40% of the value of freight with speed and efficiency, and acts as an economic catalyst by opening up new market opportunities. Sea transportation facilitates more than 90% of world trade and contributes directly to a country's international competitiveness (ICTSD, 2010). The vulnerability of both air and sea transport

infrastructure to climate change, carries tremendous implications for Caribbean Small Island Developing States (SIDS).These States are very dependent on air transportation to bring most tourists from the main markets in North America and Western Europe to their shores, as well as very reliant on sea transportation to move nearly all of their merchandise trade. Caribbean SIDS constrained by shrinking budgetary space and rising public debt can least afford to allocate a large proportion of their annual budgets to rehabilitate damaged infrastructure due to climate change. They must now consider preventative measures such as a better design methodology and a more sustainable maintenance effort to minimize the impact of climate change.

Finally, international transportation is the fastest growing source of GHG emissions and there is now a growing consensus that future targets for emissions reductions in the post 2012 Climate Policy Framework must now include air and sea transportation. Global emissions from international aviation doubled between 1990 and 2005 and are projected to almost quintuple to 2050 (IPCC, 2007). Emissions from the international maritime industry also doubled between 1994 and 2007, and are projected to possibly even triple by 2050 (Lee et. al., 2009). Even though air and sea transportation combined are responsible for just 3% of GHG emissions, policy proposals to mitigate emissions from international transportation could increase economic costs for Caribbean SIDS.

OBJECTIVES OF THE STUDY

The main objective of this study is to establish an approach to analyzing the economic impact of climate change (temperature, precipitation, extreme events, sea level rise, and ocean acidification) on the international transportation sector in Montserrat so as to inform national strategies for mitigation and adaptation. Its specific objectives are:

- To collect relevant data on the air and sea transportation sectors in Montserrat in order to estimate the costs of identified and anticipated impacts associated with climate change over the next 40 years in comparison to a Business As Usual (BAU) scenario and a scenario with adaptation measures;

- To forecast losses in the air and sea transportation sectors in Montserrat until 2050 derived from climate change using an appropriate discount rate; and

- To prepare a list of possible adaptation and mitigation strategies that can be undertaken by the air and sea transportation sectors in Montserrat to address the observed and projected impacts of climate change.

LIMITATIONS OF STUDY