

I. Introduction

Human society has never before faced forces of change as complex and potentially catastrophic as climate change. The Anthropocene corresponds to the current epoch of humans and our post-industrialization societies, as they have become a global geophysical force. Climate change and many other human-driven changes to the environment are raising concerns about the future of Earth's environment and its ability to provide the services required to maintain viable human civilizations (Steffen, Will, Crutzen, Paul, et al. 2011).

The motivation behind this research is the need for governments and funding agencies to understand where to focus and track progress on climate change adaptation. This research gathers evidence of adaptation planning for coastal resources from a case study of the Dominican Republic (DR). Global climate change impacts communities, ecosystems, and people's lives in the coastal zone, which is home to over 40% of the global population (USAID 2013). Climate change will be a major challenge for the DR; a World Bank study ranked the capital city of Santo Domingo in the top five coastal cities most vulnerable to climate change, by cost of expected damage as percentage of GDP. (World Bank 2013). The city is exposed to significant negative effects of extreme coastal weather events and rising sea level, at great economic and social cost (Hanson 2011).

This research utilizes the conceptual framework of the Orders of Outcomes (Olsen 2003) to examine the presence of enabling conditions for addressing the challenges of climate change in a climate-sensitive hotspot: Santo Domingo¹. Data was gathered from the analysis of a

1 Per recommendation in the 2013 USAID study on climate change vulnerability in the DR (USAID 2013) the capital city of Santo Domingo (SD) province is the area of focus for this research. The area of focus is the geographically defined area that ecosystem-based adaptation planning addresses and is therefore the focal point for a governance baseline. An approach to work at the appropriate level of scale recognizes natural functions of the coastal ecosystem, governance forces, and relevant stakeholders. Santo Domingo is legally 2 Provinces, comprising the National District that has historically been Santo Domingo, and the current City of Santo Domingo which is comprised of 3 municipalities: Santo Domingo North, East and West. This has important implications in terms of government management and governance dynamics in general.

literature review and a semi-structured interview instrument. The purpose of this research is to analyze the forces that influence actions to adapt to climate change in the DR. The main sources of governance are government, the private market, and civil society (Juda 2001). A “governance baseline profile” (Olsen, et al., 2009) provides analysis of a country’s experiences with changing ecosystem conditions and the processes of decision-making. The goal for this paper is to provide a level of analysis to make explicit recommendations for policymakers planning climate change adaptation for coastal resources. Identifying opportunities and barriers of the country’s current governance profile informs a plan of action and assists policymakers and stakeholders to set goals within the local governance context.

The questions this research seeks to answer are;

- 1) What coastal resources are most at risk to negative impacts of climate change?
- 2) Which source of governance currently leads in shaping responses to climate change?
- 3) What enabling conditions are in place as barriers and opportunities for planning a strategy to address these vulnerabilities?

This paper begins by introducing key concepts of climate change, coastal resources, governance, and the conceptual framework of the Orders of Outcomes. These key concepts are important to this research because of the significance of coastal resources, particularly for developing countries, the emerging challenges of climate change, the societal forces that determine a response of adaptation to these challenges, and a framework for monitoring the progress of adaptation. The process of assembling a governance baseline is then introduced, and the methodology for how these concepts informed the literature review and interview instrument used to answer the research questions. The case study of the Dominican Republic provides contextual background. Next, we present our interview findings that identify sources of governance and current conditions that act as barriers or opportunities to adaptation planning. In the Appendix, a detailed analysis is provided as an example of how a new use of a coastal resource that was previously dominated by destructive fishing is now conducting effective governance through a co-management

arrangement that provides SD with economic development and climate change resiliency. Finally, recommendations for adaptation planning are presented, based on findings where opportunities lie in current governance conditions to promote opportunities at hand, and barriers to be addressed.

