GUEST EDITORIAL

THE IMPACTS OF CLIMATE CHANGE ON THE GALAPAGOS ISLANDS: ASSESSING VULNERABILITY AND PLANNING FOR ADAPTATION

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Historic data on thermal anomalies and El Niño events in the Eastern Tropical Pacific provide compelling evidence that Galapagos ecosystems have been exposed to rapid and abrupt oceanic and climatic changes in the past. However, their ability to adapt, if such changes become more frequent and persistent, is uncertain. This vulnerability to climate change is exacerbated by growing human pressures, driven by rapid economic growth, unregulated development, and immigration. These bring increasing numbers of cargo vessels, passenger boats and tourist flights, and invasive species. Over-fishing and rapid land-use change add to concern over loss of ecosystem integrity.

Given the uniqueness of the Galapagos environment, it becomes imperative to acquire a full understanding of this vulnerability and to find solutions to increase the resilience and adaptive capacity of the Galapagos. In this issue of *Galapagos Research* are several papers that developed from the "Climate Change Vulnerability Assessment of the Galapagos Islands", completed in 2009. This was a collaborative effort between Conservation International, the World Wildlife Fund, the Galapagos National Park and the Ecuadorian Ministry of the Environment, supported by the Charles Darwin Foundation and other Ecuadorian and international scientific institutions. On the 50th anniversary of the establishment of the Galapagos National Park and the Charles Darwin Foundation, the assessment was an initial study of how climate change may alter Galapagos ecosystems and how losses of ecosystem services may radically change its society. The articles on pages 26–61 of this issue provide evidence of past climate variability and ecosystem responses in the Galapagos through the analysis of recent fossil records at increasingly fine scales (Bush *et al.*), climate patterns and variability in the last 50 years (Wolff), and climate changes that the Galapagos should expect in the coming decades (Sachs & Ladd), including a review of the current Galapagos climate and the potential consequences of changing conditions on the dry and humid zones and their native vegetation (Trueman & d'Ozouville). The potential effects of climate change on populations of two charismatic species, the Galapagos pinnipeds, are explored by Salazar & Denkinger.

The studies presented here, together with other unpublished studies that resulted from the assessment, provide evidence of the connectivity of the marine, coastal and terrestrial ecosystems and the great dependence of Galapagos society on their ecological services. This information allows managers, conservationists and scientists to understand the response of species and ecosystems to interactive effects of human activities, including climate change. But the outcomes of the assessment reach beyond the scientific evaluation of ecosystem responses, and work towards solutions for increasing the adaptive capacity of Galapagos ecosystems and the people that depend on them. Adapting to climate change is crucial to ensure the survival and continued well-being of ecosystems and human societies exposed to climate change. We believe that this initiative represents a real commitment, taken together by the people of the Galapagos, the Ecuadorian Government, NGOs and scientific institutions, towards increasing the capacity of marine and terrestrial ecosystems to maintain themselves and their services under future climatic conditions, for the benefit of society and the future generations of the Galapagos Islands.

The assessment was a collective effort between Conservation International, the Ecuadorian Ministry of the Environment, the Galapagos National Park and the World Wildlife Fund, supported by the Charles Darwin Foundation, the Centro Internacional para la Investigación del Fenómeno del Niño, the Universidad San Francisco de Quito and the University of North Carolina. We extend our most sincere gratitude to the authors who contributed to this issue and to all who participated in the assessment. Finally, we are grateful to the Charles Darwin Foundation and the Editor of *Galapagos Research* who encouraged the development of this special section.