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Development and application of the fisheries vulnerability assessment tool (Fish Vool) to tuna and sardine sectors in the Philippines

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ABSTRACT

Climate change studies in the Philippines are emerging fast, focusing on different fields of sciences. However, studies that address the fisheries sector remain insufficient. Here, we described a sector-based fisheries vulnerability assessment tool (Fish Vool) to evaluate the vulnerability of primary fishery commodities. Tool demonstration and validation were conducted in General Santos and Zamboanga City, which are the primary producers of tuna and sardine, respectively. Fish Vool revealed an overall medium vulnerability (low exposure, medium sensitivity, and low adaptive capacity) for both sectors. The vulnerability assessment of the tuna and sardine sectors emphasizes the potential of Fish Vool to assess climate change vulnerability for primary commodities and other fishery sectors.

1. Introduction

Climate change, also referred to as global warming, is the increase in global atmospheric temperature and high variability in frequency and intensity of extreme weather disturbances, which poses threat to society, biodiversity, economy, and food security (Adger et al., 2005; IPCC, 2001). Philippine development and progress are critically related to the adaptive capacity toward the emerging effects of climate change. The fisheries sector contributes to the country's economy by generating approximately 2.2% (170.3 billion pesos) of gross domestic product and 452 million dollars of export earnings (Bureau of Fisheries and Aquatic Resources (BFAR), 2010), as well as providing sources of livelihood to rural areas and coastal communities. However, this sector may be highly vulnerable to the impacts of climate change (Burke et al., 2012; Hughes et al., 2012). Harmeling (2011) ranked the Philippines as the seventh most vulnerable country to climate change on the basis of long-term trends of exposure and extreme weather events from 1990 to 2009. Impacts contributing to the vulnerability of fisheries include direct and indirect effects of physical and chemical factors, such as temperature, winds, vertical mixing, salinity, oxygen, and pH (Brander, 2010).

Accordingly, a National Framework Strategy on Climate Change was formed to aid in adaptive capacity building of communities and optimization of mitigation opportunities toward sustainable development. The Philippine climate change policy provides guidelines for the development of adaptation strategies, which can be accomplished by conducting vulnerability assessments (VAs), among others (e.g., Allison et al., 2009; Cochrane et al., 2009; Mamauag et al., 2013; Santos et al., 2011). VAs, especially for fisheries and aquaculture, provide a better way to understand the interactions among the natural system, pressures, and threats, which serves as a basis for the development of climate change adaptation (CCA) options (Mamauag et al., 2013).

Several climate change and VA studies (Jose and Cruz, 1999; Badjeck et al., 2010; Sajise et al., 2012; Mamauag et al., 2013) have been conducted in the Philippines, which also included the development of a VA tool. However, most of these vulnerability tools were designed to evaluate the vulnerability of specific subjects only. Mamauag et al. (2013) designed a framework for the VA of coastal fisheries ecosystems (Tool for Understanding Resilience of Fisheries, VA-TURF). VA-TURF was used to assess the vulnerability of the coastal fisheries ecosystems in the tropics to climate change. This tool was demonstrated in all coastal barangays of two island municipalities located along the Verde Island Passage, which has the world's highest marine shore fish biodiversity. However, VA-TURF is limited to fisheries associated with nearshore habitats, uses the coastal or fishing village (barangay) as the spatial unit, and lacks commercial and sectoral levels of assessment.

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