

A Climate-Smart Fisheries Toolkit for the Caribbean: Part 2 – A Monitoring and Management Framework for Guiding Climate Change Adaptation in the Fisheries Sector

Una Caja De Herramientas Para La Pesca Climáticamente Inteligente En El Caribe: Parte 2 – Un Marco de Monitoreo y Gestión para Guiar la Adaptación al Cambio Climático en el Sector Pesquero

Boîte À Outils pour Soutenir Les Pêcheries Face au Changement Climatique aux Caraïbes: Partie 2 – Un Cadre de Surveillance et de Gestion Pour Informer l'Adaptation au Changement Climatique dans le Secteur de la Pêche

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EXTENDED ABSTRACT

Introduction

Climate change adaptation planning is often constrained by a lack of quantitative information on vulnerabilities and impacts. The recent completion of detailed impact assessments for Caribbean fisheries as part of the Caribbean track of the Pilot Program on Climate Resilience (PPCR) now provides a stronger foundation for a more systematic and informed approach to climate change adaptation planning in the region's fisheries sector (see Eyzaguirre et al., within this volume). While the results of these modelling-based assessments provide a useful starting point for adaptation planning, monitoring data from within the region are needed to better tailor adaptation to local contexts. This paper summarizes key outcomes from work on a 'climate-smart' fisheries monitoring and management framework developed for the Caribbean region.

Successful adaptation of the fisheries sector to climate change and variability is an iterative process that requires long-term monitoring and continual adjustment within an adaptive management framework (West et al. 2017, Poulain et al. 2018, Karp et al. 2019). Monitoring data collected with this objective in mind can help detect climate-related changes to fish populations, characterize patterns and drivers of climate vulnerability or resilience, and parameterize or update predictive models of climate change impacts. Understanding relationships between the changing distribution, abundance, and productivity of fish stocks and climate-driven changes to the environment is also a prerequisite for effective adaptation in the fisheries sector. For example, early detection of climate-induced changes to fish stocks or supporting habitats can help build a case for proactive adaptation measures such as increased habitat restoration and protection, additional harvest controls for vulnerable species, and supporting social transitions among fisherfolk to build climate resilience. Moreover, this type of monitoring will be essential for establishing baselines and tracking progress in relation to the implementation of national and sectoral adaptation strategies (e.g., Government of Jamaica 2017, Government of Saint Lucia 2018).

Although there is an extensive body of work on climate change vulnerability assessment and adaptation in the fisheries sector (e.g., Cinner et al. 2013, Oxenford and Monnereau 2018), relatively little guidance is available for monitoring to inform management within this context. Moreover, existing literature provides very few examples of work that specifically addresses the challenges of climate change monitoring for small-scale fisheries (SSF) in small-island developing states (but see McPhee 2010). SSF in these contexts are often characterized by multi-gear, multi-species fisheries with limited capacity for adaptation and where adaptation to climate change is closely linked to sustainable development and poverty alleviation (Poulain et al. 2018). Overarching frameworks linking fisheries monitoring to management decision-making within a climate change context are lacking and, at the time of writing, there was no regional framework in place for systematically tracking climate change impacts to inform adaptation decision-making in the Caribbean fisheries sector.

This component of the PPCR project sought to fill this significant gap. This work has produced a transparent, flexible, and feasible ‘climate-smart’ fisheries monitoring framework for tracking priority climate, ecological, and socio-economic indicators to support climate-smart fisheries management and adaptation planning in the Caribbean. This framework includes a series of key monitoring questions (‘Big Questions’) for climate-smart fisheries, indicators and metrics that would help to answer each big question, and guidance for sampling designs and methods to support rigorous data collection. The monitoring framework is supported by complementary guidance linking monitoring outcomes to decision-making. This guidance includes a compendium of climate adaptation measures relevant to the fisheries sector, selection criteria to guide prioritization among these many adaptation options, and a discussion of opportunities for the use of impact assessment and monitoring data in marine spatial planning.

Methods

Development of the proposed climate-smart monitoring framework began by establishing the current baseline level of information on climate change impacts in the region via literature review. A next step was to establish the current baseline of fisheries monitoring occurring in the six pilot nations of this project (Jamaica, Haiti, Dominica, Saint Lucia, St. Vincent and the Grenadines, and Grenada) through literature review and interviews with fisheries managers. This baseline information was used to formulate the series of Big Questions, used to guide monitoring priorities related to the physical, ecological, and socio-economic dimensions of climate-smart fisheries (Table 1). For each big question, we then identified a set of key indicators and metrics relevant to major socio-ecological impact pathways within the qualitative conceptual models developed during an earlier phase of the project. Finally,

Table 1. Big Questions to guide monitoring activities for supporting climate-smart fisheries management.

