Development of Climate Change Indicators and Metrics for the Chesapeake Bay

Project Goals

Eastern Research Group (ERG) is working with the Chesapeake Bay Program to develop a suite of climate-related indicators that can be used to track and analyze trends, impacts, and progress towards advancing "climate resiliency." The chief aim of this project is to track progress toward the climate resiliency goal in the 2014 Watershed Agreement:

> **Goal:** Increase the resiliency of the Chesapeake Bay watershed, including its living resources, habitats, public infrastructure, and communities, to withstand adverse impacts from changing environmental and climate conditions.

While the 2014 Watershed Agreement has many goals, this project's scope includes only the *climate resiliency* goal. However, this work will undoubtedly relate to existing indicators for other goals.

Key Definitions for This Project

Resilience is the ability to anticipate, prepare for, and adapt to changing conditions and to withstand, respond to, and recover rapidly from disruptions.

Our working definition of resilience is intentionally broad. We will seek further input and define the term operationally over the course of the project.

An ***indicator*** is a numerical value derived from actual measurements of a state or ambient condition, ecological or societal response, or programmatic action, whose trends over time represent or draw attention to underlying trends in the condition of the environment or measure progress towards a desirable state or condition.

Project Framework and Criteria

We will seek a balance of indicators across three categories:

- Indicators of ***physical climate trends*** based on measurements of physical or chemical attributes of the environment.
- Indicators of ***ecological and societal impact*** that measure a) attributes of ecological systems, particularly attributes that may be influenced by physical climate trends, or b) impacts on society, such as health or economic outcomes.
- Indicators of ***programmatic progress toward resilience*** that quantify resilience or show evidence of learning or adaptation over time. Responses include management actions such as designating land for protection, as well as physical actions such as constructing systems to reduce combined sewer overflows into the Bay.

We will also look for connections across categories, such as causal relationships. Candidate indicators will be prioritized based on a set of 20 criteria that consider factors such as relevance, value added, data availability, and data quality. These criteria are designed to focus our efforts on indicators that will be useful and relevant to technical users, such as scientists and policy analysts involved in management and oversight. Where possible, we will prioritize indicators that are also relevant to a public audience.

Workflow

Step	Timeframe
Establish framework (categories, definitions, criteria)	May 2017
Compile lists of potential indicators and data sources	May–June 2017
Evaluate candidate indicators against the criteria	June–July 2017
Gather feedback and prioritize candidate indicators	Aug–Oct 2017
Develop implementation plan	Dec 2017–Jan 2018
Develop the top three to six indicators	Mar–April 2018
Compile final results	May–July 2018

Our goal is to develop a few indicators as resources allow, while providing a detailed plan for how a larger set of indicators can be developed. The indicators in the implementation plan will be selected based on several rounds of review and scoring, including input from numerous stakeholders. While feasibility is one consideration, candidate indicators will not be restricted to existing datasets. The implementation plan may propose indicators that require more substantial data collection and analysis for future consideration.