Introducing Concepts

Climate Change

The United Nations Conference on Trade and Development (UNCTAD) declared that climate change continues to rank high on the international policy agenda in both developed and developing countries (UNCTAD 2013). Climate change vulnerability is a concept in research and policy that is inconsistently defined (Adger, 2006; Hinkel, 2008), and thus requires further understanding (USAID 2012, Hinkel 2011, Pahl-Wostl 2009). This research uses the Intergovernmental Panel on Climate Change (IPCC) definition of vulnerability as a function of three indicators: *exposure* to climate stressors; the *sensitivity* of a system to that stress; and the *adaptive capacity* to recover from the impacts of that exposure (USAID 2013, IPCC 2012, Sano 2009). *Exposure* to climatic stresses is based on the geographic location and frequency of meteorological events such as rainfall, temperature, and wind. *Sensitivity* is the degree to which the area is affected by climate events, such as resulting in flooding, storm surge, and coastal erosion (USAID 2013). *Adaptive capacity* is the ability of the people and communities of a society to respond and recover from the impacts of exposure and sensitivity (Adger, 2006).

Climate change presents a challenge that requires changes in ecological and social conditions (USAID 2012). Traditionally, coastal resource management has been organized around particular uses such as fisheries, tourism or seaports, resulting in separate governance regimes for each use. Over time it has become apparent that such a sectoral approach results in conflicts among users and is inadequate for sustaining the goods and services that flow from healthy ecosystems (US Commission on Ocean Policy 2004). Solutions to coastal ecosystem-based challenges must shift from managing individual sectors, to an integrated perspective of interconnected ecological and socio-political systems (Cicin-Sain 1998). This is often termed “an ecosystem-based approach.”



Figure 2. Map of Dominican Republic (Source: Icupromo)

The DR is a Small Island Developing State (SIDS), with high incidence of damaging storms, compounded by limited resources (UN Conference on Small Island Developing States 2012). The UN Millennium Development Goals (MDGs) are international development goals established by the United Nations in 2000 to improve conditions in the areas of poverty and hunger, education, gender equality, child mortality, maternal health, diseases like HIV and malaria, and environmental sustainability. The DR and Caribbean region perform relatively well on meeting goals for hunger, education, HIV/AIDS, and health (MDG Report 2013). However, indicators needing progress include poverty and environmental sustainability, including water resources, and urban populations living in slums.

Climate Change Vulnerability in the DR

Multiple projections of climate change impacts identify the DR as highly vulnerable, based on criteria of exposure, sensitivity, and adaptive capacity (IPCC 2012, Nature Climate 2012). A World Bank study ranked the capital city of Santo Domingo in the top five coastal cities most vulnerable to climate change, by cost of expected damage as percentage of GDP (World Bank 2013). The city is exposed to significant negative effects from extreme coastal weather events and rising sea level, at great economic and social cost (Hanson 2011). Challenges to climate adaptation in the DR include high economic

vulnerability, limited national resources, inadequate baseline data for scientific research, and high reliance on degraded coastal ecosystem conditions (Vignola 2009). Climate change will impact the health and welfare of coastal communities, the health and resilience of coastal ecosystems, and the billions of people that depend on these resources.

The DR has already experienced consequences of climate change on coastal resources, including coastal erosion and loss of property, flooding, saltwater intrusion, depletion of valuable marine species, accelerated spread of invasive species, coral bleaching, loss of coastal wetlands, and the expansion of marine dead zones (Grogg 2013). Many urban slum dwellers are highly vulnerable to climate change, living along the coastal areas and riverbanks that flood often. Likely future impacts of climate change in the DR in the coming years include sea level rise, increased frequency of storm events, acidification of seawater, desertification of arable land, and further declines in ecosystem function of coral reefs (Nichols 2013). The Gallup study (Gallup 2012) finds that 75% of the population is very concerned about climate change, however when compared with other issues like education, security, and health it ranks low in relative relevance. A governance baseline is an important next step to identify issues that must be addressed for the country to establish an adaptation planning strategy.

III. Methods

Literature Review

This section provides an overview of the interview process and the documents chosen for the literature review. An initial literature review focused on research on capacity for climate change adaptation planning and coastal resource governance. Documents gathered from past coastal resource projects in the DR conducted by institutions such as the United States Agency for International Development (USAID), show evidence of results based on the Orders of Outcomes framework (USAID 2010). Specific planning documents examined included constitutional amendments, national development strategies, and international conventions where the DR has signatory status and actively engaged in drafting.