

# Using participatory modelling to help seafood producers on the US East Coast identify ways to adapt to a changing climate

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## ABSTRACT

Local citizens in three Atlantic Coast communities identified climate stressors impacting their fishery and devised adaptive actions that could be taken to ensure financial stability in the face of a changing climate. Tools and discussion generated in each community by this NOAA Coastal and Ocean Climate Applications Program-funded project will help fishermen, fishery-related businesses, and local officials better manage resources while also fostering communication about climate-related changes in fisheries and participation in fishery-related policy making.

## METHODS

### Step 1: Background Interviews

Spoke to fishermen, shellfish growers, local planners, and scientists to determine what climate factors are impacting their industry the most.

### Step 2: Vulnerability, Consequences, and Adaptation Planning Scenario (VCAPS)

Held multiple workshops with fishermen, growers, resource managers, scientists, and community planners to diagram how climate stressors are impacting the fishery and the resulting consequences to harvesters. This process helped identify private and public action that can be taken to influence the outcomes and consequences (Fig. 1).

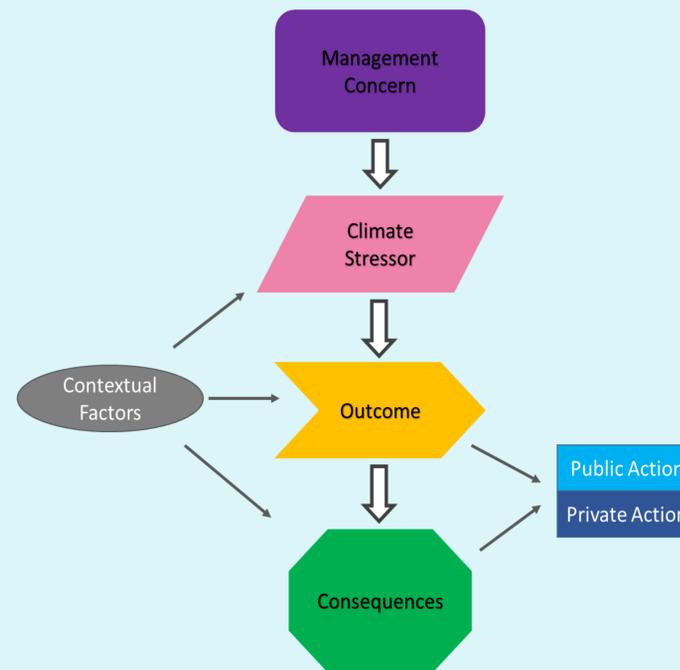


Figure 1. Components of a VCAPS diagram

### Step 3: System Dynamics (SD) modeling

Workshop participants provide ecological data, harvest data, and operating costs information to modelers. Models that allow harvesters and local planners to visualize how adaptive actions reduce climate-related consequences were created. The purpose of the models was to improve their ability to assess economic impacts and how to avoid them. Fishermen provided feedback to the research team as the model was built.

## LOBSTERS SOUTH THOMASTON, ME



**Industry Stats:** From 2012-2014, statewide, roughly 4900 license holders landed 120 million lbs. per year; a catch valued at \$450 million (ME Dept. Marine Resources, 2014).

**Climate Stressor:** Rising water temperatures  
**Outcomes:** Extremely early season; molting cycle and migration impacted  
**Consequences:** Lack of local market for softshell lobsters, no capacity available with Canadian processors; therefore a crash in both the market and pricing occurred.

#### ADAPTIVE ACTIONS

- Alter timing and duration of fishing effort
- Develop local processing capacity
- Provide aeration in holding tanks
- Refrigeration of trucks

## OYSTERS WELLFLEET, MA



**Industry Stats:** In 2012, Massachusetts growers produced 4.1 million lbs. of oysters valued at approximately \$12 million (MA Div. of Marine Fisheries, 2013).

**Climate Stressor:** Rising air and water temperatures, sea level rise  
**Outcomes:** Potential increased incidence of illness from *Vibrio*, impaired access to grants  
**Consequences:** Increased public health regulation, consumer perception of safety of seafood impacted, escalating costs and financial risks to harvesters

#### ADAPTIVE ACTIONS

- Anticipate costs of compliance with new regulations and costs of closures
- New *Vibrio* management plan
- Public education on seafood safety

## BLUE CRAB BEAUFORT, SC



**Industry Stats:** In 2012, 50 license holders in the County landed nearly 1.7 million lbs. of crab valued at \$1,500,000 (SC DNR, 2013).

**Climate Stressor:** Extended period of drought  
**Outcomes:** Increase in salinity  
**Consequences:** Crabs migrate above regulatory line leading to decreased landings, increased incidence of disease (i.e. *Hematodinium*), potential impact on spawning and recruitment

#### ADAPTIVE ACTIONS

- Improve understanding of impact of salinity on crabs by gathering finer resolution salinity data.
- Crabbers create 'Crabbers Who Care Research Network' to contribute data on salinity and crab abundance.



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## ACKNOWLEDGEMENTS

NOAA Climate Program Office  
 Coastal and Oceans Climate  
 Applications (COCA) Program  
 (#NA12OAR4310106)