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Estimating the link between climate change and flooding in Atlantic Canada

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According to the 5th Annual Report of the Intergovernmental Panel on Climate Change (IPCC), impacts from recent weather extremes such as hurricanes, floods, cyclones, heat waves and others reveal significant vulnerability and exposure of some ecosystems and many human systems to current climate variability. Climate change leads to an increase in frequency and magnitude of various large weather events now and in the future. To tackle with consequences of these events and mitigate their destructive impact on human life, infrastructure, and ecosystems, humanity must look for advanced tools that might forecast intensity and severity of these large weather events. In this regard, Atlantic Canada is extremely vulnerable to various types of floods. On the other hand, the most common forms of climate change in Atlantic Canada are increase in temperature, change in precipitation patterns, and sea level rise. The main goal of this study is to find the link between floods and climate change in Atlantic Canada and to test the hypothesis of increasing frequency of floods due to changing climate. In doing so, the first part of the study is dedicated to evaluation of probability of

floods in Atlantic Canada due to climatological, hydrological and socio-economic factors. It is shown that statistically significant factors for flooding in Atlantic Canada are annual amount of rain, annual average temperature, mean sea level, and annual maximum river discharge. Annual amount of rain is the most important climate related factor. That is why the second part of the study tests the hypothesis of increasing frequency of floods in Atlantic Canada in the future due to changing dynamics of annual amount of rain. It is shown that climate change affects the dynamics of annual rain in the future which leads to increased frequency of in-land floods. Our statistical analysis is based on 1930-2015 time period and the data presented in this study were collected from various sources such as Statistics Canada, Canadian Disaster Database, Database of Environment Canada and local flood history databases. Coupled with previously estimated economic damage from floods, the results of this study produce future expected damage from floods due to climate change which serves as a target for investment into mitigation measures.

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