BQ1	How is the physical environment changing in response to climate change?
BQ2	How are habitats that support harvested species being impacted by climate change?
BQ3	How is the growth and productivity of fished species changing in response to climate change?
BQ4	How are species distributions changing in response to climate change?
BQ5	How is the distribution of fishing effort responding to climate change?
BQ6	How is dependence on fisheries changing?
BQ7	Is fishery production changing in response to climate change?
BQ8	How is post-harvest productivity changing in response to supply constraints from climate change?
BQ9	How is uptake of climate risk management measures in fisheries changing?

we developed guidance for survey and sampling design for each set of indicators and metrics as well as initial suggestions for analyses of the resulting monitoring data and their implications for decision-making. Notably, both indicators and survey designs are stratified into tiers to accommodate varying levels of monitoring capacity across the region. All of this monitoring guidance is collated into a series of quick-reference ‘Monitoring Cards’ that synthesize key considerations for answering each of the Big Questions about climate change impacts in the fisheries sector (Figure 1). The supporting discussions on adaptation options, prioritization criteria, and marine spatial planning were developed through literature review.

The project culminated in the release of detailed project reports and data through the Caribbean Regional Fisheries Mechanism’s online data portal (<http://portal.crfm.int/>) as well as the delivery of a regional training workshop where fisheries managers from pilot countries learned how to apply these tools to their own fisheries management contexts.

Results & Discussion

This work provides the first detailed monitoring guidance that moves beyond assessing climate change impact and vulnerability and towards tracking the long-term impacts of climate change across the value chain of the fisheries sector, which in turn provides information to inform decision-making on adaptation strategies as well as a baseline against which to measure the effectiveness of chosen interventions.

Although developing a detailed regional monitoring program was beyond the scope of this project, the modular design of this framework will allow fisheries managers throughout the region to adapt monitoring to suit their current needs and level of capacity. Recognizing that capacity is often a limitation in initiating and sustaining initiatives in the absence of new project funding, the framework also emphasizes the need to leverage existing programs to increase capacity for climate change monitoring and impact reduction in the face of limited adaptation resources. This effort will undoubtedly benefit from existing and new partnerships between fisheries managers and their peers in other government agencies, non-governmental organizations, and the broader fishing community.

By adopting the monitoring and adaptation guidance provided through our work, regional fisheries managers will be able to better tailor adaptation strategies to the nature and magnitude of impacts observed at local scales rather than relying on coarse regional climate model projections to guide decision-making. Moreover, while this monitoring guidance was designed for the Caribbean context, the framework was designed to be adaptable to any fisheries system and we hope that it will contribute to broader mainstreaming of evidence-based adaptation planning for fisheries in a rapidly changing climate to ensure there is fish for today, and tomorrow.

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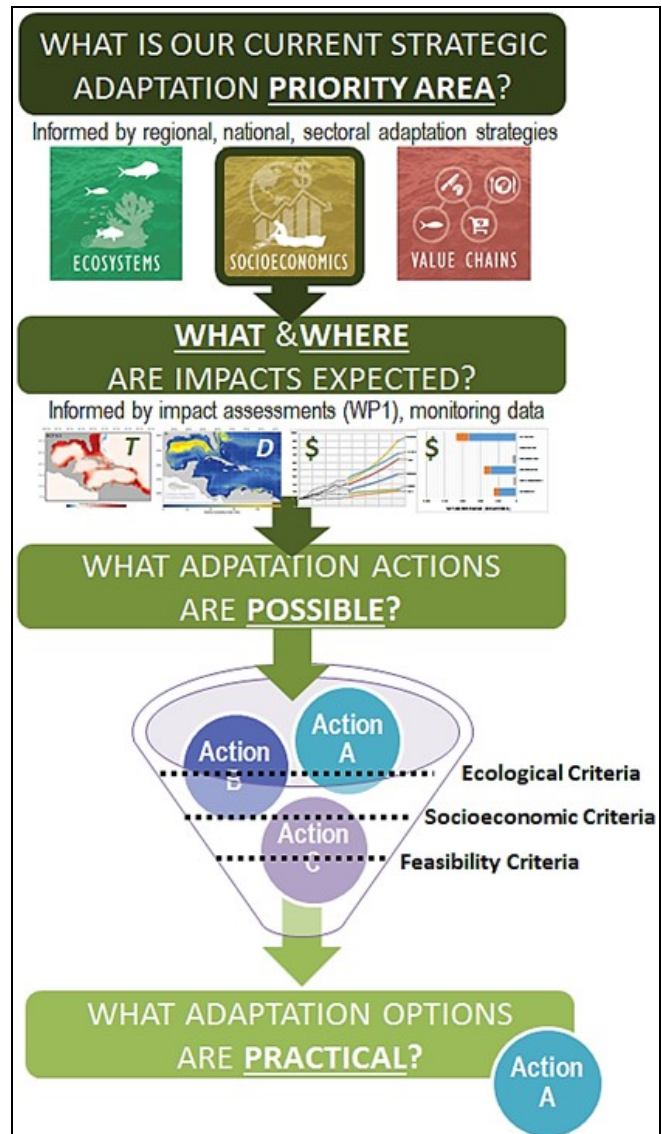


Figure 1. A workflow of considerations in selecting among potential adaptation options.